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# Master Thesis

**Merseburg University of Applied Sciences**

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## Conception of a barrier-free mobile social network app for people with intellectual disabilities

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## **Abstract**

This master thesis reports preliminary results from an exploratory study of mobile technology as well as social networks usage of people with intellectual disabilities. At the same time, it focuses on finding out if a social network app can be developed without barriers of accessibility and usability.

For the introduction into the subject matter, the research interests were described by the goal setting of this thesis. In the next part the relevant terminologies were defined and available studies as well as references on mobile technology and social networks use of intellectually disabled individuals were outlined.

The methods section describes the procedures of the empirical study. In preparation for the study, the target group was specified and personas as well as use cases were created in order to have a better idea of the demands of the target group. Afterwards, research questions were derived and a prototype of the app developed. To give an answer to the leading questions, a qualitative research was conducted. The data were collected by using interviews and an usability test. The results were subsequently analysed and interpreted with the qualitative content analysis method of Mayring.

The research of the main question, if a social network app can be barrier-free, could be confirmed by the study. According to the results, persons with intellectual disabilities are able to use social networks on their own and can define the important characteristics of their definition of a barrier-free app. However, the requirements of a barrier-free app are very versatile due to the different forms of disabilities. The development procedure is a complex process and has to be analysed as well as updated constantly.

In the last part after the interpretation, hypotheses were deduced from the study results for further research approaches and a critical reflection on the methodical as well as empirical approach was discussed.

## Acknowledgements

By exploring the barriers of accessibility to mobile technologies and social networks for people with intellectual disabilities, I hope to raise awareness for this field and also for the challenges affected persons have in order to use modern technologies and social media platforms. To conduct research on this topic was my personal desire because I had the privilege to volunteer and work with mentally impaired people for three years before starting to plan my master thesis. This experience and the way the mentioned persons cope with their situation impressed me a lot and inspired me to conduct this study in order to contribute to promote inclusion. I hope that the interest I have in this topic also spreads to the readers.

There are some persons whose support I would like to highlight and to which my special thanks go to: First I would like to thank the Lebenshilfe Merseburg and Mrs. Schmidt, head of the residential home, for their interest and engagement in bringing me in contact with their residents who have intellectual disabilities. Mrs. Schmidt was a great help to organise the conduction of the study rather quickly after I had initial challenges finding the required test persons. Furthermore, I would like to thank all candidates for their time, effort and interest in participating in this study. I was overwhelmed and surprised by the motivation and patience they brought with them.

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# 1 Introduction

Max just finished his golf training session and is excited to get home. Once he arrives home, he pulls out his smartphone and opens the barrier-free social network app he has been using lately. Max scrolls through the app to read the news and updates from his international friends. He is a golf athlete for the Special Olympics and travels around the world to compete in different tournaments. On his travel he meets a lot of people and starts new friendships. The social network app gives him the opportunity to stay track of his friends' status and talk to them on a daily basis. He misses his friends a lot and cannot wait to see them again. Meanwhile, he is happy to be able to see what they have been up to and take part in their lives. Max is also checking the updates about new international golf tournaments in the groups he has been joining. He likes to stay up-to-date about golf activities, so he can tell them to his coach and teammates during his next training session. Max has Down syndrome and some functional limitations but with his parents' support he is able to manage to become a passionate golfer and lives in his own apartment. He lived with his parents for many years before transitioning into a residential group home. Due to initial difficulties, he wanted to move back home with his parents; however, his parents did not think it would be a good idea, as they were getting older and felt Max may soon be faced by life without them. With the current technologies and social networks, he can check in with his parents and let them know he has arrived home safely and doing well. Furthermore, he tells them about his day and his further plans for the rest of the night. His parents are able to observe that Max is taking his medications as prescribed and prepares food in a safe as well as appropriate manner. The technology allows him to live in his own apartment, which was once considered impossible.

These days the information and communication behaviour of society are determined by the internet (Chadwick, Wesson & Fullwood, 2003, p. 377). Besides all practical activities that can be done with the help of the internet, the social networks have reached a status, which has shifted the social interaction in the online world. Experiences have shown that particularly the incorporation of different communication opportunities is an important motivation for the inclusion of people with mental impairments (Stöppler, 2017). Even though, social networks offer a chance for them to interact, the existing barriers are often neither considered nor have been analysed enough. Problems are caused by the fast-technological innovations and progressions, which complicate the adaption to the needs of disabilities. (Aktion Mensch, 2010)



## 2 Problem definition and objectives

Communication is the transfer of information such as messages, ideas or simply thoughts and can be delivered by words, gestures, body language as well as behaviours (Röhner & Schütz, 2016, pp. 1-2; Six, Gleich & Gimmler, 2007, pp. 1 & 21; Delhees, 1994, pp. 11-13). This process not only strives for spreading information, education or awareness raising but can also be a tool to improve the chances of success in human endeavours (Röhner & Schütz, 2016, pp. 9-15). Communicating means to be able to get information out to the audiences, listening to their feedback and responding appropriately (Ibid., 2016). Unfortunately, with the effects of various intellectual disabilities most of the persons affected are not able to comprehend and express themselves effectively (Biermann, 2003). Due to their special needs it can be a challenge for them to connect with other people and find new friends. This state can result in feeling completely isolated and excluded from society (Goggin & Newell, 2003, p. 4). As society adapted a digital as well as fast-paced way of life, communication has also changed through social media (Hollier, 2012, p. 5). With advanced innovations and technology, the society is able to use new ways of communication. One of them are social network platforms. (Bächle & Thimm, 2014, pp. 41-47) Although, social networks e. g. Facebook, Twitter, LinkedIn and Instagram, are now part and parcel of modern daily lives (Holmes & O'Loughlin, 2012), there are still many barriers that stop mentally impaired persons from successfully accessing those mentioned platforms (Goggin & Newell, 2003, p. 43). Furthermore, even though this topic becomes more important in society, this field still provides very little research and studies about how people with intellectual impairments use mobile technology and social networks. What is known, however, is that this group of persons has limited social circles (Sallafranque-St-Louis & Normand, 2017). A study conducted by Löfgren-Mårtenson, Sorbring, & Molin (2015) reports that students with special needs are seen by parents and teachers as socially isolated. Therefore, access to social networks and the needed technology could potentially facilitate the development of relationships, increase social participation and reduce social isolation. In a study in the journal *Cyberpsychology*, a participant reported that he feels very lonely, especially when on summer break (Sallafranque-St-Louis & Normand, 2017). He then uses Facebook to distract him from feeling bored, angry or lonely. Another participant once published suicidal thoughts and received support from a long-distance friend on Facebook. The personal and social networks of mentally disabled individuals are often limited to relationships with family members, caregivers and other persons with intellectual impairments (Clement & Bigby, 2009; Forrester-Jones et al., 2006; Cambridge et al., 2002). The challenges are not only the barriers of social network platforms but also the

competence to use the technology as well as certain necessary skills are required for them to keep abreast with the modern trends of the world. The proven statistics of the increase in technological innovations and steady rise in number of intellectually disabled people using social networks, makes it necessary for the society and companies to include those groups of individuals. (Chadwick, Wesson & Fullwood, 2013, pp. 378-380, 383-384)

The purpose of this master thesis is to gain insight about the impact of mobile technology and social network usage among mentally impaired people as well as barriers to successfully access common online social network platforms. The main research question is: *How can a mobile social network app be developed barrier-free for people with intellectual disabilities?* For this purpose, a mobile social network app concept will be developed based on the research findings of existing studies together with the Mobile Accessibility Guideline provided by the World Wide Web Consortium. After developing the concept and prototype, it will be tested among people with special needs. This usability test shall approve if the techniques of the guideline as well as existing presumptions and findings are realistic and to what extent they can help remove barriers. It is expected that the concept of the new app could serve as a sample of how the requirements for a barrier-free social network app can be realised. The main goal is still addressing inclusion. Therefore, the concept for the exemplary app plans to build an online community platform not only for people with intellectual disabilities but also for their families, friends, volunteers and all others, who would like to be a part of that community. But regardless, it is to expect that the group of mentally impaired individuals are still the subjects with the least required capacities and thus need to be the main target group in this research.

## 3 Theoretical Background

The theoretical principles are forming the basis of an empirical study. Therefore, this paragraph deals with the analysis of the extensive research on the subjects of intellectual disabilities, mobile technology, accessibility and social networks. In order to understand this master thesis unambiguously, relevant terms are being defined first. Following this, an overview of the current state of the art will be given so that relevant information for personas and use cases as well as research questions for the study can be derived.

### 3.1 Intellectual disability

In the following section the term *intellectual disability* will first be defined for a better general comprehension. The last part of this chapter will go into the importance of inclusion and link the relevance to the research. As not every intellectually disabled person can be considered for the empirical study due to their diverse characteristics, the group will be narrowed down based on the requirements for this thesis and the usability test in chapter 4.1.2.

#### 3.1.1 Definition of term

Disability is to be understood as the impairment of physical and intellectual functions as well as the consequences of those impairments (Simpson, Mizen & Cooper, 2016). Those special needs make it harder for the people concerned to be included into society and interact with their surroundings (Biermann, 2003). This restricted condition is thereby not temporary but can get better or worse depending on the individual abilities and special assistance (Stein, 2006). As this thesis is focusing on disability of the intellectual factor, the term is used to describe a permanent health-related condition that limits an individual's ability to function in a mental capacity (Simpson, Mizen & Cooper, 2016). The most common intellectual disabilities include Down syndrome, Autism, Fragile X syndrome and Fetal Alcohol Spectrum Disorder (The Arc, 2018; Special Olympics, 2018; Daily, Ardinger, Holmes & Daily, 2000). As the term intellectual disability is overall hard to classify since it is socially constructed, terminology has varied widely over time and across cultures and countries. Even organisations have their own preferred terminologies and can vary within the country depending on the usage and purpose, e. g. in the education sector (learning difficulties) or on legal regulations (mental handicap).

The different definitions reflect attempts by professionals and advocates to change social attitudes toward people with intellectual disabilities, who experience high levels of stigma and discrimination. But even with a lot of efforts to promote inclusion each name has eventually become a term of abuse. (Weber & Rojahn, 2009)

Intellectual disability is diagnosed when a significantly deficit in intelligence and mind can be proved and is linked at the same time with both a lack of cognitive ability as well as a reduced social-adaptive capability. It not only affects the IQ score of an individual but the social context of the person as well, which regards to family, friends or caregivers. (Stöppler, 2017) It needs to be highlighted that the impairing deficits in intellectual functioning has to commence in early life, usually originates before age 18, and persists with development (Simonoff, 2015) so that similar conditions like consequences of a brain injury, can be ruled out (Simpson, Mizen & Cooper, 2016). With regard to impairments in adaptive functioning, a standardised test including testing of conceptual, social and practical skills can determine limitation in adaptive behaviour (Ibid., 2016). This group of people with special needs mostly depends on their surroundings for help since they have difficulties in certain areas of functioning, especially mobility, language, learning and independent living. It is proven that a person may be able to function perfectly well in a supportive environment than someone in a less supportive environment. (Stein, 2006) At the same time, the improvements also depend on a person's individual profile of capabilities (Hatton, 2012).

This master thesis is using the term *intellectual/mental disability*, *intellectual/mental impairment* and as well as *special needs* as a synonym.

### **3.1.2 The role of inclusion**

According to the Oxford Dictionaries, the term inclusion means “*the action or state of including or of being included within a group or structure*” (2018). This means the exclusion of individuals from society due to their ethic, social and religious affiliation, colour of skin, intelligence, sexual orientation as well as other empirical characteristics needs to be ruled out. Inclusion is seen as a universal human right and can affect all aspects of public life of every human being (Schwalb & Theunissen, 2012). Especially, in the world of disabilities people are fighting for the removal of discrimination, intolerance and barriers aiming equal access as well as opportunities. For this thesis the focus will be set on the inclusion of people with intellectual disabilities.

According to Special Olympics (2018), 1-3% of the population has an intellectual disability, which means approximately 200 million people. Based on the understanding of inclusion, the population with mental impairments shall neither be integrated in the social structures (integration) nor excluded (exclusion) from it, but rather be a part of the whole social culture (Aktion Mensch, n.d.). This enables an equal existence without social barriers of any kind. Thus, an intellectually disabled person with his/her individual limitations also has the chance of participation in all social and cultural offerings such as employment, education, leisure activities and above all a life among society (Schwalb & Theunissen, 2012). Since both terms are often wrongly used as synonyms, the following graphic simplifies the meaning of inclusion and shows the distinct difference to integration. Furthermore, both terms are compared to the meaning of exclusion as well.

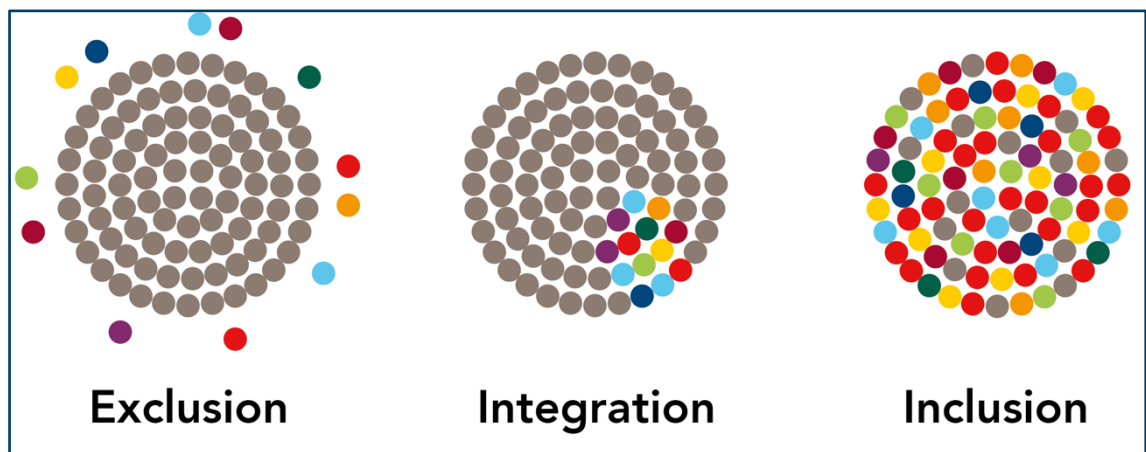


Figure 1: The difference between exclusion, integration and inclusion (adapted from Aktion Mensch, n. d.)

According to the graphic, exclusion is to be understood as the full isolation of a certain group of people, in this case of people with mental disabilities. With integration the affected individuals are certainly a part of society but only as a separated group of persons that is not incorporated in the social and cultural structures. Inclusion, in contrast, involves the complete equality and participation of intellectually impaired people in all social areas.

The position of intellectually disabled people in society, however, is marked by conflicting tendency: on the one hand the demand for participation of humans with mental disabilities as well as the effective recognition of this population as an equal citizen has distinctly risen in the past years. There are for example international documents, which demand the participation and inclusion of people with special needs. Those include the Standard Rules of the UN 1993, the Salamanca Declaration for schooling inclusion of the UNESCO 1994, the Charter of Luxembourg 1996 or the Declaration of Madrid 2002.

On the other hand, the existing uncertainty and the lack of social acceptance still outweighs. (Lindmeier & Lindmeier, 2006) The reason for an unsuccessful implementation of an inclusion idea is often the inhibition, which are defined by strong prejudices. Only when the disabilities are not seen as an individual problem anymore then the goal of an inclusion society can be achieved (Rohrmann & Schädler, 2014). One of the core values of social work is to promote dignity and worth of a person regardless of any factors such as an individual's abilities, history or current situation (NASW, 2017). With society becoming more accepting of intellectually disabled people, they are participating and have been included in communities more than ever before. This shift of acceptance has given people greater access to work with or support individuals with mental impairments in different areas like housing, employment and social activities. This leads to a less restrictive and rather desired environment, which increases the quality of life. (Muer, 2015, p. 17)

The previous described definition of inclusion demands that also the population with mental disabilities have the right of unrestricted access to mobile technology and social networks platforms respectively, otherwise an inclusive society cannot be justified due to the existing barriers. With the online communication, individuals with special needs have the possibilities to include themselves in society and exchange views (Müller, 2011). By a barrier-free access the participation in public and private life is enabled. Even Tim Berners-Lee, the inventor of the World Wide Web, has seen the challenges of inclusion in modern technology as well as the digital world and promoted inclusion during a speech in 2007, saying:

*“The Web is designed, in turn, to be universal: to include anything and anyone. [...] It has to be independent of language and of culture. It has to provide as good an access as it can for people with disabilities. [...] A mobile phone - or whatever device we carry around which uses GSM technology and its successors - is going to be everywhere, and everyone will have one. It has to be designed to be universal. So that everyone can use it. So that you can do anything with it. [...] I personally believe that it is important to humanity to connect peoples across the world as widely as possible. I think we must preserve the diversity of cultures and ideas. But also I think we must connect people to give more global harmony.”*

This quote demands the change of the situations where people with intellectual disabilities are limited due to the constraints society has established through the use of new technology. Some inventions, such as mobile technologies, might limit their ability

to engage in areas of society that have new standards of participation (Wise, 2012). Individuals with mental impairments are not able to connect, socialised or share information as they are unable to use the new form of advancements due to their disabilities, which can significantly limit their ability to function (Chadwick, Wesson & Fullwood, 2003).

## **3.2 Mobile technology**

Mobile technology is reshaping not only society and communications but also the global economy, education, health care and political life (Goggin, 2011). Through new technological innovations, products like smartphone and tablets are already outnumbering desktop computers (West, 2015).

The following chapters deal with the definition of the term mobile technology, especially focusing on smartphones, tablets and mobile applications. These three inventions are important for the empirical study and relevant for the results of the concept. Lastly, the current situation of the use of mobile technologies among people with intellectual disabilities will be analysed.

### **3.2.1 Definition of term**

*Mobile technology* is a generic term for a broad range of wireless devices and mobile applications with internet capability that are easy to carry around and use in a wide variety of environments (W3C, 2015). Mobile devices range from small appliances like iPods, smart watches and smartphones to larger ones such as tablets, e-book readers and laptops (Adeeb & Hussain, 2009, p. 48). The characteristics of mobile technology are portability, flexibility, simplicity of use and its unique ability for integration with other technology systems (Alder & Fotheringham, 2012). The use of mobile technology is also pushed by the advancements of the mobile internet. Mobile internet refers to the access of the internet via cellular mobile devices and Wi-Fi connection or mobile data charges (Goggin, 2011, p. 117). The popularity of the internet and its benefits led to the successful implementation of mobile internet on mobile devices. The continuing combination of growing numbers of mobile devices and deployment of internet networks offered a more ubiquitous platform for accessing the web with smartphones or tablets. (Ibid., 2011, p.

128-132) The Global Digital Report of We Are Social (2018) stated that the worldwide number of users of mobile devices of any kind amounts to 5.135 billion people, which is 68% of the population (7.593 billion).

The way how people access, use and share information has changed because mobile devices, mobile internet and mobile apps allow them to find any essential information at any place and situation; for example talking to public officials, access financial and health care records or complete transactions online (Eble, 2014, p. 117). Furthermore, mobile technologies have helped to reduce social inequality, increased education levels as well as participation in social life (Chadwick, Wesson & Fullwood, 2003). People are now able to connect with each other in a relatively inexpensive and convenient way globally and 24/7 (Bächle & Thimm, 2014, pp. 41-47). It offers important access for those, who live in underserved rural communities, where limited broadband access and other telecommunication services make it difficult to participate socially as well as economically in the modern world (Goggin, 2011). They can help minorities to start businesses, engage in online education opportunities or other benefits of the technological revolution (West, 2015). According to the The Mobile Economy 2018 Report by GSMA, the number of mobile consumers around the globe has surpassed five billion in 2017 and is expected to reach 5.9 billion in 2025, which is equivalent to 71% of the global population (GSMA, 2018). Many people have more than one mobile device these days, for example some who have a smartphone also own a tablet for other purposes (West, 2015). Thus, the number of mobile connections exceeded seven billion in 2015 and reached 8.485 billion in early 2018 (We Are Social, 2015; 2018).

For this thesis smartphones and tablets are relevant mobile devices for the development of the app concept and therefore defined further in the next chapter. After that, there will be a closer look to the functions of mobile applications.

### **3.2.2 Smartphones and tablets**

The smartphone is considered as a mobile technology and is technically based on a regular cell phone (Bächle & Thimm, 2014). For the past decades, a standard cell phone has united basic functions of a mobile phone with related features of a computer and the services from the internet to become not only a mobile phone but, to mention a few, also a navigation system, instant messaging client, game console and photo camera (Krotz, 2014). According to Statista, there are currently 2.6 billion (2018) smartphone users



worldwide and will predictively increase to 3.08 billion by 2021 (Statista, 2018). It was to be expected that after a while, mobile computing devices such as tablets emerged and are taking the combined functions of cell phone and computers to the next level. The key difference between a smartphone and a tablet is that tablets are actually a combination between smartphone and laptops (Verivox, n.d.). They provide a bigger screen and therefore better multimedia experiences and allow users to have more computational capabilities. Since Apple has launched the iPad, the use of tablets has distinctively become popular (Ibid.). Though, there are no latest statistics of tablet users, an eMarketer research resulted in 2017 that there were 1.08 billion users in 2016 and predicted an increase to 1.28 billion in 2021 (Statista, 2017). Smartphones and tablets run on operating systems such as Apple's iOS and Google's Android (Webopedia, 2018). Unlike smartphones that had Wi-Fi and mobile connectivity since the beginning, tablets had only Wi-Fi connectivity first and could neither make phone calls nor send text messages. With time and technological advancements, smartphones and tablets can be compared on the same level at technical terms (Computer Hope, 2018). Intensive researches couldn't find any statistics, which display the most used functions on smartphones and tablets worldwide. However, there are records by countries. For example, according to a report by BitKom (2017), in Germany 100% of the users primary use their smartphone to make calls, followed by the use of the camera (90%) and search engines (79%). Around 68% access social networks on their smartphones, followed by listening to music and reading news with both 69% of the respondents. In the U.S. the top three most used functions are messaging, including social network (95%), phoning (93%) and also using the camera (86%) (Statista, 2017). In Germany tablets are also use for e-mails (51%), getting latest news (50%) and looking up information (42%). On fourth position is the access of social networks with 39% (n = 403). (BurdaForward, 2015)

### **3.2.3 Understanding apps**

The term *app* is short for *applications* and are programmes developed to run on mobile devices, especially smartphones and tablets. These apps usually provided a specific functionality that is not included in the original system. (Schilling, 2016, p. 158) There are different forms of apps, which can either be developed for a specific operation system (Google's Android, Apple's iOS or Windows) or have the goal to be able to run on all devices. Apps that are adjust to an operating system can only be downloaded at the associated app store: iOS apps on Apple App Store and Android apps on Google Play Store. (Aichele & Schönberger, 2016, pp. 59-60) Even though, mobile apps already exist

since the 90s, the worldwide success of them began only after the opening of the Apple App Store in 2008. Since then, it has been possible for Apple users to download mobile apps from a central point on their mobile devices. During the first weekend after the launch, more than 10 million apps were downloaded. These days, mobile apps are indispensable in the private as well as professional daily routine. People are using their smartphones and tablets to communicate with their friends, colleagues or business partners via WhatsApp, Facebook or e-mail, they are writing or reading scripts and presentations with their tablets, they make banking transactions online and book flights for vacation. Even the search for the best specialist or the cheapest gas station nearby can quickly and easily be done by a mobile application. (Vollmer, 2017)

To understand the complexity of an app, the three types of apps are further explained below: native apps, web apps and hybrid apps.

### **Native applications**

Native apps are applications, which are tailored to the specifications of a particular operating system, for example apps for Apple iOS only run on iOS devices such as iPhones or iPads (Schilling, 2016, p. 160). This ensures that the app and all interfaces of the hardware (e. g. camera or microphone) are working consistently, which ensures that resources of the device are used optimally (Aichele & Schönberger, 2016, p. 60). Well programmed native apps are characterised by an excellent usability (Vollmer, 2017, p. 16). They are fast, more reliable and responsive to users. It is therefore important to consider the standards and conventions of the chosen system because the user interface can vary between the operating systems significantly. For example, an Android user does not want to have a recreation of an iOS app because then he could have bought an iPhone. Furthermore, if the application has a similar look as the operating system, the navigation can be more intuitive. Moreover, native applications are able to use push notifications that alert users about new happenings and can remind them to come back. Getting consumers engaged the first time might be easy but the challenge is to keep them interested and returning is the key to a successful app. (Schilling, 2016) One disadvantage is that every system has its own language, which means every native app has to be developed with an individual code, so that hardware and app understand each other (Vollmer, 2017, p. 16). To comply with this procedure, operating system providers offer app developers their own development tools, interface elements and standardised Software Development Kits, which enables any developer to create native apps relatively easily (Schilling, 2016, p. 160). Usually developers are mostly specialised in one operating system, which means if an app shall be compatible with every system

you need separate developers or teams. This results in higher costs, more developing time and greater maintenance but ensures ideal integration into the operating system. Yet, the majority of the apps on the market are still native apps. (Vollmer, 2017)

### **Web applications**

Web apps are developed based on HTML5, CCS and JavaScript and therefore can ideally be used on different operating system through the use of browsers (Aichele & Schönberger, 2016, p. 60). Basically, they are specially programmed websites, which are recognised by the mobile device and automatically adjust the content to the device' requirements. To put it simple, a website is generally informational, web apps provide functionality. One advantage is that they do not require to be downloaded and installed because browsers belong to the standard provided programmes on smartphones and tablets (Schilling, 2016, p. 165-166). Thus, they do not take up any memory and storage of the user's mobile device. They adapt automatically to the current user interface of the device and only one code needs to be developed for all devices. Web apps are in contrast to native apps not available on app stores but usually linked on the services website (Ibid., p.166). The biggest disadvantage of web apps is the user interface. Because they are not specifically coded for an operating system, they are still a website with only native plugins, which can have a less smooth user experience. (Vollmer, 2017, p. 17-18)

### **Hybrid applications**

Such as the term indicates, hybrid apps unite functions of native and web applications in one. They can be used on different operating systems but are not individually developed for those systems (Schilling, 2016, p. 170). Hybrid apps are written with a native code and supplement with HTML5 elements at any required place. The native code ensures that the app can access the appliance hardware and uses the benefits of the associated system. Hybrid apps are also available on app stores and need to be installed on the mobile devices. These applications have the goal to create something usable as quickly as possible, when short on resources but still provides value. (Vollmer, 2017, p. 19) Thus, one advantage is since they have to manage only one codebase they likely require less time and half number of developers as two native apps would have required. Also, developers for hybrids are often less expensive than native developers which can reduce costs further. (Schilling, 2016, p. 172) In contrast, the performance of hybrid apps is rather on the weak side and therefore they are only as good as the browser, which is also responsible for displaying the user interface (Aichele & Schönberger, 2016, p. 60). People tend to be very loyal to their operating system and used to how things work in

native apps. In the end, hybrid apps won't be able to please both consumer groups. Getting your hybrid app customised and run appropriately on every platform might take substantial work and end up costing the same as two native apps, depending on how close you want to get the "native user experience" or how simple you want to keep it (Schilling, 2016, p. 172).

### **Which app is the best?**

There is no best app but rather the purpose is a crucial factor for the decision which app should be developed. Natives apps are usually used for applications, which have many and complex tasks as well as functions because they can adjust to the individual system to enhance the performance. Furthermore, if the target group can be narrowed down, a native app is sufficient. Web apps focus on functionality and are an option if the app is not used regularly because they do not require an installation. This applies if the users are rather heterogenous and harder to be identified. Consequently, web apps can be used on every mobile device and generally have lower production costs. If the planned app should have native characteristics but low costs in production, the hybrid app is possibly the right decision. The following aspects are important to consider when planning to create an app: purpose of the functionality, time, cost, user experience, performance and compatibility with device features.

### **3.2.4 Mobile device and app usage with intellectual disabilities**

Mobile devices, such as smartphones and tablets, not only led people into a new digital era but also the technology of graphic display as well as pretentious operating and interaction options have advanced. Those inventions have set the latest standard of mobile technology. (Richter & Flückiger 2016, p. 19) By now, the use of smartphones, tablets as well as mobile apps have established and have become ubiquitous (Vollmer, 2017, p. 1).

The mobile technology has also impacted the life of numerous individuals with intellectual disabilities (Dekelver, et al., 2015). With the combination of the technology and education or trainings, it shows how the use of mobile devices can influence positively the life of people with special needs in different life aspects: learning, employment support, communication and inclusion are just some examples of many more. Mobile devices can be used for both leisure and education, which diminishes users to negatively associate learning as a difficulty and helps them to get engaged. (Muer,

2015) Due to the versatile benefits, the devices can meet the physical, mental and social needs of those intellectual disabled people (Lancioni, O'Reily, Sigafoos, Singh, 2013). According to Special Olympics (2018), there are approximately 200 million people living with a mental impairment and even though they have more capacity to function, they are facing barriers that limit them to use their skills. Individuals with intellectual disabilities can use the technology to help them overcome their disability and be more independent (Bryant, Bryant, Seok, & Ok, 2012). In an article by the Times Colonist (Kines, 2013) about the Garth Homer Society, an organisation which supports adults with developmental disabilities, the organisation described how they experienced that the use of tablets always improves their client's moods because it allows them to use the internet, access current events and play games. Others use tablets to look at a visual representation of their daily schedule, which seems to reduce their anxiety about the daily activities. The article summarises the impact of tablets among people with intellectual disabilities as a method for opening up their worlds and concludes that future mobile technology and innovations will have an increasing impact on the lives of those people allowing them to have bigger presence in the world. (Kines, 2013) The Autism Spectrum Disorder Foundation also revealed that mobile devices are great devices to facilitate communication and education among persons with autism spectrum disorder because of their versatility. The devices are able to accompany the individual wherever they go, which allows them to use it in a variety of settings and implement it situationally as needed. Because many people with mental impairments do not have much coordination, the functionality of the touch screen is another crucial component. For example, there is no more need to continuously move their eyes back and forth from the keyboard to the screen as they would with laptops. Moreover, mobile devices can be easily customised to the needs of their owner, which is a necessary aspect since not all disabilities have the same skill levels. By the use of different functions, it can train the cognitive, communication and also physical abilities. (Muer, 2015, p. 15-16)

The research for this study revealed that there are a large number of applications entirely developed for people with intellectual disabilities. These app have been adapted to meet the various evolving needs of the users. A study identified that the following areas are most commonly addressed: academics, communication, employment, leisure and transitioning skills (Kagohara et al., 2013). Many of these apps are able to approach more than just one area at the same time and support the users in various challenges of their lives. The study continues to state that the ability of mobile devices to have the capacity to manage a large number of apps can enable the user to keep multiple apps stored on a single device. The possibility to access these important apps by using just one device can be more comfortable for mentally disabled people instead of handling

many devices, which can bring confusion to them. An example of an app that helps support communicating is called *LetMe Talk*. The app allows the user to line up images in a way to read the row of images as a sentence. The image database contains more than 9,000 easy to understand images but existing images from the own device or newly taken photos by the build-in camera can be easily added additionally to the app. Further advantage of *LetMe Talk* is that no internet connection is necessary, which makes the app usable in almost any situation, like hospitals, nursing home or schools. (LetMe Talk, 2018)

A study completed by Bryant, et al. (2012) evaluated the trends in technology use among intellectually impaired people. The results from a survey show that the most widespread type of technology used by a group of 200 individuals was among mobile technology, which helped to address social outcomes in a community setting. Participants reported that using mobile technology helps them to participate in social activities such as communicating in groups and facilitate them to exercise assignments with classmates. The main reason for them to use mobile technology is socialisation including surfing the internet, online interactions on social networks, e-mail correspondence, online games and activities. Accordingly, the most common usages are seen in categories related to community and social living. People with mental disabilities especially enjoy being able to enter the community on their own, FaceTime<sup>1</sup> with their family and friends and discuss with others about current events and news. A similar study also led to the result that mobile technology impacts the areas of communication, leisure and socialisation (Muer, 2015). Following reasons were stated by participants why mobile apps are being used:

*“Individuals can load games on their smartphones or iPads and access them whenever they want. They can bring them with to doctors’ appointments, on bus rides to work, or when lying in bed. It allows individuals to be able to play a game, watch a movie, or read an interesting book at any time. It can make a stressful situation more manageable, a time where sitting still can be difficult, easy, and a way to relax and provide structure during downtimes.”* (Case 3, page 2, lines 47-52)

Clearly, technological advancements have made a shift from being limited to addressing the special needs of intellectually impaired people to supporting individuals to use it to address their social and leisure needs. For them it is a valuable method to establish their independence, increase community integration and self-determination. Additionally, specific developed mobile apps can teach independent living skills and help them to

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<sup>1</sup> An application for videotelephony by Apple Inc.

manage their daily routing. Through the communication technology, people with mental disabilities are able to access the community independently whenever they desired without the need of being accompanied by family members or caregivers. They can even quickly connect with their guardian to communicate health and safety needs when living independently. A big difference of mobile devices to other assistive technology is the diverse functionality and the comparatively low costs. (Muer, 2015) Mobile technology therefore not only has become common in today's society but also among individuals with intellectual disabilities. People with special needs experienced a reduction in negative impacts from their disabilities because of the support of technology. This proves that the increased versatility of mobile devices is very practical to use and can help support physical, mental as well as social needs (Bryant, 2011). Furthermore, the low costs as well as multiple functions of mobile devices and applications allow them to be used as valuable assistive resource in comparison to other expensive technologies (Bradshaw, 2013). Mobile technology is able to address different areas of daily living through a single device rather than using many for different purposes, which makes it easier to be more independent, build up self-determination and integrate into the community (Douglass, Wojcik & Thompson, 2012). It has been long proven that individuals, who have the opportunity and choice to exercise self-determination have a higher quality of life than those who have less choice of trying new things and opportunity for self-determination (Wehmeyer & Schwartz, 1998). With barriers removed through the use of mobile technology, many mentally impaired persons are able to experience life more like they would if they did not have a disability (Wehmeyer & Abery, 2013).

### **3.3 Barrier-free**

With regards to the barrier-free design and possibilities of mobile apps, an analysis of the existing barriers is required. First, the term will be defined, followed by the presentation of the aspects of accessibility as well as the principles of the international determined Mobility Accessibility within the Web Content Accessibility Guidelines by the World Wide Web Consortium.

### **3.3.1 Definition of term**

In general, the term barrier-free describes an easy and unrestricted accessibility in all areas of life for all people of all ages and with different capabilities (Vieritz, 2015). The barrier-free constitution does not distinguish between specific groups of people but shall include the needs of all human beings (Thesmann, 2016). For example, elderly with mobile walking aids or mothers with buggies also should have an easy access to all buildings (ramps instead of stairways). Barriers can therefore occur in every aspect of a human life and their impact vary from person to person. On the internet, for example due to technical reasons, barriers can also be challenging for a person without any disabilities (Ibid., 2016).

This master thesis places the focus on barriers of mobile technology (smartphone, tablets and apps) for people with intellectual disabilities. Furthermore, the barriers of social network are being defined and analysed on how they can become accessible.

### **3.3.2 Accessibility to mobile technology**

People with intellectual disabilities have to overcome countless barriers in order to gain a more normalised life (Muer, 2015). This is no different for accessing technology. Over the past decades, there have been significantly advancements in technological innovations. The internet, for instance, has revolutionised our social behaviour and has become more accessible to people all over the world. (Chadwick, Wesson & Fullwood, 2013) Prognostically, the use of the internet will continue to increase with its growing integration into societies and cultures worldwide. The same prediction applies to the use of mobile devices since everyone wants to be able to access online services anywhere. (We Are Social, 2017) According to the latest report of the International Telecommunication Union (ITU, 2017), 74% of the population prefers to use the mobile internet for accessing social media instead of a desktop computer (26%). Consequently, the group of mentally impaired people also wants to keep up with this society changing situation. Technology is often used by persons with special needs to increase, maintain or improve their functioning capabilities, which can be argued that this technology is assistive technology (Muer, 2015). If society can look at mobile technology, that are more commonly used by people without intellectual disabilities, through this lens, they might become more accessible to the population with intellectual disabilities (Bryant, 2011). A study (Bryant, et al., 2012) revealed that over 50 % of the participants do not use any technological devices due to lack of access. The common barriers were stated as the



lack of funding for devices, inadequate matching of technology to person and insufficient training for service providers. Hence, the lack of access is the main reason for not using technology.

A good orientation for web accessibility standards provides one particular organisation. The World Wide Web Consortium (W3C) founded the Web Accessibility Initiative to promote international standards for web accessibility and usability for people with disabilities (W3C, 2018). The organisation has partnerships with other institutions around the world, including industry, disability organizations, government and accessibility research organizations, that helped releasing the first guideline of web content accessibility (Web Content Accessibility Guidelines 1.0 = WCAG 1.0) in 1999. Since then the guideline has been continuously updated to current web and technological trends, which also means that a guideline for mobile technology and apps were necessary. The first guideline for mobile web content and apps accessibility was available in February 2015 using techniques of the Web Content Accessibility Guidelines 2.0. applied to mobile technology. A separate guideline for mobile accessibility does not exist but the W3C is clearly addressing accessibility issues of people using mobile phones and other portable devices. The content of WCAG 2.0 can be applied to mobile web content, mobile web apps, native apps, and hybrid apps using web components inside native apps. Even though, an updated version (WCAG 2.1) was released in June 2018, a conforming guideline for mobile accessibility has not been published. The additional requirements related to mobile accessibility in the WCAG 2.1 as well as a Mobile Accessibility Introduction with guidance for designers and developers are expected to be completed in 2018. (W3C, 2017)

### **3.3.3 Causes and types of barriers of mobile technology**

Not every operator of social networks is aware of the specific requirements for a barrier-free access. The complex structure with unclear options and difficult language are some examples of challenges for intellectually impaired people (Aktion Mensch, 2016). Online validation tools make it easy to determine if mobile apps are disability friendly (Buettner, 2015). For a structured overview, existing barriers are divided in four categories and described with regards to the relevant group of people with mental disabilities for this thesis.

### **1. Technical and functional barriers**

The technical barriers are based on the programming as well as hardware and software restrictions and are determined by the application possibilities of the output devices (Kruse, 2005). For example, smartphones have a smaller screen than laptops. People, who depend on assistive helping devices, might not be able to use digital content under certain circumstances because it is not optimised for their devices (Ibid., 2005). In general, mentally impaired persons might have limited access to computer and internet. This might affect their prevalence of participation in social networks. (Gill, 2014) According to a study of Aktion Mensch (2010), the technical barriers, however, are in contrast to the other challenges for people with intellectual disabilities easier to overcome.

### **2. Editorial and content-related barriers**

Insufficiently structured editing of the content and its implementation can cause challenges for intellectually disabled people (Aktion Mensch, 2010). Examples are difficult language, lack of text structures or alternative texts<sup>2</sup> of images. The comprehensibility of contents and explanatory texts proves to be one of the biggest challenges. The participants of the MMB study (Aktion Mensch, 2016) are primarily using supportive tools like easy language (41%) and personnel support. As a barrier apply thus the diverse range of offerings and information (information overload), which appear unselectively on social network platforms (Aktion Mensch, 2010). In addition, those networks have a variety of characteristics e.g. communication channel, regional, business, contact exchange, and demand different usage behaviour (Sheldon, 2015).

### **3. Design Barriers**

In the design of the navigation structure of social network apps orientation problem might occur, if there is no logical page structure (Aktion Mensch, 2010). Functions, which are needed can be hard to be found for people with intellectual disabilities. The insufficient design can extend to the contrasts, background images, colour selection as well as font sizes and disruptions of perceptibility. (Ibid., 2010) Therefore, it is important that the designer and developer of a mobile social network app considers the easy handling and requirements of the target group.

### **4. Organisational barriers**

Mentally impaired people are specially dependant on the support of their environment and might need partially help with the use of social network offerings (Döring, 2006). So

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<sup>2</sup> Descriptions of the appearance and function of a media element on a webpage

far, the promotion of media education is an integral part of development concepts only of few disabled aid institutions (Aktion Mensch, 2016). This leads to the conclusion that also environmental and contextual conditions have influence on the barriers. People with intellectual disabilities, who live in an institution use easy language more frequently: 29 % of the respondents in private households and 49 % of the respondents in institutions (Aktion Mensch, 2010). This might attribute to the fact that institutions are more notified of the special offerings in easy language and thus the concept of easy language are better known and used. Another reason is that offerings with easy language are not yet well-known by the target group and therefore not actively searched because of the lack of basic information as well as self-motivation (Ibid., 2010).

### **3.3.4 Accessibility principles by the Mobile Accessibility Guideline**

Most of the people view mobile devices separately from desktop computers or laptops and thus they might require different accessibility guidance. According to the Mobile Accessibility Guideline, there is no absolute divide between the two categories. The following examples are reasoning listed by the W3C (2017):

- many desktop/laptop devices now include touchscreen gesture control
- many mobile devices can be connected to an external keyboard and mouse,
- web pages utilizing responsive design can transition into a "mobile" screen size even on a desktop/laptop
- mobile operating systems have been used for laptop devices

Furthermore, an extensive majority of user interface structures from computers and laptops, for example text, hyperlinks, tables, button and menus, are equally adaptable to mobile. Therefore, a large number of existing WCAG 2.0 techniques can be applied to mobile devices and content. Regardless, mobile devices do present a mix of accessibility issues that are different from typical computers. The four principles below explain how these issues can be addressed in the context of WCAG 2.0 with additional practices. All guidelines can be applied to mobile websites, mobile web applications as well as native or hybrid applications. It should be noted that the guideline does not provide testable success criteria for some of the mobile-related issues but has been developed techniques and best practices in these areas.

**Principle 1: Perceivable**

The first principle deals with three challenges: small screen size, zoom/magnification and contrast. A small screen size is one of the most common characteristics of mobile devices, but it limits on how information can actually be viewed at a time. The amount of information should be minimised by providing a dedicated mobile version or a responsive design. The dedicated mobile version contains content tailored for mobile use; for example, the content may consist of fewer content modules, images or focuses on important mobile usage scenarios. With a responsive design the content can stay the same but with the help of programming techniques it can be rendered differently depending on the viewport width. For example, if the screen is narrow, the navigation menu can be hidden until the user taps a button. To ensure magnification possibilities a variety of methods can allow user to control content size on mobile devices with small screens. These methods are available as accessibility features to serve especially people with visual impairments or cognitive disabilities and includes default setting of text size, entire screen magnification and lens view magnification under the user's finger. Texts should be resizable up to 200% without assistive technology. Furthermore, mobile devices are more likely to be used in varied environments. This fact heightens the importance of use of good contrast for all users, for example when using outdoors and the glare from the sun makes the content invisible on screen. To sum up this principle, all information and elements of the user interface should be presented to the people in a way that they are able to perceive them. It is important to ensure that with the adjustments of the content no information and structure get lost.

**Principle 2: Operable**

The second principle explains related challenges to touchscreen, keyboard control and button elements. Smartphones and tablets these days are designed to be primarily operated by gestures on a touchscreen. These gestures can range from a simple tap with one finger to a very complex move with multiple fingers and movements. When developing an app, gestures should be as easy as possible to carry out; for example, by a simple tap or swipe. The high resolution of mobile devices allows interactive elements to be shown together on a small screen, but they need to be big enough and have enough distance from each other in order for users to safely target them by touch. Interactive elements such as buttons, should be positioned where they can easily be reached when the device is held in different positions. However, developers should consider that an easy-to-use button placement for some users might cause difficulties for others, for example left- vs. right-handed use. Therefore, a flexible solution should always be the goal such as allowing the content to shift downwards or sideward. Furthermore, mobile

apps are lacking on-screen indicators that remind people how and when to use functions and gestures. Mobile devices have evolved away from built-in physical keyboards towards displaying on-screen keyboard only when users have selected a function that accepts text input, for example a textbox. Keyboard accessibility, however, remains as important as ever and most major mobile operating systems allow mobile devices to be operated by external physical keyboards via Bluetooth or USB ports. This option can benefit several groups of people, for example the ones, who are confused by the dynamic nature of on-screen keyboards and benefit from the consistency of a physical keyboard.

### **Principle 3: Understandable**

Information and functions of the apps should be designed understandable and simple. Often, specific contents are only accessible through symbols and make it hard for people with intellectual disabilities to view the information. This aspect also aims to consider the reading level of the users. Barriers of comprehensibility can be reduced by easy language, short sentences and a clear structure of the page. Some mobile apps automatically set the screen to a particular display orientation (landscape or portrait) and expect users to respond by rotating the mobile device to match. Developers should try to support both orientation at all times in order to let the user decide if he wants to switch. A consistent layout is very important for most of the people with mental impairments because they might get confused easily. Components that are repeated across multiple pages, for example the app logo, a title, search or navigation bar, should be presented in a consistent placement. Elements that trigger changes should also be sufficiently distinct to be clearly distinguishable from non-actionable elements such as content or status information. Visual features that can set actionable components apart can include shape, colour, style, iconography (home icon, back arrow), positioning or text label.

### **Principle 4: Robust**

The last principle requires all content to be robust enough to allow different users and assistive technology to reliably interpret them. The robustness concerns the compatibility of the content to current as well as future technologies. This applies to the requirements that contents need to be accessible and optimal displayed on different mobile devices. Furthermore, it is important that contents are able to be accessed correctly without major adjustments. Although, users can enter information on mobile devices in different ways (keyboard, touch or speech), text entry can be time-consuming and difficult in certain circumstances. The amount of text can be reduced by providing select menus, check boxes or by automatically entering known information such as date, time and location.

### **3.4 Social network**

Social networks are a common means of communication in society since the past few years and have distinctly changed both the media usage and communication behaviour of humans (Simons, 2014, p. 169). In this chapter, after the general definition of the term, the meaning and impact of social networks on society will be outlined. Moreover, the usage of social networks of people with intellectual disabilities will be researched.

#### **3.4.1 Definition of term**

Social media is a place where individuals can not only find information but also share their own content, which means the user can be a sender and receiver at the same time. This concept changed the traditional communication model as well as the classical role of sender and receiver. Nowadays, not only the media can spread news, but also private person can share information and messages. On social media people can easily gather online and hence, with time it changed the way of people communicate with each other. (Gabriel & Röhrs, 2017, p. 15-16) Social networks, including Facebook, Instagram, YouTube or LinkedIn, are a form of social media technologies (Sheldon, 2015). They are a social construct that is made of quickly information spreading, sharing media like videos and photos, instant messaging and creating own content (Schmidt, 2018). Over time and with new technology innovations, methods of interaction on the internet has changed and now social networks have become a major form of communication, especially for young people (Ibid., p. 18). The purpose of those platforms is to help people to easily make and maintain social connections on a global level through the internet. Those relationships can be with family and close friends or acquaintances at a distance as well. A significant difference to face-to-face relationships is that social networks make the connections between people visible for other users (Barnes, 2013). However, social networks remain to be one of the most popular social media apps (Gabriel & Röhrs, 2017). According to the We Are Social (2018) report, Facebook is still the most commonly used online social network. Particularly young adults prefer to use social networks because they contain images, video and audio, which are likely to be a more entertaining environment (Gabriel & Röhrs, 2017, p. 19-20).

### 3.4.2 Role of social networks in society

With the technological advancements of smartphones, tablets and the mobile internet, social network systems are widely used these days (Goggin, 2011, p. 126). The reason why program inventions like social networks became successful is because being connected and socialised with other people is part of the human nature (Barnes, 2013). According to the report of We Are Social (2018), there currently are 4.021 billion internet users (53 %) worldwide, 3.196 billion social media users (42%), 5.135 billion mobile users (68%) and 2.958 billion mobile social media users (39%). This data measurement was made in January 2018 with a total population of 7.593 billion (Ibid., 2018). People are not going online anymore, they *are* online (ITU, 2017). With new technology and software innovations since the beginning of the internet, the way of communication has changed but the idea of connection has not. Before the internet has become the place, we have known today, it has gone through distinctive different phases: text-based (e-mails), World Wide Web (websites) and Web 2.0 (social media) (Huber, 2010, p. 13-15). It has evolved from textual exchanges to the sharing of media such as photos and videos. When the Internet shifted from Web 1.0 to Web 2.0, where the users take control over the majority of the online shared information, traditional interpersonal communication has especially among the young generation become insignificant. (Schmidt, 2018, p. 16) Social networks are a quick method of expressing individual ideas and by time people became more individualised as well as aware of user-generated content. They like the idea of placing news and messages on the web themselves instead of receiving information from mass media companies. In the current stage of communication, social networks are used as the main tool to share information and stay in contact with friends. Consequently, relationships and friendships are visible on social networks through the personal profile of the user. (Barnes, 2013) People can for example observe another users profile and their behaviour unobtrusively by reading their status messages and the shared biographic information (Sheldon & Pecchioni, 2014). The idea of privacy has consequently changed as well. Things that once were private knowledge have become public online and could be accessed by anyone, including supervisors, strangers and even persons who do not have good intentions (Sheldon, 2015). Moreover, widespread photo and video sharing networks such as Instagram and YouTube make it possible to create own content and share it on a global scale, which often can go viral. It has become popular especially among young adults to collect likes and shares, which will spread their content even more globally. With better technologies of smartphones and tablets, those media can be shot instantly and uploaded directly to the Internet. (Barnes, 2013) This trend has impacted the use of social networks immensely that new business or marketing

concepts have emerged (Judt & Klausegger, 2018; Jahnke, 2018). Not only the marketing sector but even political campaigns are carried out on social media (Ratzek, 2012) and organisations are constantly trying to find new ways to reach out to their consumers (Bitkom, 2016). Another aspect of the communication change are the services of instant messages, which are usually integrated in every social network platform, for example Messenger on Facebook (TNS Infratest, 2015). The principle is that online communication works through real-time transmission of the messages and, thus, the recipient is able to receive the information and reply immediately (Ibid., 2015). For the new generation the fast transfer of messages feels like an uncomplicated and time-saving way of communication (ITU, 2017). These changes show that more than just the way of communication has changed, it also demonstrates how the society can be shaped by the impact of social networks in their lives and is for most people no longer indispensable. The activities on social networks have increased significantly worldwide over the past years and the number of users will keep growing (We Are Social, 2018).

According to a new national study on Americans and social networks, participation in social networks not only strengthens relationships with close friends, but also provides social support and promotes political engagement (Hampton, Goulet, Rainie, & Purcell, 2011). Other studies have indicated that participation in social networks is associated with psychological well-being (Steinfeld, Ellison, & Lampe, 2008; Valkenburg, Peter, & Schouten, 2006). Kim and Roselyn Lee (2011) examined the effects of number of Facebook friends and qualities of self-presentation on subjective well-being. They surveyed undergraduate students with a Facebook account and found out that their happiness is enhanced when they have more Facebook friends and their positive self-images are better preserved as well as affirmed through self-presentation on Facebook (e.g. they post photos that only show their happy side, or they avoid writing about negative things that happen to them). Confirming previous studies, it was also found that honest self-presentation including self-disclosure, plays a key role in the development of social relationships in social networks services (Lee, Lee, & Kwon, 2011). Kavanaugh, et al. (2005) surveyed households in Blacksburg, Virginia in order to examine the link between community involvement, activities and interests, and internet use. The researchers found out that people with bridging ties across groups have higher levels of community involvement, civic interest, and collective efficacy than people without bridging ties among groups. Moreover, heavy internet users (more than 1.5 hours per day) with bridging ties have higher social engagement, use the Internet for social purposes and have been attending more local meetings and events since going online than heavy internet users with no bridging ties. These findings, in addition to other



studies, emphasise the importance of online bridging ties to the individual's psychological well-being (Abbott & McConkey, 2006; Lasgaard, Nielsen, Eriksen, & Goossens, 2010).

### **3.4.3 Social network usage of people with intellectual disabilities**

Access to mobile technologies and social networks are no longer considered as a luxury but is instead an integral as well as important tool in society, which can make life more enjoyable and empowering (Shapiro & Rohde, 2000). The few studies on social network use by people with intellectual disabilities show that information and communication technology is important to them to forge their identity as well as finding a place in which they belong to. Participants, who were interviewed in the studies, like using social networks for keeping in touch with family members and friends, making new friendships and receiving support (Aktion Mensch, 2010, 2016; Hollier & MAA, 2012; Asuncion et al., 2012; Chadwick, Wesson & Fullwood, 2013; Gill, 2014, Muer, 2015; Caton & Chapman, 2016; Sallafranque-St-Louis & Normand, 2017). Therefore, the removal of the barriers of social networks might prelude people with mental disabilities from participating in a variety of daily activities (Hoppestad, 2013). The group of intellectually impaired people can be scattered geographically like other groups of individuals. Through social network platforms they are able to communicate with each other, which may never happen due to the restrictions of the first group (Döring, 2006). The accessibility to social networks can increase the number of social contacts for persons with mental disabilities, if online functions, such as instant messaging, complement the current interaction and communication process (Stöppler, 2017). On the internet, looks and speaking difficulties do not matter (Sheldon, 2015), thus, users can decide for themselves what they like to reveal. Because intellectual disabilities are not obvious for others online unlike face-to-face communication, people with special needs might feel more comfortable and safer from curious stares. In a study by Shpigelman & Gill (2014) most of the participants stated that they are more comfortable communicating online than face-to-face. Going online may help mentally impaired young persons to cope with the negative stereotypes and make them feel more like typical teenagers (Chadwick, Wesson & Fullwood, 2013). In Sweden, parents and teachers in special programs for young adults with intellectual disabilities (18–20 years old) describe their students as socially isolated. They add that the internet has become a very important tool for the youth, even though some of whom have networks of online friends whom they have never met offline. (Löfgren-Mårtenson, Sorbring, & Molin, 2015) Moreover, their students

use the internet for multiple purposes, including writing a blog, chatting, socialising and searching for friends. They use it also for finding information, listening to music and watching videos. Being able to communicate with a wider audience and engage with them on social networks may have the potential to reduce feelings of loneliness for people with mental impairments (Kydland, Molka-Danielson, Balandin, 2012). A study in the *Cyberpsychology: Journal of Psychosocial Research* stated that the most popular activities on the internet is to connect and communicate with other people online (Sallafranque-St-Louis & Normand, 2017). All study participants declared Facebook as their preferred social network sites, although they also had profiles on Twitter, Instagram, Pinterest and Snapchat. Facebook is a good place for them to stay in touch and seek entertainment. Although, only a few of them publish their own content, they like to follow up what other users posts on their pages (Ibid., 2017). Social networks are also used as a substitute for writing e-mails. They give people with mental impairments the possibility to send private messages to their family and friends (Shpigelman & Gill, 2014). Users with special needs also reported to like joining groups with common interests on social networks and be alerted of new posts published within these groups. Although, they usually do not actively participate in the conversations, they like to read people's opinion on a certain topic. (Sallafranque-St-Louis & Normand, 2017) There are some users with special needs who take the advantage of the usefulness of social networks instead of socialising (Ibid., 2017). For example, a study participant figured since a lot of his colleagues are on Facebook, they could send him his working schedule through the messenger instead of to his mail account. He also likes that he can combined a lot of functions by using one platform, so he also uses Facebook to open up conversations with his classmates to prepare for classes (Ibid., 2017). Another reason for using social networks, is that they provide opportunities of a private life for people with mental disabilities (Löfgren-Mårtenson, 2008). The study participants reported that the internet allowed them freedom and escape from control of their parents or caregivers (Ibid., 2008). Through social media activities they can express their feelings and make friends with whom they want without asking for permission from their guardians (McClimens & Gordon, 2009; Shpigelman & Gill, 2014). Social networks can become a tool for a lot of intellectually disabled people to be more open because the discomfort of face-to-face communication is removed. For example, a participant from a study revealed on Facebook that he was gay and received positive feedback for coming out (Sallafranque-St-Louis & Normand, 2017). The activity on social networks can be a way to gather recognition and social support (Hollier & MAA, 2012). Moreover, they might help to develop interpersonal as well as skills (Chadwick, Wesson & Fullwood, 2013). A study

by Shpigelman, Reiter and Weiss (2008) reveals that the participants had developed more meaningful relationships and increased positive self-esteem.

Although, participants of a study reported they have very few friends in real life, they surprisingly have a lot of Facebook friends (up to more than 400), which range from close family members to extended family and also friends from school, work or community at large. One participant stated that he does not write to them though but that they are “*just friends like that*” (Sallafranque-St-Louis & Normand, 2017, p. 7). This shows that having a wide range of friendships on social networks is no guarantee of having true relationships with the befriended people online or even any contact with them. It can be concluded that the social isolation and loneliness people with intellectual disabilities experienced in real life partially reflects in their social network experience. But for some of them it is certainly a way to remain close ties with a few selected friends or relatives, especially those who live far away and cannot be visited on a regular basis (Ibid., 2017). Relatives are an important part of the online social network and those platforms help mentally disabled persons to keep in touch with them. Another participant of the study in the *Cyberpsychology: Journal of Psychosocial Research* stated that social networks have given her the opportunity to become closer to her extended family members with whom she had little contact before (Ibid., 2017). A further study participant lost touch with her high school friends after graduating and now could reconnect with them through Facebook (Ibid., 2017).

Social networks seem to alleviate social isolation and loneliness of people with intellectual disabilities, although at least on the surface. It is easier to accumulate many online friends and connect with them due to the removal of discomfort during face-to-face conversations. But also because of this reason, mentally impaired users usually do not have affective connections and personal communication with their friends on social networks except for family members and close friends. Although rarely done, reaching out and communicating feelings online can allow emotional social support to emerge, from strangers met online, but more likely from closer friends.

#### **3.4.4 Risks of using social networks with intellectual disabilities**

The internet has opened a wide window of opportunities for people with intellectual impairments, but more support and education are needed to ensure safety and positive use. A study by Sallafranque-St-Louis and Normand (2017) revealed that all participants

had distressing experiences including: being insulted online, having false rumours spread, receiving threats or being targets of sexual cyber-solicitation. Users with mental disabilities have had to rely on family and friends or social workers to avoid or rectify cyber-victimisation episodes. The perceived vulnerability of people with special needs has led to the creation of safer social networking environments for them (Chadwick, Wesson & Fullwood, 2013). However, reporting on the social networking experiences of mentally impaired persons, Holmes and O’Laughlin (2014) found that respondents did not necessarily want to use such restricted social networking sites and prefer to have access to social networking sites that allowed for interactions with a wider audience, an audience not restricted to those with intellectual disabilities. Although, some are afraid of the risks that social networks bring, parents with mentally disabled children stated that people should not be afraid of risks because, for example, cyber mobbing can even happen to people without disabilities (Chadwick, Wesson & Fullwood, 2013). Sadly, it is something that is not completely avoidable but if the group of people with special needs shall be included, they need to be included in everything. The community can help and support them how to deal with such risks. Some parents said that they are trying to help their children to only accept friends’ requests from people they know and sometimes check their Facebook as well as scan their profiles for threats. But so far, they have never seen anything threatening. (Grimes; Undrom; Simmons; Lalee; Coleman, 2018, personal communication, 17 April)

## 4 Conception of the mobile app

Before starting with the practical section of this thesis, the figure below gives an overview of the different parts of the study, which will be analysed one by one. Since the mobile social network app is seen as an innovative product based on existing technology and concepts, the study is divided in the following processes:

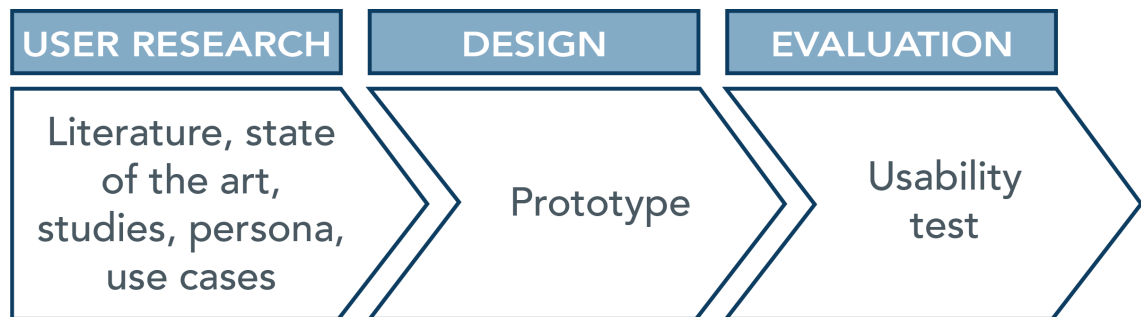


Figure 2: Study process

This chapter approaches the development of the prototype for the empirical study considering the general objectives and requirements of the target group. Furthermore, for the preparation of a targeted usability test, persona and use cases were created. Based on all the information, a prototype of the app with central functions was designed and developed.

### 4.1 General objectives

The two following subchapters deal with all general requirements, which need to be cleared before getting into the study. Since the concept of the app will be a template for developing an app for the Macau Golf Masters, a short introduction will be presented first for a better understanding of the goals. Next, the requirements of the target group will be discussed because the use of this social network app needs certain skills and the targeted group needs to be narrowed down for this special case. For a better approach to developing the prototype, possible personas and scenarios were created considering the targeting group as well as the theoretical background and the researched studies. The last section deals with the development of the prototype for the empirical study based on the principles of the Mobile Accessibility Guideline taking the previous research, studies, definition of the target group and personas as well as use cases into account.

### **4.1.1 Macau Golf Masters**

Today, intellectual disabilities have become much more accepted in our society. Over the past half century, there have been many changes to the support offered to individuals with mental disabilities and their families. The Charity Association of Macau Business Readers has been organising a variety of social and inclusion events as well as conferences to promote solidarity, social relations, including, cultural, artistic, sportive and recreational events in Macau and internationally. Since 2012, the organisation has been yearly inviting Special Olympics athletes from all over the world to the Macau Golf Masters to give them the opportunity to play golf, compete, show their individual skills and meet friends from other countries for further social interaction; eventually strengthening their self-esteem and capabilities. Promoting the acceptance of intellectually disabled people in Asian societies and providing a platform to show their individual and social skills has been the major aim of the project.

As a result of long-term experiences and analysing inclusion problems, the organisers want to find out the barriers of the mainstream social networks in order to create an international social network platform, which allows intellectual disabled people to access and use without any difficulties. Furthermore, it should be designed to make the communication between the organisers as well as participants and coaches easier. For example, when posting updates regularly or submitting the entry form. The decision to create a social network in form of an app results from the fact that smartphones, tablets and other mobile devices are used the most to access social networks platforms.

### **4.1.2 Requirements of target group**

As mentioned before there are even differences within the group of people with intellectual disabilities. A relevant factor is to define a specific target group and their abilities in order to achieve the best results during the process of the study and designing the app. The top goal of this project is the inclusion of all individuals, especially the participants of the conference and tournament, which means the app will have several target groups that need to be defined. The primary group are users with intellectual disabilities. The focus is to conceptualise an app that has no access barriers and is easy to use. The second target group are family, friends or caregivers, which means people who deal with mentally impaired people on a daily basis. The last target audience is focusing on everyone else, who is interested in the topic, wants to volunteer or just connect and needs a platform to get certain information about intellectual disabilities. For

this master thesis and the relevance of the study, the focus will set on the primary target group and their requirements.

Even though the causes can have similarities, intellectual disabilities have very different clinical pictures and show a large heterogeneity (Seidel, 2006). Since it is socially constructed (Hatton, 2012), it is a descriptive diagnosis with many identified causes (Simonoff, 2015). That makes it even harder to define the exact condition of intellectual disabilities. While the last two target groups don't need any more definition for the purpose of this study, the primary group has to be narrowed down because this research requires specific skills. Since a concept of a barrier-free mobile app is the result of this master thesis, it needs to be analysed which requirements the target group has to have in order to use the app. It is important that the people concerned not only have basic communication skills but also technical expertise as well as digital and media competence (Aktion Mensch, 2016). They need to know or be able to learn how to use mobile technology and access mobile apps. Furthermore, a basic understanding of the internet as well as the functions of social networks are mandatory (Ibid., 2016).

The following used classification system determines who counts as being intellectual disabled and therefore who is suitable for the target group. As mentioned above, intellectual disability is a descriptive diagnosis, yet this thesis uses the levels of intellectual disabilities to define the target group since it is required to provide a basis for the following practice part. The classification is based on worldwide accepted standardised IQ scores of the International Classification of Diseases (ICD-10) by the World Health Organisation (ICD, 2016) and is the common practice in researches and epidemiological studies (Hatton, 2012). In chapter five (Mental and behavioural disorders) under the code F70-F79 (Mental retardation), a mental impairment is described as a below-average development of the mental capability. In the process, adaptive and communication skills, interpersonal interactions, independent care, linguistic, emotional and motoric as well as everyday practical abilities, educational achievements and other cognitive functions are affected. (ICD- 10, 2016)

Category	IQ Range	Adaptive Behaviour
F70: Mild mental retardation	50 to 69	Likely to result in some learning difficulties in school. Many adults will be able to work and maintain good social relationships and contribute to society.
F71: Moderate mental retardation	35 to 49	Likely to result in marked developmental delays in childhood but most can learn to develop some degree of independence in self-care and acquire adequate communication and academic skills. Adults will need varying degrees of support to live and work in the community.
F72: Severe mental retardation	20 to 34	Likely to result in continuous need of support.
F73: Profound mental retardation	under 20	Results in severe limitation in self-care, continence, communication and mobility.

Table 1: Classification system according to International Classification of Diseases (2016)

According to the classification system above, persons ranking in the last two categorisations are to be excluded from the target group considering the prior mentioned requirements. As stated in the definition for those classifications, it can be assumed that these groups won't be able to understand the complexity of the needed technology as well as media competence and therefore will depend on a lot of external help during the learning process because of their reduced cognitive capabilities. The table doesn't show the remaining codes F74, F78 and F79 since these only divide the category F73 further.

It is of significance to note that, as it has become apparent during the definition part, it is scientifically difficult to determine who belongs to the group of people with intellectual disabilities. The applied classification above is a tool to simply narrow down the target audience for this empirical study. Only then there can be clear results to answer the research questions. However, it also should be considered that, because of the variety of understandings of intellectual disabilities, there are further conceptions to classify mental disorders.



Moreover, specific requirements for the usability test are defined below:

1. Test persons should be used to in dealing with smartphones and/or tablets
2. Test persons should be familiar with the use of apps and social networks
3. Test persons should be able to understand assignments in easy language

It is to be expected that obtaining views and information from people with intellectual disabilities is particularly difficult due to their cognitive impairments and limited communication skills (Prosser & Bromley, 2012). One such difficulty is that of response bias and the proclivity of participants to acquiesce, especially to closed “yes” or “no” questions. Acquiescence is when the respondent gives an affirmative reply to contradictory prompts, e. g. replies “yes” to both questions “Are you happy?” and “Are you sad?”, or when a person agrees with whatever statement has been given. The reasons that people are thought to acquiesce are basically due to two factors: impaired cognitive development and social desirability. (Shaw & Budd 1982; Sigelman & Heal, 1995) Acquiescence is more common when the question is not understood or when respondents do not know how to answer the question, although it can also be a way of seeking social approval. The respondent may reply “yes” even when he understands the question but replies “yes” because he believes that a negative or other answer will displease the interviewer, and/or the respondent will be looked upon unfavourably by the interviewer. (Prosser & Bromley, 2012)

## **4.2 Creation of personas and scenarios**

User personas and scenarios (use cases) are effective techniques to ensure the right test persons are recruited. They describe future use situations as well as the expectations of the target group. Therefore, they can be used to screen potential participants in order to find the right candidates for the usability test and get relevant insights. Use cases are similar to a story with a main character, storyline and ideally have a solution for the problem (happy ending). The stories trigger the imagination and can help to build a useful app for the target group. A persona is a combined profile from several users out of the target group. It represents and describes their behaviour patterns and motivation regarding the app. Ideally, information for creating personas and use cases should be retrieved from pre-conducted interviews and questionnaires. But with time and financial restriction, existing studies and analytics data can be used. The display

of personas can differ but a compact presentation with a picture, name and short summary of the major key points has proven to serve as the most effective. (Schilling, 2016, pp. 203-224; Jacobsen & Meyer, 2017, pp. 107-118; Grünwied, 2017, pp. 118-121)

Below, in preparation for the study four personas and six use cases were created, which at the same time will act as templates for the assignments in the study.

## Personas

Usually, information for the creation of personas are taken from previously conducted interviews of the target group (Schilling, 2016, P. 212). But due to the limited processing time for this thesis, the information and presumptions about the following personas are derived from the previously performed research as well as related studies.

**LISA (Autism)**



*"Being on social network helps me to communicate with other people and be more confident in communicating."*

**Used functions:**

- finding / connect with people
- stay in touch with family members and friends
- updating status
- sharing media / seen news and content
- participate in groups
- sending messages

**Frustrations:**

- bad experiences with face-to-face communication
- limited social circles
- lonely during summer break
- living far away from relatives and friends
- no one else to talk to
- wants an easy way to communicate

**Expectations:**

- no curious stares and prejudices
- not only contacts with family, other disabled or caregivers
- integration in social community
- re-connect and talk to distance family members
- discussion in groups about same problems, topics
- feeling better through more contact with people
- learn how to interact with new people
- train communication skills
- easy and fast way to communicate
- available everywhere

**Age:** 17

**Location:** lives with her parents

**Occupation:** goes to a local high school

**Hobbies:** spending time with her dog, painting

**Character:** creative, shy in person, passionate

Figure 3: Persona 1 - Lisa

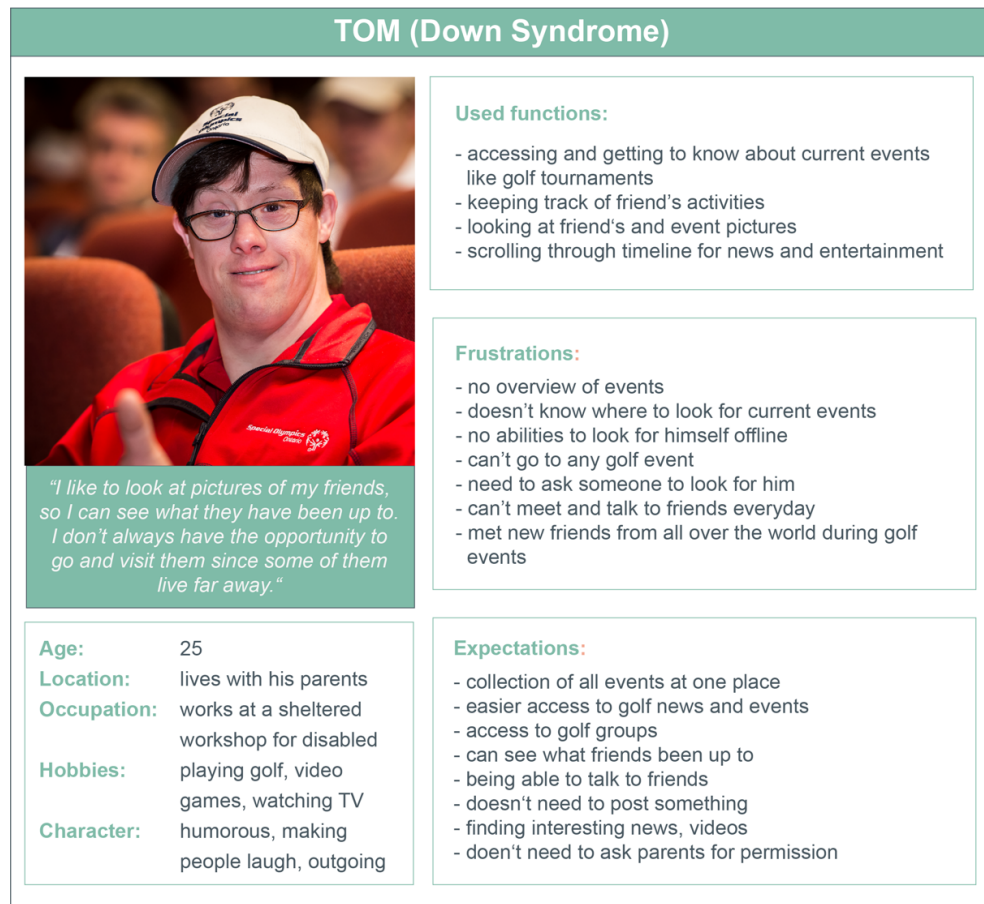


Figure 4: Persona 2 – Tom

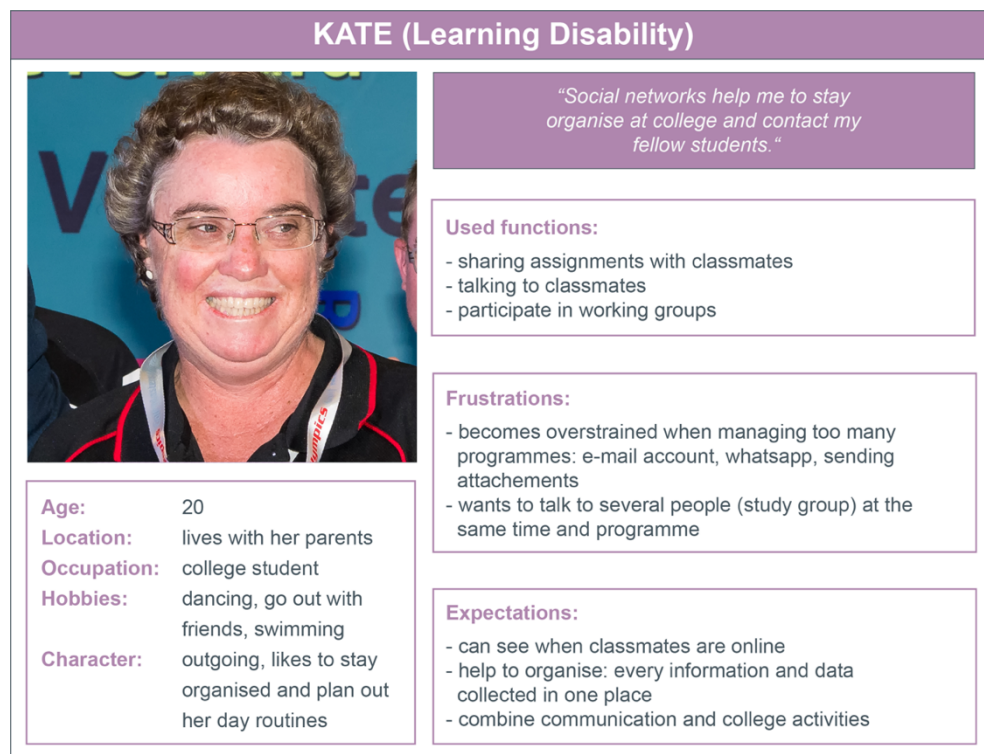


Figure 5: Persona 3 - Kate



Figure 6: Persona 4 - Patrick

## Use Cases

For a fluent flow of tasks during the usability tests, following scenarios were created. The use cases require the app to be already downloaded and installed on the mobile device.

### 1. Register an account

Tom recently downloaded the new social network app on his iPhone. Now, he wants to try out the functions and find out if the app fits his needs. In order to use the app, he has to register an account first. When open the app for the first time, it will automatically ask him to register an account. Tom enters his preferred username, password and his e-mail address before he goes on the CREATE-MY-ACCOUNT-Button to confirm his request to register a new account. After a few minutes, he gets an e-mail with the confirmation for a new account and a link, which forwards him to the app by simply tapping it (means the app opens automatically).

## 2. Sign in to the account

Tom successfully registered an account. After being forwarded from the link in the e-mail to the app, he sees the start page, which requires the entering of the login information. Tom now can sign in with his previously chosen username and password. After entering his information, he goes on the LOGIN-Button.

## 3. Set up profile

After being successfully logged in, Tom wants to set up his profile. He can choose what private information he wants to share with the community. These information include personal data such as name, age, birthday, location, etc. He decides to enter his name, birthday, location and hobbies. Tom enters those data in the provided fields and saves them by going on the DONE-Button.

## 4. Upload a photo

Tom also wants to share a picture of himself because he likes and prefers looking at pictures more than reading texts. By looking at photos he can picture his friends, whom he talks to, better. For uploading a profile photo, he goes on his profile. On top of his profile, he sees a box with the label "Upload profile picture" in the middle. When he touches the label with his finger, he has the possibility to upload a picture from his phone or take a new one directly with his phone camera. He chooses to upload an existing one from his photo library. For this move he simply needs to go on the button CHOOSE FROM LIBRARY and the app will open his photo library. In the library he looks for his preferred picture, marks it by tapping it and goes on the button UPLOAD PHOTO. After some seconds his profile picture appears on his profile instead of the placeholder.

## 5. Accept a friend request

Tom told his friends that he also joined the new social network app. During the set-up of his profile, he got a new friend request from his close friend Lisa. He can see the new friend request at the menu bar at the bottom of the screen. It is marked with a "friend" symbol and has a red bubble with the number "1" next to it, which means he has one new friend request. Of course, he wants to accept his first friend request and connect with Lisa. Therefore, he taps the symbol and gets forwarded to a new screen. On the screen he sees a picture of Lisa and next to it one button that says ACCEPT and one that says DECLINE. When he touches the ACCEPT-Button, after seconds a text appears stating: "You and Lisa are now connected."

### 6. Sending a message

Tom is happy that he and Lisa are now friends on the social network app. Enthusiastically, he wants to let Lisa know and intends to send her a message. Thus, he goes to her profile page and clicks on the SEND-A-MESSAGE-Button. The messenger screen opens. On the bottom of the screen he can tap on the text box for the keyboard to pop up. Now he types in "Hello Lisa, we are now connected, and I am very happy about that. I hope we will meet for a round of golf soon again. Have a good day. Bye, Tom" After he finishes writing his message he goes on the SEND-Button.

## **4.3 Development of a prototype of the app**

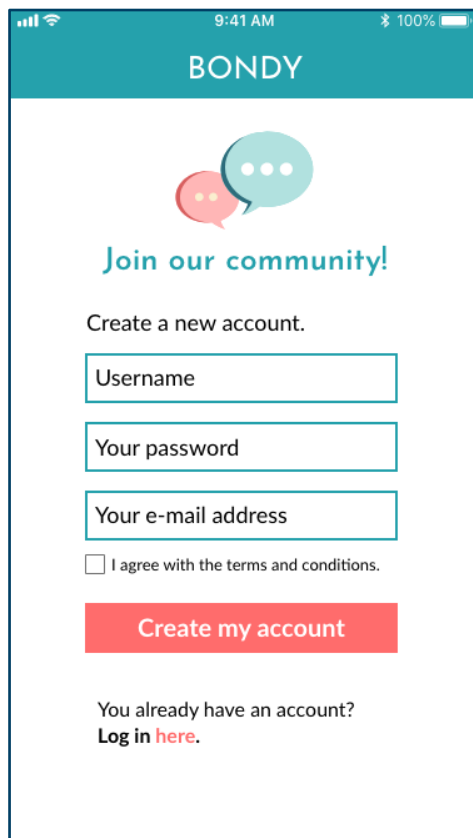
The development of the prototype was done with the Adobe software XD (Experience Design), which allows designing and testing prototypes on different terminal mobile devices. As mentioned before, the content development was based on the Mobil Accessibility Guideline by W3C, derivation from the state of the art and personas. It was decided to provide one mobile device for all test persons so that every participant had the same conditions. Therefore, the prototype was programmed for the iPhone 8 Plus and guided by the iOS design guidelines as well as User Interface Kit provided by Apple. These resources helped to design the app to match the iOS design language and ensures the familiar interface of an iPhone for the users.

For the content, it was important to use easy language. A guidance was the set of rules of the Network of Easy Language. The following rules were picked considering which were necessary for the app:

- easy and short sentences
- one statement per sentence
- every sentence starts in a new row
- use of familiar words
- use of verbs
- avoidance of complex and technical terms
- active and positive language
- no use of subjunctives
- no full spelling of numbers

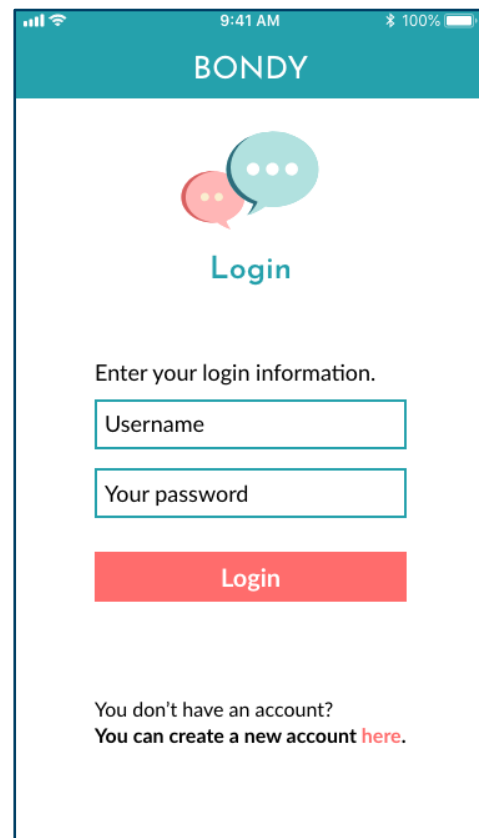
For the typography the following guidelines were applied:

- fonts are sans-serif: Josefin Sans and Lato
- font size is at least 14 pt.
- line spacing is 1.5 pt.
- texts are aligned left
- font colour is dark on bright background



The register screen features a teal header with the 'BONDY' logo. Below the header is a red and teal speech bubble icon. The main heading is 'Join our community!'. The form includes the text 'Create a new account.' followed by three input fields: 'Username', 'Your password', and 'Your e-mail address'. Below these fields is a checkbox labeled 'I agree with the terms and conditions.' and a red button with the text 'Create my account'. At the bottom, it asks 'You already have an account?' and provides a link 'Log in here.'

Figure 7: Register screen of the prototype



The login screen features a teal header with the 'BONDY' logo. Below the header is a red and teal speech bubble icon. The main heading is 'Login'. The form includes the text 'Enter your login information.' followed by two input fields: 'Username' and 'Your password'. Below these fields is a red button with the text 'Login'. At the bottom, it asks 'You don't have an account?' and provides a link 'You can create a new account here.'

Figure 8: Login screen of the prototype

### Principle 1: Perceivable

Due to the small screen size, the layout overall is kept clean and simple with a steady structure for the icons and navigation bars. Texts and images are minimized to match the layout and structure but are still providing enough information for the user. Fonts size and colours are chosen to meet the needs of the target group. As listed above, the font size is at least 14 pt. and the font colour is dark on bright background. Therefore, it has a good contrast for people with possible visual impairments. For the designing of the

interface it was also important to highlight links as well as call-to-action-buttons (CTA). This way, links and buttons can be noticed easier by the target group.

### **Principle 2: Operable**

Gestures and touch commands are kept simple in order to not confuse the user with too many instructions. The user only has to make one single tap if he wants to do an action. Buttons and navigation are positioned at the same place and where they can easily be reached, so the movements can be done intuitive. The app interface is adapted to the requirements and design of the operating system, so the target group gets a familiar feeling from the app.

### **Principle 3: Understandable**

Information and functions of the apps are designed understandable and simple. This aspect also aims to consider the reading level of the users. Therefore, easy language is used throughout the app. A consistent layout is also very important for most of the people with mental impairments because they might get confused easily. Components that are repeated across multiple pages, for example the top and bottom navigation bar, are presented in a consistent placement. Elements that trigger changes are sufficiently distinct to be clearly distinguishable from non-actionable elements such as content or status information. Furthermore, icons were complemented by designations, so they can be understood better. Another difference to common social networks is that there are more explanatory texts and comments to guide the target group through the app.

### **Principle 4: Robust**

The app is designed to be compatible with the current and future technologies. When designing the app official guidelines of the operating system (Apple iOS and Google Android) were considered and used. Therefore, the app can be used on different devices and even on computer with browsers. Through tests, it is approved that the contents are accessible and displayed correctly without major adjustments.



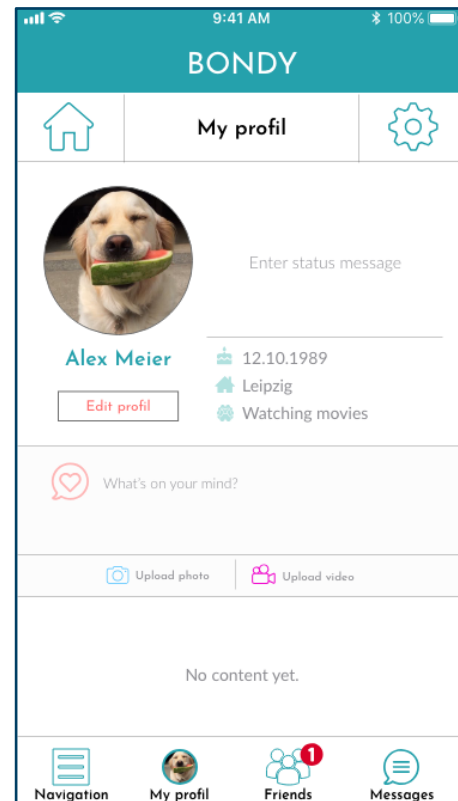
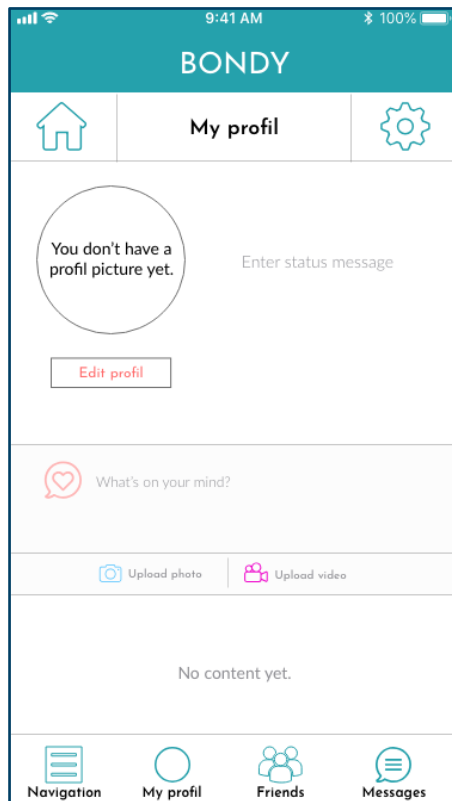


Figure 9: Profile screen of the prototype

Figure 10: Profile screen with added content of the prototype

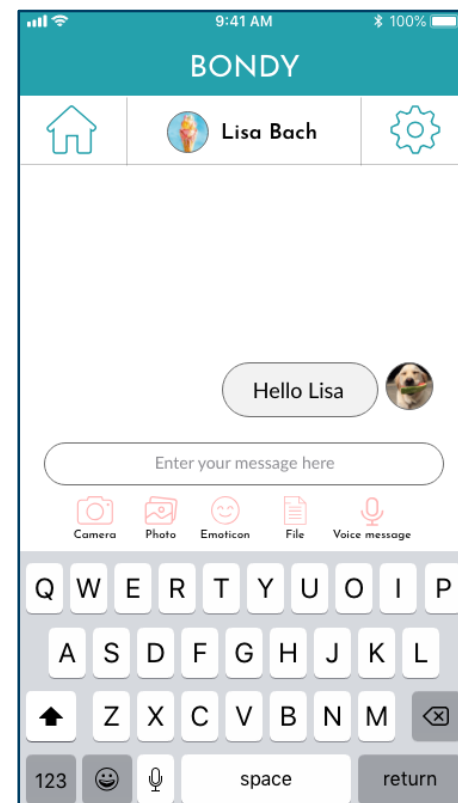
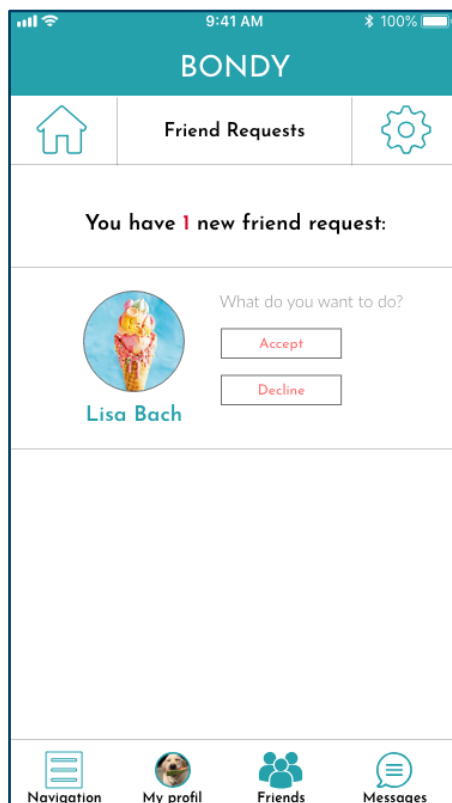


Figure 11: Friend-request screen of the prototype

Figure 12: Message screen of the prototype

## 5 Empirical study

To find the answers for the framed research questions an empirical study was conducted. An empirical research is an analysis, which yields scientific findings about the social world and can verify theories (Kromrey, Roose & Strübing, 2016). After defining the research questions, the research design as well as methods will be explained further and relate to the objectives of the study.

### 5.1 Test objectives and research questions

The first step for a successful usability testing with relevant results is to set the objectives straight. What goals are pursued? What research questions shall the test answer? What problems could be revealed? The objectives for this empirical study are to find out if the app is barrier-free for people with intellectual disabilities as well as how comfortable it is for them to access and use. Therefore, the main research question is:

**How can a mobile social network app be developed barrier-free for people with intellectual disabilities?**

Since the Mobile Accessibility Guidelines are used to create the prototype, the usability test shall give some indication of if the guidelines are implementable in reality:

*Q1: How is the target group evaluating the usability of the app?*

*Q2: What does the target group think about the structure?*

*Q3: How does the target group evaluate the design?*

*Q4: What are important characteristics of a barrier-free apps?*

Furthermore, in this case it is interesting to find out directly from the target group what kind of activities they do on social networks and in general their usage behaviour. Therefore, the following questions were formulated:

*Q5: How is the target group using mobile technology?*

*Q6: What kind of activities is the target group pursuing on social networks?*

*Q7: How are social networks influencing the daily life?*

## 5.2 Research design

There are two methods to perform an empirical study: qualitative and quantitative research (Schumann, 2018). A qualitative study is used to discover new contexts and/or amplify existing theories. It is not used to analyse known scientific knowledge as the quantitative study does (Flick, Kardorff & Steinke, 2017). Preferably, qualitative researches apply to analysis', which do not have sufficient information through the state of art and need an exploratory strategy. In contrast to quantitative studies, which are statistically constructed, this approach is detached from objectivity and allows subjective views of the research question. According to Mayring (2016), subjectivity is important to find previously unknown insights. Thus, the biggest difference between qualitative and quantitative studies is that the first mentioned method describes social aspects verbally and the other one with the help of numbers (Schumann, 2018). According to Flick, it is the goal of qualitative research to represent the "environment from the inside from the perspective of the acting person" (Flick, Kardorff & Steinke, 2017, p. 14) in order to explain a better understanding of the real social world as well as their processes and structures. Hence, it is widespread that within the qualitative approach no formulated hypotheses or if-then-hypotheses are verified but rather new hypotheses are generated out of the new collected data (Mayring, 2016). However, research questions and presuppositions have to be phrased so that a specific analysis can be carried out (Kromrey, Roose & Strübing, 2016). Even though, an exploratory work allows the researcher to have many options, a research goal is necessary for orientation. The formed presumptions, thus, are setting the targeted direction for the study. New generated hypotheses from a qualitative study can be verified further by a following quantitative analysis.

The purpose of this research is to gain insight of the impact as well as barriers of mobile technology and social network usage among people with intellectual disabilities. This study used a usability test and qualitative interview to gather information from participants. Based on findings contained in the literature as well as studies review and the consideration that the concerned topic is classified as a relatively unexplored field, a qualitative analysis appeared to be the most effective method.

### 5.2.1 Usability testing of mobile apps

*"[...] every application must have an inherent amount of irreducible complexity. The only question is who will have to deal with it."*

– Larry Tesler, computer scientist and inventor of Copy & Paste

Usability is, besides utility and design, one of the aspects of User Experience (UX). UX regards to the total experience a user makes with the product. Usability focuses on how well a user can handle the functionality of a certain product. The criteria for a good usability are effectiveness, efficiency and satisfaction, which are defined in the international standard ISO 9241-11. Effectiveness regards to the full achievement of the goals of the product functions. The efficiency refers to the expense a user has to make in order to reach the goal by using the product functions. And lastly, the satisfaction covers the positive attitude towards the product use. With the digitalisation and innovative technologies comes a new claim of product usability. (Sarodnick & Brau, 2016, pp. 17-25; Schilling, 2016, pp. 37, 45-47, 269; Grünwied, 2017, pp. 57-60; Jacobsen & Meyer, 2017, pp. 33-36) As Theodor "Ted" Holm Nelson stated: *"A user interface should be so simple that a beginner in an emergency can understand it within ten seconds."* (2011).

A usability test is the most popular method for conducting an evaluation. According to Jakob Nielsen (2000) and his study, it only takes five test persons to reveal 85% of all usability problems of a test object. In this stage the product should already reach the best usability possible. The main goal of usability testing is to answer the question *"Can people use this design?"* In order to find the answer, a common practice is to:

1. Put a product or experience in front of someone
2. Ask them to perform a set of tasks
3. Observe their behaviour
4. And listen to them talk through what they do as they do it

This method can help to understand how real users respond to the product. The developers can learn what parts they like or dislike, where they get stuck or confused and what can be improved (Schilling, 2016, p. 269). A usability test has the role to discover and fix potential weaknesses as well as errors, which only reveal during the use of the entire system. The core part of the test is based on tasks that test persons have to perform. During this process there are different methods for data collection and

observation. Following, the candidates will be questioned about their behaviour by an interview or questionnaire. (Grünwied, 2017, pp. 136-140)

Usability testing of mobile applications can be conducted with two main methods:

1. Laboratory-based usability testing:

This method is performed in a usability laboratory with corresponding equipment and is used especially for observational studies. In laboratories the moderator and project manager are present and can observe the participants closely during the process. These tests can also be conducted outside of a laboratory with specific mobile conducting technology, which allows a more familiar environment for the test persons.

2. Remote usability testing:

This method can be performed everywhere, which means the users are in their familiar environment, usually at home, during the test. The moderator is most of the time not present but can talk to the participants via Skype. Therefore, this method can also be conducted unmoderated and with a subsequent questionnaire.

For this master thesis, a so-called mobile laboratory-based user test is chosen because they are location-independent (Grünwied, 2017, pp. 108, 149). That means participants can test the prototype in their familiar surroundings, which reduces the stress factor immensely. This is especially for the target group a decisive factor because they might feel uncomfortable in an unfamiliar environment, which could affect the testing process. Even though, in practice a remote test is chosen for testing apps (Ibid., 2017, p. 146) but with the requirements of the target group and the limited information about this topic, it was necessary for the researcher to be at the same place as the participants to help and in order to conduct the subsequent interview as well as collect qualitative data.

### **5.2.2 Case selection**

Unlike quantitative studies, the sampling of qualitative research is not determined coincidentally but deliberately by specific criteria (Kromrey, Roose & Strübing, 2016). The target group for this usability test was previously described in chapter 4.1.2. In order to select test persons accordingly, organisation and institution for people with intellectual

disabilities were contacted. Two of them were open and cooperative for providing participants but only participants of one institution could be considered. Due to the time pressure the test had to be done promptly and the other institution was not able to make quick arrangements.

From the Lebenshilfe Merseburg gGmbH were six mentally impaired persons willing to participate in the usability test. Due to the limited external information of the research question it is recommendable to have a heterogenic test group in order to find out as many unknown facts about the target group as possible. Thus, there were two female and four male candidates, ranging from 22 to 40 years old. The number of each gender and age happened randomly. All of them have a mild but different intellectual disability, which ensures that they fulfil all requirements. Furthermore, the different characteristics of the impairments allow an observation of a more versatile behaviour and result than if testing with only one type of intellectual disability.

In the end only four candidates were able to participate in the usability test and were all male. One female participant opted out due to medical reasons and for the other person, it turned out during the usability test that she does have a mobile phone but not a smartphone. Therefore, it was too difficult for her to handle the touchscreen because she was not used to it. This misunderstanding happened because the participants were suggested by the caregiver and the requirements were probably not considered correctly.

### **5.2.3 Testing method**

As presented in chapter 4.3 a prototype of the app was developed for the usability test, which is not a fully programmed app but rather a simulation. Due to the limited time and resources, the whole app could not be developed but parts of it, which are important for the conduction of the test. The participants were using the same provided iPhone 8 Plus and had to perform six test tasks while being encouraged to think aloud. This means, they are requested to speak their thoughts during the test out loud in order to be able to comprehend their thought processes, expectations and reactions (Jacobsen & Meyer, 2017, p. 182). The choice of an iPhone had no particular reasons and did not influence the test results. The focus of the test was the usability and accessibility of the app and not of the specific smartphone or operating system. Therefore, it was not decisive which device was used.

Since this study has an exploratory character, a pre and post interview were conducted with the support of an interview guide (Grünwied, 2017, p. 159), which was helpful because there were limited experiences with conducting interviews. In this way, a smooth procedure of the interview was ensured because if the interviewer lose the thread, the participants might also become uncomfortable and nervous. The interview guide consisted of twelve key questions and eight questions about background information. The questions about background information were asked during the pre-interview before testing. The guide is oriented on the research questions as well as goal of the usability test and categorised in four thematic section: app usability, app structure, app design and overall impression. All questions were formulated openly and could be adapted to the needs of the interview, which means the order of the asked questions was not of importance and sometimes there were also questions asked during the interview which are not listed in the guide because they were arisen spontaneously. There was no pre-test conducted due to the limited time and difficulty of sampling suitable candidates.

#### **5.2.4 Testing procedure**

The usability test took place at the residential home of the participants at the Lebenshilfe Merseburg gGmbH in Merseburg. The institution provided a separate room where the equipment could be set up and the test could be conducted undisturbed. The test persons were asked to come in one by one.

After the greeting, the participants had to sign a declaration of consent first, which was formulated in easy language beforehand. This consent included background information of the project, testing procedure and use of test material. It was important to get their signature and agreement because the test process and material were recorded.

As an introduction, candidates were told about the project, the purpose of the study and got an explanation of the equipment and prototype as well. Before testing, participants were asked in the form of a pre-interview a few introductory questions regarding their usage behaviour of mobile devices and social networks. Next, the test tasks, which were written in easy language and printed out, were handover to the test persons. Then the candidates were asked to solve the test tasks and encouraged to speak their thoughts aloud. After completing the usability test, a post interview was conducted to find out the

opinion of the test persons regarding the app. Overall, the interviews and usability tests had a duration between 7 to 25 minutes.

Regardless of the recording, the researcher made some notes on every test script of each participants. The notes were made when something couldn't be recorded such as certain movements, or comments on issues, abnormalities, things that reoccur, etc.

### 5.2.5 Preparation of data material

The usability tests were recorded by video and audio by the internal screen recording software of the test device. This allows to be able to look at the actions of the participants any time after the test completion. Thus, it could be seen if the test person had any problems resolving the assignments or if it could be done intuitively. The sound recording also ensures their thinking-aloud and comments to be saved for later evaluation. All interviews (pre and post) were recorded as well, so that the interviewer could have full concentration on the interviewee and be able to listen to the material again during the evaluation process. The recordings were transcribed with the MAXQDA qualitative data analysis programme for the evaluation and development of the category system. The transcription was carried out with the guideline of the following transcription rules:

Element	Display in transcript	Definition
Interviewer	Interviewer:	Marking the text passages of the interviewer, stands in the beginning of the passages of the interview
Interview partner	Respondent:	Marking the text passages of the interviewer, stands in the beginning of the passages of the interview
Time stamp	#00:00:00-0#	Stands at the end of every paragraph in order to be able to find it quickly on the recording
Paragraph	Example Interviewer Example Respondent	Blank row in between of a change of speaker
Short break	(.)	Breaks up to 1 second
Medium break	(..)	Breaks up to 2 seconds
Long breaks	(...)	Breaks up to 3 seconds



Longer breaks	(5)	Breaks longer than 3 seconds
Non-verbal expressions	(laughing) (clearing throat)	Emotional and non-verbal expressions, which support the statements
Comments	(grabs smartphone)	Actions, which cannot be recorded by audio
Incomprehensible passages	(inc.)	Passages, which are incomprehensible due to disruptions or bad quality of the recording
Breaking off words or sentences	smartph/	Marked by /
Words and sentences spoken at the same time	Interviewer: What do you think //about that?// Respondent: //I think that...//	Passages spoken at the same time are marked by //
Audible signals	ehm, oh, hm Mhm. (positive) Mhm. (negative)	All signals from respondent are being take over. All signals from interviewer omitted unless it represents an agreement or negation
Emphasis	I think this is REALLY exaggerated.	Emphasis' are displayed with capital letters

Table 2: Transcription rules (adopted from Dresing & Pehl, 2018, p. 20-25)

Furthermore, notes were made during the usability tests and interviews as well to capture actions and impressions, which couldn't be recorded by screen and voice.

### 5.2.6 Evaluation method

The evaluation of qualitative research projects is more time-consuming than of quantitative method, because the collected data consist of texts and cannot be covered statistically. With the qualitative content analysis, social trends and developments are explorable (Flick, 2014). In the following sections, the evaluation process with the qualitative content analysis according to Mayring (2016) is explained in detail. For the content analysis, he developed the process model of the data evaluation below:

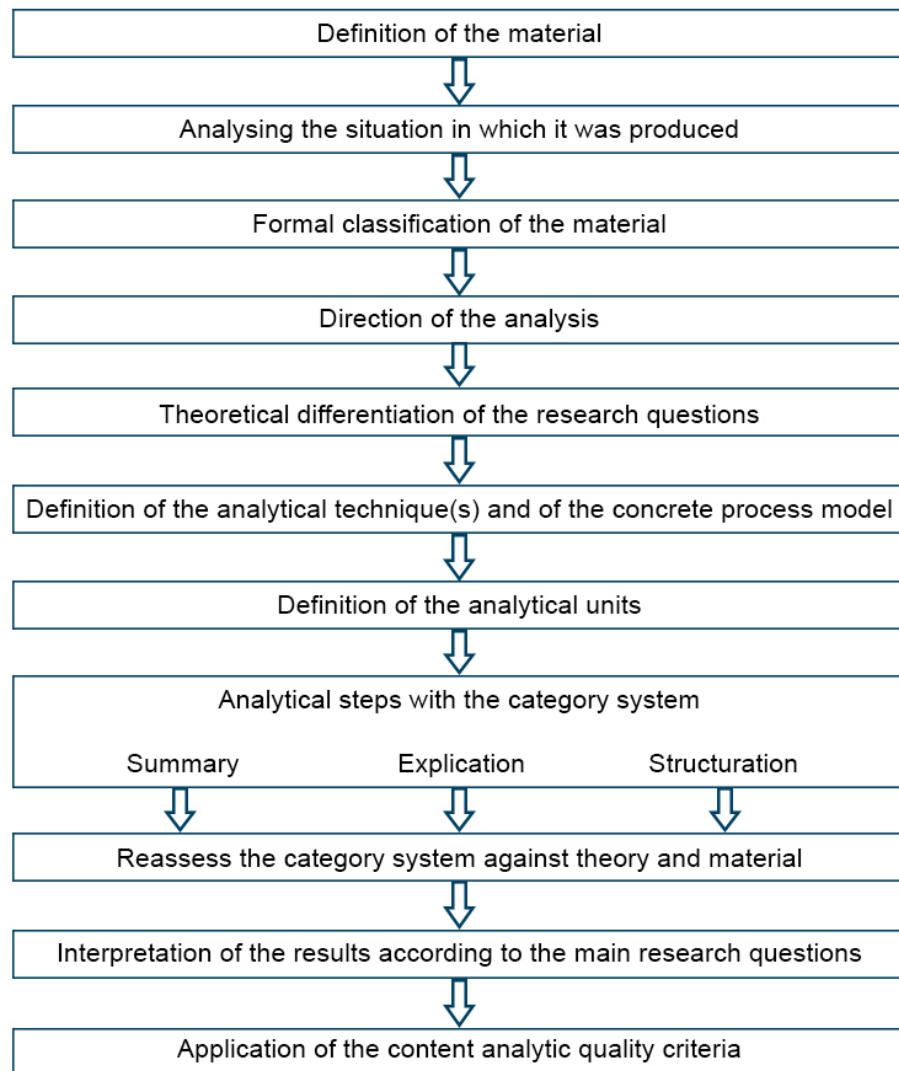


Figure 13: Content analytic process model (adapted from Mayring, 2016, p. 54)

According to Mayring, the first step is to define the material, to select the interviews or those parts that are relevant for answering the research questions. The second step is to analyse the situation of data collection: how was the material generated, who was involved, who was present in the interview situation, where do the documents to be analysed come from? In the third step, the material is formally characterised: was the material documented with a recording or protocol, was there an influence on the transcription of the text when it was edited? Those three steps were already described in chapter 5.2.2 Case selection, 5.2.3 Testing method and 5.2.5 Preparation of data material with reference to the study. In the fourth step Mayring defines the direction of the analysis for the selected texts and what needs to be interpreted. For example, compare the specific experiences the participants had during their first time being on social networks. In the next step, the research questions are further differentiated on the

basis of theories. Mayring emphasises the role of defining the research questions and categories before starting to analyse the materials in a qualitative content analysis. Finally, analytic units are defined and are differentiated between coding units (smallest element of material), contextual unit (largest element in the text) and analytic unit (passages). Next, the actual analysis is conducted before, in the final step, their results are interpreted with respect to the research questions and quality criteria.

The next section describes the summarised content analysis, which was used as the evaluation method for this study.

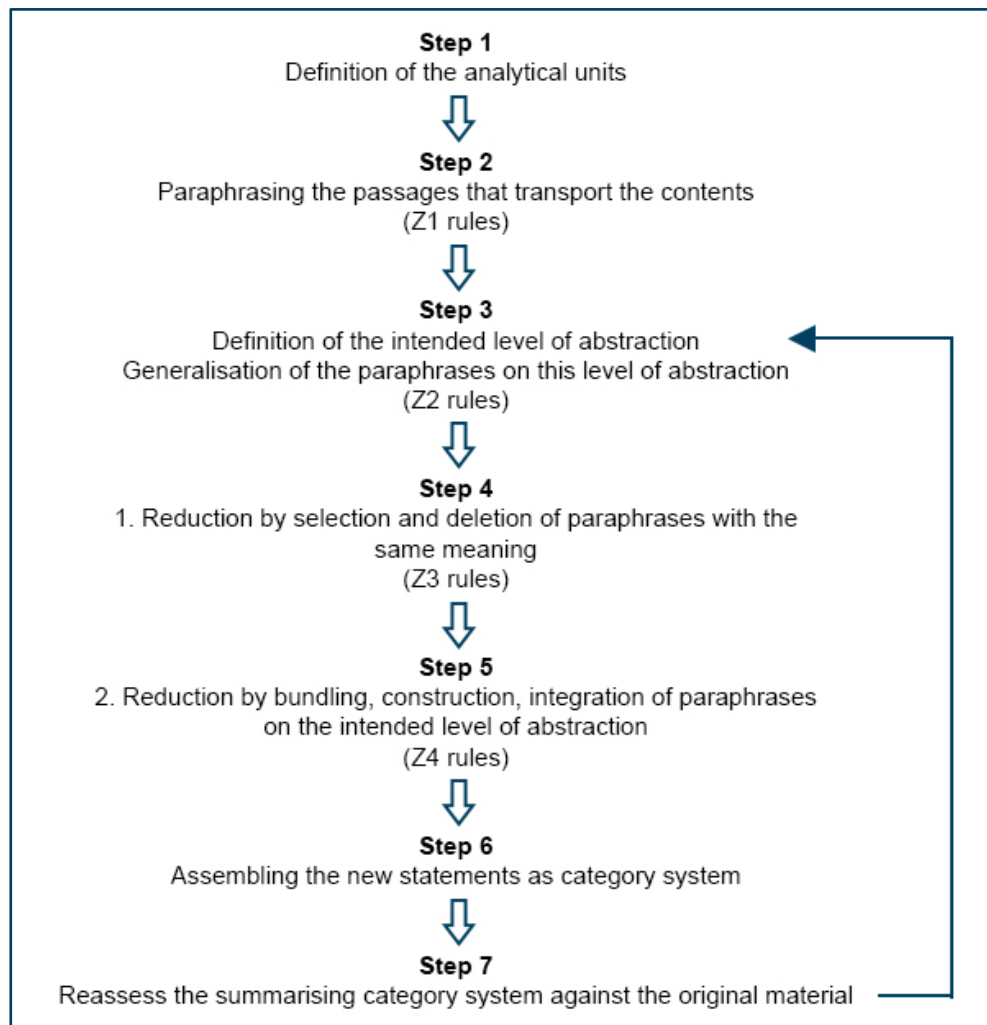


Figure 14: Process of summarising content analysis (adapted from Mayring, 2016, p. 60)

In the summarised content analysis method, the material is paraphrased. The first step is to skip less relevant passages and paragraphs with the same meanings in order to reduce the material. Similar paraphrases are then bundled and summarised (second reduction). This process allows the material to be reduced by turning several concrete

statements in the original text into paraphrases that are more and more abstract from the concrete formulations. For example, if ten statements are represented by the same paraphrase, thus the original text of the ten statements is cut down to one statement. In order to make this reduction more effective, the paraphrases are then reformulated on a more abstract and general level. This again allows a further reduction of the material. For the process of summarising statements, a number of rules are formulated by Mayring (2016).

<p><b>Z1: Paraphrasing</b></p> <p>Z1.1 Deletion of unsubstantial textual components (e.g. embellishing, repeating explanations)</p> <p>Z1.2 Translation of important text passages into a consistent level of language</p> <p>Z1.3. Transforming into grammatically short form</p>
<p><b>Z2: Generalisation to the level of abstraction</b></p> <p>Z2.1 Generalising the item of paraphrase to the defined level of abstraction so that the old items are implicated to the new formulated ones.</p> <p>Z2.2 Generalising of statements in the same way</p> <p>Z2.3 Leaving the paraphrases which are above the aspired level of abstraction</p> <p>Z2.4 Use theoretical presumptions in cases of doubt</p>
<p><b>Z3: First reduction</b></p> <p>Z3.1 Deleting of synonymous paraphrases within an analysis unity</p> <p>Z3.2 Deleting paraphrases which are not considered as content full on the new level of abstraction</p> <p>Z3.3 Adopt paraphrases which still are considered as content full (selection)</p> <p>Z3.4 Use theoretical presumptions in cases of doubt</p>
<p><b>Z4: Second reduction</b></p> <p>Z4.1 Summarising paraphrases with same or similar item and similar statement to one paraphrase (bundling)</p> <p>Z4.2 Summarising paraphrases with diverse statements to one item</p> <p>Z4.3 Summarising paraphrases with the same or similar item and different statements to one paraphrase (construction/integration)</p> <p>Z4.3 Use theoretical presumptions in cases of doubt</p>

Figure 15: Rules of summarising content analysis (adapted from Mayring, 2016, p. 62)

Before the summary, the relevant passages were filtered out of the interview with the coding system function of MAXQDA. This coding process allows a rough overview of the information as well as the formation of categories, which can be assigned to statements of the interviews. In the next step, the analysis units were reviewed sentence by sentence

and undergone a further category allocation. Thereby, the categories were reassessed, new ones were created and irrelevant categories were discarded. Eventually, the researcher could start with the qualitative analysis. First, the individual statements of the participants were paraphrased and generalised in the following procedure in order to be able to apply the first reduction. With the second reduction, the first pass of the summary was completed. The third reduction allowed the statements to dissolve from the interview and be able to be generalised. With the last reduction, the final category system was developed.

## **6 Description of results**

The following sections are describing the findings from the evaluation of the study. The first subchapter is a short summary of the usability tests, followed by the analysis of the results of the category system. Next, the findings are interpreted and implemented into the new concept and prototype of the app. Lastly, a verification of the quality criteria of the content analysis is being complied in order to review the suitability of the statements.

### **6.1 Summary of the usability tests**

All test persons were motivated and openly towards the usability test even though 50% were shy at the beginning. After a while they felt comfortable and had courage to ask the researcher if they understood the task correctly. During the testing procedure, they demonstrated patience although there was one decisive technical challenge with the prototype. It did not respond to the touch movements correctly, which causes the participants to have to tap several times during the typing process. Yet, none of the candidates cancelled the test but all were determined to finish. The usability test duration ranges from 5 to 20 minutes, the pre-interview from 20 seconds to 3 minutes and the post-interview from 2 to 6 minutes. It was also expected that they might get confused with the given registration and login data but they all understood the tasks well over. All test persons have a smartphone and are using Whatsapp and Facebook except for one candidate, who only uses Whatsapp but is interested in other social networks. The researcher tried to provide a relaxing environment by using small talk and giving confirmation. This was keeping the participants motivated and encouraged.

#### **6.1.1 Test person A**

The first test person was with about five minutes the fastest to finish the usability test. He had no problems understanding the test tasks and solved them on his own without support. It stood out that he was able to use the app intuitively from the beginning. If there was a challenge, he could overcome it by himself. Although, he didn't talk much during the test and was also given answers in form of agreement or disagreement. His responds were also short, rather quickly and without further information. It had the impression that he wanted to finish the test fast. If the researcher wanted more

information and opinion about something, it was necessary to ask specifically. It was difficult to get a lot of insights from this participant.

### **6.1.2 Test person B**

Test person B has reading difficulties but is still able to use social networks on his own. He was able to manage the test tasks because given words like the login data were easily to re-type. Challenges only occur if he doesn't know the word or the word was too long such as "Freundschaftsanfrage" [friend request]. Therefore, the researcher had to step in several times to explain the test tasks to him verbally. No support with the solution of the tasks were given, only further explanations. The candidate was determined to solve them by himself but asked for confirmation if he spelled the words correctly afterwards. Also, when unsure he liked to ask if his planned next step is correct while pointing at the buttons. He needed encouragement to just try the functions on his own. Due to his reading disabilities the test duration was longer (about 11 minutes) although he has the skills to finish faster. During the test process he did talk about his opinion on the app and also the challenges he has while using social networks. He even brought his own smartphone to demonstrate how he send messages and mentioned that he is used to handling apps as well as programmes due to his hobby as a DJ. The participant was able to recognise usual activities on his own, for example he saw immediately that he had a friend request. One particular thing, that stood out was that he didn't know where to find the @-sign and need support during the registration process. But once logged in, he was able to operate the app by himself. He admitted that he requires some time to get used to apps but afterwards he usually handles apps without help from caregivers. He also stated that he had help from his mom to set up his profile on Facebook.

### **6.1.3 Test person C**

Test person C was initially shy and need some time to get used to the prototype. But he made an exciting impression and was happy to take part in the usability test. Except for one task, he was able to solve the other tasks by himself. The participant had challenges to complete task 3 (uploading a profile picture) because he couldn't find the function, which allows him to upload the photo. After being encouraged to re-read the assignment and looking at the prototype carefully, he was able to perform the task on his own.

Otherwise, his usage was mainly intuitive and he was the first one who paid considerable attention to details such as the upper and lower cases on the keyboard. Yet, he asked several times if his actions were correctly and need encouragement to try out the functions on his own. The candidate didn't comment or talk during the test and was only given answers when asked directly. Another challenge occurred when he tried to solve the last task (writing a message). He tapped on the area of the message history with the expectation to activate the keyboard. It was intended that the test persons have to tap in the provided text box below in order to activate the keyboard. But after realising that it wouldn't work, he managed to find out that he has to tapped on the text box. This usability test took about eight minutes, which was comparably average.

#### **6.1.4 Test person D**

The last test person was the longest to finish the usability test and needed about 20 minutes. With some help he could manage to complete all test tasks. This participant also had challenges to solve task 3 (uploading a profile picture) and needed active support because he didn't know where to tap. Thus, intuitively he knew how to edit his profile and add information. Although, he didn't have reading difficulties, he took his time to think about the test tasks and what to do than the others. The candidate also liked to ask if his planned steps were correctly before performing the action and needed encouragement to try by himself. When animated to endeavour to complete the task on his own, he was able to find the right functions and could perform without help. He was another participant who didn't know where to look for the @-sign but paid considerable attention to details such as the upper and lower cases on the keyboard. It also stood out that he expected the keyboard to be activated when tapping on the message history area instead of the provided text box below, even though it was hinted where to enter the text. Furthermore, the test person had particularly difficulties with the touchscreen. On the one hand the prototype didn't respond correctly, on the other hand he had a lack of fine-motor skills and problems to hit letters on the keyboard precisely. Therefore, he had to try several times during typing processes and thus took longer time than the other test persons.



## 6.2 Results from the category system

As outlined in the methods section, the material was summarised into a category system using Mayrings content analysis method. At the end of the evaluation process, ten categories (C) and 22 subcategories (S) were created. The categories C1 – C4 are representing general information relating to the usage behaviour of mobile technology and social networks, while the categories C5 – C10 refer to the findings of the usability test. In the next paragraphs, these categories are being described with regard to the research questions. The usability tests are numbered with UT-01 – UT-04.

### 6.2.1 Usability Test

As a base for the research if the concept of the app is barrier-free or rather the prototype has a good usability, the following questions were formulated:

*Q1: How is the target group evaluating the usability of the app?*

*Q2: What does the target group think about the structure?*

*Q3: How does the target group evaluate the design?*

*Q4: What challenges does the usability test have?*

*Q5: What are important characteristics of a barrier-free apps?*

Regarding the research question Q1, category C5 and its subcategories reveals that the prototype was good to operate in some areas and had some challenges in other parts. Overall, the usability was good (S10) because the test persons had mostly no problems to solve the test tasks in a short period of time and were using the app intuitively. It was stated that it was similar to other social networks (UT-01, l. 28) and it is manageable once got used to it (UT-04, l. 56). No further suggestions for improvement was made. Although, it was mentioned that the prototype was too slow and has to be faster in order to be able to use the app without spending too much time on waiting for it to load (UT-02, l38 &46). One subcategory (S11) indicates that some functions have to be improved because candidates were expecting certain features to be working but the prototype didn't provide that particular function. For example, when trying to activate the keyboard to send a message, the test person where tapping in the area of the message history instead of the text box below even though there was a note were to type the message.

The answer to the second research questions provides C6: Structure. Except for the challenge with S11, the structure was stated as clear (UT-01, l. 24; UT-02, l. 46) and the

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most functions were easy to find. One particular function was mentioned frequently: voice messages (S16). Except for one participant, everyone likes to use voice messages. It was especially important for one person because he has difficulties with reading. Voice messages are also a way to send messages fast to save time.

The evaluation of the design (C7) had similar positive results: the meanings of the used icons were clear, so the designations were not necessary (S15). One participant admitted that he just looked at the icons instead of reading the designations. Candidates had no problems reading the text and were fine with the text font (S14) as well as colours. One test person said:

*“Ich zumindest konnte es jetzt lesen, also jetzt was hier so (zeigt auf die App), solche Buchstaben geht. Die sind fast so wie bei mir hier. (nimmt sein Smartphone und zeigt auf eine App) Ist ja fast die gleiche Größe. Muss ja einheitlich sein bei der App.“ (UT-02, l. 40) [I could read everything, like here (points at the app), those letters are ok. They are just like the ones on mine. (takes his smartphone and points at one app) It is almost the same size. It has to be uniform.]*

Category C9 is defining the challenges that occur during the usability test (S17). Out of four, one person had initial difficulties with the new app but could managed after getting used to it. Except for one candidate, who didn't need support at all, the rest had difficulties to find symbols as well as functions. Those three also needed support when solving the test tasks (S18). The support ranged from little hints to further explanations of the task and active support with the solution. They also needed constant confirmation and encouragement to try it on their own instead of asking if their actions are right or wrong. One participant had reading difficulties with long and unknown texts (S20). Another test person needs a long time to get the idea of what to do after reading the test tasks but was able to solve them on his own. He had also difficulties with the touchscreen due to his lack of fine-motor skills. Thus, the test duration of both participants was longer even though they were used to operate apps (S19).

The usability test discovered that according to the test persons, a barrier-free app should feature a clear structure and specific instructions what to do. A participant answered after being asked if he likes the app:

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*“Für mich wäre die besser als die anderen Apps. Die Erklärung wie du etwas zu machen hast.“ (UT-03, l. 87) [For me, this app would be better than the others. The instructions what you have to do.]*

Moreover, to be able to send voice messages was an important aspect for three out of four candidates. One participant mentioned that a good app should also be fast enough to keep up with the actions or typing of the user (UT-02, l. 38 & 46).

### **6.2.2 Usage behaviour**

In order to understand more about the usage behaviour of the target group, it was of significance to find out how they use mobile technology and social networks. Additionally, it was interesting to find out if their usage would have an impact on their daily life. The findings can help to match the functions of the app to their specific needs as well as verify if the guidelines of barrier-free mobile technology are enough to fulfil the requirements. Accordingly, the remaining categories are going to give answers to the following questions:

*Q6: How is the target group using mobile technology?*

*Q7: What kind of activities is the target group pursuing on social networks?*

*Q8: How are social networks influencing the daily life?*

From category C1: usage behaviour, the subcategories give answers to the research question F6 and F7. Mobile technology such as smartphones and tablets as well as mobile internet and apps are frequently used (S1). Also, participants are using social networks regularly while preferring Whatsapp and Facebook (S2). As activities on social networks (S3), playing games, writing messages with family and friends, looking at pictures and listening to music were named. It is mostly preferred to use the voice message feature because it is fast and is an alternative to people with reading difficulties (S5). Facebook is also used to look for people they know and add them to their friends list.

Category C2 and C3 prove that accessibility is not an important aspect even though they spend time on the smartphone regularly. Furthermore, according to the participants, the usage of social networks has no influence on their daily life. Reasons were stated that

they only go on social networks during leisure time and don't have the constant desire to be online.

The last category (C4) indicates further important information regarding the target group and describes their capabilities of accessing social network apps. In the subcategory S9, it became apparent that they can use social networks independently and are able to learn new things quickly. Participants had also very considerable attention to certain functions and details, for example upper and lower case on the keyboards. Yet, there is a lack of experience in using apps and certain complex functions cannot be done on their own such as the registration process due to difficulties choosing the right password and remembering it (S10).

## 7 Discussion and outlook

The last chapter is dealing with the interpretation and with subsequent adaption of the results to the edited app concept. This section is followed by the verification of quality criteria according to Mayring and approaches as well as hypothesis for further studies. Conclusively, the methodical and empirical procedures are being critically reflected and suggestions for improvements discussed.

### 7.1 Interpretation of the results

From the results it emerges that in general an app can definitely be barrier-free for people with intellectual disabilities. Although, barrier-free characteristics differ from one mental impairment to another due to the versatile forms of disabilities. Therefore, in order to develop a barrier-free app, it would be necessary to constantly analyse barriers and update the app continuously to meet the needs of all intellectually disabled people. The versatile disabilities might be a reason for the mixed results on the usability test; when some were able to manage the app without support, others had difficulties to find certain functions. It also needs to be considered how much experience participants have in using mobile technologies as well as social networks. Some might have difficulties because they tend to forget how complex processes work or always had support for those situations. For example, registering a new account. It might also be the reason that the register and login process is only required to be done once and not frequently as writing messages for example. Comparatively, even people without disabilities tend to forget their password or username occasionally. Nevertheless, everyone test person was able to get used to the app after an acclimatisation period. The results also show that the usage of social networks is mainly intuitively because the structure of those apps is similar to each other.

The challenges of finding certain functions can also be due to the structure and design of the prototype instead of lack of skills or understanding. It stands out that task 3 might be a difficulty because the button was not big enough or too unobtrusive. Furthermore, expected functions were not available. One that occurred repeatedly was during the last task: writing a message. Participants expected to be able to activate the keyboard when tapping on the message history, but it only appeared when tapping on the text box. Even though, there was a note saying: "Enter your message here", it was overlooked by most

of them. This means, people with intellectual disabilities might not think about what might be logical for other persons but rather just do it. In contrast, icons had designations in order to help the target group to find certain functions quickly. But it turned out, that this was not necessary because the meanings of the symbols were clear to them and they didn't even paid attention to the designations. This finding shows, that functions should be indicated by simple icons that usually everyone knows without thinking about it. For example, action of writing messages can be represented by a graphic of a letter and a pen, while the function of taking a picture can be symbolised by a graphic of a camera.

Another important point are the test tasks. It didn't exactly emerge if the wording of the tasks were the reason that some persons need more explanations or if it was due to their cognitive abilities. Even though, the participants said that they knew what to do, some did need confirmation that they understood the task correctly. This shows that mentally impaired person still need support with new things and situations or when being unsure about something. Even after confirming that their approaches are correct and being encouraged to try it on their own, test persons kept asking if they do it correctly. It might be a habit of them or they might have learned to always ask for approval to reassure that they were not doing something wrong.

The only suggestion that were stated is that the app needs to be faster. The reason for the prototype to have issues is though, that it didn't respond to touch correctly due to technical obstacles. Therefore, during this test it couldn't be identified if the reason for tapping problems fully occur due to the prototype issues or would have been solve with a professionally developed app. No further suggestions for improvements were made despite some challenges that they had. The reason might be that they had no idea how to answer the question or they were afraid of saying something wrong and were seeking confirmation rather than disapproval.

As described in the state of the art, mobile technology and social networks usage are regularly. Preferably, the smartphone is used for all activities. It could be the reason that smartphones are small and can be used as well as taken to any places (chapter 3.2.2). Only two social networks were mentioned: Whatsapp and Facebook. The latter is the biggest social network in the world (chapter 3.4.1), so it could be expected that participants were member of that network. Though Whatsapp is not a typical social network, it is compared to social networks often because according to the definition of social networks (chapter 3.4.1) it has some features that usual social networks have. On Whatsapp people can also instantly connect, communicate and interact socially in form

of text, images, video and audio. Nowadays, you have a profile on Whatsapp, share status and stories as well as exchange media just as on Facebook. The only difference is that your profile is not open to everyone and you cannot randomly find people to add on Whatsapp. The sharing of information usually happens in private conversation on Whatsapp. On Facebook for example, people can see friends of friends if they comment on the same public picture. Nevertheless, Whatsapp still provides useful insights about the usage behaviour of people with mental disabilities. It seems like they prefer to use Whatsapp for sending messages because it has a clear and simple structure. The usage also indicates that sending messages is the main reason for using social networks and could be the central function when developing a barrier-free app. This also confirms the similar results of the study by Shpigelman & Gill (2014) on how people with mental impairments like to send messages on social networks. In this context, one feature that was mentioned several times was voice messages. It has the impression that this function was particularly important, especially for people with reading difficulties. Voice messages can be done fast because speaking is much quicker than typing in a long message. The test persons seem to choose the easier way to use social networks. Also, that function might also be a better alternative to people with fine-motor dysfunctions because it might be difficult for them to hit the buttons correctly. This way, they can skip the process of typing in a message, which would probably take longer for them than recording a voice message.

Surprisingly, the results show that accessibility to and availability of social networks are not as important as presumed from the theory. Social networks are only used occasionally during leisure time and mainly to send messages to family and friends. It might also be the reason that too less people were asked to do the test and could be different when there was a larger amount of test persons instead of only four. Also, the aspect of feeling alone and being isolated from society couldn't be verified as described in theory. This is might be due to them all living in a residential home together, where they always have someone there to spend time with and talk to. Results could might be totally different with another group of test persons, who don't live in a residential home with other intellectual disabled people.

Overall, the results and defined challenges indicates that the dealing with new mobile technology such as smartphones and apps as well as social networks could be improved if the required competence for the usage is promoted. There are not only technical barriers but also the media competence is required. Results and observations show that people with intellectual disabilities are able to learn how to manage social networks on

their own. Although, they might need support with certain processes (registration, login), it can be assumed that they would be able to handle them on their own if someone would show them how. Therefore, education in those areas would be a good approach to help a barrier-free and inclusive usage of social networks.

## **7.2 Quality criteria of content analysis**

Any kind of social research asserts its claims to fulfil certain quality criteria for measuring and collecting data. It is widely accepted that measurement or the methods of measurement should be as objective, reliable and valid as possible. In fact, the research strategy that is regularly pursued in content analysis is governed by these traditional criteria of validity and reliability, where the latter is a precondition for the former (but not vice versa). Since arguments concerning the content are judged to be more important than methodical issues in qualitative analysis, validity takes priority over reliability (Mayring, 2016). In practice, quality criteria for the qualitative analysis are defined to review the suitability of the statements and material. Below, the study is analysed by the six quality criteria according to Mayring.

### **7.2.1 Rule drivenness**

Although qualitative research has to be open towards its field and ready to modify the in advance planned steps of analysis, it has to follow certain codes of practice and process data systematically as well.

The rule drivenness of this thesis can be verified because the steps of analysis were defined prior to the conduction and described in the methods section. Accordingly, the investigation of the research questions has been proceeded systematically.

### **7.2.2 Proximity to the subject under discussion**

Instead of getting the test persons into a laboratory, qualitative research tempts to go into the field and perform studies in the natural world of the subject under discussion. In contrast to experiments, qualitative research aims to do research with and in favour of



the concerned environment. Through the rapprochement of researcher and persons concerned, the research process achieves the closest possible proximity to the subject.

This quality criterion is represented in this study as well since interviews were conducted and participants had the possibility to speak freely about their experiences and opinions. Furthermore, the usability test and interviews were completed in a familiar environment of the test persons.

### **7.2.3 Documentation of procedures**

According to Mayring, any result is scientifically worthless, if procedures, which lead to the result, are not documented properly. In qualitative research, methods are not standardised and more differentiated as well as often specific to a certain domain or field of research. As a consequence, procedures have to be documented in detail in order to make the research process traceable to others.

In order to fulfil this criterion, the procedure and conduction was described in detail in the chapters of the methodical approach (5.2). Additionally, for a complete traceability the interviews and usability tests were recorded and transcript. In order to comprehend the steps of evaluation, the category system is attached to this thesis.

### **7.2.4 Argumentative backing up of interpretation**

In qualitative research, interpretation play a decisive role and thus, assessing the research's quality has to emphasise the interpretative parts. Since interpretations cannot be recalculated like arithmetic operations, interpretations have to be reasoned argumentatively. First, the preconception for the respective interpretation has to be adequate inducing that explanation is reasonably theory driven. Second, interpretations have to be argued conclusively. Finally, it is important to think of alternative explanations and to disprove them.

The interpretation of the results was constantly done with reasons and reference to previous studies as well as literature from the state of the art. Moreover, interpretations were support by the observations during the usability tests and were able to give answers to the research questions.

### **7.2.5 Communication validation**

A way of validating the interpretations and results is to present the work to the concerned persons (interview partners, test persons, etc.) and discuss the matters. If they can find themselves in the results and interpretations, this could be a significant argument that backs up the results. Certainly, this must not be the only criterion, otherwise an analysis could never go beyond the subjective meaning of the persons concerned and would be stuck to their myths, stereotypes and ideologies. Nevertheless, qualitative orientated research regards the persons under study as more than merely a data supplier and seeks for the dialog in order to gain significant arguments.

In this research, this quality criterion is being excluded due to the limited time of processing this master thesis. Therefore, an extensive discussion with the test persons about the results could not be conducted.

### **7.2.6 Triangulation**

The concept of triangulation can be compared to a triangle, where only the linkage of the three sticks constitutes the sound. Thus, the combination of several strings of analysis may enhance a qualitative research's quality. Triangulation does not aim at achieving completely identical results but uses different perspectives and composes them to a kaleidoscopic picture.

The results of this study were compared and set in contrast to each other during the interpretation process. It emerged that there are some differences between the results.

## **7.3 Formation of hypotheses and approaches for further studies**

Through the explorative research, many useful findings were gained and those results give approaches for further empirical studies. Therefore, the following hypotheses are derived from the acquired results of the study and could be verified in a quantitative research. From the overall interpretation the first two hypotheses emerged:

*H1: The use of social network apps increases when media competence is promoted.*

*H2: The lack of capabilities can be supported by the right education.*

Category C-10 describes what characteristics are needed for the development of a barrier-free app. On these grounds, two central hypotheses can be derived:

*H3: A barrier-free app has the feature of voice messages.*

*H4: The app is barrier-free when there are instructions of what to do.*

Due to the preference of using voice messages (C1-S5), the following hypothesis can be assumed:

*H5: The majority of people with intellectual disabilities prefer to use voice messages.*

## **7.4 Outlook and critical reflexion**

The research for this thesis was rather difficult because there are not many studies about the social network usage of people with intellectual disabilities. Currently, there is no social network platform that fully meet the needs of mentally impaired people. There are guidelines and applications, which are trying to adapt to the requirements of the mentioned group and can be used as a guide for the development of the app conception. The review of literature for this research has indicated that there are few studies that relate to how mobile technology and the usage of social networks impacts the lives of intellectually disabled people. However, the majority of the studies on accessibility and technology usage have focused on disability in general or internet access. There was very little information about the specific usage of social networks by mentally impaired persons. Furthermore, those studies do not clearly distinct between the opportunity of access and actual use. Particularly, future researches should report more clearly about the nature of the disabilities of the respondents because individuals with mental impairments are a heterogeneous group, so influences on access are likely to differ amongst them. It was also challenging to find latest statistics and studies related to mobile technology usage generally as well as by people with intellectual disabilities.

Regarding the methodical approach, there were several challenges that occurred during the study process. One problem that had decisive impact on the usability test was, that the prototype was not responding correctly to tap gestures since it was only a simulation.

Therefore, the test persons were forced to tap the buttons and letters on the keyboards several times for it to work. This occurrence had an impact on the test results. It couldn't be determined if the challenges regarding the touchscreen were only caused by the issue of the prototype or by the lack of fine-motor skills of the participants. For better preconditions of the usability test, it is recommended to use a more advanced prototype, for example one that is not only a simulation but programmed by professionals. This option couldn't be realised due to the lack of required resources such as financially and timewise.

The qualitative study is based on data that are gained not only from the usability test but also from the interviews as well. Overall, the conduction of the interviews proceeded without problems but there are some aspects, which need improvements. On the one hand, the researcher doesn't have much experience on conducting interviews as part of an empirical study. On the other hand, it was a challenge to remember to constantly ask open questions because typically, people prefer to ask closed and often suggestive questions. This led to situations during the interview that test persons were responding with only "Yes" or "No" answers. Even though, the interviews provided useful information for the answering of the research questions, some responds might have been more detailed when the right interview questions would have been asked. Furthermore, no pre-test could be conducted due to the lack of time. The pre-test would have shown, that some questions would have needed improvement because they didn't encourage to talk freely. Moreover, the researcher could have practice conducting an interview with people with mental disabilities and get used to the role of an interviewer. Additionally, potential problems could have been identified and the researcher could have been prepared for them. For example, the interviewer was afraid that the test persons would become impatient eventually and might cancel the test. Therefore, the first test was rather "rushed through". But it turned out that the candidates were motivated, very patient and able to handle the situation accordingly.

One more challenge was to not only ask the right questions but trying to make the test persons feel comfortable in order to encourage them to talk freely. It was planned to use the method thinking aloud during the usability test but that didn't work out as intended. Most of the participants probably didn't like to talk much or didn't like to talk much with people they just met. Even though, the researcher had the impression that they were relaxed after a while and tried to encourage them to talk, they only respond when specific questions were asked. This contributed to an uncertainty on both sides and eventually further questions were stopped being asked because the interviewer didn't want to keep

pressuring the participants and make them uncomfortable. As discussed in chapter 4.1.2, it was expected that obtaining views and information from people with intellectual disabilities is particularly difficult due to their cognitive impairments and limited communication skills. The researcher also had the impression that some questions were only agreed or disagreed on because it was suggested, or the question was not understood correctly (acquiescence). This behaviour might also affect the outcome of the results. Nevertheless, the more tests were conducted, the interviewer became more confident with managing the interviews and usability test.

The last critical point of this research is, that it is recommended for a project like this to involve several people and experts. Due to the complex topic and requirements, it was a huge challenge to comply all important aspects and specifications. It would have been better to have the help of experts such as app developers and people who are professionals in the field of intellectual disabilities or already have experience in developing barrier-free technologies. It would have been a great support to just be able to ask them for advice and experiences. Furthermore, even though according to Jakob Nielsen (2000) only five test persons are enough to reveal 85% of all usability problems of a test object, the development of a barrier-free app definitely requires more. The reason is again, the assorted characteristics of intellectual disabilities. The barriers need to be constantly analysed and updated because not all requirements can be found out with just a few studies. It is an ongoing process which demands a lot of work and expertise.

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## **Appendix**

Appendix A – Project paper and declaration of consent

Appendix B – Test script

Appendix C – Test tasks

Appendix D – Interview transcriptions

Appendix E – Category system

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## Appendix A – Project paper and declaration of consent

Masterarbeit:  
„Konzeption einer mobilen barrierefreien sozialen Netzwerk-  
App für Menschen mit intellektueller Beeinträchtigung“  
Mila Pham  
Hochschule Merseburg



### **Benutzer-Freundlichkeits-Test: Barrierefreie soziale Netzwerk-App**

#### **Worum es geht:**

Es geht um die Entwicklung einer Netzwerk-App.  
Apps sind Programme für Computer, Tablets oder Handys.  
Die Netzwerk-App richtet sich an Menschen mit geistiger Behinderung.  
Daher soll die Netzwerk-App barrierefrei sein.  
Barrierefrei bedeutet,  
dass alle Menschen die Netzwerk-App benutzen können.

Es soll ein Benutzer-Freundlichkeits-Test durchgeführt werden.  
Der Test soll überprüfen,  
ob die Netzwerk-App leicht zu bedienen ist.  
Für den Test wurde ein Beispiel der Netzwerk-App erstellt.  
Bei dem Test sollen 6 Test-Aufgaben gelöst werden.

#### **Voraussetzungen:**

Die Test-Person soll folgende Eigenschaften erfüllen:

- die Test-Person benutzt Handys oder Tablets
- die Test-Person ist an soziale Netzwerke interessiert,  
zum Beispiel: Facebook
- die Test-Person versteht einfache Aufgaben-Stellungen in leichter Sprache



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### **Test-Ablauf:**

Als erstes wird das Projekt vorgestellt

und der Test-Ablauf erklärt.

Danach wird ein kurzes Interview durchgeführt,

um die Test-Person näher kennenzulernen.

Dann bekommt die Test-Person die Test-Aufgaben,

die nacheinander gelöst werden müssen.

Bei dem Test ist es erlaubt seine Gedanken laut auszusprechen.

Das ist eine große Hilfe,

um herauszufinden, ob die Test-Person die Netzwerk-App mag oder nicht.

Am Ende wird nochmal ein kurzes Interview durchgeführt.

Bei dem Test wird der Bildschirm von dem Test-Gerät aufgenommen.

Die Interviews werden auch aufgenommen.

Es wird nur die Stimme der Test-Person aufgenommen.

Das Gesicht bleibt unerkant.

Die Aufnahmen werden nicht öffentlich gemacht,

sondern nur für die Auswertung genutzt.

Die Test-Person muss mit den Aufnahmen einverstanden sein.

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## Einverständniserklärung

Vielen Dank.

Dass Du dabei hilfst die App zu testen.

Der Testablauf wird mit Ton aufgezeichnet.

Das erleichtert die Auswertung der Ergebnisse.

Die Aufzeichnung wird nur für die Masterarbeit verwendet.

Die Aufzeichnung wird nicht veröffentlicht.

Bitte lese Dir die folgende Erklärung durch.

Darunter kannst Du unterschreiben.

---

Ich bin damit einverstanden, dass ich in Ton aufgezeichnet werde.

Während ich an dem Test teilnehme.

Ich gestatte es ausdrücklich, dass diese Aufzeichnung für die Studie der Masterarbeit verwendet werden darf.

Vorname und Name: \_\_\_\_\_

Ort und Datum: \_\_\_\_\_

Unterschrift der Testperson: \_\_\_\_\_

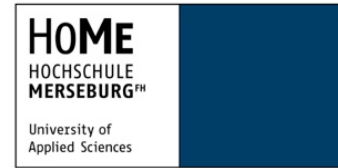
Unterschrift der Testleiterin: \_\_\_\_\_

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## Appendix A - English version

Master thesis:  
Conception of a barrier-free mobile social network app  
for people with intellectual disabilities

Mila Pham  
Merseburg University of Applied Sciences



### **Usability test:**

#### **Barrier-free social network app**

##### **The project:**

The project is about the development of an app.

Apps are programmes for computers, tablets and smartphones.

The social network app is targeting people with intellectual disabilities.

Therefore, the app needs to be barrier-free.

Barrier-free means,

that everyone is able to use the app.

The app needs to undergo a usability test.

The test analysed,

if the app is easy to use.

For the test, a prototype was simulated.

There are 6 test tasks,

which need to be solved.

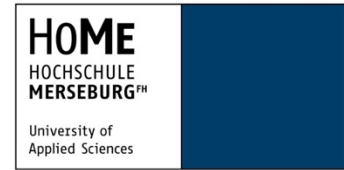
##### **Requirements:**

The test persons fulfil the following criterias:

- Uses smartphones or tablets
- Interested in social networks  
For example: Facebook
- Can read the test tasks in easy language

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Merseburg University of Applied Sciences



**Test procedure:**

First, the project will be introduced  
and the test procedure explained.

Then a pre-interview will be conducted  
in order to get to know the test persons usage behaviour.

Then the test persons will receive the test tasks.

During the test, it is allowed to speak aloud.

At the end, a post-interview is conducted.

The whole usability test will be recorded by video.

The interviews will be recorded by audio.

Only the voice of the test person is being recorded.

The identity stays anonymous.

The recordings will not be published,

but used for the evaluation only.

The test person needs to agree with the recordings.

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## Declaration of consent

Thank you,  
for participating in this usability test.  
The test procedure will be recorded by video and audio.  
This makes the evaluation easier.  
The recordings will only be used for the master thesis.  
The recordings will not be published.  
Please read this declaration carefully.  
You can sign below.

---

I agree to the recording by video and audio.  
I authorised,  
that the recording can be used for the master thesis.

First name and family name: \_\_\_\_\_

Date: \_\_\_\_\_

Signature of test person \_\_\_\_\_

Signature of test manager: \_\_\_\_\_

## Appendix B – Test script

### Usability-Test: Testskript

#### Pre-Test Fragen zur allgemeinen Information:

- *Welche sozialen Netzwerke nutzt du?*
- *Für welche Aktivitäten benutzt du soziale Netzwerke?*
- *Wie viel Zeit verbringst du auf sozialen Netzwerken?*
- *Wie wichtig sind dir soziale Netzwerke?*
- *Wie beeinflusst die Nutzung der sozialen Netzwerke deinen Alltag?*
- *Was magst du an der Nutzung von Apps?*
- *Welche Erwartungen hast du an der App, die du gleich testen wirst?*

Nach dem Pre-Interview wird der Testperson genau erklärt wie der Usability-Test ablaufen wird. Die Erklärung wird in Form eines Szenarios erzählt, damit die Testperson sich besser in die Situation hineinversetzen kann.

---

## Durchführung des Usability-Test

Die Testperson bekommt die Testaufgaben und soll diese nacheinander erledigen. Während des Tests wird die Testperson zum "lauten Denken" aufgefordert. Die Aussagen werden mithilfe einer Tonaufnahme festgehalten. Während des Testablaufs wird der Bildschirm des Testgeräts aufgenommen.

### Kommentare zu den Aufgaben:

Aufgabe 1: Einen neuen Account registrieren

Aufgabe 2: Anmelden

Aufgabe 3: Profilbild hochladen

Aufgabe 4: Profil bearbeiten

Aufgabe 5: Eine Freundschaftsanfrage annehmen

Aufgabe 6: Eine Nachricht senden

## Post-Interview nach dem Usability-Test

Nach dem Usability-Test wird mithilfe eines Interviewleitfadens ein kurzes Interview geführt, um Eindrücke und Beurteilungen über die App zu sammeln. Das Interview wird als Tonaufnahme aufgenommen.

### **Interviewleitfaden:**

#### **1. Usability der App**

*Wie ist dein allgemeiner Eindruck von der App?*

*Wie intuitiv war die Nutzung der App?*

*Wie leicht/schwierig findest du die Navigation der App?*

#### **2. Struktur der App**

*Wie leicht/schwierig war es bestimmte Funktionen zu finden?*

*Wie sinnvoll findest du die Aufteilung?*

#### **3. Design der App**

*Wie lesbar waren die Textinhalte?*

*Welchen Eindruck hast du von den Farben der App?*

*Wie hilfreich waren die Symbole/Icons?*

*Wie hilfreich waren die Beschriftungen? (Oder würden die Icons ausreichen?)*

#### **4. Allgemeiner Eindruck über die App**

*Was magst du an der App?*

*Was magst du nicht an der App?*

*War etwas dabei was du nicht erwartest hattest?*



---

## Appendix B - English version

### Usability Test: Test script

#### Pre-test questions for general information:

- *Which social networks are you using?*
- *Which activities are you using social networks for?*
- *How much time are you spending on social networks?*
- *How important are social networks for you?*
- *How does the usage of social networks impact your daily life?*
- *What are you liking about the usage of social networks?*
- *What expectation do you have on the prototype you will be testing?*

After the pre-interview, the procedure of the usability test will be explained clearly. The explanation will be in form of scenarios so that the test persons can have a better feeling for the testing situation.

---

## Conduct of the usability test

The test person is getting the test tasks and is instructed to solve them consecutively. During that process they are encouraged to think aloud. The statements will be recorded by voice, while the usability test will be recorded by video as well.

### Comments on the test tasks:

Task 1: Register a new account

Task 2: Log into your account

Task 3: Upload a profile picture

Task 4: Edit your profile

Task 5: Accept a friend request

Task 6: Send a message

## Post interview after the usability test

After the usability test, a post interview is conducted with the help of an interview guide in order to collect impressions and opinions on the app. The interview will be recorded.

### **Interview guideline:**

#### **1. Usability of the app**

*How is your general impression on the app?*

*How intuitive is the usage of the app?*

*How easy/difficult are you evaluating the operation of the app?*

#### **2. Structure of the app**

*How easy/difficult were certain functions to find?*

*How are you evaluating the division of the structure?*

#### **3. Design of the app**

*How readable were the text contents?*

*How are you evaluating the colours of the app?*

*How helpful were the symbols/icons?*

*How helpful were the designations? (Or were the icons sufficient?)*

#### **4. General impression of the app**

*What are you liking about the app?*

*What are you disliking about the app?*

*Were there any functions that you didn't expect?*

## Appendix C – Test tasks

### Usability-Test: Testaufgaben

Du hast jetzt die neue App Bondy heruntergeladen.  
Und bereits auf deinem Handy installiert.  
Bevor du sie nutzen kannst,  
musst du ein neues Konto erstellen.

#### **Aufgabe 1: Ein neues Benutzerkonto registrieren**

Registriere ein neues Benutzerkonto.

Dein Benutzername ist: **alex**

Dein Passwort ist: **keks1**

Deine E-Mail-Adresse ist: **alex@web.de**

Für diesen Test musst du dein Konto nicht in der E-Mail bestätigen.  
Du kannst direkt mit Aufgabe 2 weitermachen.

#### **Aufgabe 2: Bei der App anmelden**

Melde dich nun bei der App an.

Dein Benutzername ist: **alex**

Dein Passwort ist: **keks1**

#### **Aufgabe 3: Profilbild hochladen**

Es ist deine erste Anmeldung.

Daher sind noch keine Informationen auf deinem Profil.

Damit dein Profil interessanter wirkt,

lade ein Profilbild hoch.

Bitte benutze für diesen Test das Bild mit dem Hund.

Das findest du in der Bibliothek.

**Aufgabe 4: Profil bearbeiten**

Du hast jetzt ein Profilbild.

Bearbeite jetzt dein Profil.

Gebe den Wohnort ein: **Leipzig**

Gebe ein Hobby ein: **Filme anschauen**

**Aufgabe 5: Freundschaftsanfrage annehmen**

Du hast eine Freundschaftsanfrage bekommen.

Nehme diese Freundschaftsanfrage an.

**Aufgabe 6: Eine Nachricht schreiben**

Lisa und du seid nun Freunde auf Bondy.

Schreibe Lisa eine Nachricht.

Schreibe diese Nachricht an Lisa: **Hallo Lisa**

**ENDE**

Du hast alle Aufgaben erledigt.

Vielen Dank.

## Appendix C - English version

### Usability test: Test task

You recently download the app Bondy.  
And it has already been installed on your phone.  
Before being able to use it,  
You have to register a new account.

#### Task 1: Register a new account

Register a new account.  
Your username is: **alex**  
Your password is: **keks1**  
Your e-mail address is: **alex@web.de**

For this test you don't have to confirm your e-mail address.  
You can continue with the next task.

#### Task 2: Log into the app

Please login to the app.  
Your username is: **alex**  
Your password is: **keks1**

#### Task 3: Upload a profile picture

It is your first login.  
Therefore, there are no information on your profile yet.  
For your profile to become more interesting,  
Upload a profile picture.  
For this test, please use the picture of the dog.  
You will find the picture in the library.

**Task 4: Edit your profile**

Finally, you have a profile picture.

Now you edit your profile.

Insert the location: **Leipzig**

Insert a hobby: **watching movies**

**Task 5: Accept a friend request**

You received a friend request.

Accept the new friend request.

**Task 6: Write a message**

Lisa and you are now friends on Bondy.

Write Lisa a message.

Write this message to Lisa: **Hello Lisa**

**Finish**

You solved every task.

Thank you.

## **Appendix D – Interview transcriptions**

### **Testperson A - männlich, 25 Jahre**

**Pre-Interview: 20 Sek.**

**Usability-Test: 4:40 Min.**

**Post-Interview: 2:00 Min.**

#### **Pre-Interview**

Interviewer: Benutzt du regelmäßig dein Smartphone?

Befragter: Ja.

Interviewer: Auch regelmäßig mit Internet?

Befragter: Ja, auch mit Internet.

Interviewer: Benutzt du auch Apps und soziale Netzwerke?

Befragter: Ja.

Interviewer: Auch Facebook zum Beispiel?

Befragter: Ja.

(Weitere Fragen wurden nach dem Usability-Test gestellt)

#### **Usability-Test**

- war sehr schnell fertig
- keine Probleme
- brauchte keine Hilfe bei den Aufgaben
- nutzt die App intuitiv
- hat währenddessen nicht geredet wie die anderen
- Touch wurde nicht richtig angenommen

#### **Post-Interview**

Interviewer: Wie ist dein Eindruck von der App?

Befragter: Gut.

Interviewer: Ist dir etwas aufgefallen was verbessert werden könnte?

Befragter: Nö.



Interviewer: Wie unterscheidet sich die App deiner Meinung nach mit anderen sozialen Netzwerken?

Befragter: Unterscheidet sich nicht.

Interviewer: Konntest du sie gut bedienen?

Befragter: //Mhm.//

Interviewer: //Oder ist die Schrift zu klein?//

Befragter: Nö, ist eigentlich in Ordnung so.

Interviewer: Ok. Dann möchte ich gerne noch wissen, welche Aktivitäten benutzt du sonst so auf den sozialen Netzwerken?

Befragter: Ich spiele meistens.

Interviewer: Spielen?

Befragter: Mhm. (...) Musik runterladen, Bilder. So vom Fußball.

Interviewer: Schreibst du auch Nachrichten?

Befragter: Ja, bei Whatsapp. Und bei Facebook.

Interviewer: Benutzt du sonst noch irgendwas?

Befragter: Nö.

Interviewer: Nur die beiden?

Befragter: Ja.

Interviewer: Mit wem schreibst du Nachrichten?

Befragter: Freunde und Familie und Kumpels.

Interviewer: Und ist dir das wichtig, dass du so etwas nutzen kannst?

Befragter: Eigentlich nicht.

Interviewer: Brauchst du eigentlich nicht?

Befragter: Nö.

Interviewer: Verbringst du denn viel Zeit auf sozialen Netzwerken?

Befragter: Manchmal ja. Wegen den Spielen.

Interviewer: Würdest du sagen, dass es deinen Alltag beeinflusst?

Befragter: Nein, nicht unbedingt. Es ist eher für Freizeit.

Interviewer: Und hast du auch einen Computer //oder//

Befragter: //Nee.//

Interviewer: //benutzt du nur Handy?//

Befragter: Nur Handy.

Interviewer: Alles klar. Dann bist du fertig.

---

## **Testperson B - männlich, 25 Jahre**

**Pre-Interview: 2:45 Min.**

**Usability-Test: 11:10 Min.**

**Post-Interview: 5:20 Min.**

### **Pre-Interview**

(Bei den ersten Fragen wurde vergessen das Aufnahmegerät anzuschalten)

Interviewer: Du hast ja ein Smartphone. Welche sozialen Netzwerke benutzt du täglich?

Befragter: Whatsapp.

Interviewer: Welche sozialen Netzwerke benutzt du noch?

Befragter: Facebook, ja.

Interviewer: Also du benutzt Facebook und Whatsapp?

Befragter: Ja.

Interviewer: Wie benutzt du denn Whatsapp?

Befragter: Da mache ich dann Sprachnachrichten.

Interviewer: Benutzt du auch oft Facebook?

Befragter: Ja, teilweise. Nur nebenbei so, aber mehr Whatsapp eigentlich.

Interviewer: Und verschickst du dann eher Nachrichten oder //was für Aktivitäten machst du auf den Netzwerken?//

Befragter: //Ich mache da// einen Smiley hin oder ich mache praktisch so hier (holt eigenes Smartphone raus) Habe mal mein handy mitgebracht. Pass auf, dann mache ich das manchmal so hier (zeigt wie er Sprachnachrichten verschickt)

Interviewer: Alles klar. Also tippen tust du gar nicht?

Befragter: Ich kann auch mal was schreiben so wie (tippt „Du“) das hier jetzt. Also das was ich kann so richtig. Also so wie schwere Aufgaben und sowas, so wie das jetzt hier (zeigt auf das Blatt mit den Testaufgaben) was oben steht, kann ich jetzt nicht entziffern.

Interviewer: Ok, alles klar.

## Usability-Test

- Probleme beim Lesen
- vorgegebene Wörter konnten gelesen werden, d. h. beim Test gab es keine Probleme, aber war dementsprechend etwas langsamer
- hat Hilfestellung bei den Aufgaben gebraucht
- fragt viel nach statt einfach von alleine auszuprobieren
- muss animiert werden selbst nach Funktionen zu schauen
- fragt nach dem Eintippen, ob Wörter richtig geschrieben sind
- kannte das @-Zeichen nicht
- braucht Hilfe beim Einrichten von Benutzerkonto, aber kann soziale Netzwerke sonst selbstständig nutzen
- hat von alleine die Freundschaftsanfrage gesehen
- benutzt neue Apps nicht so intuitiv, aber nach einer gewissen Zeit ist die selbstständige Nutzung kein Problem
- Touch wurde nicht richtig angenommen

## Post-Interview

Interviewer: So, jetzt kannst du mir erzählen was an der App verbessert werden muss.

Befragter: Die ist ein bisschen zu langsam.

Interviewer: Und was noch? Was hat dir gefallen, was hat dir nicht gefallen?

Befragter: Es kann// So wie es jetzt ist, ist es schon ok. Was noch verbessert werden kann ist praktisch, dass es schneller sein muss. Also wer gut schreiben kann, ja, ich sehe, dass viele Leute die machen so schnell schreiben, ja, da kommt manchmal das Handy nicht mit. Das muss verbessert werden. Die Sprachnachricht ja, das sind A und O. Also heutzutage wollen wir schnell was schreiben eigentlich. Manchmal geht das kaum, wenn du Auto fährst ja, dann ist es normal, dass du mal schnell drauf sprichst, ja, wie bei Whatsapp. Das musst verbessert werden. Und ja, das Handy ist bisschen zu langsam. Aber sonst ist es eigentlich fast ok.

Interviewer: Konntest du denn alles gut lesen?

Befragter: Also für// Ich zumindest konnte lesen jetzt, also jetzt was hier so (zeigt auf die App) solche Buchstaben geht. Die sind fast so wie bei mir hier so. (nimmt sein Smartphone und zeigt auf eine App) Ist ja fast die gleiche Größe. Muss ja einheitlich sein bei der App. Also wie gesagt größer darf es ja nicht sein normalerweise ja.

Interviewer: Warum denn nicht?

Befragter: Es kann groß sein, aber unter der Schrift, sag mal jetzt SoundCloud ja, (zeigt auf die App SoundCloud auf seinem eigenen Smartphone) steht ja auch ganz klein SoundCloud. Und ein Bild muss praktisch hin, also d. h. wenn du die App kaufst oder downloads, muss praktisch der Käufer oder der- oder diejenige, muss praktisch wissen, ok, ist die// muss ich da was bezahlen? Ist die kostenlos? Oder wie viel muss

ich bezahlen im Monat? Es gibt ja auch solche Apps die du bezahlen musst. Einmal im Monat oder alle paar Jahre oder nicht. Es gibt auch Apps wie Facebook oder Whatsapp oder SoundCloud oder schlag mich tot was es noch alles gibt, das muss mit drunter geschrieben werden.

Interviewer: Alles klar. Benutzt du denn Apps wo man zahlen muss oder nur kostenlose?

Befragter: Äh, ich habe eine mal benutzt, bin ich ganz ehrlich, aber ich habe sie gekündigt, weil die zu teuer war. 1,99€ hat sie gekostet, für die Musik. Jeden Monat 1,99€, das musst du dir mal ausrechnen. Bei SoundCloud sind da so Djs so wie ich, die stellen praktisch die Musik kostenlos zur Verfügung. Aber diese Cloud, die habe ich normalerweise, sagen wir mal, die habe ich gemixt, die stelle ich für die anderen zur Verfügung. Das die anderen können sagen: „Ja ok, die gefällt mir, die höre ich mir immer öfters an.“

Interviewer: Konntest du bei der App intuitiv alles benutzen oder musstest du nach Funktionen suchen?

Befragter: Eigentlich nicht. So wie es ist war es ok. Es ist übersichtlich. Heutzutage wollen wir nicht so viel suchen, weil die Zeit ist eng.

Interviewer: Und hier ist ja eine Beschriftung (zeigt auf Icons), das hat Facebook zum Beispiel nicht. Findest du die jetzt hilfreich?

Befragter: Es kann hilfreich sein für andere Leute, die schnell lesen können. Für Leute wie mich da sind Bilder drauf, das finde ich ok.

Interviewer: Du kannst mit den Symbolen auch etwas anfangen?

Befragter: Genau genau. Das ist schon mal ok.

Interviewer: Ok. Ja, dann war es das eigentlich auch schon. Dann danke ich dir erstmal.

---

### **Testperson 3 - männlich, 22 Jahre**

**Pre-Interview: 3:10 Min.**

**Usability-Test: 8:05 Min.**

**Post-Interview: 3:10 Min.**

#### **Pre-Interview**

Interviewer: Du hast ja ein Smartphone. Welche sozialen Netzwerke benutzt du?

Befragter: Manchmal Facebook oder Whatsapp.

Interviewer: Benutzt du noch weitere soziale Netzwerke?

Befragter: Und halt Spiele.

Interviewer: Benutzt du Apps für die Spiele?

Befragter: Fußball-Apps.

Interviewer: Wie gut kennst du dich aus mit Apps?

(...) (Interviewer wiederholt die Frage)

Befragter: Nicht so (wirklich?). Da brauche ich Hilfe wie man sich anmeldet.

Interviewer: Und wer hilft dir immer dabei?

Befragter: Die Betreuer.

Interviewer: Und sonst nutzt du das Handy immer selber oder mit den Betreuern?

Befragter: Alleine, wenn ich schon weiß wie das geht.

Interviewer: Also du benutzt Whatsapp und Facebook, was machst du auf den Netzwerken?

Befragter: Mit Freunden schreiben.

Interviewer: Verschickst du auch Sprachnachrichten oder schreibst du immer nur?

Befragter: Sprachnachrichten traue ich mir nicht so wegen meiner Stimme. Da schäme ich mich.

Interviewer: Wieso das?

Befragter: Weiß nicht, das ist halt /

Interviewer: Magst du nicht hören?

Befragter: Nein.

Interviewer: Und wie viel Zeit verbringst du so auf den //sozialen Netzwerken?//

Befragter: //Nicht so oft// wie bei jemand anderes. Nur dann wenn ich halt mal Lust habe.

Interviewer: Also ist dir das nicht so wichtig, ob du das hast?

Befragter: Nö, also ich schreibe immer mit der Fußballmannschaft, (unv.). Wenn wir zum Fußball fahren schreibe ich mit denen. Und Freunde.

Interviewer: Du spielst Fußball?

Befragter: Ja.

Interviewer: Und dann schreibst du mit denen immer über Whatsapp und Facebook?

Befragter: Nee, nur Whatsapp.

Interviewer: Und Facebook, wie benutzt du Facebook?

Befragter: (.) Da schaue ich wen ich kenne.

Interviewer: Verschickst du dann auch //Freundschaftsanfragen?//

Befragter: //Ja.//

Interviewer: Aber würdest du sagen, dass dich soziale Netzwerke im Alltag beeinflussen?

Befragter: Nö. (.) Ich bin ja nicht regelmäßig am Handy.

Interviewer: Wie oft bist du denn täglich am Handy?

Befragter: Zurzeit geht ja mein Handy nicht.

Interviewer: Ach so, ist es kaputt?

Befragter: Nee, (nicht das?) Handy kaputt. Da haben wir erst eine neue Simkarte geholt. Da ist noch kein Geld drauf.

Interviewer: Ach so, also kannst du zurzeit nicht ins Internet?

Befragter: Mhm.

Interviewer: Und hast du auch einen Computer?

Befragter: (.) //Nee.//

Interviewer: //Oder nur Handy?//

Interviewer: Also machst du alles am Handy?

Befragter: Ja.

### Usability-Test

- Aufgaben konnten gelöst werden
- fragt manchmal nach, ob das richtig gemacht wurde
- nach Aufforderung die Aufgabe nochmal durchzulesen, konnte sie selbstständig gelöst werden
- bei Aufgabe 3 war Hilfestellung nötig, Funktion wurde nicht gefunden
- Benutzung war überwiegend intuitiv
- große Aufmerksamkeit bei bestimmten Funktionen: Groß- und Kleinbuchstaben
- tippt beim Nachrichten schreiben im Nachrichtenverlauf und nicht ins Textfeld
- hat während des Tests sonst nicht geredet, aber auf Fragen wurde geantwortet
- Touch wurde nicht richtig angenommen

### Post-Interview

Interviewer: Wie ist dein Eindruck von der App?

Befragter: (unv.) War besser als wenn man das nicht so (..) wenn man es einfach selber machen muss.

Interviewer: Also, du meinst, dass es vorgegeben war war gut?

Befragter: Ja.

Interviewer: Hattest du trotzdem Probleme bestimmte Funktionen zu finden?

Befragter: Das hier wusste ich nicht (zeigt auf Aufgabe 3: Profilbild hochladen) wusste ich es nicht.

Interviewer: Stimmt, das wusstest du nicht, da musstest du ein bisschen Suchen.

Befragter: Und nachfragen.

Interviewer: Ja, das ist nicht so schlimm. Und wie sieht es aus mit der Schriftgröße? Konntest du alles gut lesen? Ist die Schrift zu klein oder zu groß?

Befragter: Nee, die ist so ok.

Interviewer: Und hier bei den Symbolen steht ja immer noch drunter was es ist. Beschriftung als Hilfe. Wie findest du das? Weil Facebook hat das ja zum Beispiel nicht.

Befragter: (..)

Interviewer: Hast du darauf geachtet?

Befragter: Nee.

Interviewer: Also kannst du mit den Symbolen schon etwas //anfangen// ohne, dass da steht was es ist?

Befragter: //Ja.//



Interviewer: Wenn du jetzt ein Foto posten möchtest, wüsstest du jetzt bei der App automatisch wie es geht?

Befragter: Hier drauf. (Proband tippt auf das entsprechende Symbol)

Interviewer: Hat dich sonst etwas an der Aufteilung oder App gestört?

Befragter: Nö, es ist in Ordnung.

Interviewer: Gibt es etwas was du nicht magst an der App?

Befragter: Nö, das ist (unv.)

Interviewer: Wie bitte?

Befragter: Die halt das nicht so wissen wie Außenstehende. (.) Für mich wäre die besser als die anderen Apps. Die Erklärung wie du etwas zu machen hast.

Interviewer: Also ist für dich wichtig, wenn da steht was du machen musst? Dann kommst du damit gut zurecht?

Befragter: Mhm.

Interviewer: Hast du sonst noch Verbesserungsvorschläge?

Befragter: Grad erst mal nicht.

Interviewer: Was hast du denn sonst für Probleme bei den anderen Apps? Kannst du mir die nennen?

Befragter: Bei Benutzerkonto.

Interviewer: Das kannst du nicht selber machen? Oder was meinst du?

Befragter: Ich meine das Registrieren.

Interviewer: Ist das nicht so einfach für dich?

Befragter: Es ist nicht so einfach, weil ich nicht weiß was ich nehmen kann für Passwort.

Interviewer: Ok, verstehe. Und wer hat dir dabei geholfen ein Konto auf Facebook zu registrieren?

Befragter: Ein Betreuer.

Interviewer: Hast du dir das dann aufgeschrieben, das Passwort und //Benutzername?//

Befragter: //Aufgeschrieben.// Mit dem Betreuer. Ich kann dann immer nachgucken.

Interviewer: Also kannst du dann immer nachgucken und dich anmelden.

Befragter: Mhm.

Interviewer: Und sonst, musst du dann zwischendurch mal immer wieder nachfragen oder schaffst du immer //alleine alles?//

Befragter: //Nee,// ich frage lieber nochmal nach.

Interviewer: Ok. Dann danke ich dir erstmal.

**Testperson 4 - männlich, 40 Jahre****Pre-Interview: 1:28 Min.****Usability-Test: 20:52 Min.****Post-Interview: 3:10 Min.****Pre-Interview**

Interviewer: Benutzt du überhaupt soziale Netzwerke?

Befragter: Ja, Whatsapp, wenn ich das Handy habe.

Interviewer: Hattes du mal ein Handy?

Befragter: Ich hatte, aber es ist mir kaputt gegangen.

Interviewer: Also hattest du immer Whatsapp. Und noch andere soziale Netzwerke?

Befragter: Nee.

Interviewer: Hast du da kein Interesse dran? Oder warum?

Befragter: Nee.

Interviewer: Und was genau machst du bei Whatsapp?

Befragter: Mit Freunden schreiben.

Interviewer: Verschickst du dann auch Sprachnachrichten?

Befragter: Ja.

Interviewer: Oder schreibst du lieber?

Befragter: Schreiben und// (.) beides.

Interviewer: Findest du die Sprachnachrichtenfunktion gut?

Befragter: Ja, geht schneller.

Interviewer: Bist du denn täglich bei Whatsapp online?

Befragter: Nein, nicht täglich. Ab und zu.

Interviewer: Alles klar. Hast du auch einen Computer?

Befragter: Laptop. Aber da spiele ich bloß.

Interviewer: Benutzt du auch Apps?

Befragter: Auf dem Computer überhaupt nicht.

Interviewer: Aber auf Tablet und Handy? Benutzt du da Apps? Oder auch nur spielen?

Befragter: Spielen, Musik hören.

Interviewer: Hast du denn überhaupt Interesse an sozialen Netzwerken? Nicht nur Facebook, es gibt ja auch Instagram, Youtube.

Befragter: Mhm.

### **Usability-Test**

- Aufgaben konnten gelöst werden
- es wurde lange überlegt was zu tun ist
- es wurde nochmal nachgefragt, was bei den Aufgaben gemacht werden muss (als Bestätigung: „Jetzt muss ich das hier eingeben oder?“)
- bei Aufgabe 1 gefragt, ob die vorgegebenen Daten eingetippt werden soll
- wusste nicht wo das @-Zeichen ist
- bei Aufgabe 3 war Hilfestellung nötig, lange bei der Aufgabe überlegt was gemacht werden soll
- manchmal Sachen nachgefragt anstatt einfach auszuprobieren, z. B. „Und jetzt auf WEITER oder?“
- nach Aufforderung selber nach der Funktion zu suchen, wurde sie auch gefunden
- Benutzung war trotzdem überwiegend intuitiv
- große Aufmerksamkeit bei bestimmten Funktionen: Groß- und Kleinbuchstaben
- tippt beim Nachrichten schreiben im Nachrichtenverlauf und nicht ins Textfeld
- nicht viel beim Test geredet
- antwortet, wenn etwas gefragt wurde
- kognitive Schwierigkeiten beim Touch gehabt
- Touch wurde nicht richtig angenommen
- hat lange gebraucht, weil es Schwierigkeiten mit dem Touchscreen gab
- viele Versuche gebraucht um was einzutippen, aber sehr geduldig

### **Post-Interview**

Interviewer: Wie war es? War es schwer oder einfach?

Befragter: Es ging.

Interviewer: Was hast du denn für einen allgemeinen Eindruck von der App?

Befragter: Nicht schlecht.

Interviewer: Würdest du damit zurecht kommen?

Befragter: Ja.

Interviewer: Auch ohne Hilfe oder bräuchtest du am Anfang erstmal ein bisschen Unterstützung?

Befragter: Also, bei Whatsapp (.) hatte ich ja schon, also da weiß ich ja schon bescheid. Aber sonst.

Interviewer: Wie war das bei Whatsapp, hat dir das auch jemand gezeigt oder hast du dir das selber beigebracht?

Befragter: Ich habe es mir abgeguckt. (lacht)

Interviewer: Abgeguckt? Von Freunden?

Befragter: (nickt)

Interviewer: Hast du ein Profilbild bei Whatsapp?

Befragter: Hatte ich.

Interviewer: Hattest du das selber gemacht?

Befragter: Das habe ich selber gemacht.

Interviewer: Ok, das hast du selber gemacht. Weil hier musstest du ja ein bisschen suchen (Verweis auf den Test). Hast du es nicht gleich gefunden?

Befragter: Ich hatte lange keins mehr. Das ist es.

Interviewer: Wie lange ist es her?

Befragter: Oh, das weiß ich jetzt gar nicht mehr. (.) Seit vier, fünf Jahren?

Interviewer: So lange schon. Aber auf deinem Tablet hast du kein Whatsapp?

Befragter: Nee.

Interviewer: Da guckst //du nur Filme oder hörst Musik.//

Befragter: //Nee, hab ich leider nicht.//

Befragter: Musik kann ich hören. Da kann ich ja eine Speicherkarte reinmachen.

Interviewer: Ok. Aber wenn du es jetzt wieder benutzen würdest, hättest du keine Probleme?

Befragter: Ja.

Interviewer: Könntest du denn alles gut lesen bei der App?

Befragter: Ich konnte es gut lesen.

Interviewer: War die Schrift ok?

Befragter: Die Schrift war ok.

Interviewer: Kannst du mit den Symbolen was anfangen? Wüsstest du was das für Funktionen sind?

Befragter: Ja. (zögernd, schüttelt mit den Schultern)

Interviewer: Hättest du denn noch Verbesserungsvorschläge für die App? Was kann man da besser machen?

(Befragter weiß nicht, was er antworten soll)

Was wünschst du dir denn vielleicht für Funktionen? Hast du da eine Idee?

Befragter: Nee.

Interviewer: Aber würdest du die benutzen, wenn es die geben würde?

Befragter: Ja, würde ich benutzen.

Interviewer: Ok, alles klar. Dann war es auch schon, Danke dir.

Befragter: Habe ich doch gerne gemacht.

## Appendix E – Category system

Categories	Sub-categories	
<b>C1: Usage behaviour</b>	<b>S1</b>	regular usage of mobile technology - smartphone - mobile internet - mobile apps
	<b>S2</b>	regular usage of social networks - Facebook - Whatsapp
	<b>S3</b>	activities on social networks - playing games - writing messages - sending voice messages - looking at pictures - listening to music - looking for known people - sending friend requests
	<b>S4</b>	spending a lot of time on social networks
	<b>S5</b>	preference of sending voice messages - reading difficulties - faster
	<b>S6</b>	no usage of voice messages - doesn't like own voice
<b>C2: Accessibility</b>	<b>S7</b>	not important because - usage only during leisure time - no feeling like needing it - spending little time on smartphone - no constant desire to be on social networks - occasional usage
<b>C3: Influence</b>	<b>S8</b>	daily routine is not affected because - spending little time on social networks - occasional usage - no constant desire to be on social networks - usage only during leisure time
<b>C4: Capabilities</b>	<b>S9</b>	positive - independent use of social networks - quick to learn new things - tasks could be solved - considerable attention to certain functions
	<b>S10</b>	negative - not much experience - need of support with certain process/functions - difficulties to remember important data

<b>C5: Usability</b>	<b>S10</b>	<p>good usability of the app</p> <ul style="list-style-type: none"> <li>- no suggestions for improvements</li> <li>- easy to operate</li> <li>- intuitiv usage</li> <li>- no negativ feedback</li> <li>- similar to other social networks</li> <li>- managable when used to it</li> <li>- test duration was short</li> <li>- no need of support</li> <li>- tasks could be solved</li> </ul>
	<b>S11</b>	<p>poor usability of the app</p> <ul style="list-style-type: none"> <li>- app is too slow</li> <li>- functions couldn't be found</li> </ul>
<b>C6: Structure</b>	<b>S12</b>	<p>good structure of the app</p> <ul style="list-style-type: none"> <li>- functions easily to find</li> <li>- structure is clear</li> <li>- meanings of icons are clear</li> </ul>
	<b>S13</b>	<p>poor strcuture of the app</p> <ul style="list-style-type: none"> <li>- expected functions were not avaiable</li> </ul>
<b>C7: Design</b>	<b>S14</b>	<p>text</p> <ul style="list-style-type: none"> <li>- text font is readable</li> <li>- text font is standardised</li> </ul>
	<b>S15</b>	<p>icons</p> <ul style="list-style-type: none"> <li>- meaning of common icons are clear</li> <li>- don't need to be labelled</li> </ul>
<b>C8: Functions</b>	<b>S16</b>	<p>voice messages are important because</p> <ul style="list-style-type: none"> <li>- difficulties with reading</li> <li>- can be done quickly</li> <li>- can be send during busy moments</li> <li>- people are living in a fast-moving time</li> </ul>
<b>C9: Challenges</b>	<b>S17</b>	<p>challenges during test</p> <ul style="list-style-type: none"> <li>- difficulties to find symbols</li> <li>- difficulties with reading</li> <li>- need support for solution of the tasks</li> <li>- initial difficulties with new apps</li> <li>- need long time to get the idea of what to do</li> </ul>
	<b>S18</b>	<p>challenges when solving test tasks</p> <ul style="list-style-type: none"> <li>- need of support</li> <li>- need encouragement</li> <li>- need confirmation</li> </ul>
	<b>S19</b>	<p>long test duration</p> <ul style="list-style-type: none"> <li>- typing was difficult</li> <li>- lack of fine motor capabilities</li> </ul>
	<b>S20</b>	<p>reading capabilities</p> <ul style="list-style-type: none"> <li>- given or known words could be read without help</li> <li>- asking if word is spelled correctly</li> </ul>
	<b>S21</b>	<p>touchscreen didn't respond to touch correctly</p>
<b>C10: Barriere-free</b>	<b>S22</b>	<p>important characteristics</p> <ul style="list-style-type: none"> <li>- fast</li> <li>- clear structure</li> <li>- instructions what to do</li> <li>- voice messages</li> </ul>



## **Declaration of Authorship**

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