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EMPATHY DESIGN IN SKILLS ASSESSMENT TOOL FOR RECOVERY AND REHABILITATION

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ABSTRACT

Ashutosh Gautam: Empathy Design in Skills Assessment Tool for Recovery and Rehabilitation
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Empathy has become a major concern in the modern world where most of the services are digitized as information is primarily shared from behind the screen. In the healthcare sector, patient and healthcare provider's interaction is among the most powerful and emotional experiences any of us can encounter. Healthcare providers try to adopt different strategies to empathize with the patient, but the digital technology creates a bridge between patients and caregivers. The prevalent challenge and opportunity for the healthcare system is closing the gap between humans by facilitating emotional connection with the help of technology.

In this research, we present empathy as a vital skill for healthcare workers, for designers as well as for people suffering from substance use disorder and going through recovery and rehabilitation. We try to identify processes on how designers can better empathize with the users by following Kouprie and Vissier's framework on empathy design. The objective is to identify how the process of empathy design is used not just to understand the users, but during design and while communicating the findings with the stakeholders.

The empirical work carried out in this thesis is aimed to enhance the user experience of existing skills assessment application, LivingSkills. LivingSkills has been developed as a skills assessment and monitoring tool, where patients can plan their own recovery by developing the skills they need with the help of healthcare personnel or caregiver. The tool helps to understand the patient's and caregiver's journey throughout a system – understand the patient's journey to recovery, visualize their skill level and find out ways to provide better skills coaching service.

User experience of the LivingSkills tool was evaluated at SiltaValmennus (rehabilitative coaching service / recovery home) to improve the condition of residents who were serving the last term of their sentences in prison and were going through drug recovery and rehabilitation program. UX evaluation questionnaires such as AttrakDiff and user satisfaction questionnaire along with multiple rounds of semi-structured interviews were conducted with various stakeholder groups in order to uncover user needs and problematic areas during application use. We implemented the applicable solutions by closely following ISO 9201-210 human-centred design process. We assessed how the perception towards the application changed before and after the empathic redesign approach. We then evaluated overall experience of the application with users (n=7) with the help of AttrakDiff, user satisfaction questionnaire and series of semi-structured interviews with the stakeholder group including residents (n=4) and staff members (n=3), iterating the design whenever necessary.

We found that the LivingSkills application was viewed as a positive tool for skills training among the residents as well as staff members at the recovery home. There were multiple areas of opportunities within the application such as giving patient's access to their own record, improving visual designs, using responsive layout and humanizing the interaction dialog by using faces and carefully selecting texts to facilitate the empathic exchange of information. The findings were prioritized and implemented based on user needs, importance and effort required to implement the solution within the research timeline.

We found out that the user experience has improved but the difference in perception was not statistically significant among the residents and healthcare workers We have suggested some extension of product features with the possibility to integrate existing healthcare procedure implemented by the organization. We found out that the application is oriented towards healthcare providers to enable residents to get the help they need for better outcomes. Asking questions,

providing opportunities for feedback, listening, and taking notes are intended features of the application itself which demonstrate empathy to the patients, showing them that their voices are being heard through the use of LivingSkills application.

Keywords: Empathy design, web application, recovery, rehabilitation, substance abuse, prisoners, inmates, addiction, user experience, empathy.

The originality of this thesis has been checked using the Turnitin OriginalityCheck service.

PREFACE

This thesis presents my interest in the topic of empathy and how it comes into play while communicating with others. Being a software engineer, I work from behind the computer screen and use many communication tools such as text messages, emails and voice or video call. While these tools make communication easier, I started to realize that my social skills and competencies are diminishing, and I am slowly losing effective communication skills. Most of the communication is expressed through words, but also through non-verbal expressions such as tone of voice, face and body language, and if we only rely on digital communication channels, soon we will no longer be different than robots or the artificially intelligent beings.

Being a son of a veterinarian, I was always amazed by how my dad could treat his patients (animals) just by analyzing the symptoms and observing them without even speaking. I realized that in order for us to remain humane and sane, we need more empathy, to be able to understand and relate to all sentient beings. While we rely on technology more than any other time in history, I felt it is important to convey empathic feelings towards one another through technology as well.

Human behaviours and psychology had always fascinated me, and the courses I took during my master's degree studies perpetuated that interest even more. While studying user experience, I realized the importance of user research and conducting studies on empathy felt like a perfect opportunity to finally meet the users and find out about their expectations from the application which I am building.

This research work is cumulative of all of the studies during my master's degree and while working at LivingSkills Oy. The lessons I had learned from my teachers and my classmates while studying User Experience lead me into the realization that empathy will be of major concern moving forward with the digitalization of everyday lives.

The more I learned about User Experience, I realized that there's still so much more I need to know. This study could not be completed without the cooperation from SiltaValmennus, and Kaisa Nyberg from LivingSkills. I would like to thank members of both organization who helped me by giving me their valuable time, providing me with feedback and guidance. To my supervisor Kirsikka Kaipainen, without her guidance and support this research would not be possible and completed.

To my parents, for bringing me to life and supporting my decisions throughout my life. To my brothers and sisters, without whom I cannot imagine my life and to all the researchers and scientific community for dedicating your time and bringing unknown knowledge into life.

Tampere, 18th September 2019

Ashutosh Gautam

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1. Introduction

In a world full of digital intelligent beings and smart objects, humans are left with emotions to feel as most of the services are being automated or taken care of by computer applications and remote service providers. Unheeded progress in technologies has made life more about feeling than about doing, however, human values like empathy come as a secondary concern while creating and using digital services.

Empathy, the science behind understanding people and their perspective is often misunderstood in the present day. The significance of empathy is immense now, as artificial intelligent beings and smart objects have become more prominent, in the medical field as well, there is no exception.

Due to the increase in digital communication tool such as emails, SMS, people become physically invisible which permits them to disregard any kind of eye contact or non-verbal reactions. A vast majority of face-to-face communication relies on non-verbal cues such as tone of voice, body language and facial expressions. In online conversations it reduces the information being transmitted, resulting in less understanding and empathic exchange (Terry, Cain 2016). Due to the challenges presented by the new technologies, the authors Terry and Cain (2016) felt the need to define digital empathy as, “traditional empathic characteristics such as concern and caring for others expressed through computer-mediated communications.”

The significance of empathy in conveying social healthcare has been known for quite a while. An extensive variety of proof (Anderson, Agarwal 2011) focuses on the way that specialists and medical attendants who are compassionate will, in general, give better treatment. Being treated with dignity and respect matters more for patient satisfaction even than pain control. When medicinal services are being changed by digitalization and automation (Sitzman, Watson 2017), we need to explore how our patients and the healthcare professional’s interaction is supported using the digital tool.

Empathy in design is a fairly new concept, as the digital solutions are moving forward from problem-solving to creating solutions that people value, it is necessary to put empathic design approach into practice. Empathic design is an approach to identify user needs through observations and contextual inquiry into their challenges and necessities with aim to provide solutions that users would value (Luh, Ma et al. 2012, Fraquelli 2015).

Empathic design is closely related to human-centered design approach, as it offers designing user-centred solutions with deeper insights and understanding which offering effective emotional relationship with their users (Leonard, Rayport 1997). Empathic design also focuses on interactions and collaboration among members of an interdisciplinary team.

LivingSkills application serves as a skills mapping and assessment tool to help patients or people who are going through recovery, track progress and find out skills that need improvement. When medicinal services are being changed by digitalization and automation, the aim of LivingSkills tool is to find out opportunities to provide comfortable patient care, easy to use service for healthcare professionals and reliable data to track the performance of the patient or the whole company using LivingSkills application.

Moreover, this research aims to develop the content and enhance user experience of an existing LivingSkills Substance Abuse Rehabilitation Tool to meet the needs of the recoverery and rehabilitation service at SiltaValmennus, a non-profit organization which offers coaching and training facilities for inmates with substance abuse past and prepare them for independent living. Furthermore, we plan to understand how to use a skills assessment tool in conjunction with a twelve-step recovery program to support prisoners with substance abuse past in the final stages of their sentence.

The specific objectives of this research project are:

- To identify the needs for recovery and rehabilitation services to improve user experience of LivingSkills application by enhancing it’s features, contents and functions to support the existing healthcare procedure at SiltaValmennus.
- To find out problematic areas during application use and improve the ease of use of the tool and redesign the application by following ISO 9241:210 Human-centred product development process.
- To explore different methodologies which can be used while creating digital healthcare services with the empathy design approach and help people with substance abuse past to commit to a drug-free, crime free and responsible life.

The main questions this study aims to explore are:

Research Question 1: How to design with empathy to enhance user experience in the context of a skills assessment tool for recovery and rehabilitation services?

Research Question 2: What opportunities and challenges arise when carrying out empathic design in recovery and rehabilitation services?

Research Question 3: How does the user experience of the skills assessment tool change and benefits of following empathic design process?

1.1 Structure of the Thesis

In chapter 2, the review of related literature is presented in the areas of empathy, the significance of empathy in the healthcare sector, addiction recovery and design. It presents addiction problems in Finland and steps to overcome addiction including digital solutions for recovery and other skills-based training programs available. Chapter 3 presents LivingSkills Application, it's theoretical background and substance rehabilitation tool questions. In the same chapter, the structure of the LivingSkills application elaborates on how the application is used. Chapter 4 presents the research approach, methodology and results. In the study design, the details about data collection and analysis methods, participants and empathy design approach used in this research is explained. Latter part analyses the study procedure which includes goals, methods, analysis and results of each study phases. The result of the final evaluation of the redesigned application is presented in the final section of chapter 4. Chapter 5 presents the discussions, principal findings, evaluation and limitation of the study while Chapter 7 elaborates on conclusions. The references and the appendices are provided in the last sections of the thesis.

2. Review of related literature

This chapter focuses on review of related literatures regarding empathy, addiction problems and digital solutions available for addiction recovery. The literature review serves as a preparation for this research and provides an overview on the theoretical foundation of this study.

2.1 Empathy

The word “empathy” is derived from ancient Greek word, ἐν(en) - meaning into and πάθος(pathos) - meaning passion or feeling. Although there is no universally agreed definition of empathy, the term “empathy” describes the ability to feel and to understand the emotions of another person while being aware of the causes that lead to these emotions (Flasbeck, Gonzalez-Liencres et al. 2018). Throughout time, the concept of empathy developed in into the science of understanding people from their own perspective.

Psychologists Daniel Goleman and Paul Ekman classify empathy into three different categories (Goleman 2007):

- **Cognitive empathy**: Ability to understand how a person feels and what they might be thinking.
- **Emotional empathy** (affective empathy): Ability to share the feelings of another person.
- **Compassionate empathy** (empathic concern): Ability to go beyond understanding others and sharing their feelings: it moves us to take action or express concern.

In this research, we adopt the definition of empathy as an approach to allow deep emotional understanding of people’s needs and values which evolves over time and not as an instantaneous quality of experiencing the emotional state of the subject.

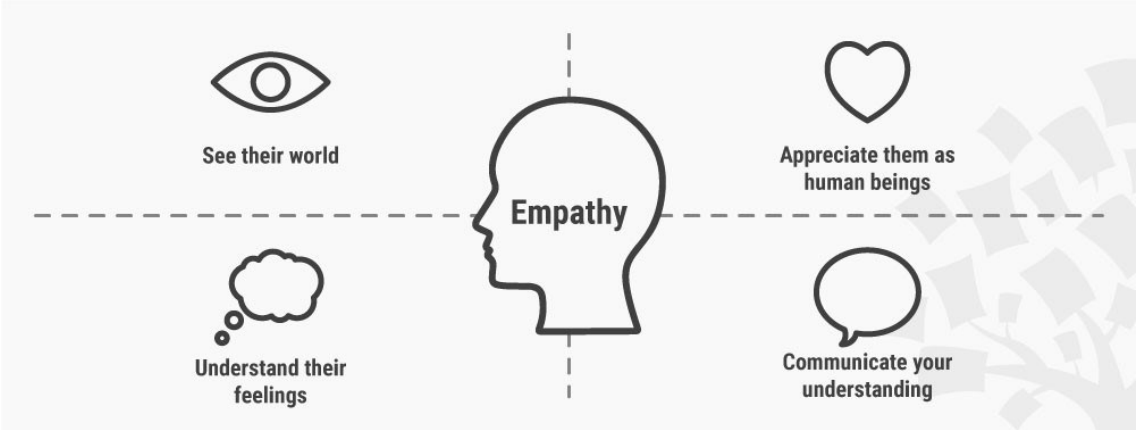

Figure 1. *Empathy (Mortensen 2019)*

Empathy has emerged as a core element in design thinking process which intends to solve real-life problems of users instead of focusing on how the problem can be technically solved, it's main focus is addressing needs and innate requirement of the users (Leifer, Meinel et al. 2009).

Instead of putting the designer as an expert within a design activity, empathy allows the designer to gain perspective of the potential users of a given product. Human-centred design shift has allowed designers and stakeholders to participate and actively iterate over the design process, effectively turning users into a co-designer, whereas other methods actively use multiple techniques to actively gain empathy from users before proceeding with the design (Smeenk, Tomico et al. 2016).

2.1.1 Empathy in Design

A research study conducted by (Kouprie, Visser 2009) titled, "A framework for empathy in design" presents empathy in design as a process in which designers develop a deeper understanding of the user's experience including situation and feelings. It draws upon people's real-world experiences which in return inspire designers to create products that users need and value.

Moreover, empathy in the design realm is still new as compared to other domain such as aesthetic, sociology and psychology. Empathy is seen as a crucial step in human-centred design, which is defined in ISO 9241-210: 2010 as "an approach to interactive systems design and development of that aims to make systems usable and useful by focusing on the users, their needs and requirements, and applying human factors/ergo-

nomics and usability knowledge and techniques”(International Organization for Standardization, 2010). The standard also describes the potential benefit of following a design approach that improves usability and human factors: “Usable systems can provide a number of benefits, including improved productivity, enhanced user well-being, avoidance of stress, increased accessibility and reduced risk of harm” (Harte, Glynn et al. 2017).

Empathy requires a deeper understanding of the user's situations and feelings, which is more than just knowing about the user. In human-centred design, it is crucial to understand users and their context, empathy helps identify and define problems and involves setting goals to develop a new solution to current or future problems (Mattelmäki, Vaajakallio et al. 2014).

Empathic design as contrary to ethnographic research emphasizes on daily experiences, moods, desires and emotions, turning such experiences and emotions into inspiration for designing solutions. Strategies and methods to build empathy are part of design traditions such as user-centred design, human-centred design, participatory layout, and co-layout. Yet, this frame of reference focuses nearly solely on making use of user perspectives and user contact to guide design decisions, while design is essentially built on designers' own experiences, feelings, and emotions from design context. (Smeenk, Tomico et al. 2016, Mattelmäki, Vaajakallio et al. 2014)

Empathic design focuses on sensitivity in four layers (Mattelmäki, Vaajakallio et al. 2014):

- Sensitivity toward humans: gain inspiration and information from people’s experiences and contexts;
- Sensitivity toward design: seeking potential design directions and solutions and posing “what if” questions;
- Sensitivity toward techniques: application of generative, prototyping, and visualizing tools to communicate and explore the issues, and;
- Sensitivity toward collaboration: tuning the process and tools according to co-designers, decision-makers, and organizations alike.

Kouprie and Visser’s perspective design framework on empathic design presents gaining empathy with users in design as a chronological process divided into four stages (Kouprie, Visser 2009):

- Discovery: Familiarization with the user, exploration and discovery phase.
- Immersion: Understanding the situations and conditions, as a second-person or user's perspective.
- Connection: Connect with the situation and relate to their own experiences and feeling, first-person perspective.
- Detachment: Step back from the user's perspective to be a designer with new insights for ideation and reflection.

The framework presents empathy in design which gives insight into what role the designer's own experience can play when having empathy with the user. This framework can be applied to research activities, communication activities and ideation activities. 'Design empathy requires direct and personal engagement and is dependent on the designer's willingness' (Kouprie, Visser 2009).

It is important to note that the designer needs to be open-minded and free from own prejudices and biases while meeting the user. The designer should also have positive attitudes towards the users and believe that the user insights are beneficial for the design process. As designer incorporates their own beliefs and ideas into the design, the personal empathic ability of designer also plays an important role in taking notes and decision making. As the designer facilitates communication between the stakeholders and the users, it is crucial to have a flexible mindset and be open to various opinions and not be guided solely by intuition (Battarbee, Koskinen 2005).

2.2 Addiction Recovery

This section provides details on significance of empathy in healthcare, it's role in addiction recovery and brief overview of addiction problems in Finland as well as details on twelve steps of recovery program.

2.2.1 Empathy in Healthcare

In healthcare, empathy is seen as a cognitive ability to understand patients' concerns, experiences and perspective together with the intention to help and provide relief. (Hojat, DeSantis et al. 2017). Empathy is regarded as a basic competency and an integral component of person-centred care to promote a healthy relationship which in turn improves

the quality of care and patient's outcomes. (Bauchat, Seropian et al. 2016, Lelorain, Brédart et al. 2012)

Empathy is shown to have strong positive effects on patient's health outcome, increase in the level of satisfaction, reduce distress as well as malpractice allegations. However, with the digitization of healthcare, and the corresponding decrease in the expression of empathy is one of the major concern for the healthcare providers as well as for the patients (Terry, Cain 2016).

We can conclude that empathy is regarded as a vital quality in healthcare especially while delivering person-centred care while effectively communicating the concerns of patients with the healthcare workers.

2.2.2 Empathy in Addiction Recovery

World Health Organization Expert Committee on Addiction-Producing Drugs in 1950 described addiction as a state of periodic or chronic intoxication, detrimental to the individual and society, produced by the repeated consumption of a drug (natural or synthetic) (World Health Organization 2019, World Health Organization. Management of Substance Dependence Team 2001). Its characteristics include an overpowering desire or need (compulsion) to continue taking the drug and to obtain it by any means; a tendency to increase the dose; a psychic (psychological) and sometimes a physical dependence on the effect of the drug. In 1964 a WHO Expert Committee introduced the term 'dependence' to replace the terms 'addiction' and 'habituation' (World Health Organization 2019).

Empathy is considered of significant quality in order to recover from drug abuse and dependence, according to the World Health Organization (World Health Organization 1999). The WHO guidelines while learning life skills during rehabilitation mention that a person in recovery should develop the quality of empathy for others to make recovery last longer and make it more certain.

When someone is addicted to drugs or alcohol, one becomes self-centred and cannot see beyond one's cravings. Due to this selfish drive for drugs, relationships suffer. The addicted person probably lies or steal from people close to him such as parents to support his habit, which might be difficult for people to build trust. Due to dishonesty, it is problematic for either person to have empathy for the other (Narconon International 2019).

Empathy is considered as a foundation of relationships, when a person develops empathy for others, one will consider other's needs when making decisions which in return helps one guide a life down a sober path. Empathy, the quality which can be learned,

helps develop understanding as it is one of the abilities which diminishes when a person's life is consumed by drugs (Chen 2018).

2.2.3 Addiction Problems in Finland

In Finland, addiction is considered as a huge problem, in the recent years, alcohol and it's associated risks has reduced but drug use and it's risk has increased. Changes within the populations' substance use additionally affect the demand for services. Total alcohol consumption in Finland increased until 2007 but since then, total consumption declined by nearly a fifth by 2017 (THL 2019).

According to the research, "*Differences in Empathic Concern and Perspective Taking Across 63 Countries*" conducted in 2016 which yielded more than 100,000 response from across the globe, Finland was ranked 58th among 63 countries (Chopik, O'Brien et al. 2017). The research demonstrated that Finns are not so good as other countries at showing concern or are good at being in tune with other's feelings. The same study concluded that countries which ranked higher in empathy have higher levels of collectivism, emotionality, self-esteem and subjective well-being.

In Finland, national drug strategy stresses on increasing the availability of quality drug treatment in prison, with the ultimate goal of reducing substance use among inmates (emcdda 2019). Drug use is however still on the rise, that will increase the demand for substance abuse services, plenty of treatment choices are therefore available in Finland. The foremost appropriate treatment choice is chosen on a personal basis. It will embrace, for instance, informal medical care either separately or during a group setting or with people that have already recovered from addiction, medication or varied assist programs (Emcdda, 2019).

People with an alcohol or drug addiction sometimes begin seeking treatment through the health center, welfare workplace or occupational or student health services. In several municipalities, private clinics provide treatment for those affected by varied styles of addictions, in addition, to support for his or her dear ones(A-Clinic Foundation 2014). Medical detoxification is the first part of the rehabilitation process for recovery from addiction which is followed by behavioral therapy, medication and continued support.

In this thesis, SiltaValmennus, a non-profit association working towards increasing social equality and welfare in Tampere, Finland provided us with research participants who are going through recovery and rehabilitation at their facility. They helped us familiarize with treatment procedures, training programs, and therapies that recoverees had to go

through to commit to a responsible, crime and substance-free lifestyle. (Silta-Valmennusyhdistys 2016)

2.2.4 Twelve Steps of Recovery Program

Recovery is considered as maintenance of abstinence from alcohol or any other drugs by any means and is unique and personal for everyone. It is a quite individualized system that is motivated by numerous elements, which includes the type, severity and length of addiction but there are standards that embody recovery for all styles of addiction (World Health Organization 2019). As it is a lifelong process, a person in recovery group is viewed by themselves as a "recovering" alcoholic, however, the term "recovered" might be used by others.

Twelve-step programs are self-help groups where people attend meetings and admit past blunders, surrender themselves to a higher force and share lessons on how to be sober. Alcoholics Anonymous, the first 12 step group was established in the 1930s and by now the program has spread across the globe and is used to treat varieties of addiction problems. There are various adaptation of the AA program such as Narcotics anonymous and gambler's anonymous (Kurtz, Chambon 1987).

AA ' s programme of twelve steps involves admitting one is powerless over one' drinking, and over one' s life because of alcohol, turning one' s life over to a "higher power", making a moral inventory and amends for past wrongs and offering to help other alcoholics. A recovering alcoholic following the programme must never drink again, although this objective is accomplished one day at a time. AA is organized in terms of "twelve traditions", which enjoying anonymity, an apolitical stance, and a non-hierarchical organizational structure (World Health Organization 2019).

SiltaValmennus requires all of the residents to go through twelve steps program at least once a week as part of their drug rehabilitation program until they are released. However there are other treatment options and therapy sessions such as reality therapy and financial planning that residents had to go through. Other twelve-step groups vary in their adherence to the twelve traditions but narcotics anonymous follow the same principles as presented above.

2.3 Digital Solutions for Recovery

In Finland, research has shown that the amount of time spent in the hospital could be reduced if services and technology, social assistance, were more user centered, specifically before being ill, and in the recovery phase (Alhonsuo 2017). Users should be able to get healthcare services when needed as it is affected by many challenging factors such as distance, weather, seasonal conditions, network communication and other technological problems involved (Vähäniemi, Warwick-Smith et al. 2018, Kurokawa 2015).

Other studies have shown that healthcare technologies will increase the potential for patient engagement and transform the nature of the relationship between the healthcare personnel and patients (Murray 2012). Patients have instant access to their health data and the ability to monitor their symptoms precisely and be more effective partner in their own care (Lupton 2013). Patients are able to engage in computer-based communication with experts through online platforms and are getting involved in psychological interventions as well (Antoun 2015).

Although it is supported that communication through digital tools lack emotional cues and creates barrier to convey empathy (Wiljer, Charow et al. 2019). This emphasizes on integrating digital empathy into the curriculum of health professionals (Terry, Cain 2016) which has shown increase in expression of empathy and compassion, improved communication skills and self-reflection while interacting in a digital system.

Web-based treatment solutions are considered plausible as they are convenient, easily accessible, and can maintain anonymity/privacy. It also has the potential to combine the personalized face-to-face consultations with the scalability of public health interventions that have low marginal costs per additional user. (Murray 2012)

On a study conducted by (Williams, Fossey et al. 2018), which explored service users' experiences of using an innovative and interactive recovery-oriented website based on SMART (Self-Management And Recovery Training) found out that the website was viewed positively among the participants in their personal recovery journeys. Watching videos of people sharing their experience of psychosis on the website supported recovery processes. User reported that it provided relief and felt like they were not alone, inspiring hope, and supporting them to revise and affirm a personal meaning of recovery.

2.3.1 Web-based Intervention in Addiction Recovery

Digital tools are getting more and more popular within the healthcare environment. It is becoming a daily use thing nowadays, as it is providing more data for professionals to analyze and have more power of decision when prescribing, treating patients, diagnosing and more as well as helping patients to keep track of their own evolution. Besides, technology has transformed the way medical procedures such as appointments and check controls are being made, by making these processes faster and more efficient.

Studies have shown that web-based interventions can help people with a lengthy history of heavy drinking problems to lower their alcohol consumption and it's associated problems. These methods are reliable when the person has acknowledged their drinking problems and are willing to take actions to change their habit (Campbell, A. N. C., Nunes et al. 2014).

Mobile or web-based interventions are able to deliver complex, evidence-based behavioral interventions for the treatment of drug dependence and use disorder with high efficacy and low disturbance to clinical procedure (Litvin, Abrantes et al. 2013, Acosta, Marsch et al. 2012).

The ubiquity of the internet and mobile devices allow interventions with greater accessibility and reach. Hence, it's impact on public health is immense but it also comes with limitations, as it is dependent on the way people use it and nature of medium (Campbell, W., Hester et al. 2016). Developers have significant control over the content and design of the program, but the remote context of use gives users great deal of freedom but it also prevents close engagement and assessment of evident therapeutic treatment (Cunningham, Van Mierlo 2009). Further, in Web-based interventions there is significantly less engagement with the people than developers think of when they design them (Danaher, Seeley 2009).

2.3.2 Other Applications Available for Recovery

There are numerous applications available to assist you in the road to recovery(Liang, Han et al. 2018). In a study by Savic et. al. (2013) on smartphone applications for addiction recovery, the content of recovery application provides information on recovery, enhance motivation, social support features and progress monitoring features. Users reviews revealed that application help them be informed, focused, inspired, and make connection with other people and groups (Savic, Best et al. 2013).

In 2017, the U.S. Food and Drug Administration (FDA) approved new class of treatment using software to treat medical disease namely, prescription digital therapeutic (PDT).

PDTs are regulated by the U.S. FDA and validated through randomized clinical trials, with data to demonstrate their safety and efficacy (Pear Therapeutics 2019). reSET is the first mobile medical application to treat substance use disorders (U.S.Food and Drug Administration 2018) The digital therapy application named reSET contains curated twelve week program schedule which features weekly check-ins.

reSET aims to provide cognitive behavioural therapy, on top of a contingency management system. Contingency management refers to a type of behavioural therapy in which individuals are 'reinforced', or rewarded, for evidence of positive behavioural change (Petry 2011). It is intended to be used for patients above eighteen years, who are seeking treatment in outpatient treatment under the supervision of a clinician and aims to promote abstinence during treatment and increase retention in the outpatient treatment program. It uses a series of reward-based incentives to help patients continue to the program and features a patient's application (see Figure 2) and clinician dashboard in an attempt to teach skills that aid in substance use disorder treatments (Hoffman 2017).

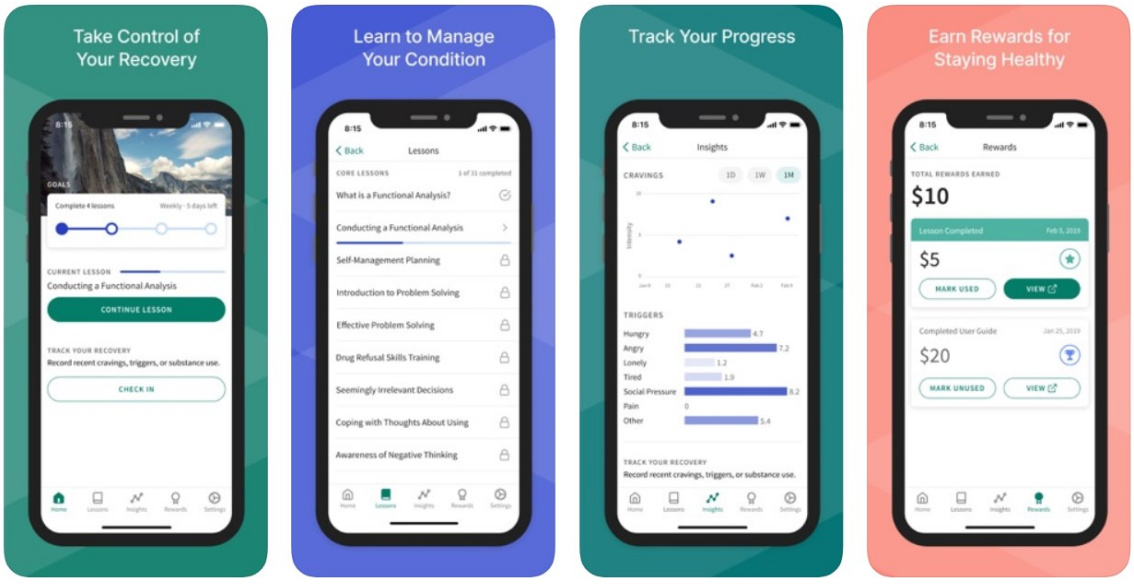

Figure 2. *Screenshots of* reSET® *application (Pear Therapeutics Inc. 2019)*

None of the application intended for recovery promises relapse avoidance in long term trials. As the application is not recommended to be used as a stand-alone treatment device or as a replacement for medication, it is important to seek medical practitioners' advice to treat substance use disorder. The benefit of treatment with digital tools for abstinence such as reSET was not measured beyond 12 weeks (Pear Therapeutics 2019).

The ability of training and therapy program to prevent relapse after stopping treatment had not been studied.

2.4 Skills-based Training in Recovery Context

For people going through addiction recovery, it is difficult to recognize in what ways addiction is causing problems to others and to themselves. Although people have accepted their problems with drugs, quitting it is not sufficient as learning to cope up with cravings, urges and distress and being productive are other challenges that people face on a daily basis during recovery. Most life skills training aims to support independent living, to promote mental health and wellness (Tungpunkom, Maayan et al. 2012).

Life skills programs are an important part of the rehabilitation process, it addresses the needs associated with independent living. This involves managing own finances, communication, domestic, personal self-care and community living skills (World Health Organization 1999). The aim of the life skills training program is to help people develop skills and access resources needed to increment their capacity to be successful and satisfied in the support, working, learning, and social surround of their choice.

There are a lot of approaches available towards psychosocial rehabilitation, such as cognitive behaviour therapy, social skills training, and dialectical behaviour therapy (DBT). Out of these, dialectical behaviour therapy (DBT) is based on cognitive-behavioural interventions and is considered evidence-based psychotherapy (Linehan 1993). It emphasizes on teaching skills on emotional regulation and impulsive behavior and managing it’s dysfunctional pattern. .

Several therapy lessons or training program intends to teach the user following skills to aid in the treatment of substance use disorder (*Treatment for stimulant use disorders.* 2009):

- Identifying trigger situations
- Avoiding drug use,
- Coping with thoughts about substance use
- Recognizing negative thinking and identifying techniques to move to positive thinking.
- Making decisions about substance use
- Taking responsibility for choices made and evaluating the consequences of those choices.

Some of the training and therapy programs provide skills for distress tolerance and for emotional wellbeing, which could be carefully selected by the healthcare workers as it has been proved and commonly used in dialectical behavioral therapy for behavior change (Linehan 1993). Training program utilizing emotional regulation is very crucial in order to have more control over urges to engage in impulsive behavior. As we can see, that the person going through recovery can also utilize empathy to step back from stressful situations and understand their own condition and find meaning in painful situations (Sunrise Residential Treatment Center 2017).

According to MindsTogether project, for effective mental health and substance abuse services in Finland, it is necessary to provide decision-makers with evidence-based information about effective models for mental health and addiction services (Wahlbeck, Hietala et al. 2018). New operating models should be more user-centered and need to include and support peer experience to transform mental health and substance abuse services. The same study suggested that the basic mental health and substance use services should be integrated with primary care (Wahlbeck, Hietala et al. 2018). It also supported the evidence of reduced production cost caused by mental health problems, when investment is done in mental health services and it's promotion. Literary evidence from the same study found out that the care is focused less on clinical aspects of recovery but rather emphasizes on social and functional recovery issues such as help with education, employment and housing.

3. Livingskills Application for Skills Assessment and Recovery

This chapter explains Livingskills application in recovery and rehabilitation context, it's theoretical background, structure of the application and it's essential functionalities and features. It also presents the questions used in the assessment of the recoverees in substance use disorder recovery and rehabilitation context.

3.1 Overview of the LivingSkills Application

The LivingSkills application (LivingSkills 2019) is a customizable service-oriented, skills assessment tool which is tailored to mostly healthcare service provider's needs. It integrates all phases of the client's work: mapping skills, abilities and service needs, creating skills development plan, goal-oriented framework on skills reinforcement, performance evaluation and longer-term effectiveness monitoring.

There are two user groups who primarily use the application, one is patient or resident going through recovery and the other is evaluator who is well aware about patient's care plan and training programs, in our case staff members or healthcare professionals at SiltaValmennus.

Content of the application can be tailored for different customer groups such as for eating disorder, early education, and elderly care, in our research we only cover the feature of recovery and rehabilitation features.

LivingSkills Recovery is an approach to deliver customer-focused rehabilitation and care. The most important aspects of the application are:

Skills mapping

Identifying skills which one possesses and those that one lacks: self-assessment and external evaluation.

Service needs assessment

Assess the need for support on a personal basis and direct it to appropriate services.

Skills training

A targeted skill development, rehabilitation and treatment is planned. Track progress, skill development or support implementation.

Result indicator

Evaluate the effectiveness of the treatment plan: Summary view of reports on individual goals, which can be mapped to specific units or organizational goals.

3.2 Theoretical Basis of the LivingSkills Application

The LivingSkills skill assessment and planning tool is developed from practical experience and theoretical research, which utilizes the principles of problem-based learning, a cognitive-constructive approach which are frequently used in evidence-based practice(Ammeraal, Coppers 2012). It assumes that the user of the tool is humanistic, i.e. a person is basically good, independent and has freedom to build his or her own life.

The principles of problem-based learning is based on situations and problems that professionals encounter while carrying out their daily work (Poikela, Nummenmaa 2006). The items or questions on the skills assessment and mapping items are based on actual rehabilitation plan service requests that take place in housing services.

According to the CEO of the LivingSkills organization, LivingSkills application considers recoverees as an active participant, involved in acquiring, processing and evaluating knowledge using their own patterns of learning. The role of the evaluator in the tool is to be a facilitator, supporter of learning whereas the recoveree is responsible for his own learning. The recoveree, together with the support, assesses his or her level of skill that enables or hinder independent living, satisfaction and quality of life. Together through motivational interviews, they identify existing strengths and skills gaps and consider how to utilize strengths and practice developing skills.

Recovery orientation is a framework for thinking and action that focuses on resources, participation, hope, meaning and positive mental health. Practising self-motivating skills while analyzing oneself strengthens the recoveree's experience of managing life, or the sense of coherence, which in turn reduces stress and thus improves recovery. Recoverees are in the center of the activities and training at all phases. The evaluator and the support workers are only there to assist recoverees during their journey. (LivingSkills Oy 2019)

According to (Nordling 2018) recoverers must play a significant role in their recovery, the care system must recognize that each recovery is different, their needs are different, and their recovery must be based on life orientation and resource-centred thinking.

3.3 LivingSkills Substance Rehabilitation Tool Questions

The LivingSkills Rehabilitation Tool questions are based on both experience and research knowledge on the skills needed to recover from an addiction. There are nine categories of questions: pleasure skills, emotion regulation skills, impulse control skills, social skills, relapse avoiding skills, addiction assessing skills, commitment to change skills, motivational skills and quality of life questions. In addition, the tool contains a number of open-ended questions that examine everyday life skills and assess overall recovery situations such as "*What qualities do I hope to change?, How do I know that the situation is better or going in the right direction? What kind of help or support do I hope I can get to achieve the goals? From whom?"*

Recovering from addictions is promoted by "recovery capital", which includes housing, work, family and friends, subsistence and health. (Koski-Jännes, Pennonen et al. 2016). People with substance abuse have many psychosocial difficulties related to emotional activities, working life, relationships and caring for one's own health. Co-morbidities were common and psychiatric disorders such as anxiety, mood and personality disorders. In the Psychosocial Factors Relevant to Brain Disorders in Europe (European Commission 2019) project, crime, convictions and domestic violence also increased significantly (Levola, Pitkänen et al. 2018).

3.4 Structure of the LivingSkills Application

LivingSkills application is intended to be used by the evaluator/staff member at the facility or recovery home. Once the staff members, or the evaluator logs in to the system, he or she can choose from the list of residents / recoverees assigned to him and work throughout the assessment and planning together.

On the form page, there are a list of skills related questions with their explanations which needs to be answered. The recoverees map their skills individually at first by conducting self-assessment by selecting a value on a numerical scale or choose a smiley face from the slider. Some assessment forms have more than one evaluator, so the resident can get other's opinion regarding their situation. When the same question is answered by the evaluators (staff members/healthcare worker/family members) it provides a different perspective than the recoveree's own.

If there is a conflict of views or if recoverees disagree with the evaluation, then it is worked out together while practicing dialog between recoverees and evaluators. It is ad-

visable to have a different opinion on some skills, so there would be exchange of information between the resident and the evaluators. The last slider option describes the goal or the target skill level which the resident plans to achieve.

Finally, there is an option to select if the skill described in the question is either “strengths” or a “development target”. There is a comment section below each question where they can describe their situation and thoughts regarding the questions presented. Once all the questions in the form have been answered, the resident can view the summary and proceed to create a plan to develop their skills in plan page.

Plan page consists of all of the skills which was assessed in the form page, it is separated in sections according to “strength” or “development target”. One has to follow the steps below, in order to complete a plan.

1. Select skills that are your *strengths* and describe how you are going to utilize it.
2. Select one to three skills goal from the *development target* section that you want to enhance and develop. For each skills please answer the following questions in their respective fields below.
    i. Describe your current situation
    ii. Describe how you plan to achieve the goal.
    iii. Describe how you know you’ve reached the goal.

When the user has filled all the required fields with the help of evaluators, one can choose the next evaluation date and save the plan as complete and can proceed to the progress page. After successive evaluation, one can view the status and progress level of the desired skill that was selected as “development target” in the progress page.

LivingSkills application assessment and planning can be completed by following four successive steps and it’s layout is structured as described in the section below.

1. A landing page for staff members shows a list of all of the residents going through the program.
2. Once a resident is selected, staff member can view resident’s record on the overview page and asks the resident to start accomplishing skills assessment forms.
3. After the skills assessment forms are accomplished by the resident, staff member can discuss with them to evaluate and set a common goal for every skill, after that they can proceed together to create a plan.

4. Once the plan is created, the user can view the summary of the plan and view the progress chart where the progress of skills selected as a development target is displayed.

The actual design and layout of the application are not presented in this thesis due to confidentiality reasons.

4. Redesign of the LivingSkills application: Methods and Results

In this chapter we present the approach we took in order to plan and conduct this research. The research approach section explains about the use of different methodologies applied in this study. Data collection and analysis methods subchapter describes about utilizing different evaluation questionnaires and methods utilized to collect and analyze research data. In the study design, we explain the steps we took while planning the empathic design of the application and how we implemented the plan to create a redesigned application and it's final evaluation results.

4.1 Research Approaches

We chose to follow ISO 9241-210 standard (ISO 9241-210:2019(en), Ergonomics of human-system interaction — Part 210: Human-centred design for interactive systems, 2019) which provides a framework for human-centred design (HCD) methods. The method was chosen as it emphasizes multidisciplinary collaboration to design and implement information technology solutions, as well to improve user experience. This approach to redesign helps to build other aspects of system design, such as improving the identification and definition of functional requirements, reducing discomfort and stress as well as increasing usability (effectiveness, efficiency and satisfaction)(International Organization for Standardization, 2010).

The human-centred design activities mentioned in the ISO 9241-210:2010 are compatible with our research process as it allows us to iterate when necessary and incorporate empathy in every stage of our design. The activities shown in the Figure 3 provides better understanding of the main activities involved in human centered design process in order to design a solution that meets user requirements.

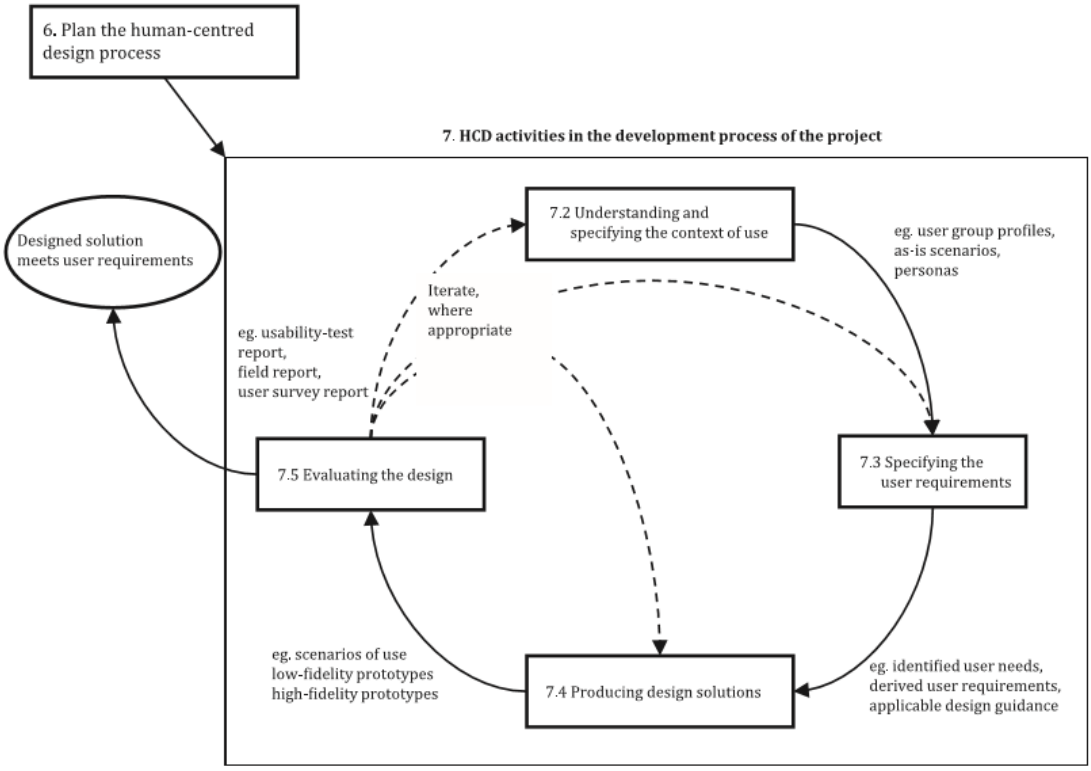

Figure 3. *Main activities of HCD as defined in ISO 9241-210 (ISO, 2019)*

We also planned the phases of the study with design thinking mindset, which is systematic, user-oriented approach intended to solve real-life problems. Instead of focusing on how the problem can be technically solved, the main focus is addressing user's needs and requirements *(*Leifer, Meinel et al*. 2009)*. These solutions are consistently oriented towards the needs of users and the process is structured and iterative. We try to maintain the user-centered mindset while developing and ideating new possible solution while empathizing with different stakeholders throughout the research timeline.

Based on the requirements of HCD, we chose to conduct five phases of study described in Table 1 below, showing HCD steps which corresponds to our study design phases.

HCD steps corresponding to phases of study	
Empathy Design Planning	Understanding and specifying the context of use
Phase I: Walkthrough and Test	Specifying the user requirements
Phase II: UX evaluation	Evaluate the design
Phase III: Ideate	Producing design solutions
Phase IV: Prototype, Design, Test	Evaluate the design
Phase V: Updated Application:	Designed solution meets user requirements

Table 1. HCD steps corresponding to phases of study

User Experience in this research refers to the cumulative experience of the target users supported by empirical research as well as feedback from the stakeholders of the Livingskills application. It tries to identify the anticipated UX before the first use of the application from the users, the initial impression of the system with the experience not just focusing on the momentary use but the changes of feelings and attitude while interacting with the system over time.

Following human centered design methodology provides better understanding about the features that the users want, and prioritize development of those features first for the development (Harte, Glynn et al. 2017).

4.2 Study Design

The research study was conducted by Livingskills organization as a pilot study program with Siltavalmennus organization to test its flagship product, LivingSkills application for recovery. The goal of this project is to improve the existing service and functionality of the application and to identify opportunities for improvements areas in the current application.

We analyzed the nature of the project and timeline in order to come up with an initial research plan which consisted of preliminary schedule of the overall process, listed in the Table 2 below:

Timeline	Phase	Tasks
November – February	Planning	Enhance empathic communication and observational skills of the researcher in order to develop motivation, increase understanding and gain insights on the user groups.
November – February	Phase I	Conduct Interview session and observe residents and staffs members at SiltaValmennus (rehabilitative coaching organization) to establish context of use of the application.
November – February	Phase I	Evaluate needs of different target groups using the application and focus on the evaluation of the end users.
March	Phase II	Initial evaluation of the program using AttrakDiff (residents and staff members), semi-structured interviews and user satisfaction surveys to gain insights on the application and set a baseline measurement.
April - June	Phase III	Redesign application of the application based on the research findings, Compare the results from the first evaluation through usability tests and other quantitative and qualitative analysis methods.
July - August	Phase IV	Another round of UX evaluation for residents/staff who has never seen/used application before and compare the results with the basic version of the web application.
September– October	Phase V	Results, discussion and revision of the thesis work

Table 2. Timeline of research processes and activities

Based on the requirements of HCD as described in Table 1 and preliminary research schedule described in Table 2, we came up with the study design plan as shown in the Figure 4 which describes the phases, methods, tasks and expected outcomes of each phase.

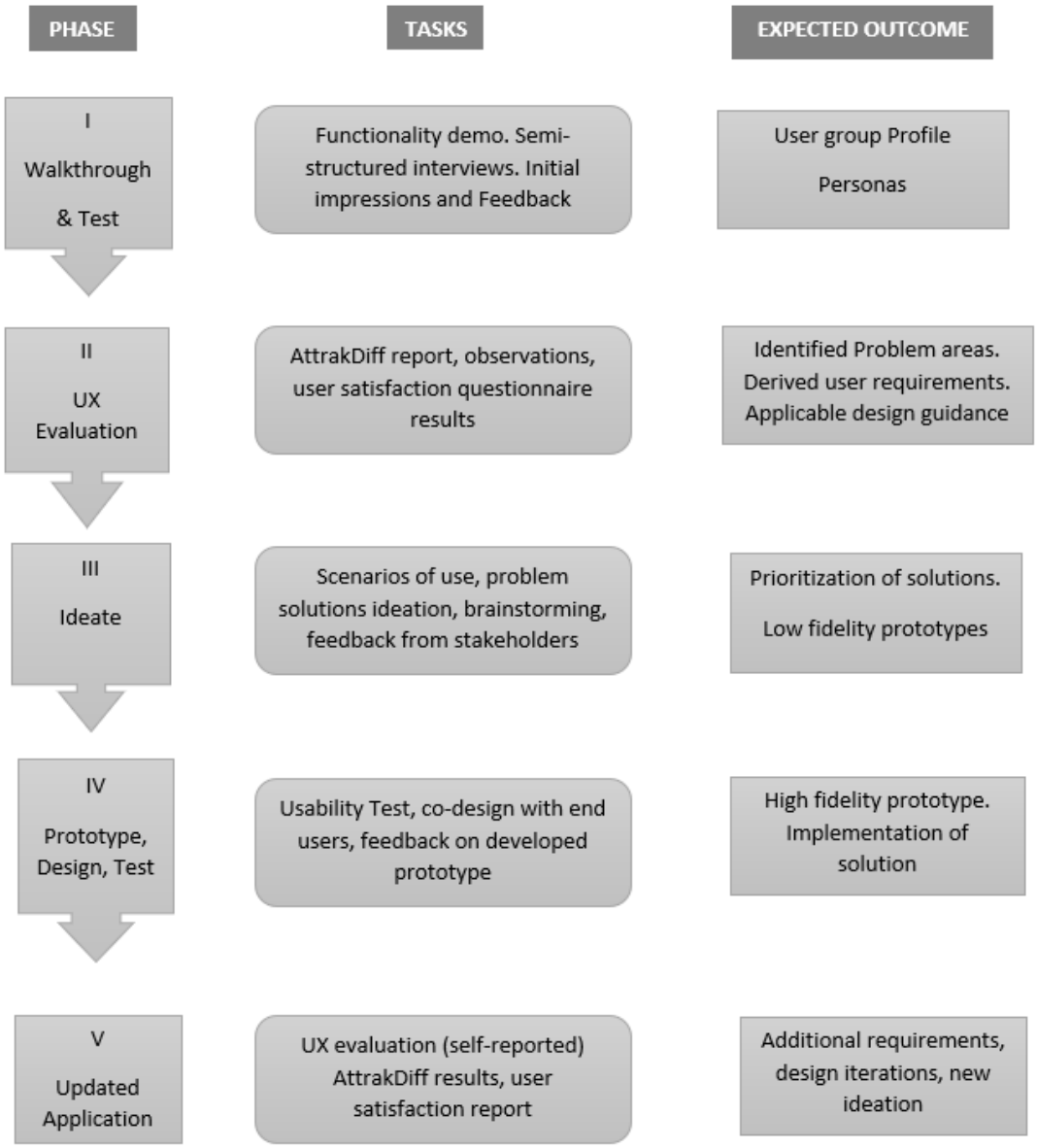

Figure 4. *Different Phases of research and expected outcome of each phase*

4.2.1 Data Collection and Analysis Methods

We chose a multi-method design by combining quantitative with qualitative data as it would provide us with comprehensive insights on user's experience with the application and means to quickly validate our results. Quantitative data was gathered from multiple questionnaires, and qualitative data was gathered from observations and semi-structured interviews from the recoverees and staff members at SiltaValmennus and development team at LivingSkills.

For quantitative data, we chose a method of evaluation with a human-centred product development process which involved design, test and redesign tasks followed by usability studies involving end-users as well as stakeholders with multi-disciplinary skills into the process.

For the evaluation of the UX of an interactive application, we had to use the evaluation method which provides insights on the subjective perception of attractiveness, along with the behaviour and emotions it gives rise to. The AttrakDiff questionnaire (Hassenzahl 2006) matches the criteria as it measures pragmatic qualities and identifies hedonic qualities and beauty related to customer loyalty.

The theoretical model of AttrakDiff (APPENDIX E) which was researched and tested by (Hassenzahl 2006) and colleagues separates it into four aspects below;

- The product quality intended by the designer.
- The subjective perception of quality and subjective evaluation of quality.
- The independent pragmatic and hedonic qualities.
- Behavioural and emotional consequences.

User satisfaction questionnaire was used to assess the user's perception about the application in areas such as ease of use, visibility, learnability and informativeness. Each item on the questionnaire is rated on a 1 - 5 point scale (1 - meaning strongly disagree, 5 - meaning strongly agree). User satisfaction questionnaire was filled right after conducting the initial and final evaluation of the application. The responses from all of the user satisfaction questionnaires were combined and used to compute for the mean, and deviation of value. A two-tailed t-test was conducted after the final evaluation in order to find out if there is any significant difference in the level of perception amongst the users.

Apart from AttrakDiff we tried to triangulate the evaluation data from interview sessions, feedback from the stakeholder groups as well as data from user satisfaction questionnaire (APPENDIX C). As relying on only one measure of evaluation did not seem feasible in our case, as the intended outcome of the design should be applicable in all of LivingSkills application, and not just for LivingSkills application for recovery. Furthermore, it helps us find out if the quantitative data would correspond to the data from the observations, interviews and feedback.

AttrakDiff and user satisfaction questionnaire provided a quick way to gather information from respondents. Results from the AttrakDiff questionnaire was entered into the AttrakDiff website which computes and provides a portfolio of results, value for hedonic and pragmatic qualities of the application along with attractiveness rating.

For user testing method, a background questionnaire was given to the participant in order to find out about their age group, level of education and how long have they been receiving treatment at SiltaValmennus. Service needs of the recoverees and the staff members were also included in the background questionnaire.

Usability test was conducted in order to focus on the findings and challenges in the redesigned application. The test session was recorded in audio and video format so it would be easier to go back and analyze the materials after study, notes were taken down at specific time when the participant showed some confusion or concern during the test. Think aloud protocol was well established in order to gain understanding of participant's mindset. During usability test, we were able to note down different data based on observations, comments and recommendations from the user. Answers to the open-ended questions after the test provided evidence to accept or reject the changes that did not seem plausible to the end users.

The data from evaluation sessions with the staff members and residents at SiltaValmennus were recorded in audio format in order to gain better understanding of their perception. Most of the communication occurred with the help of a translator, audio recordings made It easier to point out what message users were trying to convey to the researcher. Feedback from the LivingSkills development team which comprised of multidisciplinary experts were used in order to generate more ideas and prioritize the solution based on the timeline and feasibility.

4.2.2 Participants

The study comprised of 13 participants in total. Five individuals (male; age: 25 - 55) participated in the first round of evaluation (phase II), two staff members (trained healthcare professional) and three residents. Seven individuals participated in the final evaluation (phase V) of the redesigned application which was conducted in September, 2019. One resident member participated in the evaluation session conducted in June, 2019 so his responses were included in the first round of evaluation.

The first round of evaluation was conducted in March, 2019 where all of them used the application as a part of their workday. The staff members, as well as the residents conducted the assessment in pair within the recommended time of 30-minute for each session.

All of the participants in the first round of evaluation were male and none of the residents had completed university education. Whereas one of the staff members was once a recoveree and had received treatment from SiltaValmennus before being employed as a staff member.

Before the evaluation session, participants were asked to fill in the consent form to use non-identifiable personal information and to record audio and visual materials for research purpose only. Participation in the test sessions was voluntary and the participants were told that they can stop at any moment without providing any reason. Background questionnaires were filled after receiving consent from the participants. For the final round of evaluation which was self-reported, participants provided the consent forms along with their responses to UX questionnaires.

They were given a walkthrough of the application (described in phase I) a week prior to actual implementation at the facility so they could be familiar with the features and functionality of the application.

4.2.3 Empathy Design Planning

Before starting the empirical study, the researcher evaluated human factors involved the project by evaluating the purpose and use cases of the application, nature of the development environment, and how it relates to various stakeholder. The activities depicted in Figure 5 were performed throughout the research process.

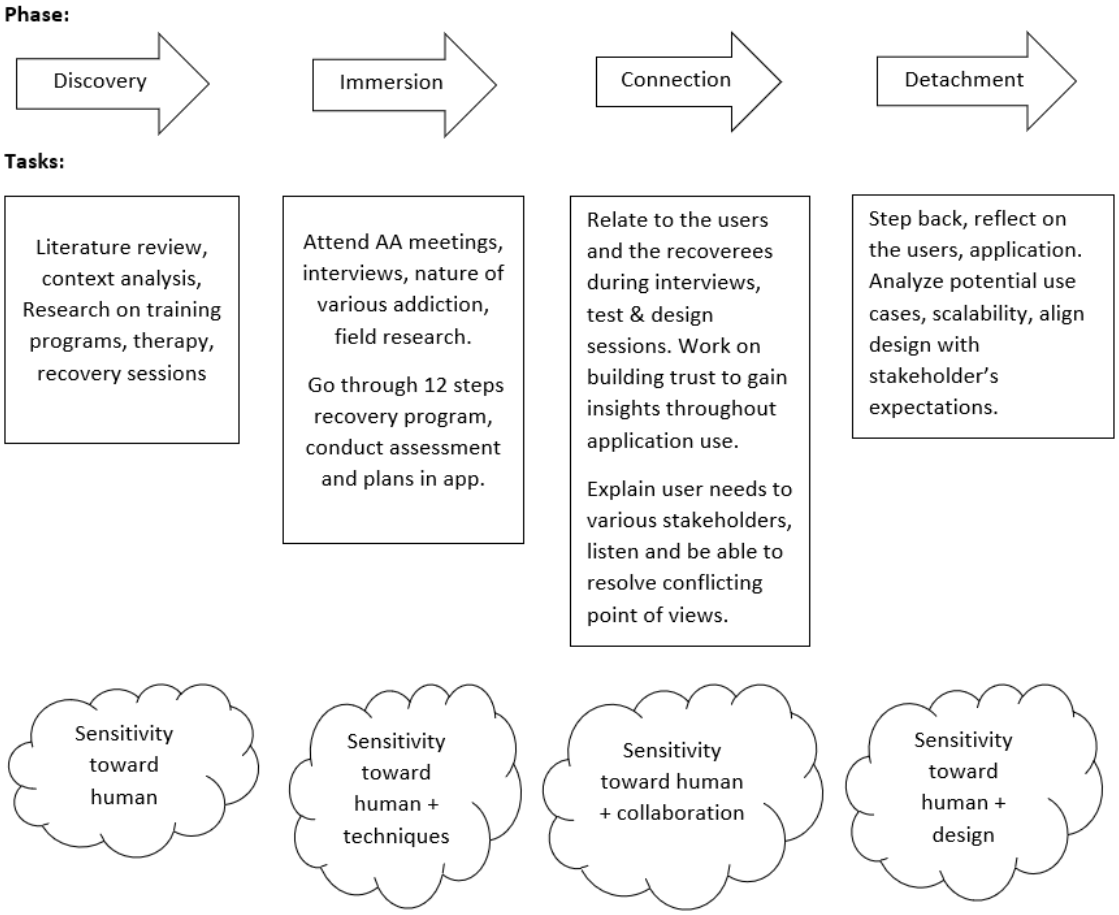

Figure 5. *Empathy Journey of the researcher*

The Goals of empathy design planning were:

- To identify the methods and resources required for the human-centred design activity and agree on the timeline.
- To identify various stakeholders of the LivingSkills application and establish a common ground for project implementation.
- To develop effective procedures for establishing feedback and communication on human-centred activities (enhance empathic understanding capabilities of the researcher).

In order to plan human-centred design studies, it is important to pay attention to the designer's own mindset. It was crucial for the researcher to analyze one's own biases

and attitudes towards the application as well as enhance one's own empathic understanding capabilities. Several techniques are employed in order to promote empathy, including brainstorming, role-playing techniques while simulating user's environment (Thomas, J., McDonagh 2013). In our research, we conducted field study by visiting users in their own environment and used adaptive interviews which rely on asking questions based on participant's response to gain insight into mental models and social situations of the recoverees.

As a designer, we adopt a "beginner's mind," with the intent to remain open and curious, to assume nothing, and to see ambiguity as an opportunity (Tim Brown 2019). The researcher opted to reflective writing in order to identify own bias towards the application, addiction and recovery. The reflective writing was done in various phases as part of a blog/journal entry in order to assess the designer's own emotions and expressions.

The researcher decided to follow empathy design (Kouprie, Visser 2009) framework to develop a deep understanding of users for empathy design. The empathy journey of the researchers for each phase are described in Figure 5. Which consists of four phases, and is not just applicable to research activities, but also during communication as well as ideation phases as described in each section below.

Each phase of the empathy design (see Figure 5) is described in more detail below. Note that in this part of the thesis, the author uses the first person due to the personal nature of empathy design.

Discovery

This phase consisted of a literature review, and context of use analysis at SiltaValmennus organization. Literature review consisted of a brief review of the twelve-step program, SMART recovery and other programs which outlines course of action for recovery. The researcher also analyzed a lot of documentary movies based on drug addiction and recovery. It was important to see how images of addiction are portrayed in movies and started to review literature on different aspects of emotions and how it comes into play. This was done by studying one's own emotions when it arises and writing it down in mobile phone application, as well as in the notepad and being aware of it.

To enhance observation skills and asking the right questions without being judgmental about users and their conditions, I observed and practised taking notes in various locations and circumstances under the common theme of empathy. Viewed different videos on youtube to enhance observation and communication (verbal/non-verbal) skills such as gait recognition, and studying body language on top of facial expressions and emotion

recognition. The goal was to enhance perspective-taking ability, cognitive component (ability to observe and understand the experience) as well as affective component (ability to share the emotional experience of others) of empathy (Chen 2018).

Personally, I realized that the things I thought I knew about the users were just my opinion, in order to truly understand I had to be aware about my own emotions before trying to observe others.

I went to join an alcoholics anonymous meeting through skype and went through a lot of motivational stories of recovery, AA big book. Most of the recoverees in these groups have been out of addiction for so many years, and some were first timers. I was difficult to just attend the meeting and not contribute any part of my own story, but as the AA big book implies, *"it doesn't matter even if we have anything to say at the meetings, sometimes listening helps as well"*. So I decided to immerse and overcome my empathic horizon (McDonagh, Thomas 2010) to go beyond my own beliefs and prejudices held against people who have addiction problem.

Immersion

I decided to go through the 12 steps program in depth, the first step was acceptance, simple admission of being powerless over alcohol. I could not do that cause I never had a problem with drinking but to understand how alcoholics feel, I decided to follow role-playing technique which is widely used in experience prototyping (Devecchi, Guerrini 2017, Mattelmäki, Battarbee 2002) and surrounded myself with the party-goers.

I frequently visited bars and clubs and strike a conversation about being alcoholic researcher. I realized that I enjoyed talking about my research, addiction and recovery in general with new people and sharing stories I had learned from Alcoholics Anonymous big books and skype meetings. It led me to a point where all my social interactions were surrounded by alcohol. It felt good at first, less inhibition, enhanced social interaction. But once I start developing resistance for alcohol, I never felt drunk enough to achieve the same friendly state of mind.

I was spending a lot of money and would always be ready to attend gatherings where alcohol would be served. On the next day, I would promise myself not to drink again, as the next day would be wasted in hangover and trying to get be normal again. My sleeping habit was disrupted as I would sleep late, or early in the morning, and it was hard to adjust my work and my normal routine into my daily lives.

I was continuing the note-taking and emotion tracking habit, which made me easier to realize why I was doing it and it was easier to remind myself, that this phase shall pass as well. While interviewing the staff members at SiltaValmennus, they said that the residents had difficulty in writing with their hand so, instead of typing, they had to go write down all the answers in their 12-step worksheet with their hand. When I decided to do it myself, it felt so much better, as I realized I had not also written down anything for so many years, I could analyze my handwriting, the stress I would put into the certain letters was very profound. I didn't even realize that simply writing a journal could feel so great, so I started writing and carrying my journal around.

Connection

In this phase, I tried to complete the alcoholic anonymous questionnaire as I could relate more with the users based on the observations and data gathered during discovery and immersion phase, and while going through each question in the worksheet. I started realizing that I might not have all of the problems stated in the worksheet, but addiction could not just be related to drugs and alcohol, but it could be anything from caffeine, to nicotine, to games and internet.

I could see the people I am in contact with at SiltaValmennus, not as an end-user, prisoners or an addict, but another human being like you and me with a different health condition. Some are there because of following their friends and their crazy ideas, some had no means to support themselves because they had lost everything to addiction and committing crimes was the only means to sustain their lifestyle. It was hard to find employment as nobody would hire them. Although there are differences in circumstances that separate us, it made me realize that we can all be more compassionate and kinder while dealing with everyone in our everyday lives.

It was important to be a designer and relate to the experiences of the participants while conducting interviews as well as during conveying the findings to the product owner and various stakeholder or board members of the company, LivingSkills. To be able to draw back on one's own memories and experiences and to be able to relate and resonate with user's feelings is enlightening in nature. The conversation itself becomes therapeutic and acts as an outlet of letting out frustrations and emotions which are buried deep.

The connection with the participants was not just to gain insights but to be genuinely interested in their lives and their lifestyle and make sense of their world. This phase made me more curious about the research study, and I felt more motivated to be more involved with the users, and empathy design research process.

Detachment

I decided to take a break from everything and tried to distance myself from role-playing alcoholic lifestyle. It was a good decision to step back and reflect on what I was experiencing. It helped me put things into perspective. With increased understanding about oneself, addiction and recovery it became easier for me to focus solely on what was important.

I continued interviewing with the staff members, gathered much more information on the residents through observations and interview, and decided to continue with 12 steps program the way residents would do it in SiltaValmennus. I was becoming more inquisitive about my research questions and felt like I was better related to the users that I was designing for.

This phase was important to communicate the findings to the stakeholders of the application other than the end-users. To keep the ideas flowing while engaging and promoting discussions regarding how to further improve the application. It was important to take into consideration that the same application code is being used at different organizations which have nothing to do with addiction and recovery. So, the challenge was also to create a general solution which could be applicable for all of the application instance, so the product developer doesn’t have to change the code for every client.

4.3 Study Procedure: Methods and Results of Each Phase

In this part, we elaborate on the study design methods, analysis of data and results of each study phase as described in Figure 4.

4.3.1 Phase I: Walkthrough and Test

To understand and specify the context of use, the researcher went to SiltaValmennus and conducted a walkthrough session of the application to familiarize the users with the system they are about to test. A semi-structured interview session was conducted with the director of the rehabilitation and recovery program and a trainer who was involved in coaching residents at the facility.

Goals

- To evaluate the initial impression of the application through observation.
- Figure out in details what kind of services the organization provides to the residents.
- Find out about the intervention and the training sessions they do to help the residents recover and live an independent life free from drugs.

Method

The walkthrough session consisted of five participants (3 residents, 2 staff members at SiltaValmennus) who had never seen the application before. They were given basic instructions in their native language regarding the overview and usage of the application. Navigation instructions to different screens as well as a basic introduction to the processes to be carried in order to complete the self-assessment module and create a skills training plan.

A semi-structured interview of 30 minutes in length was conducted with the facilitator (director of the rehabilitation program) and a trainer at the organization on how they plan to conduct the assessment and planning in LivingSkills application. All of the responses from the interview were noted down and suggestions were made by the representative of LivingSkills organization on how to conduct the planning. At the organization, they had only one computer to be used by the residents so all of them had to conduct the assessment on the same unit.

Requirements regarding the needs of residents, kind of training programs and therapy session they had to go through were gathered in the interview session. The theme of the interview was regarding the existing facilities provided by the organization, the questions of the semi-structured interviews are listed below:

What is the initial impression with regards to the LivingSkills application?

How the SV organization have been assisting the residents in their recovery?

What kind of training programmes are they going through (reality therapy, social skills development, vocational training, basic life skills training and support)?

How long do they require support and what happens once they are done with their sentence?

How are the 12 steps of recovery programme conducted and where and how do they conduct the group sessions, and interventions.

Do they think it will be helpful, and what are the problems the application aims to solve for them?

The first phase of the study concluded by understanding the context of use, details about the target groups of the application, we were able to identify different user's need and produce a user persona comparison of the target user group and decide to focus on the primary user group.

Analysis

All the data collected from the semi-structured interview session at SiltaValmennus was categorized according to the user group. Handwritten observation notes were first transferred into text, additional information regarding the services was gathered through their website. The translated texts were reviewed and clarified by the translator after the session. Target group segmentation (see Table 3) was created and the problems faced by the group was described in details based on the their needs.

Group name	Description	Problem (assumed) worth solving	Main group
Residents	People with substance abuse past and serving their last few months in prison before release. People who want to improve their health condition with use of this app.	• Need to enhance their skills, help with recovery. • Need to track their progress. • Need to map and identify own skills & strength required for abstinence from drug use	Yes
Healthcare worker / Staff members	Healthcare professionals who facilitate trainings or treat the residents. [They evaluate patient's records & give feedback, help residents while conducting skills mapping and recovery planning]	• Need to ease their lives, • Need to reduce paperwork, medical health records.	Yes
IT Manager / Administrative staff	Personnel at the organization who sets up patients / user data, and manages user access and roles.	• Difficult to manage patient records. • Difficult to implement and use.	No

Table 3. Target group segmentation and need requirements

Based on research, meetings, observations and analysis of existing materials over the SiltaValmennus website, comparison of user personas (see Figure 6) was created. Mock personas were sketched based on the gathered information before transferring them into digital medium. The comparison was to find out the opportunities for specific target group of the application.

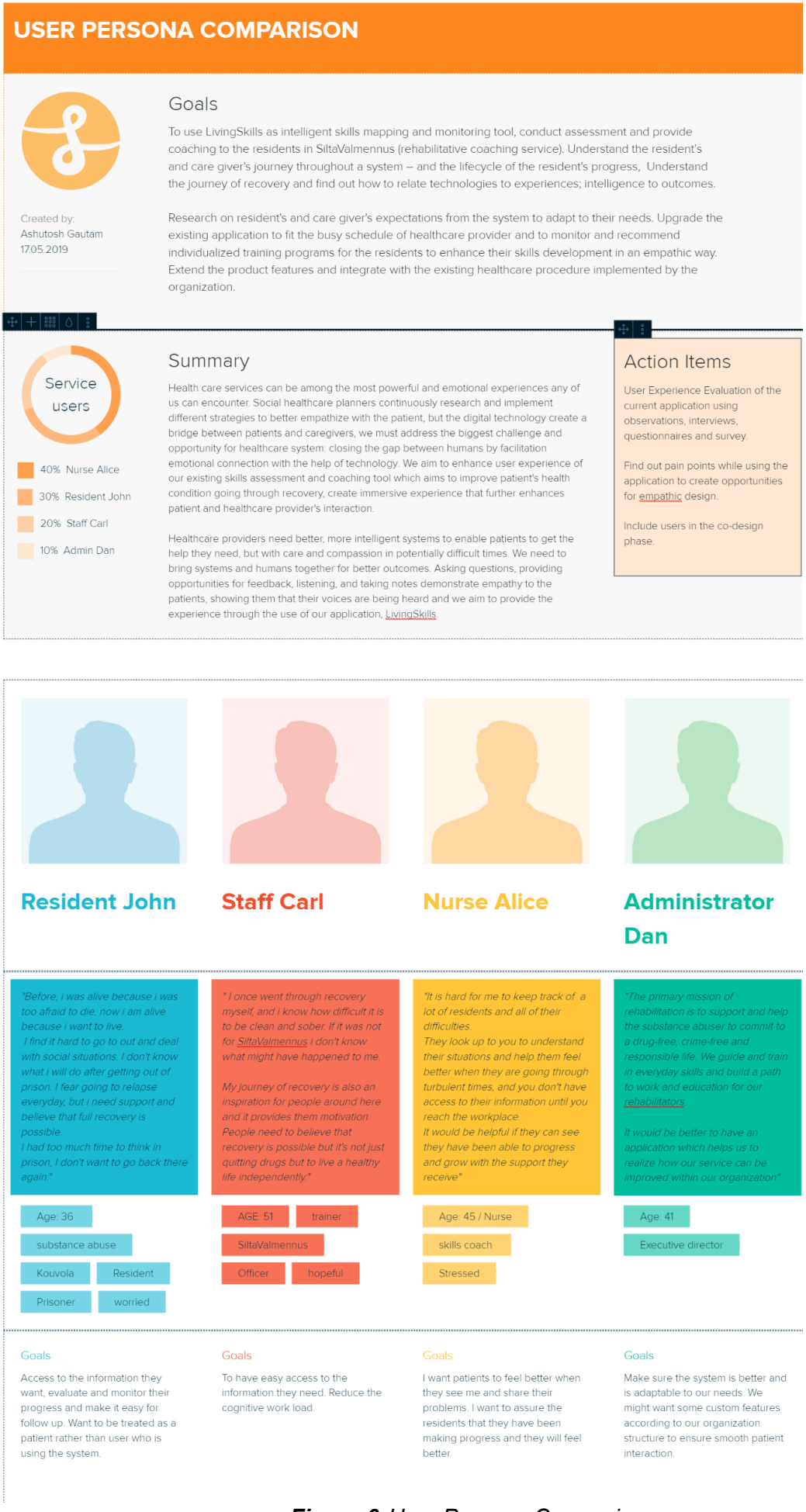

Figure 6. *User Persona Comparison*

4.3.2 Phase II: UX evaluation of the current application

Human-centered design process mentions about iterative process while defining the requirements and elaborating the tasks for each member. After the walkthrough session, we opted to test the current version product with first-time users. The same participants from the Phase I (see chapter 4.3.1) conducted the first round of evaluation, UX questionnaires (AttrakDiff and User satisfaction questionnaire) was utilized to gather quantitative data. A semi-structured group interview session was conducted after the participants had tested the application after creating the plan.

Goals

- Find out problematic areas and opportunities for design.
- Quantitative measurement of hedonic and pragmatic attributes of the application and to measure the baseline UX level of the application through a user satisfaction questionnaire.

Method

We had the first round of evaluation conducted by the staff members (n=2) and the residents (n=3) at the facility. User experience evaluation was conducted once the residents conducted the skills mapping assessment and created a personal recovery plan with the help of the staff members.

The users were recommended 30 minutes of their workday by the staff members to use the application for mapping and creating a plan. The application was tested in the natural task environment setting, at their own pace, a day prior to meeting with the researcher. We tried to assure that the participants were not under any stress and their experience with the application is still fresh and easier to recall. Audio from the evaluation session was recorded and notes were taken while the participants responded to the questions.

An extensive semi-structured group interview session was conducted with 4 out of 5 participants who had used the system which lasted for more than 1 hour and half. Since the researchers were not present when they conducted their assessment due to organization procedure regarding the privacy of health-related information we asked them to go through the application again using a test account during the evaluation and interview session so it would be easier to recall the steps they had performed.

AttrakDiff questionnaire (Appendix E) and user satisfaction questionnaire (Appendix C) were used to gather quantitative data on the application. During the interview, the participants were asked to pinpoint the difficulties they had while using the application. So, the researchers could take precise note on the difficulties and challenges the participants had faced during the process.

Since the researcher did not understand the native language of the participant, an interpreter was present to translate the findings. Two of the participants were fluent in English but only one of them was present during the interview session. As the other participants elaborated their problems and suggestions in their native language, the English-speaking participant summarized the finding and informed the researcher. The researcher was familiar with the application, so it was challenging to see any problems they might have had.

Once the evaluation session was over, we handed them the AttrakDiff questionnaire, along with the user satisfaction questionnaire.

In this phase the interviewing and observational skills of the researcher were tested, being able to ask the right questions to the target group, as well as creating a suitable ambience where people could share their views without being judged. Empathy-related skills gathered during the planning phase were crucial during interviews.

Analysis

Based on the problems stated by the residents and the staff members, we were able to identify pain points for different focus user groups. When asked, if there are any urgent problem areas that need to be solved / improved, all the participants feel like the application is good as easy to learn and there is no need to change.

List of problems and difficulties faced by the users mentioned by the residents are listed below

- Switching between questions
- Didn’t really understand what strengths and development target are.
- Needed more time to think, I could not focus on a lot of questions at once
- Doesn’t really work on the device with lower resolutions (Screen: 970px and less)
- “A simple instruction on how to answer the comments would be great.”
- Some rewards for completing filling in the form.
- Thirty minutes was not enough to answer all of the questions.
- Would be great to fill in the form at your own pace, as some questions would take time to reflect on and answer.

- The black dot needs to be removed if all of the answers have not been filled. change the color of the dot to something else if partialy filled.
- Didn't know if some of the questions are really related so it would be nice if they could know that some of the questions can be omitted, or if every one of them are mandatory.

On the plan page:

- Clicking on the dialog to select skills would close it, (mouse didn't have scroll)
- Would be nice to see the next evaluation date in the home page for users.
- Didn't know I can click on the tab to view summary.

For staff members:

- Filtering and sorting the list of patients
- *"If the date of next plan can be seen in the homepage, then it would be great."*
- View the partially filled responses in the summary page. (added later during skype meeting with the LivingSkills stakeholder).

The responses from the AttrakDiff questionnaire was transferred into the AttrakDiff website in order to compute for the results. Two separate projects were created at the AttrakDiff website, to analyse responses from residents and the staff members.

For the evaluation of the user satisfaction questionnaire, we combined the response from both staff members and resident to compute for the mean score and standard deviation of scores.

We identified areas of opportunities to implement empathy design based on their suggestions along with the quantitative data: AttrakDiff scores / USQ scores for both residents as well as the staff members at the facility.

Results

The result from the AttrakDiff evaluation was found out to be:

- For staff member: As desired (see Figure 7)
- For residents: Somewhere between Task oriented and desired (see Figure 7).

Based on the diagram of average values (see Figure 7), it indicated that the hedonic quality (stimulation) of the application could be improved. We considered the results from the residents as the baseline measurement of the application.

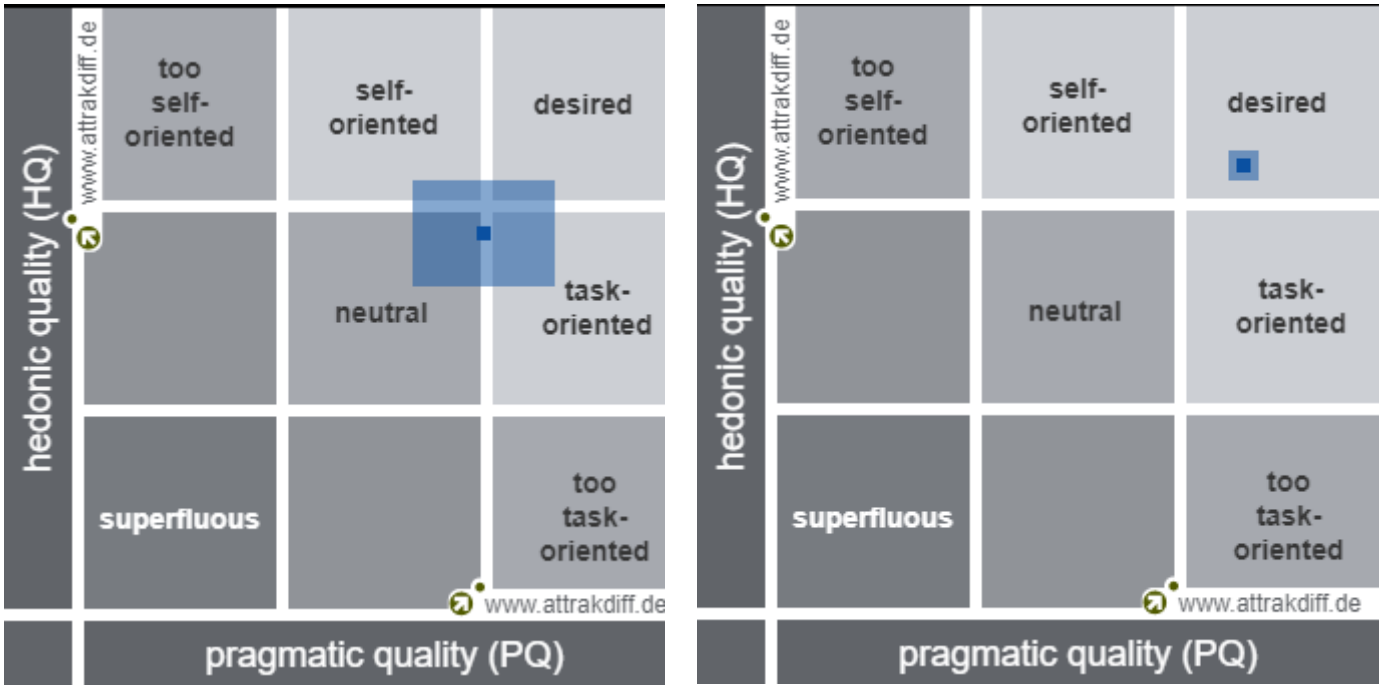

Figure 7. *Portfolio presentation of results*

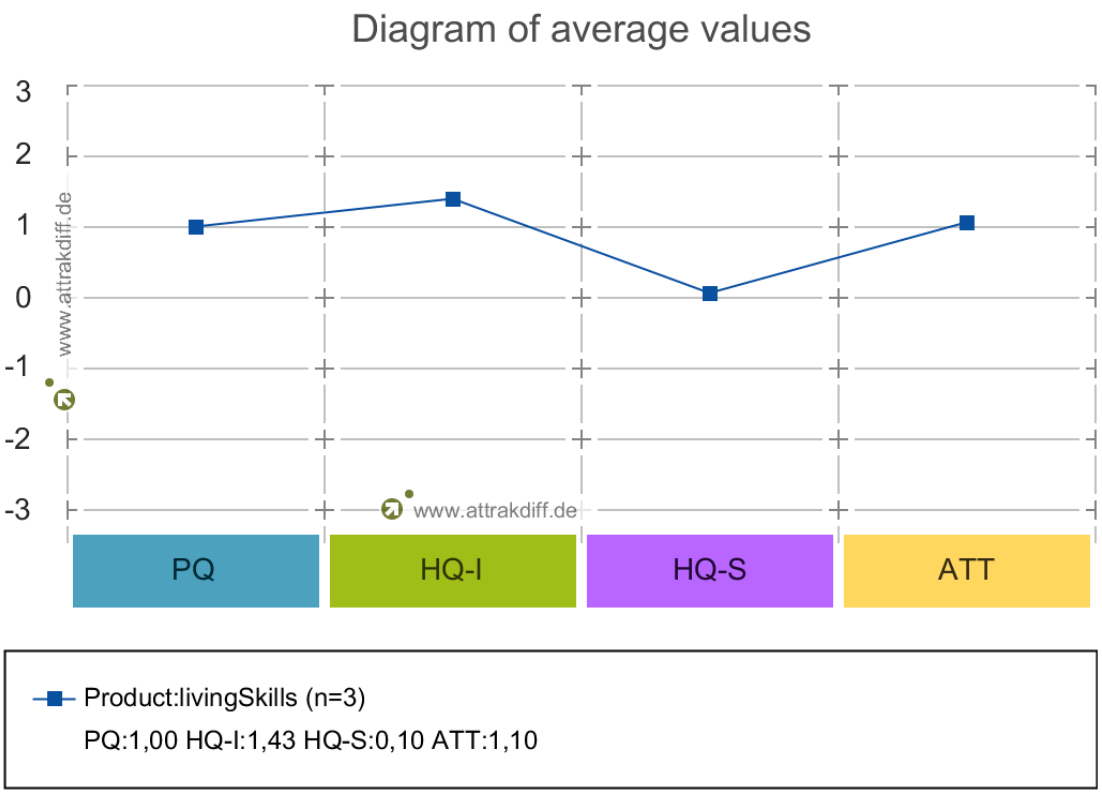

Figure 8. *Diagram of Average values for the attrakDiff dimensions for residents*

The results portfolio diagram in Figure 8 shows the position of the mean values of the scores in terms of pragmatic quality and hedonic quality. The results are interpreted according to it's positioning in its quadrants. The smaller and darker rectangle represents the mean value of the study dimensions with respect to the user experience, whereas the larger and lighter rectangle represents the confidence interval. The larger rectangle means the diverge user's opinion whereas the smaller rectangle means a converged opinion.

For residents, the application scores well in relation to the task-oriented feature as they perceived it as more of pragmatic attributes than hedonic. For staff members, the rectangle falls under the desired quadrant, which means it scored well in terms of hedonic as well as pragmatic qualities.

We decided to focus on enhancing the experience for the end-user, in our case the residents and focus more on enhancing the hedonic attributes of the application.

4.3.3 Phase III: Ideate

In this phase, feedback from the interviews and surveys were considered and presented in stakeholders meeting consisting of multidisciplinary team members to discuss and prioritize the features that had to be implemented.

The multidisciplinary team members consisted of various members of the organization:

- Practical nurse (1)
- CEO of the Livingskills Organization (Mental health expert, 1)
- Designer / Software Developer (1)
- Project manager/information technology consultant (1)

Goals

- Inspection of problems mentioned by the end-users to the stakeholders.
- Get feedback from the team members and encourage them to give ideas and opinions. (Feedback reveals strengths and weaknesses in the design solution and can provide new information).
- Prioritize the problem solutions

Methods

The researcher made use of the interdisciplinary team members feedback to ideate problem solutions. Some additional suggestions were added from the team members based on the feedback they received from the various organization the company is collaborating with. Several meetings were conducted over skype extending over an hour, to discuss the problems. The usability problems were categorized based on the severity rating on a scale of 0 to 4, 4 meaning a major bug in the system which had to be fixed immediately, 0 meaning, not actually an usability problem. For the usability problems reported by the users, they were solved and could be seen in the application itself.

Walkthrough of the use case scenario of the application, problems were conducted during a meeting where various members analyzed low fidelity prototypes such as sketches and text dialogs. Inspection based evaluation session by expert stakeholders was conducted where the members went through each of the newly introduced features and comment on them. The problems reported in the phase II were fixed and coded into the application based on their severity ratings and ease of implementation.

Analysis

The new insights which came from the team members were noted by the designer and included in the problem list and were categorized into two categories listed below and as seen in Table 4.

1. Usability problems.
2. Suggestions for improvements.

User Group	Problems mentioned	Usability Problem severity rating [0=not really a problem, 4= major problem]	Suggestions
Residents	Switching between questions	2	
	Didn't really understand what strengths and development target are.	0	yes
	Needed more time to think, Could not focus on a lot of questions at once	N/A	yes
	Doesn't really work on the device with lower resolutions.	1	
	Simple instructions on how to answer the comments would be great.	N/A	yes
	Some rewards for completing filling in the form.	N/A	yes
	Thirty minutes was not enough to answer all of the questions.	N/A	yes
	Would be great to fill in the form at your own pace, as some questions would take time to reflect on and answer.	N/A	yes
	The black dot needs to be removed if all of the answers have not been filled. change the colour of the dot to something else if partially filled.	1	
	Didn't know if some of the questions are really related so it would be nice if they could know that some of the questions can be omitted, or if every one of them is mandatory.	N/A	yes
	Clicking on the dialog to select skills would close it, (mouse didn't have scroll)	3	
	Didn't know I can click on the tab to view the summary.	N/A	yes
	One question suggests that residents are still taking drugs.	N/A	yes
Staff members			
	Filtering and sorting the list of patients	N/A	yes
	If the date of the next assessment of patients can be seen on the homepage, then it would be great.	1	
	View the partially filled responses in the summary page.	N/A	yes
Multidisciplinary team	Users have problems with viewing explanation in summary page	2	
	Show the explanation in the plan page instead of just questions.	2	
	Text for the heading is clipped in plan page	1	
	Ticket functionality to give access to patients. (under development)	N/A	yes

Table 4. Problems overview and suggestions based on stakeholder's feedback.

The usability problems reported by the users which were considered severe were identified and prioritized to be implemented first. As the user had only mentioned one such problem, the said problem with scroll issue on plan page was solved and implemented right away.

The designer also performed a self evaluation of the application which consisted of repeating the same steps performed by the end-users as part of the review session to find out other areas for improvement, which were not reported by users. As it is a web application which can also be accessed through mobile devices, we also paid attention to the responsiveness of the application in devices with various screen sizes.

Results

The features and design improvements which were easier to fix/build and deploy into the application which doesn't affect the other existing functionality of the application were selected first. The next criteria were to assess how the proposed solution could be made to the application to various clients using LS application, and not just for recovery and rehabilitation at SiltaValmennus.

The solutions selected for development are categorized according to hedonic and pragmatic attributes in Table 5.

Attributes	Proposed changes to the system
Pragmatic	Improved navigation: Use Icons [visibility of the system status.] Highlights on hover effects were added to distinguish call to action buttons.
Pragmatic	Change the question heading for some question, as it suggests the user is still taking drugs, which was considered inappropriate for some as they have not been taking drugs since they had been in prison.
Pragmatic	Change the cursor to match the functions in order to avoid confusion.
Pragmatic	Option to fill in the form at user's own place and mobility: Give users access to their own form so they can fill it up at their own pace [This feature was requested by other users and was already in development].
Pragmatic	For the staff members, filter with sorting option to quickly find residents were selected so they could choose the resident's according to the date of plan conducted, or the date they were added to have advanced sorting and filtering options.
Pragmatic	Instructions to use the application for the first time user were agreed to be built and implemented.
Hedonic [s]	Colour of the product was changed from solid to gradient utilizing more white tones [giving fresh feel, to evoke positive emotion]
Hedonic [i]	Mobile interface to be made responsive and easy to use.
Hedonic [s]	Wordings were carefully selected to humanize the interaction, Tone of voice used in interaction [Please fill in this field is better than this field is required.]
Hedonic [s]	Use animated human face in the onboarding plan, the user can identify with while filling in the application. Congratulations message after filling in the form.

Table 5. Categorization of changes to the application according to pragmatic and hedonic qualities

4.3.4 Phase IV: Design / Prototype / Test

The researcher conducted a round of usability test while most of the usability problems had been resolved and the other features selected as improvements were still under development.

Feedback from the users while in the design and development phase was considered crucial to maintain the user-centric application. Evaluating designs with users and improving them based on their feedback provides an effective means of minimizing the risk of a system not meeting user or organizational needs.

Goals

- Involve the user in the co-designing.
- Identify problems while using the application alone without any assistance from staff members.
- Verify the design solution under development and get feedback on new ideas.
- Gain new insights on user's expectations during long term use

Methods

After most of the additional features were coded into the application, and the mockup designs were created, we conducted a round of usability test and a co-creation session with a test user in a laptop and a mobile device with resolution of 2880 X 1440 pixel.

A resident user was selected who had a good command of English to review the proposed design changes and to conduct the usability test on the version where the usability problems reported on phase III had been resolved and new design prototypes were shown.

The residents had previously conducted an assessment and planning in phase II with the presence of the staff member or the healthcare worker, who was familiar with the application. We had improved the mobile interface and developed a feature to give residents access to the application with their own account where they can perform their own assessment. It was important to know if they would face any other challenges while going through the application alone.

The test session was recorded and think aloud technique was implemented during the usability test, to understand the mindset of the participant and to gain insights about their expectations and level of satisfaction. After the usability test tasks in Table 6 was completed, a series of questions were asked in order to gain insights on the current changes and design mock-ups were presented. The design prototypes shown to the users were hand-drawn sketches and low fidelity prototypes shown in the browser window to describe the ideas and features in details.

During a two hour long co-creation session after the interview, the participant was asked to give feedback on the design suggestions presented on the screen. Some text-based dialogues and low fidelity prototypes were presented along with hand-drawn sketches. The user remarked, "Do not fix it if it is not broken" which helped us only implement the

changes that the users found helpful. The participant was asked to evaluate design suggestions for improvements and comments made were recorded in audio format as well as noted down.

Usability Test tasks:
1. Please load the LivingSkills application and log in using the account provided.
2. Find the patient (testi, teppo) and view his record
3. Conduct the assessment on the form paihdekuntoutuminen
4. find and navigate to question Juhlinta.
5. check the question answered status of 1.1
6. Fill the form toipumisorientaatio.
7. Navigate to plan page.
8. Conduct a plan and save it as a draft.
9. Assign yourself a ticket to the form paihdekuntoutuminen
10. Save the plan as complete.
11. Repeat test task 1, 2 and 3 on the mobile device provided.

Table 6. Usability Test tasks

Analysis

The observation notes taken during the usability test were used to identify and label different emotions which arose while doing specific tasks. It made us realize the difficulties faced while using specific features of the application.

The resident user was able to complete all the task except one, as he didn't know how to save the plan as complete, without filling in the required text fields. As the user was able to complete almost all of the tasks from the usability test with little to no difficulty we concluded that there are no severe problems in the application. After the session when asked, why he could not complete one task, the participant's response was that last time he had done it together with the help of the staff member and did the planning after careful discussion. But now, it was to complete the task and he chose it to do it as quickly as possible and thought they were not really necessary.

The user could complete the test tasks on his own mobile device as well, which was a good indication that the changes in the updated application made it easier to access the application from devices with lower resolution.

Revisions were made to the application but were not yet deployed to live application on the client-side. Once the mockup designs were created, it was sent for approval and

feedback from the development team at LivingSkills. Multiple design iterations were performed before agreeing to the final version of the design and implementation while sensitivity towards the recoverees was carefully considered.

The team gave feedback on each of the mockup designs for onboarding plan as well as the changes in the text. For usability problems [eg. cursor change and using icons in navigations], solutions were coded right in the application and were tested by the designer as well as other team members. For functional improvements, they were coded and tested into the application as well.

For other solutions which required creating new designs, mock-up designs and sketches were drawn and shown before they were transferred into respective code. Inspirations were drawn from various web applications and internet sources (dribble 2019, codepen 2019) to create the final designs.

Results

With this round of usability test, we were able to iterate the design once again and made some changes and presented the findings to the development team meeting through skype and asked for their suggestions for improvement.

While conducting the interview, the user elaborated more on the addiction problems in Finland, the type of care he received while in prison. His addiction started after receiving pain medication in the hospital where he visited due to his existing medical condition at a young age. The problem he sees is not the drugs, but to return to the same place he came from after serving the sentence. He regrets that almost all of his friends are still addicted to drugs and if he goes back to his hometown again, he fears dreadfully that he will go into relapse and this time he might not be alive.

His perception about the application, before using it was to just try and see what's it about. As he explained, it is necessary for him to be active and functional throughout the day, so he doesn't have time to think about drugs and unnecessary stuff. But once he started using the application and going through the questions made him reflect back on his life and issues he has as well as those which might arise in the future.

Design proposals that were rejected by the users and the stakeholder groups are:

1. Display motivational messages on user login. [suggestion based on other addiction recovery application].

2. Provide in-app messaging option between care givers and residents.
3. After 10 minutes of inactivity, show a popup to continue or assign the ticket to oneself to complete the form. [*To make users aware about the feature to complete the form, with ease at their own pace, with increased accessibility through mobile*]
4. “You’re halfway there” message, keep on going! [*Display motivational message at midpoint.*]
5. After 30 minutes of using: Reminder to take breaks: Stretch, drink, exercise to make sure that the user’s feel like their health is important and are taken care of etc. [*User felt like an unnecessary distraction, don’t fix things that are not broken.*]
6. Pagination to the number of questions: 3 out of 45 filled. [Seeing a large number of questions felt like it would trigger anxiety to the resident and make them rush through the questions]

Redesign of the application

Once the designed mock user interfaces were approved, the functionalities were coded and integrated using software engineering modelling techniques such as use case diagram and interaction overview models.

Before the changes were published into the live application, they were implemented first in the test server so the team members can view them right in the application, rather than just viewing it as a prototype. It would help to identify the possible problems which might arise during the implementation phase, as well as it would be easier to catch the bug before it gets released.

Once the redesigned layouts and functionalities were coded into the test server, it was sent for functional testing and another round of evaluation and changes were made based on the feedback by development team at LivingSkills. After passing the quality assurance test, the updated application was deployed at SiltaValmennus and the staff members were informed to conduct another round of skills mapping and planning with residents.

4.3.5 Phase V: Final evaluation of the updated application

This chapter reports the results of the evaluation of the final version of the LivingSkills application. As described in chapter 4.2, the quantitative evaluation was conducted with AttrakDiff questionnaire and user satisfaction questionnaire, and qualitative evaluation was based on feedback from stakeholder group consisting of board members and development team from the LivingSkills organization.

All the participants from SiltaValmennus in the final evaluation had never used the previous version of the application, hence the evaluation measures the response from two distinct sets of users who used the application for the first time. Users were not informed about the changes in the application and they evaluated the application at their own pace and reported the response through the questionnaires provided.

Goals

1. Whether the user reached certain goals with complete accuracy. (i.e. effectiveness, ISO 9241-110).
2. Confirmation, (i.e. validation) that the requirements for a specific intended use or application have been reached (ISO 9241-110).
3. How satisfied are the end-users and stakeholders, and how positive an attitude the user-maintained towards the website (i.e. satisfaction, ISO 9241-11).

Method

The final evaluation questionnaires (AttrakDiff and user satisfaction) was self-reported and accomplished by the residents (n=4) and staff members (n=3) at their own pace in SiltaValmennus.

Once the final versions of the designs were approved, functional tests were successful, and the requirements were validated, the changes were deployed to the live application. The user group in SiltaValmennus were not informed that there had been changes in the application. The study was to gather anonymous feedback from a different set of users who had never used the application and find out if the redesigns have improved the experience of the users compared to the first evaluation.

To gather qualitative feedback from the development team at LivingSkills, we conducted a scenario-based walkthrough for two team members, they were asked to follow instructions provided by the application such as logging in after following the link on the email,

to go through the application onboarding guide, whether they are clearly able to understand and follow up tasks to do self-assessment and planning.

Feedback from the team members was taken during the prototyping phases (4.3.4) as well as after the application had been updated. Feedback from the development team members was considered as a significant one, as they had viewed, analyzed, approved the changes made to the application.

During the feedback session, there were suggestions made on how to improve the existing functionalities of the application and make the updated application available for all other instances of LivingSkills application being used at care homes, and LivingSkills for parenting and education.

The comparison of quantitative data is based on the baseline measurement conducted on phase II (see Chapter 4.3.2 user Experience Evaluation of the current application) and the final results of the updated application (see Appendix H).

Analysis

The data from the AttrakDiff questionnaire was entered into the AttrakDiff website in order to compute and analyze the results. For final evaluation data, we combined responses from both staff members and residents to gain an overall perception of the application. Data from the user satisfaction questionnaire was computed after combining the responses from the users and staff members as seen in Table 8. Once the data was finalized we compared the values of current application and updated application based on hedonic, pragmatic and attractiveness as provided by the AttrakDiff website.

The results from user satisfaction questionnaires were also compared after computing for the mean scores among the users. We performed a two-tailed t-test in order to figure out if there is any significant difference in values after the application was redesigned empathetically.

One of the residents had not filled the forms correctly as most of the values were left blank, so we decided to exclude the evaluation responses from the result. 5 out of 7 evaluators had missing values for 8 out of 28 questions (Question 21 to Question 28 in Appendix E) in the AttrakDiff questionnaire, so we decided to substitute the missing values with the neutral response, for the form to progress through the validation process.

Due to time restrictions, we were unable to get qualitative feedback from the users at SiltaValmennus. Instead, we relied on feedback from the development team at LivingSkills to validate our results which were noted down and included in discussion for further improvements of the application features.

Results

The results of the first evaluation (see Figure 9) showed us that the application felt more like task-oriented for the patients, whereas it was as desired by the healthcare professionals and staff members.

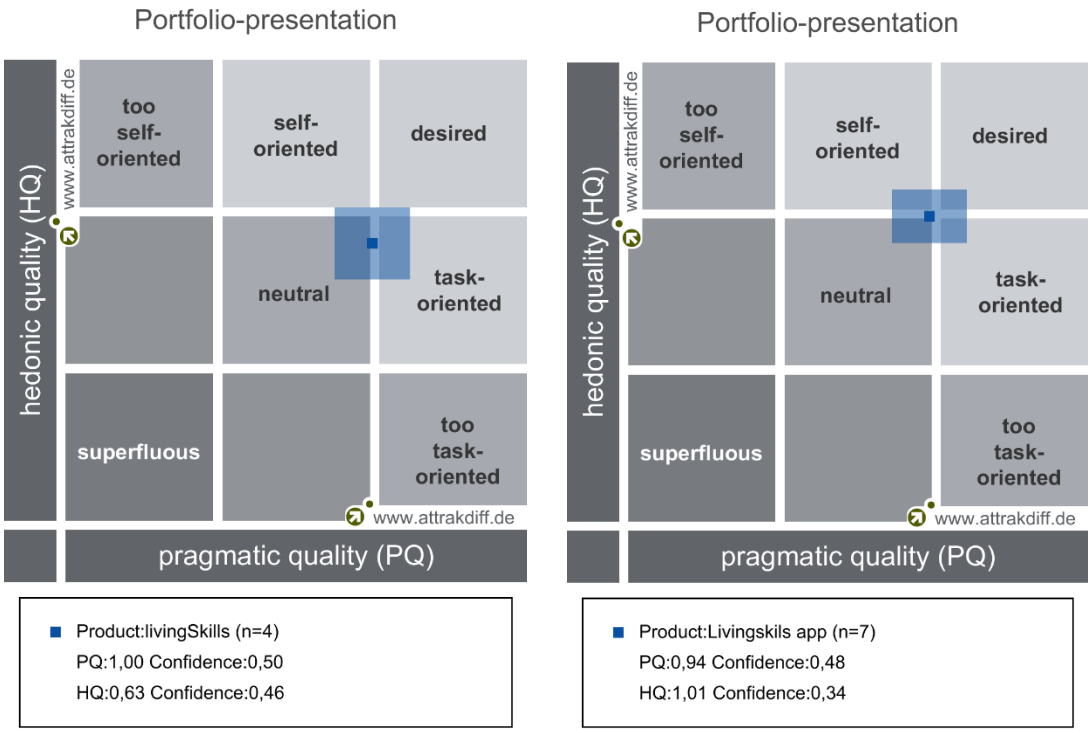

Figure 9. *Portfolio-presentation of AttrakDiff for LivingSkills application. Baseline measuerement (left) and final Evaluation (right)*

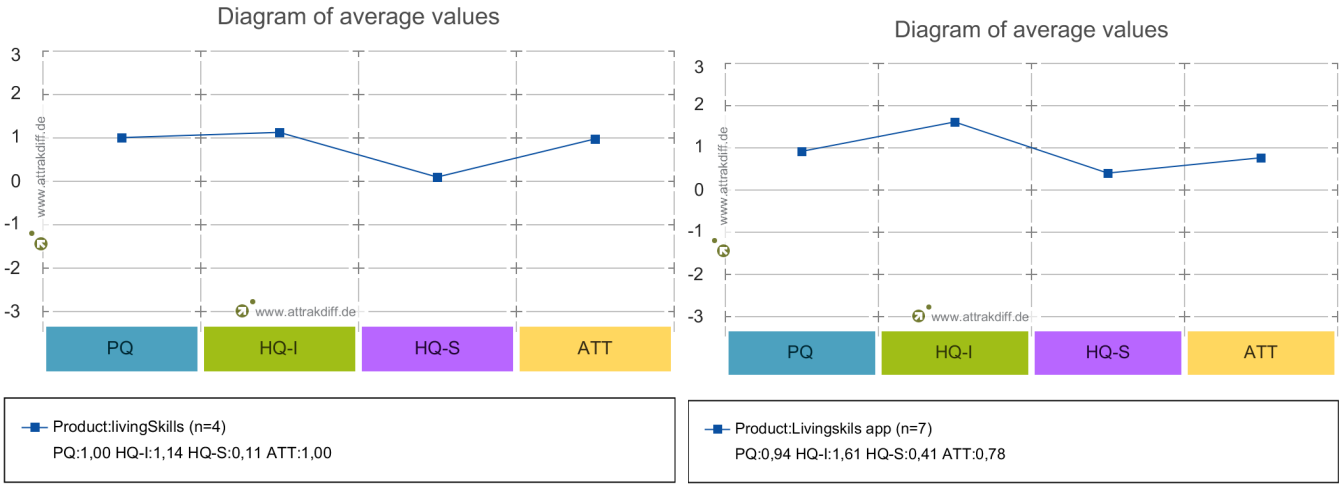

Figure 10. *Diagram of average AttrakDiff component values for baseline (left) and for updated LivingSkills application (right)*

The comparison of results from AttrakDiff as seen in Figure 10 shows that there was small increase in the perceived hedonic qualities (Identification as well as simulation) for the updated version of the application. However, the values in pragmatic qualities and attractiveness of the application decreased slightly.

A resident user evaluated the initial version of the application separately from the users group in section 4.3.2, so we have added the user's response to the end result, which increased the number of participants to 6 in the first round of evaluation as shown in Table 7.

Questions	Participant's response						Mean	Standard Deviation	Mode
The application was easy to use.	5	5	4	4	4	4	4.33	0.52	4
It was hard to perform the given tasks. (self assessment, evaluation, create plans)	4	3	3	2	2	2	2.67	0.82	2
The appearance of the service was pleasant.	4	4	3	5	4	4	4.00	0.63	4
I was able to find what I needed quickly.	4	2	3	4	4		3.40	0.89	4
The service included unfamiliar terms.	2	2	2	1	1	2	1.67	0.52	2
It was difficult to navigate within the web site.	3	2	3	2	2		2.40	0.55	2
The information provided by the service is valuable to me.	4	4	4	3	4		3.80	0.45	4
I would like to use the service also later.	4	3	4	4	4	5	4.00	0.63	4
How likely to recommend product:	5	4		4	4	5	4.40	0.55	4

Table 7. Results of first round of User satisfaction questionnaire (n=6)

Questions	Participant's response							Mean	Standard Deviation	Mode
The application was easy to use.	5	5	5	4	4	4	4	**4.43**	0.53	4
It was hard to perform the given tasks. (self assessment, evaluation, create plans)	3	4	1	3	2	3	3	2.71	0.95	3
The appearance of the service was pleasant.	5	4	4	3	4	5	4	**4.14**	0.69	4
I was able to find what I needed quickly.	5	3	3	3	4	3	4	**3.57**	0.79	3
The service included unfamiliar terms.	1	4	2	2	3	2	3	2.43	0.98	2
It was difficult to navigate within the web site.	1	3	2	3	2	3	3	2.43	0.79	3
The information provided by the service is valuable to me.	5	3	5	4	4	3	3	**3.86**	0.90	3
I would like to use the service also later.	5	4	1	3	4	1	2	2.86	1.57	4
How likely to recommend product:	4	4	5	4		3	4	4.00	0.63	4

Table 8. Results of second round of User satisfaction questionnaire (n=7)

The updated version of the application scores higher on four of the eight questions on user satisfaction questionnaire as seen in Table 8. The comparision of the mean scores from both evaluation shows that the score has slightly improved in four areas listed below:

- The application was easy to use,
- The appearance was pleasant,
- I was able to find what I needed quickly.
- The information provided by the service is valuable to the users.

However, the two-tailed tests (Appendix K) performed on the mean values of user satisfaction questionnaire reveals that there is no major difference in the before and after redesign. The difference in the scores is negligible, and it cannot be regarded as statistically significance.

According to the user satisfaction questionnaire results, there was no significant difference ($t(8) = 0.066$, $p = .095$) between the seven participants who evaluated the redesigned application ($M = 3.38$, $SD = .92$) compared to the 6 participants at the baseline measurement ($M = 3.41$, $SD = 0.63$).

Features such as onboarding guide were considered most helpful based on the feedback from the LivingSkills development team. The CEO of the LivingSkills stated that there

had been problems where users were stuck during answering the questions. Most of the information provided during the walkthrough phase could not be remembered and recalled by the users of the application as we do not know when they started using the application after the walkthrough phase. The functionalities such as previewing question explanation in plan pages as well as in summary pages were suggested by the development team at LivingSkills as well.

According to the development team members at LivingSkills, the updated application certainly looks good and they can feel improved usability and navigation as it is easier to use and find relevant information in the same page. Most significant differences felt were while using the application in the mobile device, as previously the mobile menus were cluttered and could not be used properly.

5. Discussion

This chapter presents the principal findings of the study, discusses the answers to the research questions, evaluation of the study, limitations of the study and elaborates on the needs of people going through recovery discovered during the empathic design process.

5.1 Summary of the Study

The findings of the study suggests that LivingSkills application was viewed as a useful intervention method for recovery and rehabilitation at SiltaValmennus. Empathic exchange of dialogue is an intended feature of LivingSkills as the application itself is designed to serve as a common ground to discuss and agree upon the skills level and to set a target to achieve the desired skills. Through related literature review, it can be asserted that the empathy is conveyed more face to face than through other computer-mediated communication (Powell, Roberts 2017).

Through literature review and our analysis, we can assert that medical services which are person-centred are more effective, as people prefer mobility and freedom to use service at their convenience (Vähäniemi, Warwick-Smith et al. 2018, Litvin, Abrantes et al. 2012, Acosta, Marsch et al. 2012). Through the redesign we were able to provide patients access to to their own record and increase mobility by making application more responsive on mobile devices. Empathic design approach was particularly helpful as it allows us to understand not just recoveree's but also caregivers and various stakeholder's opinion. The opinions contributed to generate more ideas in order to develop a product which is more meaningful and engaging to the users.

It is important for the staff members/healthcare workers to try to cultivate empathy and put it into practice while communicating with others as empathy is regarded as a positive trait among healthcare worker as well as people going through recovery (Lelorain, Brédart et al. 2012, S. L. Popham 2017, McDonagh, Thomas 2010, Hojat, DeSantis et al. 2017). Some of the staff members at SiltaValmennus had also undergone the drug recovery program themselves, which made it easier for them to associate and relate to the recoverees.

Designing with empathy might not feel a lot different than just following the HCD process without a specific empathy design approach, but the connection with the users and their situation makes the designer be more careful of the details which makes designer more

responsible and motivates to create a difference through design (Fraquelli 2015, Devecchi, Guerrini 2017). Things to consider while designing with empathy is, not to design just for functional use, but try to use best practices in design such as, paying attention to details in visual design, interaction design while keeping the end users in mind. It is important not to be reliant on one set of user or user group, diverse data gathered from multiple users will give a clear picture of user's situations and the solutions will be more relevant. It is better to gain understanding through different methods and utilize many probes in order to gain unique insights from multiple users (Chen 2018, Mattelmäki, Battarbee 2002).

Some of the recoverees admitted having impaired judgement and other social difficulties, hence they cannot judge their own skills and abilities correctly which coincides with findings made by other researchers (Gustafson, McTavish et al. 2014, Kurtz, Chambon 1987, Savic, Best et al. 2013, Kelly, Raftery et al. 2017, Thomas, N., Farhall et al. 2016). It made us difficult to be reliant on the results of final evaluation which was self-reported by the recoverees as it had a lot of missing values and the open ended questions were not appropriately filled to make accurate analysis.

For the first time users, the changes in LivingSkills application before and after empathic redesign was not statistically significant however the view differs among the user group who had used the application before and after redesign. By following empathic design approach, we were able to add user-oriented features (see Table 5) and address the usability problems (see Table 4) which was not evident beforehand.

LivingSkills provides a mechanism to analyze own skills and situations with the help of the evaluator or the care workers. In the long run it helps to see the effectiveness of individual skills training program and it's outcomes in long term recovery and avoidance of relapse. Based on the findings of this study, we can suggest that LivingSkills application can be used to increase effectiveness of recovery and rehabilitation treatment program.

5.2 Reflection of Research Questions

The main goal of the research was to identify the needs for recovery and rehabilitation services and to improve LivingSkills application to support the existing healthcare procedure. To find out how the application can provide support and help the substance abuser

to commit to a drug-free, crime-free and responsible life. To explore what kinds of methodologies can be used while creating digital healthcare services with the empathy design approach.

We found opportunities to make LivingSkills application more oriented towards users by giving recoverees access to their own records, humanizing the interaction by carefully choosing the texts and using faces to evoke positive emotions in interaction dialogs. Most of the improvements in the application were regarding usability issues, which was previously overlooked by the designers and developers. While empathy design approach helped us relate to the user and their journey throughout the application, it not just highlighted issues with the application but also uncovered needs of recoverees, and helped us to prioritize the development task.

Below we summarize the answer to the research questions:

RQ1: How to design with empathy to enhance user experience in the context of a skills assessment tool for recovery and rehabilitation services?

Based on the process of empathic design by (Leonard, Rayport 1997), to design with empathy, one should observe the users in their own environment, - in the course of normal and everyday routine. In order to gather meaningful data, we need to find out who you are designing for, gather as much information about the intended users and the organization through internet, interviews and observation. We had to define the scope of our research project and found out about context social and environmental conditions in which the application is supposed to be used. We chose to follow, Kouprie and Visser's framework to promote empathy in the design process which consisted of discovery, immersion, connection and detachment phases (Kouprie, Visser 2009).

In the discovery phase, for a designer, it is important to have a beginner but flexible mindset, so it's good not to assume that we know about the user group and immediately try to solve problems. Try to involve and incorporate other's view and not be guided by one's own intuition and imagination. The researcher started writing down journals and started analyzing own emotions, and biases held towards the application and the user groups. Designer needs to be sensitive when dealing with people and their emotions.

As empathy design deals with different layer of sensitivities, study user group through different probes such as observation, interview, brainstorming, bodystorming or through other field study techniques such as ethnographic research (Mattelmäki, Battarbee 2002). Reviewing the literature at the same time helps to categorize the information you

have observed and gathered. In this research, we initially studied users through observations and spending a day or participating into leisure activities together. It helps to immerse into the empathic research process and discover intangible needs and feelings.

By creating connection with the users, one can see the world through their eyes, values and culture. Proceed with the design while keeping the users in mind, and if possible, involve users during the design and creation phases and use different probes to communicate design ideas and inspiration. In our case, we sketched some ideas in paper, and created some wireframes and made use of texts, and designed dialogs in the browser to present ideas.

As we step back to the role of designer (detachment phase), we can reflect upon the experience and create unique insights and ideas. In our research, we conducted users in brainstorming to generate a lot of ideas. Giving a lot of options to the users usually confuse them it makes decision making more difficult. Whereas, if you present only ideas, then it can be challenging as well, because users cannot visualize what's going on in your mind. It is better to convey design suggestions and ideas once you have developed it well, use sketches and low fidelity prototypes to your advantage.

RQ2: How does the user experience of the skills assessment tool change after the empathic design process?

From the first evaluation (see Figure 7) we found out that the application was as desired by the staff members or the healthcare workers as they scored higher on the evaluation. It is because the product was developed based on the need of the healthcare worker/staff members at other care homes and mental health facility. The product was more healthcare worker-oriented which in turn could provide better support to the residents or the patients going through recovery. Overall, the users perceived the application as a more practical tool and easier to use for a task-oriented application.

In the empathic design process, the main improvements that were made to the Living-Skills application included giving patient's access to their own records, make the application more responsive to be used in mobile device, create an onboarding plan to guide the patients while filling in the forms and improving the usability of the application by using icons, improving visual design and interaction dialogs.

For the first time users, there was no statistically significant difference in the user experience as assessed by user satisfaction questionnaire (see Table 7 and Table 8). However, it could be because of users not being able to view and test new features which was not present in the existing application. Users were not informed about the changes

in the application as the final evaluation was self-reported and there was no researcher present to address any queries.

The results from AttrakDiff (see Figure 10) showed that the hedonic qualities of the application had increased slightly than the previous one for first-time users. For the development team at LivingSkills who had used the application before and after the redesign, they felt like there was an improvement in usability and interface of the application, the onboarding screens had been helpful to educate first-time users on how to use the assessment. Based on their feedback, end-users had reported fewer errors and confusion during use.

RQ3: What opportunities and challenges arise when carrying out empathic design in recovery and rehabilitation services?

Empathic design is all about relating to the user's feelings and designing and building product in a more user-centric way (Leonard, Rayport 1997, Luh, Ma et al. 2012). To design application for recovery and rehabilitation is difficult as it is a personal and sensitive topic and people are not willing to disclose their personal lives and health conditions with the researchers. It is even more difficult to conduct research when the researcher and the participant could not communicate in the same language which limits the expression and creates a boundary.

Having a calendar for sobriety, social sharing options to get support from peers, view motivational stories and other's journey to recovery are important features that could be helpful to the users and was discovered during the research process. We uncovered various needs of users and opportunities to design a recovery application as described in chapter 4.3.4 but it was not possible to implement those features into the existing application due to technical restrictions and usefulness in other areas of LivingSkills application.

Some of the challenges we faced were due to human constraints such as participants not showing up on the agreed date and the researchers not being able to communicate in a common language. The study was previously agreed to be a before-after comparison of the application, but it could not be completed within the timeline so we had to diverge from the initial plan. Participants in the baseline/first evaluation were volunteers, who were willing to try out a new application and they were curious and optimistic. For the final evaluation, participants were asked to conduct the assessment and planning by the staff members, because they felt it was helpful for them to keep track of residents.

Following the empathic design process gave perspective on the usage context of the application for the developers, which helped change the focus from adding and creating more features and functionality to improve the usability and accessibility. User insights were valuable for stakeholders to find potential industrial use cases of the application, such as it was advised as a method of intervention inside the prison.

Recoverees not just had problem of giving up on drugs but also admitted having other cognitive impairments and communication problems, which was challenging especially while conducting interviews as some of them could not concentrate on the question or had difficulty sitting down and relaxing for a long period of time. Challenges faced by recoverees were less regarding giving up on drug use but on social and functional recovery issues such as help with education, employment and housing which coincides with the study conducted by (Wahlbeck, Hietala et al. 2018).

5.3 Insights from the Empathic Design Process

This section focuses on the researcher's self-assessment of the study and is presented as having a positive contribution to one's own learning process. The latter part elaborates on findings based on the needs of people with substance abuse past who are going through recovery and rehabilitation process.

5.3.1 Evaluation of the Study

Empathy as a skill which could be learned and practiced by the healthcare professionals could be used to provide better support and suggest training programs to achieve the desired level of success from the residents. However, people going through recovery believe that it's a personal effort which makes rehabilitation possible and the application is helpful as a practical tool but they are not concerned whether it is sensitive and empathic to their condition.

Empathizing with the users helps to resolve the conflict in mindset when one has to implement the solution as it becomes easier to rationalize the decision when we understand and incorporate other's point of view, which creates fewer chances of friction and conflict in the team. To become aware of other's emotion and situations make you closer to one's own, it helps to identify own's prejudices and biases towards the application, user group and techniques applied. In return, team members can think more rationally and objectively to ideate new and creative solutions. It becomes easier to find out the user's point of view and not just rely on one's intuition.

If the researcher had not spent time trying to understand the users, then there would be a lack of motivation and the designed application would be for functional use only. But when the designer feels connected and not so different than the intended users, it brings the motivation and desire to build the application with all the inspirations found in empathy design process. The findings are not just applicable to a designer but to the members of the project including software engineers and product owners.

During the interview, one of the participants mentioned that it seemed like extra work on top of other training and exercises they are already doing at SiltaValmennus and they would not have used the application if It was not made mandatory by the counsellors. Almost all the participants were already free from drug use as they said they didn't have access to drugs inside prisons and are tested from time to time during the transition phase at recovery home.

While interviewing some drug users during the initial research phase, some of them had no problem with casual drug use, as they never saw themselves as addicted to drugs, they were more concerned with financial security and not committing crimes rather than being dependent on drugs.

To replace anxious and negative thoughts, it is important to understand oneself and identify one's feeling which leads to change in behaviors. The ultimate motive of the Living-Skills application is to learn and practice skills which helps them to cope and handle distress and have more control over their thoughts and let them overcome any negative and self-destructive ways.

For the healthcare workers at recovery home, they might have a lot of clients and patients that they must deal with, which puts them to a lot of pressure to perform and keep track of everyone's personal journey. Most of the people going through drug recovery cannot judge their own ability and would need support from experts and professionals who can empathize and provide better understanding about their own conditions and provide support on how to handle difficult emotions. The application is not intended to replace treatment and medical support received from a healthcare professional at recovery home, it can be used as an assistance application on top of existing training that they are going through.

People who are going through recovery have difficulties in other areas of life and not just giving up on drugs. Most of them have accepted that living with addiction is problematic and fear of relapsing after they stop receiving support from the social healthcare facilities. Most of them have difficulties in concentrating and sustaining attention for a long time.

Research has indicated that the lower level of social intelligence among long term drug use (Dependence myths and facts WHO, 2001).

The transition between prison and independent living is extremely difficult for long term drug users, as their social circle might still use drugs and they do not have anywhere else to go but to go back to the same place where they come from, and finding well-paid jobs are extremely difficult and as the financial conditions deteriorate, they might be conditioned commit crimes once again.

5.3.2 Needs for Recovery and Rehabilitation

Addiction is a disease, which can be cured but need support from a lot of people to overcome it, even to accept oneself as an addict is frowned upon by the society. People's mentality needs to be changed about addiction and one should respect everyone's situations and circumstances in life which lead to the habit. Learning about empathy helps a lot to gain perspective on someone's life and their situations, it is easy to judge people based upon their appearances and conditions but equally difficult to experience the challenges and difficulties which leads them to life of crime and self-detrimental habits.

Abraham Maslow's hierarchy of needs (Maslow 2017) suggests that people are motivated to fulfill basic needs before moving on to more advanced needs. Maslow believed that these needs are similar to instincts and play a major role in motivating behavior. Satisfying physiological and safety needs are important in order to avoid unpleasant feelings or consequences

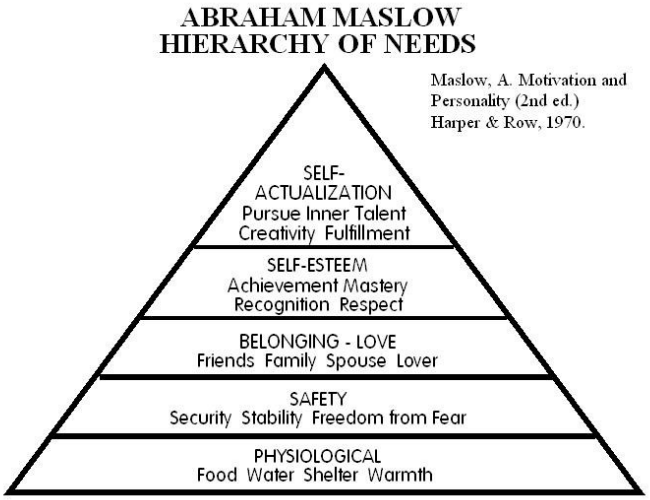

Figure 11. *Abraham Maslow hierarchy of needs (Maslow 2017)*

People going through recovery and rehabilitation has only their physiological needs met, which suggests that they could not move beyond safety and security needs as seen in Figure 11. It is harder for them to find a job, many need assistances in housing and recovering from long term drug dependence also has problems with health. Until the recoverees have financial security and stability, higher needs are harder to achieve. it is harder to traverse up the pyramid and try to find out a new life beyond drugs and crime.

After meeting some occasional drug users, they admitted that they never had a problem with recreational drug use. They never saw themselves as addicted to drugs, they felt like they were highly functional and just use it for having fun rather than being dependent on it. When things go out of hand, some of them retort to self-harm by cutting themselves with blades than harming others, which means there are more people who need help than they are willing to admit in person. Some consider themselves as being unlucky cause they were caught committing a crime, and after experience sharing among inmates inside the prison, they know ways to avoid getting caught.

It is possible to give up and be far from drugs, but the recoverees has other impairments such as difficulty concentrating, reduced concentration and cognitive abilities, some people have developed deformities and irreparable physical condition which makes it harder to live a new life without drugs.

It is difficult to recognize in what ways addiction is causing problems to others and to themselves. In a way, most of the people are addicted, whether to internet, gaming, or social media, cigarettes, or alcohol. For recovery application, it’s better to have a social sharing option where people can get help from the community and knowing people who can relate to their struggles. People have accepted their problems but quitting drugs cannot be the only motivation but keeping oneself busy and being productive is difficult. Everyone’s journey to recovery is different and personal. Learning to cope up with cravings, urges and distress differ from person to person. It is important to have a companion application which helps recoverees become aware about their own ability and how they would deal with situations when they arise.

5.4 Limitations of the Study

Not all the participants could speak English and thus the research work was mostly conducted by having a Finnish language interpreter / translator. This limited the response during interview sessions from the participants as additional translation works had to be

carried out by one of the English-speaking participant and the interpreter, who found it hard to catch up with all of the responses.

Not all of the proposed design changes could be implemented within research period due to time restrictions and as well as feedback from stakeholder group (users and owner), as the features needed to be implemented to other target customers, who are various organizations working in the social healthcare sector in Finland and not just for rehabilitation and recovery home.

The final evaluation was self-reported, so we do not know if the end-users were able to view and experience all the changes that were made. There were numerous mistakes in the second round of evaluation, as researcher was not present to answer the questions from the participants. This lead to 8 our of 28 items of the AttrakDiff questionnaire being incomplete, so the missing values had to be replaced with neutral values. Which in turn might have reduced the score for pragmatic qualities and attractiveness of the application in the second round. As the missing questions were mostly related to attractiveness.

Another aspect was, for the final evaluation, the 2 out of 3 staff members conducted the assessment on the same day the forms were collected, we do not know when was the last time they used the application or if they had used the updated version of the application.

The first in-depth interview was conducted immediately after first assessment and use, whereas we do not know when the last time users went through the application before going through final evaluation questionnaires. The final evaluation was also conducted by first-time users, who had never used the application before, so they could not feel any difference in design or find out the changes made to the application.

The sample size on the final evaluation was greater than the first round of evaluation and included both residents as well as staff members in the same results. For the final round of evaluation, the residents did not seem so keen to participate in the research as in one of the sessions, none of them showed up after agreeing on the date.

The same computer was used at the facility for all the users, which had lower screen resolution than the standard size on the market, the mouse also did not have a scroll button. Which means only the first user was able to go through the onboarding message, as it was only displayed once or until the browser session has been closed. None of them was able to test the mobile version of the application to fill in the forms and conduct their own self-evaluation.

6. Conclusion

This research aimed to identify the possibility of empathy design in skills assessment tool (LivingSkills Application) for recovery and rehabilitation at SiltaValmennus. The process of empathy design focuses on building the application based on end user's need and preferences. In order to do that, the researcher employed Empathy design framework proposed by Kouprie and Visser which consisted of Discover, immersion, connection and detachment phases to better empathize with the users. Following the framework helped us be more considerate while using different techniques to convey design ideas as well as communicating the findings with the stakeholder groups.

While following the empathy design framework, we analyzed the baseline measurement by evaluating the current version of the application through AttrakDiff, user satisfaction questionnaire and through observation and interviews. LivingSkills application was viewed as a positive tool amongst residents as well as staff members at SiltaValmennus. Empathy is viewed as a positive trait among the recoverees and essential for recovery which coincides with the previous research studies as reported in section 2.2.2.

The user experience can be improved by highlighting and finding more about the user and their experiences, not just while using the product, but also finding out their challenges on a daily basis.

To conduct user research and to understand end-user of an application or interactive product is essential for a product/software developer, as it helps to tailor the application based on user's need. For the software developers, it is important to make contact with the users, their feedback on usefulness, usability and their perspective on integration with their infrastructure is really essential to improve the product and be relevant in the long run.

We tried to closely follow human-centred design process as closely as possible by involving people from different disciplines and involving user throughout the process. We conducted a co-creation session and usability test while prototyping the ideas and made final design approval and changes after it was analyzed by the stakeholder group.

Based on the quantitative evaluation of the final version of the application, there was slight improvement than the existing version in terms of ease of use and hedonic attributes of the application but the difference was not statistically significant. On the final evaluation, the users (n=7) accomplished the questionnaires by themselves at their own pace. Due to the limitations of studies, we were not able to proceed with the before-after

comparison of the empathically designed application from the same user group. Due to the limitation of the studies, we could not be confident about the AttrakDiff evaluation results from final evaluation, that's why including users in the design process and getting feedback along the way is important to make the product more user-centred. Users are unpredictable and the perception changes over time, so it is important to iterate the process and make the applications more suitable as time progresses.

LivingSkills application enhances caregiver and resident's interaction and provides a platform to discuss about their situations, their abilities, and the desire to become better and achieve all the things they want in life. With assistance in recovery and skills development, the aim of the application is to assist healthcare worker to understand what needs to be done to provide skills training recommendations tailored to individual needs and ability.

It is not possible to keep track of patient throughout their lifetime, so further research could be conducted on how to make the application available once they have continued with their normal life, and how it could be useful to prevent oneself from getting back to relapse. We also found a possibility to integrate skills bank and training programs into the application to be used as a reference for the healthcare workers. Further study could be conducted on: If anyone who has used LivingSkills application has fallen into relapse after long term use or if people who use LivingSkills application continue with other recovery programmes such as 12 steps of recovery to ensure long term recovery.

The aim of this study was not only to improve LivingSkills Application through empathy design, but to improve lives of users through the application use, and we believe we were able to achieve what we aimed for.

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APPENDICES

APPENDIX A: CONSENT FORM FOR USER STUDY

Consent Form

You are invited to participate in the research study being conducted by Ashutosh Gautam, a master's degree student at Tampere University, as part of his master's thesis and for development work of LivingSkills Oy. The purpose of the study is to identify the user experience and development needs of the LivingSkills skill training application.

The study includes a usability test that asks you to perform various tasks on the application you're evaluating using your computer or mobile device and to tell what you think. You will also be interviewed and asked to fill in the forms for the service and its user experience. The test situation and interviews will be recorded as video or audio materials. The recordings are destroyed after the information gathered has been analyzed and reported.

All the information collected in the study is confidential and your personal data is used only for research purposes. The results of the study are reported in a way that participant's identity will not be revealed. The results of the study will be used to develop the services of LivingSkills Oy, but no further video or audio recordings or personal data are transferred.

Your participation in the study is voluntary and you may choose to discontinue your participation at any time. If you have any questions about the study, please feel free to contact the Ashutosh Gautam.

I have read and understood the information presented above and I have had the opportunity to ask questions about the study. By signing this form, I provide consent to participate in the study.

Date:_____

Please print your name: _____

Please sign your name: _____

Subject's Signature or eSignature <your name>

Thank you!

We appreciate your participation.

Please return the signed document to ashutosh.gautam@livingskills.fi

APPENDIX B: BACKGROUND QUESTIONNAIRE

BACKGROUND QUESTIONNAIRE

Background Information

Age: _____

Gender: [ ] Male [ ] Female [ ] Other / don't want to say

Role:
[ ] Resident
[ ] Staff
[ ] Health care professional
[ ] Administration
[ ] Support
[ ] Else
_____

Education (highest finished degree):
[ ] Comprehensive or elementary school
[ ] High school
[ ] Vocational school
[ ] University level
[ ] Else
_____

How long have you been working / receiving support from Silta-Valmennus?

_____

Recovery support services

[For staff members only]
Do you use any other digital applications at work? What kind of applications / software programs do you use?

_____

[For residents only]

Do you use any other application to support yourself in your recovery or rehabilitation? What kind of applications / software programs do you use?

_____

How often do you attend peer support group?

_____

Do you think the support you receive through the organization could be improved in any way?

_____

Researcher: _____ Participant ID: _____

APPENDIX C: USER SATISFACTION QUESTIONNAIRE

USER SATISFACTION QUESTIONNAIRE

Below are some statement related to the application you tested. Please select the option that best matches your level of disagreement of agreement with the statement.

Evaluate the following statements	Strongly disagree				Strongly agree
The service was easy to use.	1	2	3	4	5
It was hard to perform the given tasks.	1	2	3	4	5
The appearance of the service was pleasant.	1	2	3	4	5
I was able to find what I needed quickly.	1	2	3	4	5
The service included unfamiliar terms.	1	2	3	4	5
It was difficult to navigate within the web site.	1	2	3	4	5
The information provided by the service is valuable to me.	1	2	3	4	5
I would like to use the service also later.	1	2	3	4	5

How likely would you recommend the service to others?
(1=not very likely – 5=very likely): _____

Thank you! Your responses will be processed confidentially.

Name: _____ Participant ID: _____

APPENDIX D: CO-CREATION SESSION SCRIPT

Welcome!

My name is Ashutosh, you can call me Ash. I am a TUT master student in Information Technology majoring in User Experience. This session is to help my Master's thesis work with the title Empathy design in skills assessment tool for healthcare services. Your personal opinions and views are very important and we value your honest feedback. The session is expected to take an hour. I would like to recommend you to put your mobile on silent mode with no vibration for the duration of the test.

PERMISSION TO RECORD THE TEST

Before we move on, please note that the session will be recorded on audio and video. This will help us evaluate the system better, and the purpose is to test the system and not your performance.

The recorded audio / video material will be used only for research purpose by the research group. Personally identifiable information will not be shared with anyone.

The purpose of today's session is to identify challenges in the redesigned application, and to gather user feedback on some of the features and ideas under development. During the first part of the test, please say it out loud the things going through your mind while trying to accomplish the tasks. Please read the questions out loud and then proceed with the solution, you can move on to the next question when you are done with the question.

Once the usability tasks is completed, you will be asked about your opinions and we will go through co-design session where we will be recording only audio responses. There also paper and pens here that you can use to draw, write, or express your thoughts.

Here is a list of tasks you need to perform. You may now proceed.

APPENDIX E: ATTRAKDIFF QUESTIONNAIRE

Your opinion

Remember that there are no "right" or "wrong" answers - your personal opinion is what counts.
They represent stark contrasts and can be subdivided into further rating levels.
Do not ponder over the word pairs and make your assessment spontaneously.

	1	2	3	4	5	6	7	
human	☐	☐	☐	☐	☐	☐	☐	technical
isolating	☐	☐	☐	☐	☐	☐	☐	connective
pleasant	☐	☐	☐	☐	☐	☐	☐	unpleasant
inventive	☐	☐	☐	☐	☐	☐	☐	conventional
simple	☐	☐	☐	☐	☐	☐	☐	complicated
professional	☐	☐	☐	☐	☐	☐	☐	unprofessional
ugly	☐	☐	☐	☐	☐	☐	☐	attractive
practical	☐	☐	☐	☐	☐	☐	☐	impractical
likeable	☐	☐	☐	☐	☐	☐	☐	disagreeable
cumbersome	☐	☐	☐	☐	☐	☐	☐	straightforward
stylish	☐	☐	☐	☐	☐	☐	☐	tacky
predictable	☐	☐	☐	☐	☐	☐	☐	unpredictable
cheap	☐	☐	☐	☐	☐	☐	☐	premium
alienating	☐	☐	☐	☐	☐	☐	☐	integrating
brings me closer to people	☐	☐	☐	☐	☐	☐	☐	separates me from people
unpresentable	☐	☐	☐	☐	☐	☐	☐	presentable
rejecting	☐	☐	☐	☐	☐	☐	☐	inviting
unimaginative	☐	☐	☐	☐	☐	☐	☐	creative
good	☐	☐	☐	☐	☐	☐	☐	bad
confusing	☐	☐	☐	☐	☐	☐	☐	clearly structured

repelling	☐	☐	☐	☐	☐	☐	☐	appealing
bold	☐	☐	☐	☐	☐	☐	☐	cautious
innovative	☐	☐	☐	☐	☐	☐	☐	conservative
dull	☐	☐	☐	☐	☐	☐	☐	captivating
undemanding	☐	☐	☐	☐	☐	☐	☐	challenging
motivating	☐	☐	☐	☐	☐	☐	☐	discouraging
novel	☐	☐	☐	☐	☐	☐	☐	conventional
unruly	☐	☐	☐	☐	☐	☐	☐	manageable

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APPENDIX F: ATTRAKDIFF RESULT, FIRST ROUND (RESIDENTS)

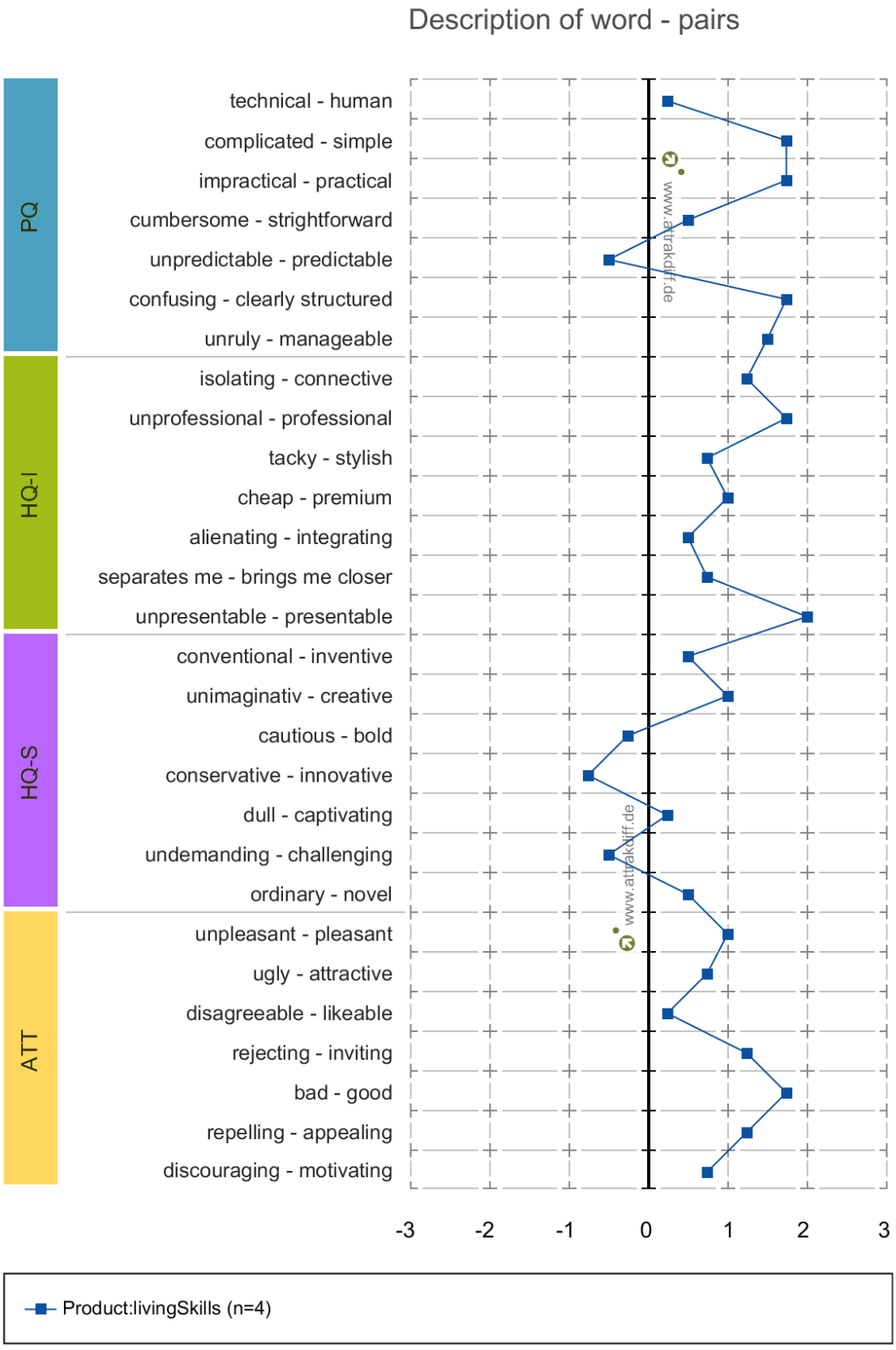
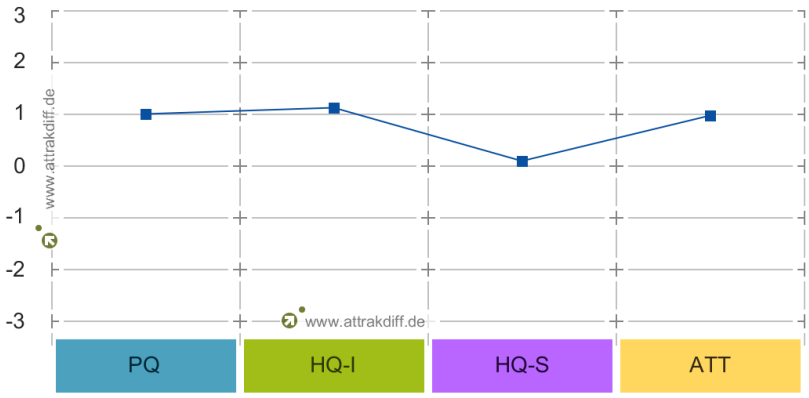
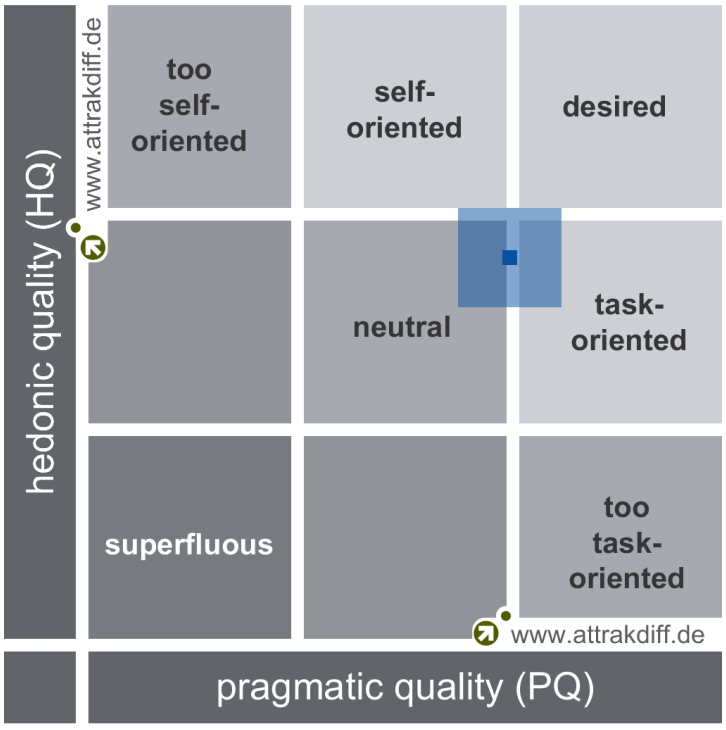


Diagram of average values



Product:livingSkills (n=4)
PQ:1,00 HQ-I:1,14 HQ-S:0,11 ATT:1,00

Portfolio-presentation



Product:livingSkills (n=4)
PQ:1,00 Confidence:0,50
HQ:0,63 Confidence:0,46

APPENDIX G: ATTRAKDIFF RESULT, FIRST ROUND (STAFF MEMBERS)

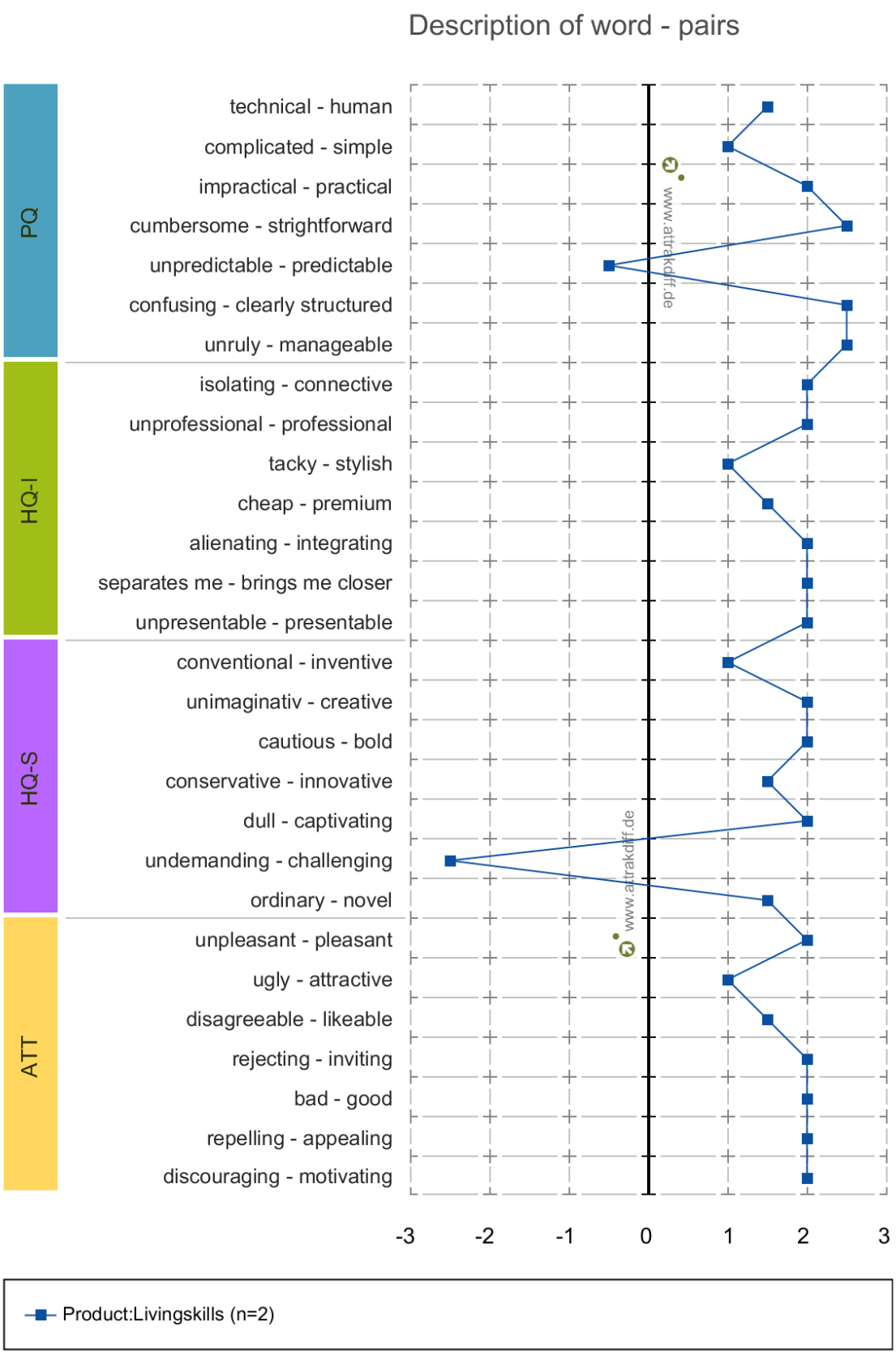
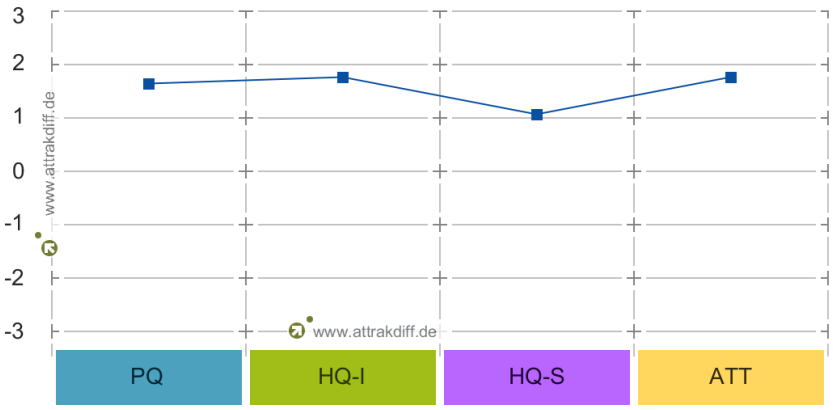
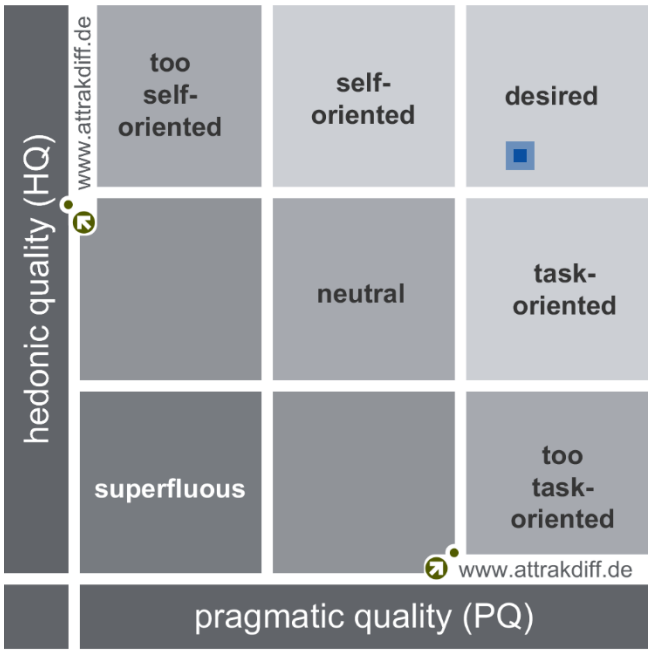


Diagram of average values



Product:Livingskills (n=2)
PQ:1,64 HQ-I:1,79 HQ-S:1,07 ATT:1,79

Portfolio-presentation



Product:Livingskills (n=2)
PQ:1,64 Confidence:0,14
HQ:1,43 Confidence:0,14

APPENDIX H: ATTRAKDIFF RESULT, SECOND ROUND (TOTAL, N= 7)

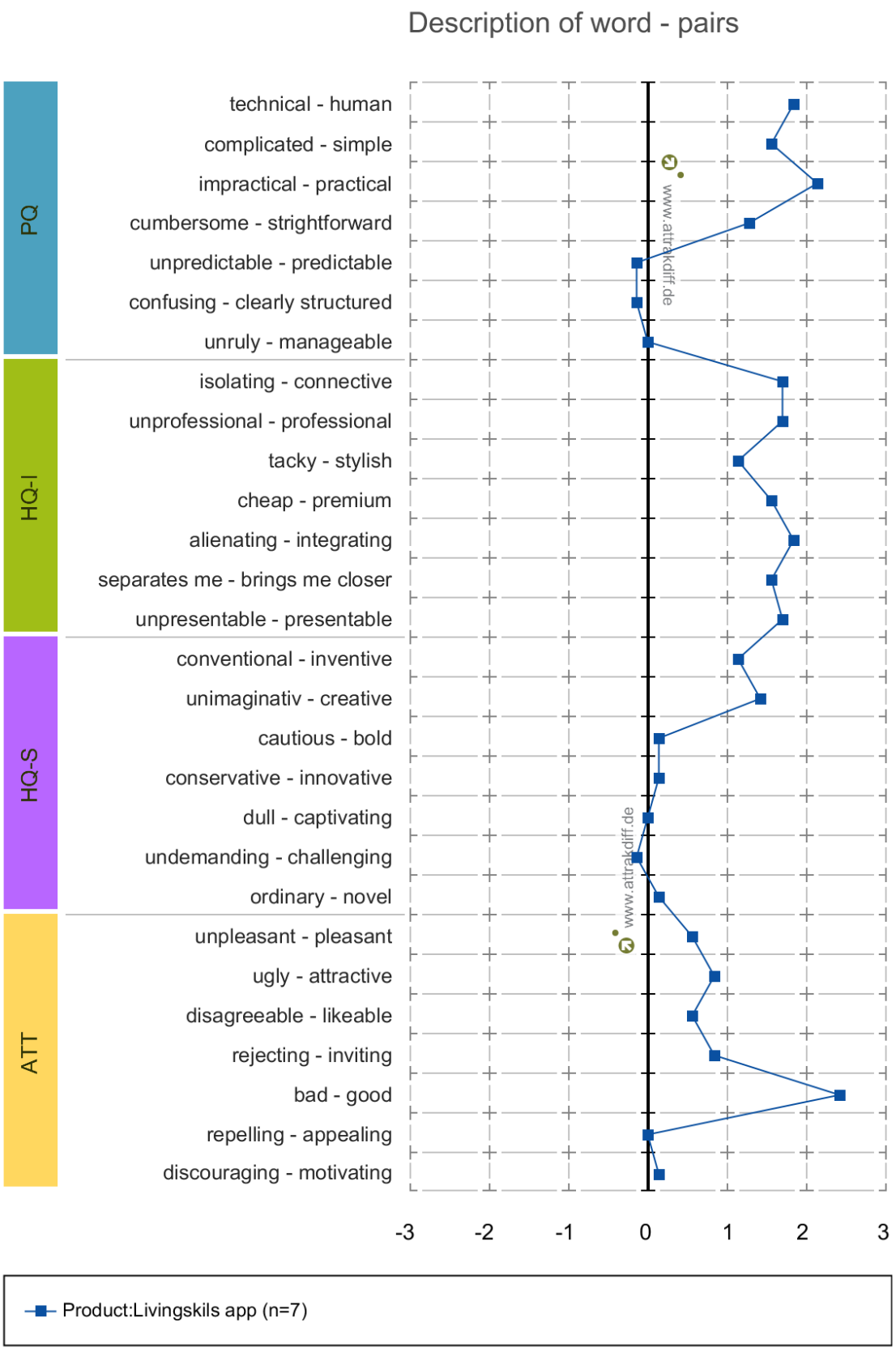
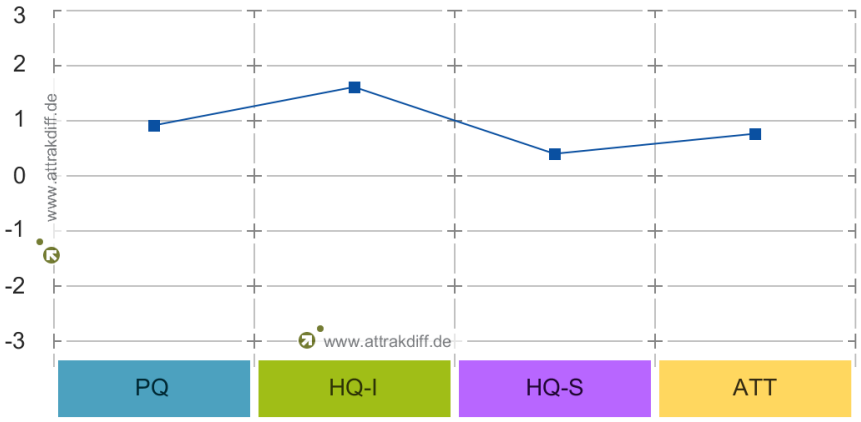
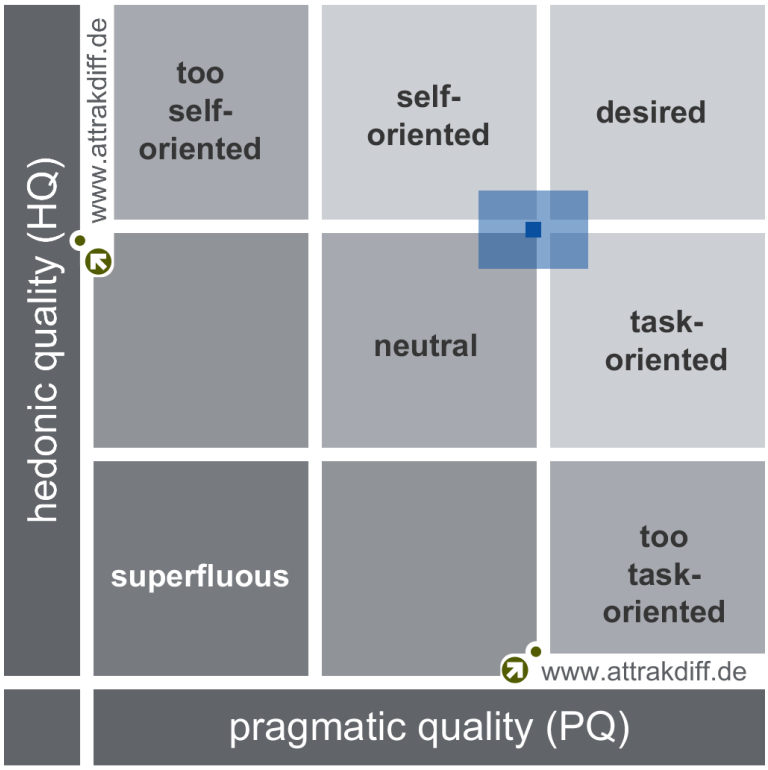


Diagram of average values



Product:Livingskils app (n=7)
PQ:0,94 HQ-I:1,61 HQ-S:0,41 ATT:0,78

Portfolio-presentation



Product:Livingskils app (n=7)
PQ:0,94 Confidence:0,48
HQ:1,01 Confidence:0,34

APPENDIX I: TWO TAILED T-TEST (USER SATISFACTION QUESTIONNAIRE)

Q	P VALUE AND STATISTICAL SIGNIFICANCE / QUESTION	CONFIDENCE INTERVAL	MEAN VALUES	
1	0.751115116	The mean of group one minus group two equals -0.10	4.33	4.43
2	0.925322741	The mean of group one minus group two equals -0.05	2.67	2.71
3	0.706554903	The mean of group one minus group two equals -0.14	4.00	4.14
4	0.732078173	The mean of group one minus group two equals -0.17	3.40	3.57
5	0.115112772	The mean of group one minus group two equals -0.76	1.67	2.43
6	0.945879703	The mean of group one minus group two equals -0.03	2.40	2.43
7	0.899337138	The mean of group one minus group two equals -0.06	3.80	3.86
8	0.125246105	The mean of group one minus group two equals 1.14	4.00	2.86
9	0.296665037	The mean of group one minus group two equals 0.40	4.40	4.00

Difference Scores Calculations	T-value Calculation
N_1: 9 $df_1 = N - 1 = 9 - 1 = 8$ M_1: 3.41 SS_1: 7.27 $s^2_1 = SS_1/(N - 1) = 7.27/(9-1) = 0.91$	$s^2_p = ((df_1/(df_1 + df_2)) * s^2_1) + ((df_2/(df_2 + df_2)) * s^2_2) = ((8/16) * 0.91) + ((8/16) * 0.61) = 0.76$ $s^2_{M1} = s^2_p/N_1 = 0.76/9 = 0.08$ $s^2_{M2} = s^2_p/N_2 = 0.76/9 = 0.08$ $t = (M_1 - M_2)/\sqrt{(s^2_{M1} + s^2_{M2})} = 0.03/\sqrt{0.17} = 0.06$
N_2: 9 $df_2 = N - 1 = 9 - 1 = 8$ M_2: 3.38 SS_2: 4.86 $s^2_2 = SS_2/(N - 1) = 4.86/(9-1) = 0.61$	The *t*-value is 0.06498. The *p*-value is .948994. The result is *not* significant at $p < .05$.

APPENDIX J: INTERVIEW NOTES AND TRANSCRIPT. (PHASE II)

What project are these participants part of?
A: Rikosseuraamusasiakkaiden valmennuspalvelut

Who is funding the project or the cost of rehabilitation?
A: Tampere City, some are personal as well. Mostly after the tenure has ended.
prison, home community / city, when they stop paying it's time to leave.

What services are provided by SV for them?
A: There are two parts, train to freedom. rehabilitation from drugs part

What kind of therapy / training programs are available? or intervention are organized once they go through plans?
A: pelata, opiskelaja, different models, reality therapy,
working with daily issues, community therapy, AA. NA. disc groups.

Who is going through the form? (staff members/nurse)
A: Workeres, usually it might be someone else here. in this unit 3 workers. several workers who are here.
Everybody is professionals, also with their experience, at least practical nurse

What steps are taken to increase the competencies for the skills that are to be practiced?
A: -

How frequently have the skills been assessed? Or the plans?
A: Plan is every twice atleast before they are let out.

How frequently do they visit SV? for what purpose?
A: Twice a week, also for NA/ AA meetings if they are attending.

What kind of suggestions are made for individual? Based on employment/substance control/ well being???
A: "Some have problems with writing, don't even know how to address letters, tried typing but felt the need to write. "

What kind of forms that they have been using? (residents)
What qualities does it assess, what else?
What is meant by skill deficiency? skill deficit?
What are the feedback from other user groups who are testing the application.

1. let user choose if a question is relevant or not.
2. Make it easier to navigate to-and-from questions.
3. Visibility of system status: to know whether the questions are being filled correctly.
4. To be able to view the quantified summary of their own responses and make sure it's easily seen.
5. To be able to do the assessment at their own pace, when necessary.
6. Since, multiple users are interacting with each other and figuring out the answers, it is advisable that they do it themselves.

APPENDIX K: NOTES FROM FEEDBACK SESSION (PHASE I)

Feedback Session (March 26, 2019)
3/26/2019

It would be great to have a rewards after completing the questionnaire, as it is too long

The black dot needs to be removed if all of the answers have not been filled. change the color of the dot to something else if partialy filled

It would be easier to have the questions come up on hover over the dot.
How many times have they used it? 1
Were they alone? yes
Didn't know if some of the questions are really related so it would be nice if they could know that some of the questions can be omitted.

Probably the first screen to be instructions on filling up the form, a popup modal window\
Needed some time to get the hang of the application.
took half hour- to an hour to fill up the questionnaire.
Isn't that hard to figure out what to do.

Any urgent requests? none,
There's no major problem though, just some enhancements that needs to make it simpler.

Didn't receive any help while doing the first assessment.

Could not focus on a lot of questions, because they need some time to think?
Didn't know if they can do it at their own pace if they wanted to.

Which device are they using? laptop, pc, at the facility.
Plan to use it at the facility

Doesn't really work well on computers with smaller resolutions
Device with 1366 px resolution,

They would probably not use the app if it had not been imposed from SV.
It is quite helpful, but it would be nice to know what to do after the forms have been filled.

On the plan page:
Clicking on the modal would close the dialogue. Scroll was not available, so it was difficult.
All the fields had to be completed but no indicators.

APPENDIX L: OBSERVATION NOTES (PHASE IV)

Takeaways from Co-design and interview Session (July 19, 2019)

Residents fear of going to relapse.
Can't focus for a long time.
Difficulty in concentrating or hard to be attentive.

12 step recovery helps, but it is not taken as a course or lesson after completion of which you graduate and not needed again.

Resident was skeptic about application at first and was asked to use and evaluate it. Willingness to participate was necessary to keep one-self busy.
Feels like LS tool is helpful, because after going through questions, he reflect upon those questions.
Something that he would not think about.

Has positive attitude towards change, admits it hard to change habit and behavior.

Having a mentor or carer to assist while going through the question is helpful.

Simple is better, don't want to be distracted by unncessary popups or something.

Takes some time to think and answer. Did not know about the features and functionality of the test.

Talking and participating in any activity (whether going to store, or doing laundry and dishes) was already challenging in addiction.

Now doesn't find it hard to interact.

Feels like they lack social skills.

Skills based training:
Journey of recovery is personal, and not everyone has same issues.

It's helpful to attend AA/NA meetings although you don't speak, you listen and be able to reflect upon other's answers when similar situa-tion arises.
Can learn from other's experiences.
Feels much better since he had quit doing drugs.
Feels like wasted a lot of time cause of addiction.

Addiction is not due to substance, but it could be anything, from games, to internet. He knew he was an addict when he got anaesthesia for surgery and would like to have it more.

Peer pressure counts in, whenever in free time, would gather friends to go and buy drugs
Knew that he was not doing the right thing but could not stop.

In prison, you get to share more ways to commit crimes. and get away with it. Would not be surprised if someone commits different style of crime.

Was certain he would have died if not being taken care by Finnish authorities.
Try to find some activity to do and just do it, like going to the center for a walk. Or just going out to buy energy drinks and roam around.
Having a companion to talk with is good he believes.

Didn't have much of a hobby, cause it was hard to be good at anything when mind wants something else.

Is happy to move to a new place and start a better life and leave the previous shack and company behind.

Believes that friends are the people who share your life with you when you do not have any money. Others are buddies.

90% relapse and come back.
Social welfare doesn't support for more than 6 months or something.
It's hard to keep one's impulse under control, without any help.

Would have a better lifestyle if he had more money.

Appreciates people who can work, study and doing something with their life.
Feels like he doesn't have any job-ready skill, and it's hard to look for job that's not physically challenging.

Is knowledgeable about philosophies, life and fear of death in general.
Doesn't get to hang out with smart and intelligent people.
Having no one to look after you or talk to you is a problem in itself.

APPENDIX M: POST INTERVIEW QUESTIONNAIRE AFTER USABILITY TEST

What do you like about the application? (Any particular features?)
Would you use it if it was not recommended by SV?
Do you think this application will prevent you from going into relapse?
Do you use any other application intended for recovery?
What would you change about the application if you could?
What problems do you wish you could solve in general? or what problems bother you with regards to day to day lives?
Do you think you will be training to develop the skills you had selected?