CHALMERS
UNIVERSITY OF TECHNOLOGY

Redesign of a mobile application for equestrians

Exploring the field of equestrians to redesign the horse training application Equilab

Master's thesis in Interaction Design and Technologies

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Gothenburg, Sweden 2017

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Abstract

This report describes the redesign of the horse training application Equilab. The application serves as a tool for equestrians to track, and follow up their horse training. The purpose of the report is to elicit needs for the wide target group of equestrians, which includes multiple disciplines, and a wide age span. The knowledge about the target group will serve as the ground for a redesign, and implementation of Equilab's current iOS version. The project's methodology is based on the Goal-Directed design Process. This process builds on five phases including an extensive background study, and user research with qualitative data gathering. This is followed up by modelling of the user needs, prototyping, evaluation, and implementation of the redesign. A major phase of the project included eliciting user needs for the wide user group. This by conducting interviews with twelve equestrians in different disciplines, complemented with a field study at a horse stable. The differences and similarities between the disciplines, and the knowledge about the equestrians view on horse training laid the ground for the design work. The user research results implied that the design to implement must meet different needs depending on the users' discipline and ambition level. With the user needs in mind the result of the thesis is a redesign of the Equilab application with a more dynamic and customizable interface. The purpose of the result is to lower the users cognitive load by presenting data in a clearer way, but mainly to give the users freedom to decide what information they want presented. This to meet the needs of the wide user group of equestrians with different needs.

Keywords: Equestrian, Horse training, Equilab, iOS, Mobile Application, Dynamic Interface, Interaction Design.

SAMMANFATTNING

Denna rapport beskriver framtagningen av en ny design för hästträningsapplikationen Equilab. Applikationen är ett verktyg för ryttare för att spåra och följa upp sin hästträning. Syftet med arbetet är att ta reda på vilka behov applikationen behöver uppfylla för den breda målgruppen av ryttare. Denna grupp av ryttare omfattas av flera discipliner och av ett brett åldersspann. De framtagna behoven för målgruppen kommer att ligga till grund för en ny designversion av Equilabs nuvarande iOS-applikation. Projektets metodik är baserad på en målinriktad designprocess. Denna process bygger på fem faser, innehållande en omfattande bakgrundsstudie samt en användarstudie genom kvalitativ datainsamling. Detta följs upp av modellering av användarnas behov, prototypbygge, utvärdering och implementering av den nya designen. En stor del av projektet innebar att förstå behoven hos den breda användargruppen. Dessa togs fram genom intervjuer med tolv ryttare i olika discipliner, kompletterat med en fältstudie. Skillnaderna och likheterna mellan de olika disciplinerna och kunskapen om ryttarnas syn på hästträning lade grunden för designarbetet. Användarstudien resulterade i att implementeringen behövde uppfylla olika typer av behov, beroende på användarens disciplin och ambitionsnivå. Resultatet av arbetet är därför en ny design av Equilab-applikationen, vilken bygger på ett mer dynamiskt och anpassningsbart gränssnitt. Syftet med resultatet är att minska användarnas kognitiva belastning genom att presentera data på ett tydligare sätt, men främst att ge användarna möjlighet att bestämma själva vilken information de vill ha presenterad. Detta för att möta behoven hos den breda användargruppen av ryttare med olika behov.

Nyckelord: Ryttare, Hästträning, Equilab, iOS, Mobilapplikation, Dynamiskt gränssnitt, Interaktionsdesign.

Contents

CONTEXTUAL GLOSSARY

Canter Is a controlled, three-beat gait of a horse, one of the fastest gait that can be performed by a horse.

Cross-Country Relating to or denoting the sport of riding along a course in the countryside, as opposed to around a track.

Distance Riding Also known as Endurance riding is an equestrian sport based on controlled long-distance races.

Dressage The art of riding and training a horse in a manner that develops obedience, flexibility, and balance.

Eventing An equestrian sport in which competitors must take part in each of several contests, usually cross-country, dressage, and show jumping.

Equestrian A person who rides horses.

Gait The paces of an animal, especially a horse or dog, also described as a pattern of movement of the limbs of animals.

Icelandic A discipline were equestrians' rides on Icelandic horses in specific gaits.

Manège An enclosed area in which horses and equestrians are trained.

Paddock A small field or enclosure where horses are kept or exercised.

Show Jumping The competitive sport of riding horses over a course of fences and other obstacles in an arena, with penalty points for errors.

Trot Proceed or cause to proceed at a pace faster than a walk, lifting each diagonal pair of legs alternately.

Walk The slowest gait of a horse.

1
INTRODUCTION

This thesis is conducted together with the company Schvung Ride AB, which develops a mobile application for equestrians. An equestrian is a person who is riding or who can ride a horse. The application quantifies the movement of a horse and help riders get insights into how they can improve upon their training. The application has around 14 000 users and is still in an early development phase. The application of today is presenting time, distance, speed or pace, experienced performance of the rider and the horse for each training. For each training, the application calculates the different gaits that were performed during the exercises. Each gait is presented with time, distance, speed or pace, stride length and beat (steps per time unit). For all completed trainings, the users can see the energy consumption for the horse and the rider. The user can also view and make notes for each exercise. For each exercise, the user can see graphs showing gait, speed, stride, pace and elevation over time. In the overview-view in the application, the user can see the last training, a link to All Trainings. An overview of this week, the number of activities, distance, time, distribution in gaits and distribution of time over the days of the current week. It displays trends, which displays time, distance and number of activities per day for the past 90 days. And lastly on the overview-view there are two graphs which show the distribution of gaits and time ridden on different surfaces for this, last and average week

Until now, the application has been developed without any user research. The applications information visualization part has been designed by the company on the premises of what they believe is the right information design for their wide user group of equestrians. The students will help Schvung Ride AB with the research of what kind of information that is relevant for their users, and how to display it on a mobile platform with high usability and learnability. The research question for this thesis is therefore to:

What information should be presented in the Equilab application to satisfy the user group's different needs, and how should this be presented to provide good usability for the entire group?

The result of the master thesis will be a prototype proposal of how the data visualization parts of their main product Equilab could be designed and implemented to meet their user group needs. The prototype will be aimed for their App Store product, and will therefore be implemented with the iOS mobile platform language Swift. To meet the user groups needs the prototype will be based on the research

made in the user group of equestrians. But the outcome of the thesis will also consider the requirements of the taskmaster Schvung Ride AB. The final prototype is aimed to be incorporated as the data visualization part of the company's main product Equilab.

1.1 Stakeholders

This master thesis has several stakeholders who are interested in the outcome of the project. The three key stakeholders are the students, the company Schvung Ride AB and Chalmers. All three are interested in the results and the outcome of the project. However, the three stakeholders are interested in different parts of the project. We as students are interested in satisfying Chalmers requirement for a properly completed, performed and implemented master thesis. To deliver a high standard of work, which meets our, Chalmers and the company's requirements. Chalmers is interested to see that we have completed the work academically correct and that we achieve our goals in the course. Schvung Ride AB want us to deliver a well-conducted study with the results from completed user research, and provide value for them by implementing a working prototype based on the result. Not to forget the end customer, in this case, the user is also a stakeholder. From the results of this project the end user and Schvung Ride AB will have an application that is tailored for their user's needs.

1.2 Ethics

There are ethical challenges that needs to be considered during the project. It is important to provide the equestrians with correct information, have their safety in mind while designing, and treat them with respect during the user studies.

1.2.1 Information Visualization Accuracy

If the information presented in our final design of the application gives a biased view of the training of the horse, it could imply to that the user trains a horse wrong and the horse could take damage. However, one of the ideas of the application, is that the horse should be trained more varied, correct, and that they should stay fit longer. It is therefore important that the information presented for the user is valid and reflects the actual sensor and algorithm data. To achieve this, it is important to choose the most accurate forms of data visualization charts and tables.

1.2.2 Equestrian Safety

Ethical issues that could arise during the project, and that should be considered when designing an application for equestrians is their safety and distraction level while riding. If the application is used while riding it should not distract the user's. The task for the students is to design the views of the application that is used primarily when the user is not riding, but the user is also able to use the application when riding, to see time, distance and gait distribution. We must consider how it could affect the user's ability and sense of the surrounding while riding, the application should not intrude on the user's attention.

1.2.3 User Studies

The project will not raise any moral or ethical problems that can interfere with the progress of the project. It could happen during the user studies that a question is perceived wrong, and it could therefore lead to misinterpretations between the user and the interviewer. During the project, we will consult with our supervisors and check that all the steps we do are properly and correctly done, to avoid those kinds of mistakes. We will be researching in a female-dominated sport, where the authors of this report have poor insight in how it looks and work. It may be difficult for us to be accepted and get in touch with equestrians to do interviews. We do not see this as a problem, the company has good contacts with equestrians and stables. Equestrians in general are a helpful and driven people, especially when it comes to their sport.

2
BACKGROUND

The use of the mobile platform is expanding rapidly (Sterling, 2016), and is the main source when acquiring information for many people today. Many companies are moving towards the mobile first thinking when designing their platforms, which means designing an experience for the mobile device before designing it for other platforms. Therefore, there is also a growing need of presenting data on the mobile platform in a way which makes it easy to grasp and relevant for the user. In our case the task is to present data for a wide user base of equestrians. However, the strategies will be possible to use for a variety of different cases when visualizing data on a mobile device.

The task for this thesis will cover many of the typical tasks carried out by an interaction designer. The thesis applies all the task such as: user research, eliciting requirements, innovative thinking, prototyping and evaluation. During the thesis, the students will enter the roles as interaction design consultants, where the thesis students are assigned a problem from the company and provides them with a well-grounded solution to their problem. By getting this challenging task, it challenge the students to apply knowledge from different fields in interaction design to end up with a successful result. As the project is targeting a wide user base, it will be of interest for research as this is a growing and somewhat unexplored field in software development. This makes this thesis suitable as a thesis in the department of Interaction Design & Technologies.

2.1 Related work

The current application-market contains few horse-related applications. Many applications in the health and fitness categories, are more focused on training guides for personal training, for example gym or home training. These applications include workouts, schedules and reminders for the user. Compared to the Equilab application these do not track time, distance or speed. Equilab is an application that tracks the rider's and the horse movements. Therefore, these applications are not that accurate for comparison, but they could be used to compare how they present their data, and their choice of navigation. One factor that will be considered is what information that is important, and when to display it.

There are several applications that help users to keep track of their outdoors activities, such as running, walking and biking. These applications keep track of the

user's movement by using the mobile's GPS, accelerometer and gyroscope. One popular application for outdoor activities tracking in Sweden is Runkeeper (Runkeeper, 2017). For example, these outdoor tracking applications tracks the user's speed, distance, location and steps (see figure 2.1). These applications are not designed for activities with horses but these applications can be used to get insight in how Equilab could present their collected data and when to present it.

There is one application named Gallopica (Gallopica, 2017) that is designed for equestrians to keep track of their riding (see Figure 2.1). Gallopica does track the same information as the other GPS based training application does, such as speed, distance and time. But they do not provide information about gaits performed. There are other horse tracking applications that tracks the users' riding. Several of these including Gallopica are outdated, and do not calculate what gait the horse has performed. Gallopica does show the difference gaits performed on a map view, but do not state how they detect gaits. They show total time, distance and breaks, max and average speed. Some applications for equestrians display distance performed in each gait and percentage of total distance. In Gallopica, it is possible to view a map that shows the route and gaits performed during a training.

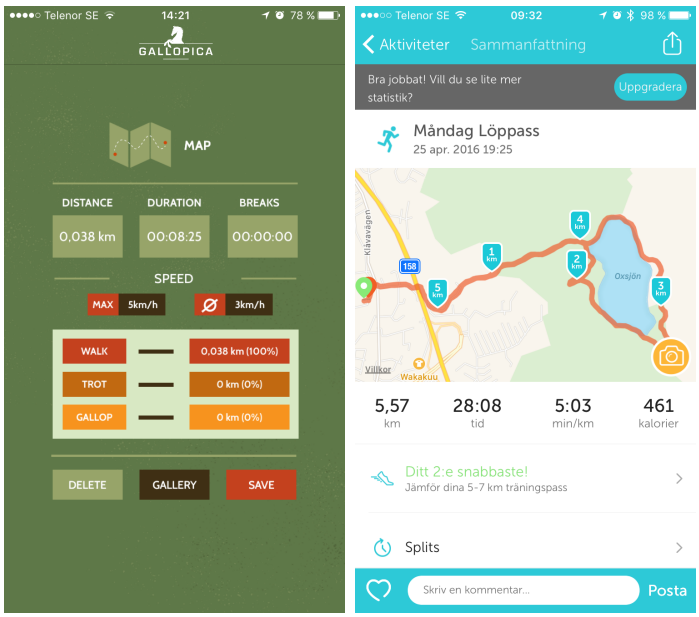

Figure 2.1: To the left Gallopica, to the right Runkeeper. Both applications display information about a training. .

3

THEORY

This theory section will present theoretical frameworks and concepts that is relevant for the thesis. It will also present related research in the field of mobile application design.

3.1 Theoretical frameworks

This section presents theoretical frameworks that is tightly coupled to this thesis. The frameworks will be explained to provide a better view on these common frameworks and terms.

3.1.1 Interaction Design

For the major part of this the students will be working as interaction designers; therefore, the authors of this thesis consider it is in place to define the term interaction design. Moggridge (2007), the founder of the design company IDEO defined interaction design in his book Designing Interaction. He defined it as *"The design of the subjective and qualitative aspects of everything that is both digital and interactive, creating designs that are useful, desirable, and accessible."* This is a quite broad definition of what interaction design is, but he still claims that the product to be designed should be digital, interactive and focus on usability. Sharp et. al (2015) defines Interaction Design in a bit different way than Moggridge. In their book, Interaction Design - Beyond Human-Computer Interaction, they define it as *"designing interactive products to support the way people communicate and interact in their everyday and working lives."*. This is a quite broad definition of what interaction design is, but he still claims that the product to be designed should be digital, interactive and focus on usability. Sharp et. al (2015) defines Interaction Design in a bit different way than Moggridge. In their book, Interaction Design - Beyond Human-Computer Interaction, they define it as *"the practice of designing interactive digital products, environments, systems, and services"*. Coopers definition is like Moggridge definition that it is digital products that should be designed. To sum up one can draw the conclusion that there is no common general definition about what interaction design is. One can still agree that it is a field in design where humans are about to interact with the product or environment that is to be designed.

3.1.2 Human Centered Design

Human Centered Design (HCD) is a framework for design, which includes phases and methods for interactions designers, that is used for development of concepts and products (Norman, 2013). This framework puts the user's needs and behaviors first, the designers goal is to meet these needs. The framework contains methods that helps the design team to develop solutions to problems by involving users in the design process. This type of design mind-set requires that developers work closely with the intended users of the product.

According to Norman in The Design of Everyday Things, HCD is a design philosophy where a designer understands the needs of their users. Norman, also states that this knowledge is obtained by observing, examining and working with the end users. Users do not know about their needs and their problems with a current solution, it is not enough to simply ask them (Norman, 2013).

The HCD process uses methods for developing interactive systems, by putting the focus on the users designing around what their needs and requirements are. A successful design starts by gathering a deep understanding of the project. A good design requires good communication between designers, developers and the users. Norman states that the HCD approach improves product efficiency, providing more user satisfaction, higher availability and better usability (Norman, 2013).

The questions to be answered when designing can be put into a pyramid, like Abraham Maslow's, Maslow's Pyramid (Maslow's Hierarchy of Needs, 2017). From top to bottom the questions in the pyramid are why, how, when, what and who (Giacomin, 2014, see figure 3.1).

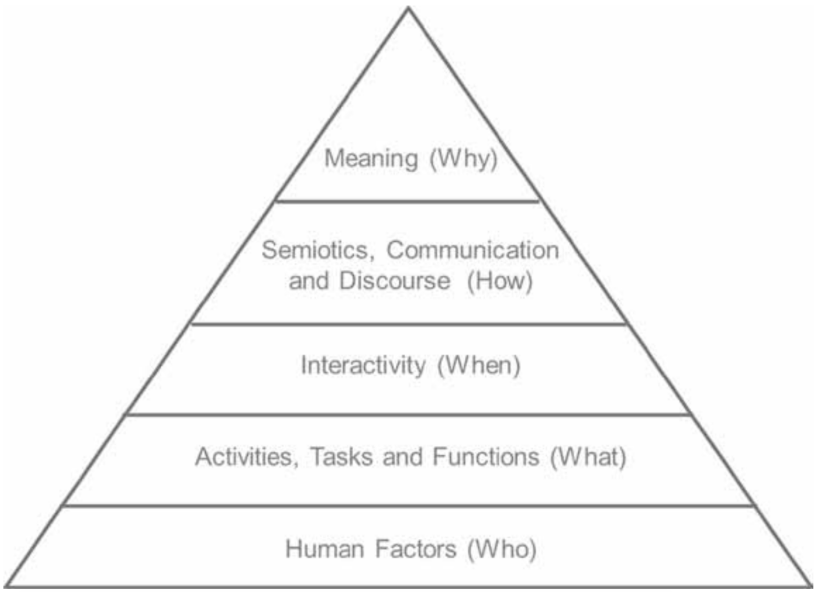

Figure 3.1: Maslow's Pyramid.

A design that answers the issues further up in the pyramid implies that it also answers the issues underneath. According to Norman solutions that answers questions further up in the pyramid has greater affordances. A product that have all the answers in the pyramid, is expected to introduce a new meaning in the user's life (Giacomin, 2014).

There are two steps in the HCD, the first step is to analyze the users and find the problem, what their needs are and define their requirements. The second step is to find and create a solution that satisfies the user and customer (Norman and Verganti, 2012). The first part involves research and determines the needs and requirements of the end users. The result of this phase should highlight the difficulties and problems of the existing products. The second is to find a solution by doing design iterations of low-fidelity and high-fidelity prototypes and test them with users. This is a phase of iterative testing, evaluation, and refinement. Norman says that HCD is an ideal iterative process to develop gradual innovations and have a low risk of radical changes in each iteration (Norman and Verganti, 2012).

The purpose of using HCD is to ensure that the users' needs are met when developing, designing, and implementing a new product. The team measures usability and user feedback to determine the success of the solutions (Norman, 2013). The solutions are based on the research and evaluation. The problems that arises is not just documented, they are a part of the design process to the final solution. This results in a product that is easy to understand and useful, which achieves the desired functions, and gives a positive user experience. Technologies and other tools are integrated to handle upcoming problems that existed or arises during the work. As technology becomes more advanced, it is necessary to have a human-centered design strategy and development of new products (Nielsen, 2013).

3.1.3 iOS Human Interface Guidelines

Apples iOS Human Interface Guidelines will serve as the basis for the design to be developed (iOS Human Interface Guidelines, 2017). The iOS Human Interface Guidelines are Apples recommendations in how an application developed for iOS should be designed and structured to meet the requirements for the App Store. The guidelines include everything from broad recommendations regarding the design, to detailed recommendations about interface components. The general design principles that Apple expect of an application are focused on clarity and deference. The application should communicate through clear texts and icons, and the focus should lay on functionality and a great affordance in the interactive parts. The guidelines therefore also recommend minimal use of shadows and gradients to keep the interface clear. The guidelines also emphasize on depth; the applications should make use of navigation dept. to keep the information flow clear and make the navigation intuitive to navigate through for the user. Further the guidelines provide more detailed recommendations and interface requirements regarding: Interaction, Features, Visual Design, Graphics and UI Components. These are detailed explanations to make the application fulfil the general guidelines mentioned above. These general

guidelines are also complemented with a bit more detailed but still general guidelines regarding application design and interaction. These are: Aesthetic Integrity, Consistency, Direct Manipulation, Feedback, Metaphors and User Control.

3.2 Related research

Related research has been conducted in the field of mobile information visualization. This study focuses on the importance of updating the guidelines for larger screen sizes, to the new era of mobile devices with smaller screens. A study relevant for the thesis is also presented in this section.

3.2.1 Mobile Information Visualization

In line with the emerging use of mobile phones, and smartphones which can display more complex information and graphics, there has been a growing need of research in the field of mobile information visualization. This since the ordinary desktop visualization guidelines can't be directly used on mobile devices. Chittaro (2006) agrees with this statement and state the following: *"Unfortunately, limitations of mobile devices (e.g., limited screen size) make it impossible to follow a trivial porting approach from desktop computers to mobile devices."*.

The technical differences in mobile versus desktop motivates a new approach to information visualization on mobile. For example, Chittaro (2006) mentions the obvious difference in screen size, which forces the designer to strip down the information or work with new techniques to be able to show the necessary information, Chittaro (2006) also mentions the ratio differences, using the smartphone in portrait mode, which is the usual way, gives a completely different screen ratio than on computer screens which needs to be taken into consideration. There is also a difference in input sources used to manipulate the information on the displays. Chittaro (2006) talks about the context differences that needs to be taken into consideration when presenting information on mobile. For example, that mobiles are used in different physical environments where the focus from the user can shift depending on the context of use. Chittaro developed a checklist with questions for the designers to ask themselves during development of a mobile information visualization. In short, these questions consist of the following: How is the information visually encoded. Among the data available, what is relevant to the considered task. How is the visualization laid out on the available screen space. What tools are provided to explore and rearrange the visualization. Are human perception and cognitive capabilities being considered. Lastly, Has the effectiveness of the visualization been tested on users. With this checklist (see checklist in Appendix A.5), he argues that more errors will be detected in the visualization.

Escobar, D. et al. (2016) has conducted research that can be tightly connected to this thesis regarding mobile information visualization. During their study, they performed a mobile information visualization case by creating an application version of the Adkintun application, which visualize user's network connection. They

mention the lack of research in this field, and presents this case study of visualization on mobile. In their research, they discuss strategies to help designers create effective mobile visualizations. Escobar, D. et al. (2016) agrees with Chittaro's view of the difficulty in applying desktop visualization techniques on mobile, and states that 'desktop visualizations do not scale well to mobile'. They also mention the challenge in keeping the visualization simple: 'An important challenge when designing information visualizations on mobile devices is to avoid cluttering the limited screen space, while at the same time displaying all the essential information to make people's cognitive task easier.'

4
METHODOLOGY

As a structure for the design phase of the thesis, the Goal-Directed Design Process will be applied (Cooper et al, 2014). The following section will describe each phase in the Goal- Directed Design process. It also presents different method alternatives for each phase, and how they could be applied to the process.

4.1 Goal-Directed Design Process

The Goal-Directed Design Process is an interactive design methodology created by Alan Cooper to address situations where different users of a proposed product express a desire for different things. The final behavior, design, look & feel, navigation and functions should be based on the goals of users, requirements from stakeholders, and the limitations by current technology. The Goal-Directed Design Process focus on identifying the goals and behaviors of users, the goals of a business, and directly translate these goals into design. The Goal-Directed Design Process consists of six phases: Research, Modelling, Requirements Definition, Framework Definition, Refinement and Supporting (see Figure 4.1). Cooper's method focuses on behavioral design; it should bring the users into the design process.

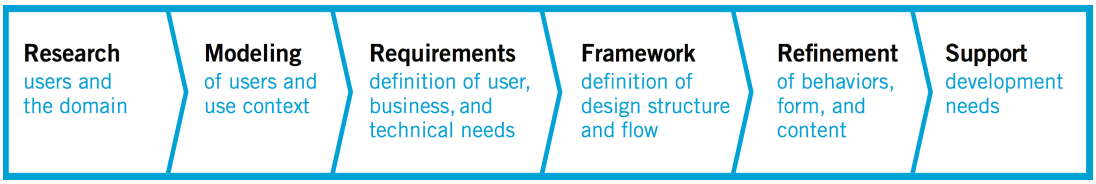

Figure 4.1: The Goal-Directed Design process.

4.1.1 Research

The goal with the research phase in the Goal-Directed Design Process is to obtain qualitative data about the current users and potential user of the product. This could initially be obtained by: investigating similar products, conduct market research, read the brand strategy, and interviewing stakeholders or developers. The last step in the research phase is to procure data by interviewing and observing the actual users of the product. During the thesis, the authors of this report will divide the research phase in two main parts. The first part is initiating the project by planning and setting the scope, and to conduct relevant background research. The second part involves an extensive phase of understanding the goals of the users and

potential users. This second phase is crucial for the outcome of the design process, since as mentioned by Gaver (2012) *"Design often addresses wicked problems which are complex enough that no correct solutions exist a priori and for which formulating the situation is integral to addressing it "*. Therefore, the understanding of the users and their goals will lay the ground to the formulation of what needs that should be addressed during the design process. By getting a clear formulation of the user's goals it will be easier to later provide solutions to their issues during the design process.

4.1.1.1 Survey (Questionnaire)

For initial user studies a survey is an option for gathering user data, the purpose of a questionnaire is to gather quantitative data about the user group to be investigated. As mentioned by Sharp et. al (2015) questionnaires have similarities to interviews in the way that they can use closed and open questions. But with the strength that they could be sent out too many people, and thereby give valuable information about demographics and the user group overall. They also stress the advantage that they avoid the common issue with people living at remote locations, with questionnaires the data can be easily collected from all kind of locations. They also state that it could be a good complement to interviews for confirming conclusions. Tullis Albert (2013) discuss the drawback that the data received from each participant can be limited, but they also mention that this can be compensated with the fact that a survey can gather a lot of participants. Tullis Albert also discusses the pros by doing the survey online, in that way it gives more tools to work with for the survey-maker. For example, images, can be used to gather opinions about a design regarding visual appeal, perceived ease of use and similar opinions.

4.1.1.2 Semi-Structured Interviews

Another option for gathering of user data, is to gather qualitative data through semi-structured interviews. This could be applied both for the initial stakeholder interviews and for user interviews. The stakeholder interviews would focus on gathering information about the current product, its users and brand strategy, whilst the user interviews are focused on grasping the user's goals of using the product. Semi-Structured interviews combines structured and unstructured interview techniques. For these kinds of interviews the interviewer has a script of topics that is to be covered during the interview to make sure the interviewer covers all the necessary topics (Sharp et. al, 2015). This script includes questions for the participant but the interviewer must complement the questions with probing. Probing is a technique where the interviewer asks the participant to elaborate their answers, and thereby dig deeper into each answer to gather as much information as possible for each topic.

The semi-structured interview technique is beneficial since according to Margaret et. al 2009 it suits well when the designer want to gather a deep understanding about the user group, they state that: *"Semi-structured interviews are often used when the researcher wants to delve deeply into a topic and to understand thoroughly the answers provided."*, therefore semi-structured interviews could be a good choice

for our thesis, since the goal during the research phase is to understand the user group deeply to be able to deliver an innovative and well-grounded solution to our stakeholders.

4.1.1.3 KJ-Analysis

The purpose of the KJ technique is to help teams organize complex structures of information (Martin Hanington, 2012). For the thesis, the qualitative data gathered from the semi-structured user interviews will be structured by using the KJ method. To be able to use the KJ method for the interviews, there is a need for preparation of the data. First the data gathered during the interviews needs to be transcribed. The next step is to filter out all the unnecessary data, this is done by reading through the transcriptions and mark all relevant statements. These are then cut out and represents the post-it that's originally is used during a KJ. When all the statements are cut out the KJ can start. During the KJ the students collaborate and put up the statements on board, the task for the students is to group the statements with what each group member think has similar themes. By grouping the statements, the students can detect common problems, and notice patterns that might emerge on the board. As mentioned by Sharp et. al (2015) *"The affinity diagram, which is used in contextual design is one common technique used in qualitative analysis. It aims to organize individual ideas and insights into a hierarchy showing common structures and themes."*. By getting a well-organized structure of data the authors of this report argue that it would benefit the modelling phase.

4.1.2 Modeling

After the extensive research phase the next step in the Goal-Directed Design Process, is to enter the modelling phase. During the modelling phase the task is to analyze the data gathered and create a good understanding of the domain and its users. This analysis should then be digested into models representing the domain and it users. This modelling can be in the form of flowcharts, user models, personas or other types of models (Cooper et al, 2014).

4.1.2.1 Personas

A good way to successfully design for a wide range of users, is to design for a specific type of individuals with special requirements and needs. To meet the requirements for the project, a persona can be created to represent the data gathered. Personas are based on the qualitative and quantitative data collected during the research phase. The importance of this is stated by Cooper et al (2014) *"One reason why personas are as successful as user models is that they are based on research on the potential users. They engage the empathy of the design and development team around the user's' goals"*. When a design team works with personas, they take the users' role to understand them and their needs in the development of new products (Nielsen, 2013). Personas will only be as good as the research and groundwork behind them, a persona should represent a user of a product (Cooper, Reimann and Cronin, 2014). Personas describes a users' background and their goal with the. A persona should

explain what the user has for expectations of the product and their needs. Each persona is characterized by a set of goals relating to a product. A persona should have a name, a picture and some personal details.

A persona is a tool for communicating how the users behave, how they think, what they want to accomplish and why they want to use a product. It is important to select the right users to develop for, choose a user whose needs best represent the needs of a greater mass. A persona should also prioritize the needs of the individuals who are the main users, if their needs are met, then it is also satisfies the needs of secondary users. For the product to meet the requirement for the different kinds of users' behaviors, attitudes and skills, designers must create personas with different types of characters.

4.1.3 Requirements Definition

The Requirements Definition phase uses personas created in the previous step and puts them in a context, during this phase in scenarios. The scenarios start as a high-level description of how the personas acts through their day. Then the designers iterate the scenarios to reach a more complex and detailed level until the scenarios are detailed enough to provide requirements. By using these scenarios and personas, the designer's role is to elicit requirements which represents the user's needs and goals with the product to be developed. Thereby the output from this phase is a requirement definition which is used in the next phase when the first sketches of the design is about to be created.

4.1.3.1 Scenarios

Johansson and Arvola (2007) describe scenarios as they are used to describe user's interaction with a product in an environment, and why a user uses a product. Carroll (1999) describe scenarios as they are used to describe stories about a user, and their tasks and activities. A scenario does not necessarily explain the functions and how the solutions are designed and work. Their purpose is to explain and tell stories as a natural communication tool for us humans to convey thoughts and ideas. Therefore, scenarios are a good tool for a design team, since it lays close to hand to tell and to receive stories. A good scenario is one that have answers to the requirements from each persona, or that has a new design concept (Carroll, 2000).

Scenarios consist of settings and situations that describes users who have different personal motivations, knowledge and capabilities. Scenarios describes a series of actions and the outcomes of these. Scenarios is a great tool to describe ideas about actions a user could take. A scenario describes a story of a situation that the user makes. A scenario can be detailed and should answer the questions who, what, when, where, why and how a user uses the product. Therefore, scenarios work great with personas. It identifies what the persona hopes to accomplish with the product. The scenario can be used to describe what is happening with a product. The increased use of personas is used as a basis for the continued use of scenarios to

describe the personas and their context (Giacomin, 2014).

Scenarios is an effective way of describing use cases for a product, how and what they would do with it. Scenarios describes the user's' interaction with a product, Goal-Directed scenarios are based on the personas and defines the product's behavior and functions.

The level of details in the scenarios depends where in the design process the design team are. In the requirements phase it is better to use the Context Scenario, that displays the user experience goals and the tasks the user is performing. By letting the intended users see the scenarios, you will quickly get their reactions and they will be engaged in the research. This lets the design team understand what the users wants, fear, and need (IDEO, 2014).

4.1.3.2 Context Scenario

Context scenario works with personas and users, their needs and their aspirations. These scenarios describe experiences around key moments. These scenarios show the moments in time when a user uses or have any contact with the product. A context scenario tells a story about the user experience, and describes how the product fits into the persona's life and environment, and how it helps them achieve their goals (Cooper, Reimann and Cronin, 2014).

Context scenarios tells a story about the future where the product is in use, how the product functions and its main context of use. It shows how the product could improve the life of a user. The scenario should show situations that enhances the experience for the users. It should show the use of the product and uncover the outcome of the product. The context scenarios are made to show how the product can help a persona to complete their goals.

The context scenarios are used and created before sketches of the products are made. They are used to explore how the new product can be used and serve a user in their everyday life. They should be written from the personas perspective. These scenarios should say why we are using the product X in order to Y for Z. Where X is the new product, Y is the what the new product should achieve and Z is the users who will use it. After the functions are designed and a framework has been established the context scenario is revised. A context scenario should address the following questions (Cooper, Reimann and Cronin, 2014).

- In what setting(s) will the product be used?
- Will it be used for extended amounts of time?
- Is the persona frequently interrupted?
- Do several people use a single workstation or device?
- With what other products will it be used?
- What primary activities does the persona need to perform to meet her goals?
- What is the expected result of using the product?

- How much complexity is permissible, based on persona skill and frequency of use?

4.1.4 Framework Definition

During the Framework Definition phase the goal is to use the previous phase to create an overall definition of the final design. This includes creating a high-level design which focusing on the basic functions of the app. For example, the flow of the app, where data should be placed, and which functions to include in the application are set during this phase. During the Framework Definition phase, there are different frameworks that is to be developed (Cooper et al, 2014). The different frameworks should define the application on a high-level, and can be used as a blueprint in how the final application should be designed and work. The different frameworks are then merged together and evaluated to create the final Framework Definition of the application.

Defining the frameworks includes defining the form factor, posture and input methods of the application. Then which functions, and data to include in the application. After that the designer must decide where the data and functions should be placed, which implies grouping the content and deciding the hierarchy for the app. When these elements are defined, next up is to create the first sketches of the framework, and validate them iterative. During the framework definition phase the designers also must decide on the visual design. The visual design is about deciding on the type of experience that the user should get when using the application. This includes defining the type of language and setting the visual style.

4.1.4.1 Low-Fidelity Prototyping

During the development of the interaction framework low-fidelity prototyping is the main activity for developing the framework. Low-Fidelity prototyping builds on creating quick high-level sketches, and setting the flow of the application. This is useful since it is a very cost-effective method which gives enough details to develop the design on a high level. This view is supported by Duayne Brade (in Moggridge, 2007) which states that *"Paper is accessible and so versatile. You can quickly sketch, lay out, and evaluate interaction design concepts for basic usability, making it possible to rapidly organize, articulate, and visualize interaction design concepts."*. Therefore, paper prototyping is a good choice to apply during this phase of the project. By using this rapid prototyping technique, the students can evaluate and test a lot of different approaches of concepts for the design without losing too much time.

4.1.4.2 Key Path Scenario

The context scenario developed during the modelling phase is used again during the Framework Definition phase. A key path scenario describes how the personas interacts and uses the product and its functions. These scenarios show the most used functions that are used daily (Cooper, 2014). The difference for this iteration is that the low fidelity sketches developed is used together with the scenario, and it

will now function as a key path scenario to validate that the sketches can be used to complete the scenario. This means that the user's interaction with the product are described in more detail. This scenario is more focused on the main interactions that a user does, it describes the primary paths through the product. As the interaction framework gets more detailed the Key Path Scenario will be iterated to meet the new features.

4.1.4.3 Validation Scenario

The validation scenarios are used to test and validate that the design and functions fulfils the requirements in different environments and situations. Validation scenarios are used to describe how the persona interacts with the product being developed during the design process. Throughout the design process, validation scenarios are used to verify the solutions. It is important to try, test, and validate different solution variants before selecting the final solution (Cooper, Reimann and Cronin, 2014). The validation scenarios tend to be less specific and are based on what-if questions about the suggested solutions.

4.1.5 Design Refinement

During the Design Refinement phase the task for the interaction designer is to translate the interaction design framework into high fidelity sketches. This focuses on the details of the design regarding, for example, icons and types of buttons. When the first version of the high-fidelity prototypes is set, the next step is to validate and test the design. The validation issues then lead to refinements of the design in a new iteration followed by a new validation.

4.1.5.1 High-Fidelity Prototyping

High-fidelity prototypes look more like the final product and provides more details than low-fidelity prototypes do. A prototype can be a sketch of a product that offers the opportunity to explore the design, function and purpose of the product. This helps to find problems before the development has started and too much time has been invested. A high-fidelity prototype can be close to the finished product, it can act and feel like a sophisticated product, designed to look and feel like the final product or an early implementation that allows click-through functionality.

High-fidelity prototypes are usually computer-generated interfaces, and are designed to look more like the final product. These kinds of prototypes are a good tool to show actual products to customers, design team and stakeholders. They can be used to collect performance and user data. With a well-designed, conducted and implemented high-fidelity prototype, it is easier to show and sell a product. A prototype with high fidelity is instead built in a material that is like the final product (Johansson and Arvola, 2007).

4.1.5.2 Evaluation

For evaluation of the high-fidelity design there are two expert methods commonly used in this process. First a cognitive walkthrough, which acts as a validation scenario to make sure the different goals can be carried out in an effective way with the current design. Secondly heuristics could be applied to validate the design even further. This is iterated with design refinements until the final design is reached.

4.1.5.3 Cognitive Walkthrough

A heuristic evaluation is carried to evaluate the interface further. Heuristics is a set of guidelines created to evaluate an existing design, originally developed by Nielsen (1990). According to Sharp et. al (2015) heuristics is described as follows *"In heuristic evaluation, experts, guided by a set of usability principles known as heuristics, evaluate whether user-interface elements, such as dialog boxes, menus, navigation structure, online help, and so on, conform to tried and tested principle."*. The heuristics developed by Nielsen includes the following topics:

4.1.5.4 Heuristics

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

In later years' alternatives of the original heuristics has been developed to better fit for new types of interfaces, especially the mobile platform which is the field of study during this thesis. For example, Kuparinen, L. et al (2013) proposed a modified version of Nielsen's heuristics were each version guideline was adjusted to fit better in a mobile context.

4.1.6 Design Support

When the design is set, the next phase is to hand over the solution to the developers. During the transition, there is a need for the designer to act as a support for the development team. This since the development team might not understand everything that is handed over, or their might be technical issues that needs to be worked around. In these situations, the designers must provide alternative solutions, and be able to answer the developer's questions.

In the case of this thesis the development will be carried out by the same people that created the design. Therefore, the design support phase in the Goal-Directed Design Process will be a bit different. Because the authors have the knowledge to adjust the design to what is possible to implement, and knowledge to do an estimation of how much time it will time consuming each function will be to implement. With this deeper knowledge, it is possible to avoid big tradeoffs because of time limits or technical limitations.

5
PLANNING

From the available methods in the Goal-Directed Design Process described in the previous section, the students have chosen the following methods based on their suitability for the process to be conducted during the project. This section discusses why these methods were chosen, how and they are planned to be used. Figure 5.1 present in which work week each of the chosen methods was planned to be applied.

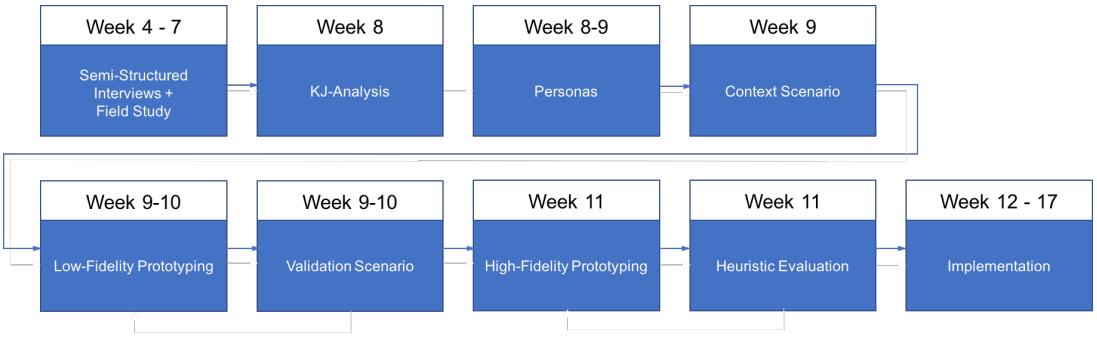

Figure 5.1: Methods planned placement in time.

5.1 Semi-Structured Interviews

Week 4-7
The semi-structured interview technique was chosen as the main source of data gathering. The interviews are planned to be done during a period of four weeks. The method was chosen instead of the structured interviews since the students needed a deeper understanding of the user group. Mainly since the students' previous knowledge was limited regarding the equestrians' lifestyle, and their view on horse training. The students had an understanding about what topics to be covered during the interviews, and therefore the complete unstructured interviews were dismissed, mainly to make sure that the necessary topics were to be covered. By keeping the interviews semi-structured, it is possible to gather data in the predefined topics, there is also a possibility to dig deeper into interesting answers during the interview.

Observation is a data gathering option that was dismissed. The reason for this is mainly since there was no natural situation where this technique could fit. Observation during training would not gain much relevant data since the application to redesign is mainly used after or before a training. To observe non-users of the product after a training would also be less effective than asking them about their views

on training and planning. This since it is easier for an equestrian to describe their view on training, than it is for the students trying to understand it while observing. Another option was to observe the current users of the product to elicit current issues. It was decided that the new design should build on the goals of all types of equestrians that could potentially use the product. The students believe that the concept to be developed then could become more innovative, and lean on to a more solid ground of user studies.

With this motivation in mind it was decided that semi-structured interviews are the best choice for data gathering. The sample of participants for the interviews was decided to be based on the discipline of the equestrians rather than their age, gender, or ambition level. Since the challenge for the design is to fulfill the goals for all kind of disciplines and should be used by all ages and ambition levels. By gathering data from the different kinds of disciplines the students can later create a requirement list which represents all kind of equestrians, which is the target group for the application. The understanding of the differences between the different kind of users and their disciplines is crucial for the work to succeed, and to be able to fulfill the goals for all users.

5.2 Field Study

Week 7
The students have planned to visit at least one stable during the research phase to complement the semi-structured interviews. This method was chosen since being able to meet the equestrians in their natural environment is beneficial for data gathering. By asking questions in their natural environment, the surrounding can be used as mediating object. This means that the interview objects can use their everyday tools and surroundings to help them explain and answer the questions. The students also believe that being in the natural environment can benefit our own knowledge regarding how equestrians live their everyday life, and better understand how they carry out usual tasks in the stable.

The plan is to find a stable with ambitious equestrians in one of the most common disciplines. By finding ambitious equestrians the students can elicit more qualitative data, and ask more complex questions about their riding. It is also important that the equestrians to be visited is active in one of the more common disciplines such as Jumping, Dressage or Eventing, especially since these disciplines count for the 99 percent of the competition starts in 2016 (Svenska Ridsportsförbundet, 2017). Thereby they can answer questions which counts for almost the whole target group of the application. At the study, the plan is to gather a deeper understanding about an equestrians' everyday life, and get the opportunity to conduct a more extensive interview.

5.3 KJ Analysis

Week 8
To structure the data gathered from the semi-structured interviews and the field study, the students has decided to conduct a KJ-analysis. The KJ-analysis will be based on the transcribed interviews, and the notes from the field study. The method was chosen since it works well together with transcriptions. It is also a simple way to organize data when working in a group since it gives a clear overview of the data.

The method will be applied by conducting two steps. The first step involves reducing the data, since transcriptions generates a ton of data, the irrelevant data must be filtered out from the relevant. This is done by printing out the transcriptions and cutting out the relevant data. The paper pieces of quotes that has been cut out will be used as the data to be structured when conducting the KJ-analysis. The goal with the KJ is to help interpret different categories of goals the target group of the application have.

5.4 Personas

Week 8-9
The next step to conduct during the project is the modeling phase. The students decided that the data gathered will be modeled and represented by personas. The students argue that personas suit very well for modeling during this project. Especially because of the different disciplines that the application targets. This since the students thereby can create multiple personas that represents one discipline each, in that way it is possible to get a clear model of a user in each discipline. It will also simplify the process of comparing the different goals and needs of the different disciplines, and thereby find out what data to present in the application, which is crucial for the project to succeed.

The goal is to elicit enough data from each of the largest disciplines to be able to create a persona each representing these disciplines. These personas should include which kind of data they are interested in, information regarding their lifestyle and personality, and their patterns regarding horse training.

5.5 Context Scenario

Week 9
A context scenario was chosen since it is a great way to verify that the product could be used by the personas. After the personas are created a context scenario that describes the user's use of the product is created. This method helps the students understand the flow, and the context in which the product will be used. It is a tool for thinking and communicating design. A context scenario is also a good way to identify problematic scenarios, it helps later in the process to detect if a design proposal is appropriate. It is also chosen since it provides a communication method

for exploring design solutions.

The method will initially be used to help identify the context and needs of the product. The context scenario is written after the personas have been created to ensure that the product can be used in their everyday lives. The method sets how the product can be used, this will be used during the project to validate that the product complies with the requirements from the scenario. It describes how, when, and why the application will be used.

5.6 Low-Fidelity Prototyping

Week 10-11
Low-Fidelity Prototyping will be conducted for 2 weeks during the framework definition phase. This method was chosen since it is a cost-effective way to express and elaborate around design ideas. By using Low-Fidelity prototyping the students can quickly share ideas, and test as many different solutions as possible. At this early stage in the process it is important to not get stuck to a specific design, and feel satisfied at the first try. By using Low-Fidelity prototyping at this stage the students can avoid this kind of problem that could arise when digging in directly to High-Fidelity prototyping. When creating High-Fidelity prototypes the designer often spend a lot of time with a specific design, and it might therefore feel harder to throw it away. Therefore, the students argue that High-Fidelity prototyping suits better when the design, wireframes, layout and flow is set, and it is time to conduct the last fixes of the design.

The plan is to apply the method as soon as the personas are created, and placed in their environment during the context scenarios. The student will then have a greater understanding of the different equestrians, their goals, and what they want to achieve with the application. When having this solid ground, the work will start to lay a ground for the first design with Low-Fidelity prototyping. First the plan is to decide what kind of information that should be placed in each view, set the navigation, and decide on which functionality to include to satisfy the users' needs. After the structure is set, ideas will be expressed by sketching design proposal of the actual interface. There will be as many different sketches as possible created both individually and together to evaluate the different design alternatives. The last step is to discuss the sketches, and try to find the best common solution to continue the process with. This is done by internal discussions, and discussions together with the stakeholders. This will be conducted for as many iterations as time will allow, and until the design is good enough.

5.7 Validation Scenario

Week 10 - 11
The Validation Scenario method is going to be used after a Low-Fidelity prototype is set, this is to validate that the design meets the requirements. The validation scenario was chosen to verify the selected design, and to see if it works in the context of use. It will be used to check that the design works in the most common cases for the primary and secondary personas. The method was chosen in favor for a formal usability test. The reason for this is that finding people for evaluation would cost too much time, and the students decided to prioritize the time on the initial data gathering process. Validation scenarios is therefore a good alternative to sanity-check wireframes before proceeding with the design process.

In the design process, this method will be used to control the design. The previously created context scenario, which initially were used together with personas would now work as a validation scenario together with the low-fidelity prototypes. It will provide varying results depending on how the design works together with the scenario. This may cause the design to be changed, and cause previous design steps to be reiterated. Then the method will be applied again until the students are satisfied with the design.

5.8 High-Fidelity Prototyping

Week 11
High-Fidelity prototyping will be done in iterations for one week, and until the designers and the stakeholders are satisfied with the design. This method was chosen since it is the most natural choice when designing a mobile application. By creating a pixel High-Fidelity prototype of the final application, the implementation process will move on much smoother. Since the developers, in this case the students themselves, can use the High-Fidelity prototype as a blueprint when coding the interface and its functions.

The plan for the project is to use the High-Fidelity prototyping method to elaborate around the designs final polish. This could for example be color themes, which kind of buttons to use, and to set exactly where the different elements on the screen should be and how they should look.

5.9 Heuristics

Week 11
Nielsen's heuristics (1990) will be used to find possible errors with the design. According to Nielsen six evaluators are the most cost-effective number of experts to test the design regarding to errors find divided by number of evaluators (Nielsen, 1995). Therefore, the aim is to find six experts to conduct Heuristics on our High-Fidelity prototype.

The heuristics was chosen since it is very effective and structured. It suits well for this project since the design to be developed can easily be tested with Nielsen's heuristics. Compared to cognitive walkthrough which is a common evaluation method, the heuristics test the whole design. Cognitive Walkthrough, which tests different use cases is probably more precise and works better for specific complex tasks. But the design to be developed will not contain very complex tasks, on the other hand it should be clear and effective overall, therefore the heuristics suits better for our case.

The application of heuristics is very straight forward in our case. The chosen experts will follow Nielsen's heuristics and try to find errors for each specific point in the heuristics. The errors found will be corrected in the interface before continuing with implementation.

5.10 Implementation

Week 12-17
The implementation phase will count for six weeks of the project, and the students will follow the Scrum implementation methodology, which is an agile development process conducted in iterations. When the design is set, the plan is to decide how to prioritize the implementation together with the stakeholders. When the order is set the students will work individually with different tasks in the Scrum backlog, which is a list of tasks to complete during the implementation, to be as efficient as possible.

6
PROCESS

This chapter describes the work process. The work has been carried out in the same order as the sub-chapters in this section. The order of the work process, and the chapters follows the Goal-Directed Design Process and its working procedures. The work began with research to gather data about the user group, to understand the users and their domain. It continued with modeling the users' needs and their context. The research work was needed to construct the framework, which defines the design structure, and the flow in the application. The design process ended with refinements of behaviors, form, content, and finishing the design of the product. At the end of this chapter, the implementation process of the design is explained.

6.1 Research

This section describes how the research has been conducted. Explaining the phases of the research phase, the methods used and in which order they were conducted. First, the students conducted a Background Study to get a better understanding of the user group. This included investigating the current application, the target groups demographics, how social media was used to get a better understanding about the users. The interview section starts with a description of how the students conducted a Pilot Interview to see that the questions worked and generated the right data. Then it continues to explain how the students went to find participants and how the interviews were conducted. This section also describes the Field Study, and lastly how the analysis of data was done using the KJ method.

6.1.1 Background Research

The research phase started with extensive background research. This included investigation of the current product to understand its possibilities and limitations. It also included understanding the target group of the application, and preparation for the user research phase. The background study was done to gain a deeper knowledge in the field of equestrians since both group members had limited knowledge in the field. The students found it necessary to gain knowledge in the field before approaching the users. It made it possible to ask more accurate questions, and to have a more fluent conversation in the field of equestrians. After setting the scope and planning the project, the students conducted a literature and market study. During the study, the students looked at related work in the field, for example existing equestrian applications, and running applications with similar functionality was reviewed.

Current Product

The existing product, Equilab was investigated, to gain a greater knowledge of its possibilities and its status. See figure 6.1 to see how the application looked before the work began, see Appendix A.6 for the views. For example, it was investigated what type of data the application technically can provide, and how the information is presented to the user today. This was necessary to understand our possibilities, and to understand the current problems that could give us ideas of what is needed to be changed during our work. This was complemented with an unstructured interview with the stakeholders, where the students had the goal to identify their goals with the product, and to understand their current user base. With the help of these interviews we gained valuable knowledge about their current user group, and what kind of feedback and challenges they currently had. From the discussions with the stakeholders it was understood that one of the challenges with the project is that the product aims for a broad user group. This target group consists of lots of different disciplines and ages. The design to be implemented therefore must fulfil the goals for this broad target group.

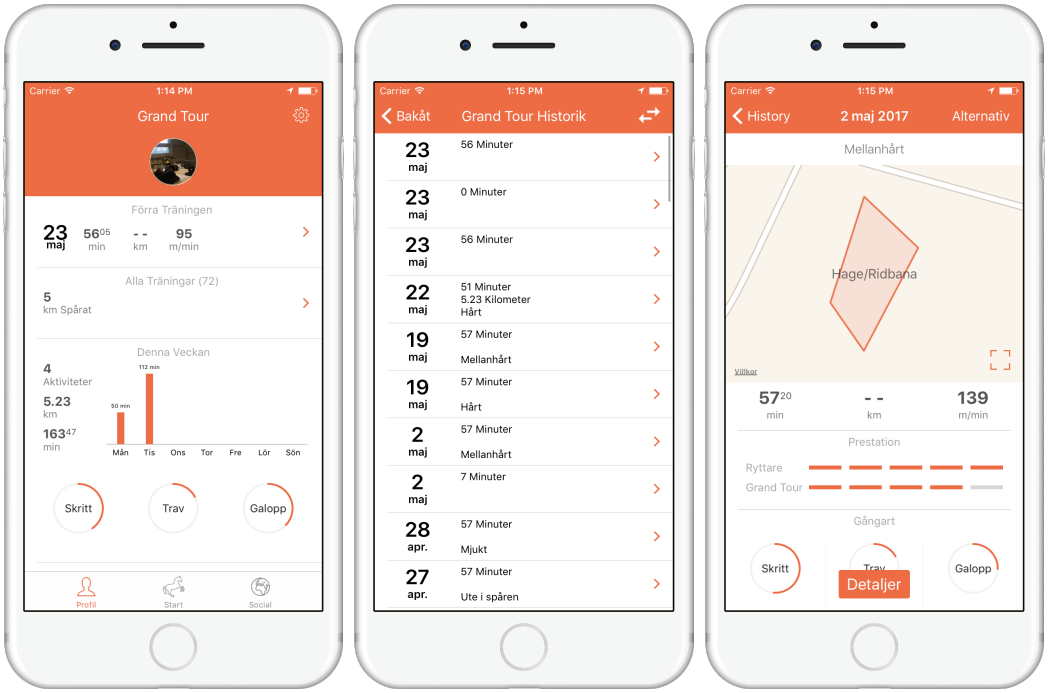

Figure 6.1: Pictures of how the application looked at the beginning of the work, from left to right we see Trends, All Trainings and Specific Training.

Demographics

After finding out what currently exists on the market, and identifying the challenges with the application was completed, the work to gain knowledge about the user group started. First basic demographic facts such as the distribution between the disciplines (Figure 6.2), age distribution (Figure 6.3) and gender distribution (Figure 6.4) were collected from the Swedish equestrian federation. The demographic data gave insights in which groups to prioritize for the upcoming user studies, especially in regards for the choice of participants.

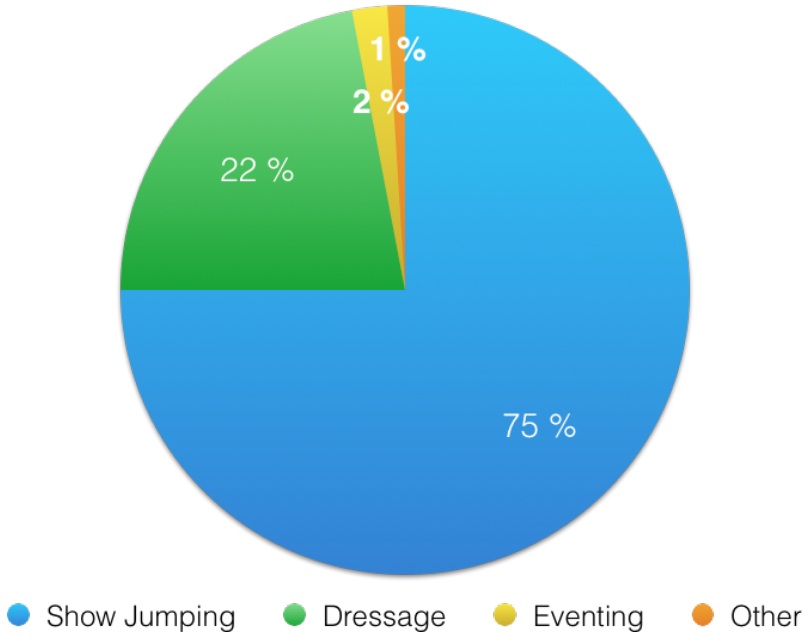

Figure 6.2: Discipline distribution in Sweden based on 378 700 competitive starts (Svenska Ridsportsförbundet, 2017).

As noticed in the discipline chart the distribution is heavily focused on the three major disciplines, jumping, dressage and eventing, but especially focused on jumping and dressage. In addition to this, it is worth to mention that not all equestrians are competing in their discipline. Many equestrians are hobby riders, and the target group of the Equilab is not only competitive equestrians. The category 'Other Disciplines' which corresponds to 1% of the equestrians, contains different categories such as: pair-dressage, driving, distance, and working equitation, which is also an important part of Equilab's target group, and should not be excluded from the final redesign.

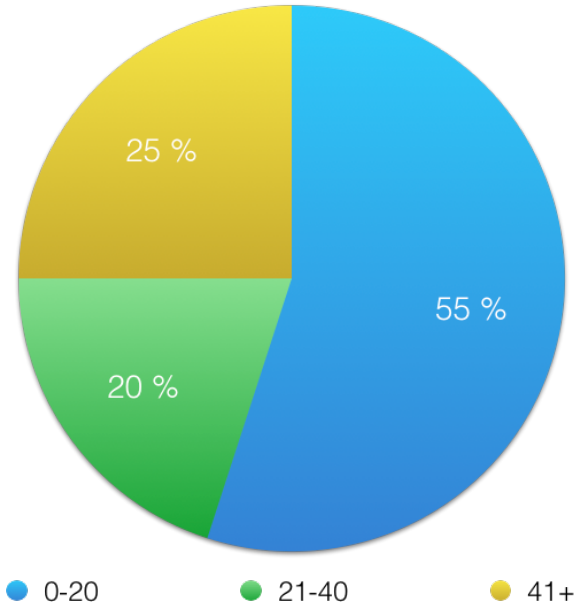

Figure 6.3: Age distribution Swedish equestrians (Svenska Ridsportsförbundet, 2015).

The age distribution between equestrians span over all ages. It is worth emphasizing that the age span of equestrians that are potential users of the application varies, this must be considered when designing the application. Young users probably have different needs and goals with using the product than the older category. Both in terms of usability but also regarding aesthetics and user experience preferences.

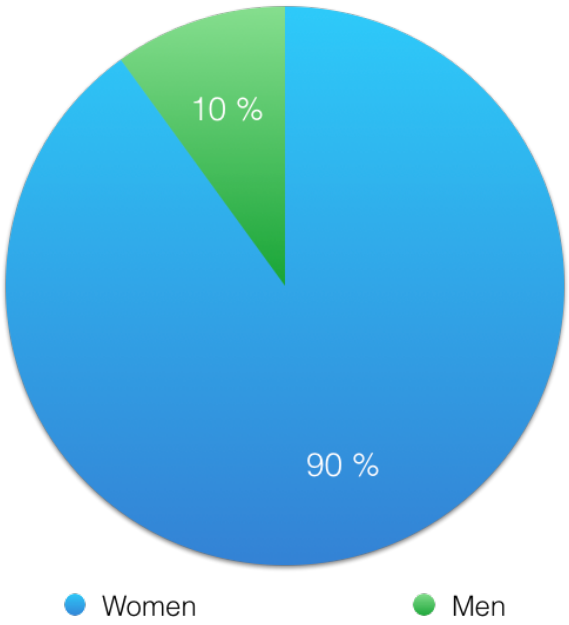

Figure 6.4: Gender distribution Swedish equestrians (Svenska Ridsportsförbundet, 2017).

Women are heavily overrepresented in the equestrian field. This will probably not affect the way the design will function or look. Neither should it be an important factor for the selection of participants. It could affect the user research since the students are two men, which are about to conduct user studies in a female dominated field.

As noticed in the figures above the target group of equestrians include all different age groups, and a lot of different disciplines. Since Equilab targets all kind of equestrians, it was realized that it will be a challenge to fulfill the needs of the whole target group with the design to be implemented. From the demographic research the students gained valuable knowledge about the user group, and how they differ in number of practitioners. It was important to have an understanding about the wide user group, since the main design challenge to tackle during this project is to design for an extremely wide user group with different needs.

Social Media
To obtain more knowledge about the user group a research in horse related media was conducted. The students watched horse vlogs on YouTube channels, listened to equestrian podcasts, visited popular horse blogs, read articles about horse training and joined Facebook groups with horse related content. This provided valuable knowledge about the user group, for example, knowledge about their daily equestrian life, their view on their horses, and how they train their horses. In addition, it generated an understanding about how they talk about their horses, and their vocabulary when explaining how they do certain exercises or take care of their horses. This was necessary for the upcoming interviews, since the interviewer must understand and use the same vocabulary as the equestrian to keep the interview fluent.

User Research Planning
When the background study was completed the students had greater understanding about the user group of equestrians, and the application to be redesigned. Questions remained in how to approach the user studies in the best way, therefore a meeting was scheduled with Pontus Wallgren who is a University lecturer in Design & Human Factors. Pontus research is about methods for identifying and communicating user needs and requirements (Pontus Wallgren, 2017). The purpose was to get input in what selection of participants that fits best for our qualitative studies, and how to structure the user research to elicit user needs in the best way. From the meeting, our speculation about the sample got validated by Pontus, and it was understood that for the case of our user group it is more important to focus on the equestrians' discipline, and if they are users of the product or not, rather than their age and gender. Pontus was also positive to selecting qualitative data sources, since he emphasized the importance of getting to know the target group and understand their lifestyle to succeed with the result.

6.1.2 Interviews

This section describes how the interview phase has been conducted, first by explaining how the students prepared for the interviews, and tested the questions with a pilot interview. Then it describes how the students found equestrians to participate in the interviews, to lastly describe how the interviews were conducted over phone.

Interview preparation
To prepare for the interviews the students stipulated goals for what to elicit from the interviews. The main goal was to elicit what kind of data the different disciplines of equestrians want to get presented in the application, and how they want the information presented. A second goal with the interviews was to get a clear picture of their general life. For example, to understand deeply the equestrians view and thoughts on their training, planning, and their relation to their horses, and how they structure their weeks as equestrians. This understanding of the equestrians' lifestyle is important to elicit underlying goals, which they might not be able to point out directly. And to widen our picture in which context the product is used and why.

With these goals in mind the students had a meeting together with one of the stakeholders at the company to brainstorm around questions for the interviews. Since the interviews are semi-structured the questions were supposed be open, and could be guidelines to make sure that all necessary topics were covered during the interview. Both interview questions and a structure of the interview was set during the stakeholder meeting. This resulted in a first version of a question-form for the semi-structured interviews.

Pilot Interview
The semi-structured interviews were planned to be conducted over phone, mainly since it is more time efficient and easier to find participants to interview over phone. The students decided to conduct a pilot interview to test the interview questions, and how the topics worked in a real context. The interview was conducted at the home of an equestrian, who has one horse, rides daily, and uses the Equilab application sporadically. The goal of doing this pilot interview is to improve the questions, and to prepare for how the questions are received by the participants. A further goal was to find out what kind of data the question form generated. Questions that is meant to elicit goals in a specific field, might be answered in a different way by the participant.

By making the pilot interview, it became clear that some questions could be removed or reworked, this to avoid repetitive questions that generated the same type of answers. For example, the participant answered an upcoming question while answering a previous one. Therefore, a new interview form version was created and decided to be used for the actual interviews (Appendix, A.2).

Find Participants
To find participants for the interviews, it was decided to publish messages in five Facebook groups targeted for equestrians. The students and the company Schvung Ride assumed that most responses would probably come from equestrians with the discipline show jumping since they account for 75% of all tournament starts in Sweden in 2017 (Svenska Ridsportsförbundet, 2017). Therefore, it was decided to publish our message in more discipline specific groups, such as dressage, and Icelandic groups. This was done to get hold of participants from more disciplines. The message was published in groups specific for dressage, icelandics, showjumping, and discipline independent groups. In total, these groups had around thirty-thousand members, which could have potentially seen and read our message.

It was chosen to write in Facebook groups in hope that members of the groups would voluntarily participate in an interview for our study. This was done because the students wanted receive participants who are open and willing to talk about their equestrian lifestyle. From the thirty-thousand potentially Facebook members who could have read our text, twelve replies were received with participants who were willing to participate. The student received an offer to visit a stable in Kungsbacka, an offer we accepted, read more about the field study in section 6.1.3. The following message were written in the five Facebook groups. The message was written in Swedish and published in Swedish speaking groups. See appendix for the Swedish and English versions of the message.

"Hejsan,

Vi är två studenter från Chalmers Tekniska Högskola. Vi arbetar med vårt mastersarbete inom interaktionsdesign där vi studerar hur ni ryttare ser på träningen av era hästar. Vi är nyfikna på vad ni tycker är viktiga aspekter att fokusera på vid träning och hur ni tänker kring träningen generellt. Det kan exempelvis vara vilka faktorer ni tittar på, hur ni planerar er träning och hur ni analyserar träningar som utförts.

Syftet är att samla in kunskap om ryttare och er träning, för att lägga grunden för en designprocess. Parallellt med denna process har vi även djupintervjuer med tränare, proffs och andra med mångårig erkänd kunskap i området. Denna intervju riktar sig däremot mot alla ambitionsnivåer - främst för att få en känsla hur ni uttrycker er och vilka rutiner ni har med er träning.

Är det någon i denna grupp som skulle kunna ställa upp på en kort telefonintervju? Intervjun är ca 15–20 minuter och bor någon av er dessutom i Göteborgstrakten kommer vi gärna ut på ett litet studiebesök till dig och ditt stall! Skicka PM till oss om intresse finns.

Vänligen, Emil & Tim"

Conducting the interviews
The semi-structured interviews were conducted over phone with the equestrians who responded through the Facebook groups. Questions were asked according to the revised interview form developed during the stakeholder meeting. The questions asked were focused on their training plan, goals with the horse, how they judge a workout, and what kind of information that could be interesting for an equestrian to get presented after, or before a training. Questions concerned how they document their training today, how far in time they plan their training, and how they follow up their training. Depending on how each participant answered, follow-up questions were asked to get a greater and broader understanding of their original response, also known as probing. Depending on how the participants answered, the interviews lasted for about 15-30 minutes each. Another parameter that effected the length of the interviews was if the participant had used the application before or not. In our sample two of the twelve participants were previous users of the application, for these interviews three additional questions were asked more specifically concerning the application. See Appendix A.2 for the semi-structured interview template that was used in the interviews.

The program Call Recorder (Ecamm, 2017) was used to record the interviews, this program allows you to record what both parts say in a call. The conversations were recorded to make it easier to conduct the interviews, mainly since taking notes while interviewing is time-consuming and could imply missing important details. It was noticed that recording the interviews helped focusing on the discussion rather than taking notes while interviewing.

Five different disciplines were covered by the interviews. See figure 6.5 for the distributions of disciplines for the twelve semi-structured interviews. As can be seen in figure 6.5, there was an overrepresentation of dressage riders in the interviews. This is probably explained by the intensity of activity in the different Facebook groups. The group for dressage riders were a more active group than the other groups, and people were more willing to help, which gave us more dressage respondents.

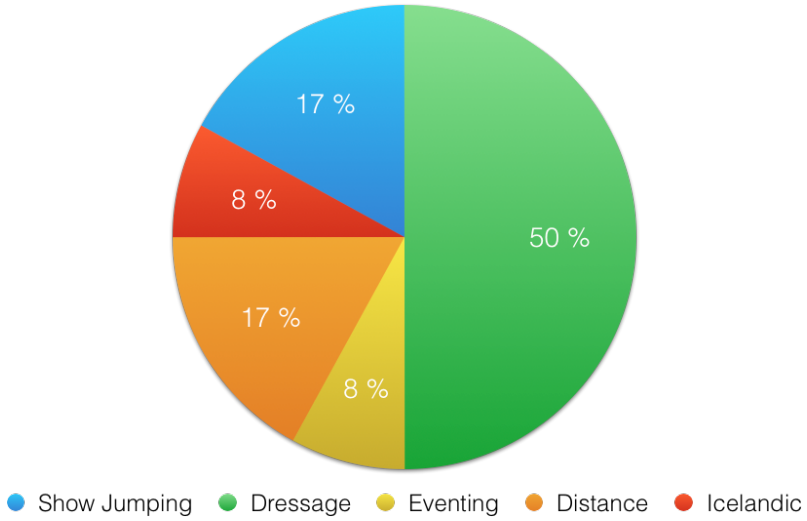

Figure 6.5: Disciplines interviewed.

After the twelve telephone interviews were conducted, everything was transcribed. The transcripts were made using the oTranscribe (oTranscribe, 2017) website as a help tool. This tool made the transcription process easier and more efficient, this since it has shortcuts for pausing while typing, and to wind back and forth. This is good for listening on specific parts one more time, to gain a better understanding on what was said. It also gives the opportunity to play the sound clips slower, which made it easier to fluently write down what was said. Everything that was said by both parties during the interviews were written down in the transcripts.

The interviews resulted in deeper knowledge about the equestrians, and deeper understanding about their lifestyle and daily training activities. For example, how their usual training week looks like and how they plan their training. In addition, it did not only gain knowledge in what kind of data each discipline wants. It gave us a greater understanding about what data elements they find more important, and how they would prioritize the information available. This data was complemented with further knowledge about which time intervals the equestrians consider is important to display data for. For example, if they want data presented on weekly, monthly or yearly basis.

6.1.3 Field Study

One of the respondents to our messages in the various Facebook groups invited us to visit their stable. We thanked them for their invitation and decided to make a visit and conduct a field study with a semi-structured interview. The visit took place at the farm of the family, the stable is located north of Kungsbacka. They have three horses of their own in their stable, they also rent out boxes to other equestrians. The family has a manége (indoor paddock), a horse racetrack, and an outdoor paddock where they exercise their horses. They have access to trails in the nature and the forest to ride their horse, to vary the training for the horses. In the autumn and the winter their horses spend their days in large gravel paddocks. In

summer and spring, they have access to large grass paddocks were the horses can move more freely.

The family has a daughter who rides and compete in Eventing and is part of Sweden's junior national team for Eventing. The mother rides dressage more for fun, but do participate in a few competitions. It is mainly the daughter who trains and rides their horses, the mother helps as well. Everyone in the family helps in the stable with the horses and chores connected to the stable. This was not a stable of elite equestrian athletes that have this as a full-time work.

The field study began with them giving us a tour around the farm, a presentation of their horses and showed us the training facilities. This while they took in their horses from the gravel paddocks to their boxes inside the stable. While they did, we talked to them generally about how they train and exercise their horses, and we asked general questions connected to our work. We talked about what our thesis is about and we presented our project. The study continued in their house that is connected to their stable. This is where the interview took place, we talked mainly with the daughter and the mother, since they exercise their horses. The interview was conducted for about one hour, the same template used in the phone interviews were used as a guide for this interview. This time we could discuss the different topics in more detail, and were also able to show the Equilab application. In addition, they also presented the tools they use during their trainings for collecting data or planning their training, see figure 6.6 for a picture of the whiteboard where they currently plan their upcoming week of training.

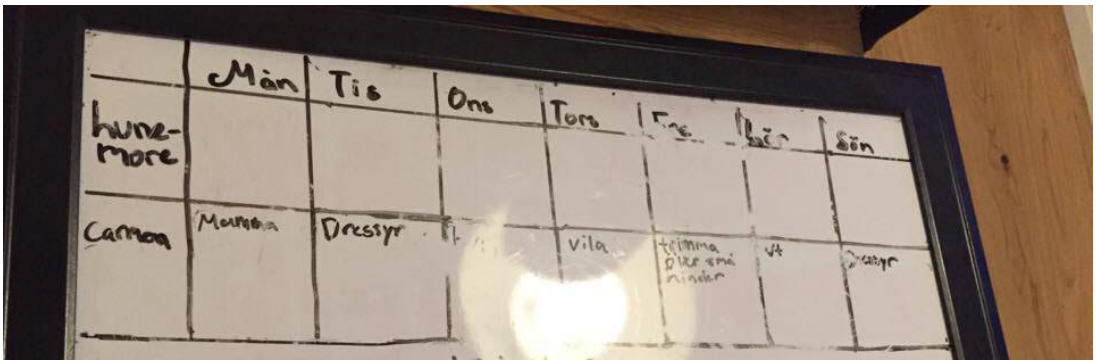

Figure 6.6: Picture of the whiteboard where they plan their week of training.

The meeting gained a further understanding about how equestrians practically plan their training, data that couldn't elicit by phone interviews. It was a good experience to go out and visit a stable, it gave new insights in how equestrians practically work with their horses. Another benefit with the field study was that the interview could be done with much better quality than by phone. It made it easier to interpret the interview objects reactions, and answers when seeing their facial expression. It was also a benefit that the interview object could bring and show their tools as mediating objects, which we noticed helped them explain their answers better.

6.1.4 KJ Analysis

The KJ analysis started by analyzing the data gathered from the interviews. The students proceeded by printing out all the twelve transcripts from the interviews. The work started by filtering out everything that was found interesting, this was done by each student reading through the transcripts, and highlighting the sections that was found interesting. Each highlighted section was cut out and placed in a large pile, together with a mark of the discipline.

When the filtering of the transcripts was completed it was time to structure the data. The students silently sorted each highlighted cutout into groups, the cutouts were sorted by their similarity to each other, this method is known as the KJ method or Affinity Diagram, the sorting of each cutout followed standard practice. The sorting was processed until all the cutouts were sorted, and until the students were satisfied with their placement. After grouping all the findings from the cutouts, there was a total of twelve different themes which were labeled by the students, see figure 6.7.

Figure 6.7: Image from the KJ-Analysis.

Each group was labeled after the content of the cutouts. This was done by reading and discussing each cutout within the team. When all the cutouts for a group were read, a fitting label for that group was picked. The last and final step was to analyze each pile and interpreted the data to give each pile a theme. After all groups had themes and labels were sorted, the students read through them again and discussed how and if they were placed under the correct theme. If not, it was checked with another theme that could fit this cutout better, or if we should create a new theme for that cutout. In short, the students structured the cutouts by placing them in groups and giving each group a theme that fits that pile of cutouts.

When the students were satisfied with the placement of the cutouts, the next step was to interpret each group with the citations from the interviews. This to translate the citations into bullet points of user needs. These user needs were then documented digitally, each user need from each group was written down and photos were taken throughout the process.

The KJ-analysis resulted in the groups labeled Social, Judgement, Goals Ambitions, The Horse, Transportation, Functions, Documentation, Exercising, Amount of Training, Feedback, Training plan, and Data. The groups Documentation, Data, and Training plan contained important user needs for our work. This since these groups contained needs that could be directly connected to information visualization, and how the users want the information presented.

The documentation group contained information on how the equestrians usually documents their trainings. These needs gave direct knowledge on how the documentation could be handled in the application, and how it should be presented. An equestrian stated the following:

'...I have a diary, I got it in 2015 where I write everyday about what I do. I write: what I have done, how it felt, and what I need to think about until next training, and what was extra good the particular day.'

The documentation about what an equestrian did for type of training was frequently occurring during the interviews.

Regarding the training plan and how they plan their training, all equestrians spoken with had a training plan in some way. Some of them kept it in their head, and some had it documented in detail. An Equestrian stated:

'I plan week per week, sufficient rest, sufficient with trail rides. I plan in my head...'

It was frequently occurring that the interview objects planned their training week per week, and that they based the planning on what has been previously done to give the horse variation in training.

Regarding the data group, it contained the needs for each specific discipline in what

data types the users wanted presented in the application. In this group, the answers differed regarding what data types they found relevant. Most of the equestrians found distance and duration interesting, but then it differed in what they preferred. When summarizing the data needs from all interviews, it resulted in that almost all the existing data types was found relevant among all disciplines. But the students also noticed a need of adding more data types for the redesign.

6.2 Modelling

The work to comprehend all the collected data was further interpreted during the modelling phase. For the modeling phase the students decided to use personas for representation of the different user disciplines.

6.2.1 Personas

The creation of personas started after the data gathering. From the KJ method conducted on the interview transcriptions, different themes and user needs emerged. These themes were highly valuable for the creation of personas. When creating the personas these themes were used to grasp different goals the users could fulfill by using the application. The students tried to understand the data even further by going through the different themes from the KJ method. For each theme, it was discussed how the user's statements could be translated into a personas goals, and tried to interpret what the statements really meant.

To build the personas the data gathered from all sources was combined. This includes stakeholder discussions, interviews, field study and the web research conducted. By combining these different sources the students argue that the personas created could get a versatile and accurate personality of an intended user of the product. The semi-structured interviews gave a good picture about more than the data requirements, we learned about the equestrian's lifestyle and goals which was very useful for creating complete personas. The field study was a good complement to the semi-structured phone interviews. This since the estimations and knowledge from these interviews could now be more deeply discussed and validated during the field study. The chance to visit the surroundings of a stable and see their context of lifestyle also gave valuable knowledge for the personas.

With the data further interpreted it was noticed that most of the equestrians had the same goals for using the product, and their lifestyle was similar. The students decided to create a primary persona, see Figure 6.8 which represents all the different disciplines goals and requirements.

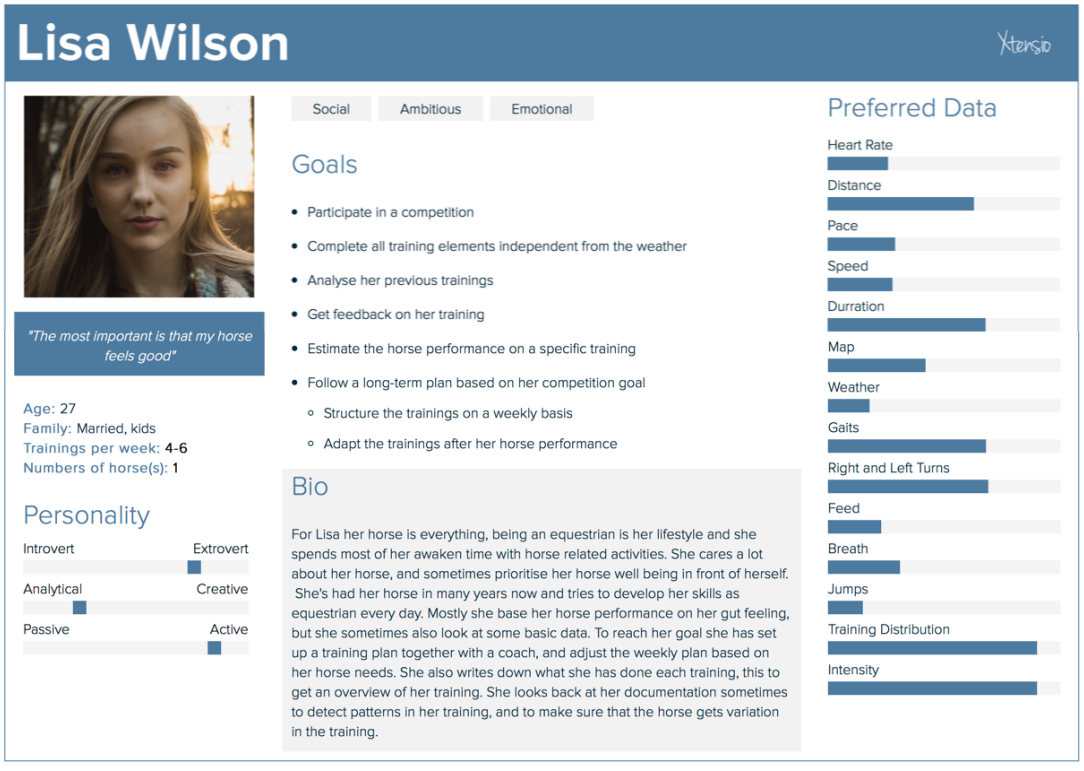

Figure 6.8: The primary persona.

Since the different disciplines had differences regarding data requirements, the students created three additional secondary personas which represents the disciplines jump, dressage and eventing (Appendix, A.1), these three disciplines are the three largest in Sweden, counting the number of competition starts in 2016 (Svenska Ridsportförbundet, 2017), we therefore chose to make personas for these disciplines. The goal with these personas was to visualize their differences regarding how important the different kinds of information was regarding of discipline.

6.2.2 Requirements Definition

The following section describes the process of setting the requirements for the design to be implemented.

6.2.2.1 Context Scenario

When the personas were created, the work to construct a context scenario started (Appendix, A.3) The context scenario was based on the primary persona that was created. The aim with the context scenario was to put the primary persona in a context, to better understand how the users would fulfill their needs and goals with the application in a context. To accomplish this, all the knowledge gathered about the equestrians' lifestyle and goals was combined into a high-level context scenario.

The work of creating the context scenario started by writing down the questions to be addressed by the scenario (see figure 6.9). The questions concern where the

scenario takes place, in what setting. For how long time the scenario will take place, and for how long time would the product be used. Further questions concerned if the persona will be interrupted during the interaction with the application, and if the users use the application at the same time. The final questions were about if the product was used together with other products, such as sensors and cameras, and what primary activity the user will conduct with the application during a day. The context scenario should also describe what the product is supposed to deliver to the user.

After identifying the questions to address during the scenario the next step was to write down the goals that the user has when using the product. This implies writing down what needs the product should fulfill for the user. The students identified three main goals by using the product. The user want variation in training based on facts. The user wants to document the training in an easy way, and the final goal is that the user should be able to follow up on the training.

With the questions stated, and the goals in mind. The students started to generate bullet points of the acts that will be carried out during the scenario. It was decided to create a "a day in life" scenario for the persona, where it is possible to follow the personas interaction with the application throughout the day. From the bullet points a scenario was generated by elaborating each bullet point in a fluent text.

The context scenario helped the students understand in what kind of situations the application could be used, and we argue that it was beneficial to have that understanding when starting to create the first design prototypes later in the process.

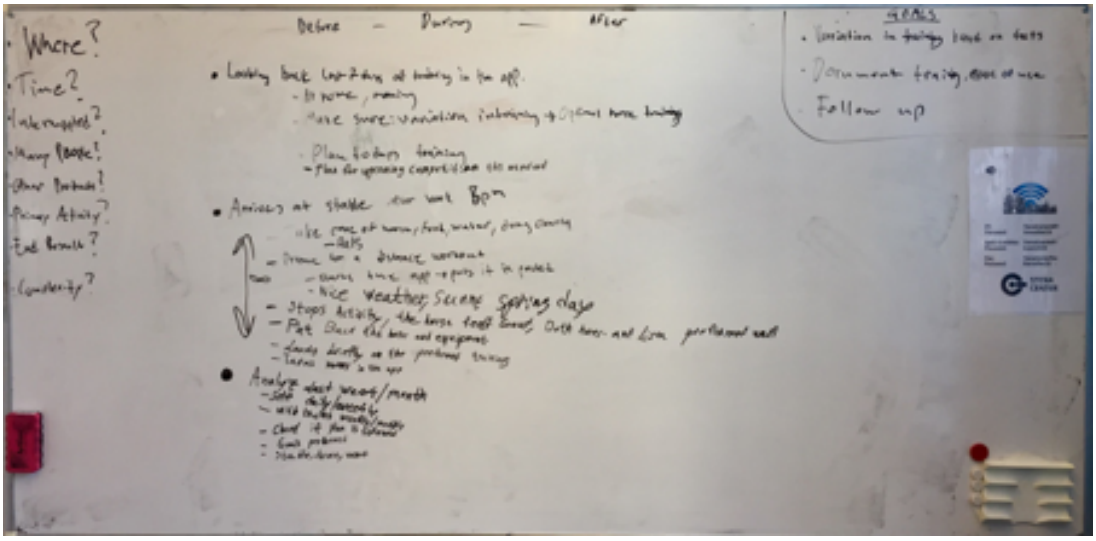

Figure 6.9: 9 Picture of the whiteboard during construction of the context scenario.

6.2.3 Requirement List

From the KJ analysis, personas, context scenario, and the field study, the students combined all the knowledge gathered to a requirement list (Appendix, A.4). The list contains all the requirements elicited during the process that is needed to fulfill the user's goals. The requirements were structured into categories. The following categories were elicited:

- **Overview Requirements** - Contains requirements for what is needed to give the user a clear overview over their training.
- **Functional Requirements** - Contains requirements that is specifically connected to a function.
- **Documentation Requirements** - Contains requirements needed for users to succeed in documenting their training.
- **Data Requirements** - Contains requirement in what kind of data that should be presented. This is divided in data requirements for each discipline.
- **Other Requirements** - Requirements that did not fit into any other category.

The requirement list working as a checklist during the design process. To make sure that the design fulfills the users' goals. It worked as a reminder to make sure that the students created a design that covered the categories of requirements.

6.2.4 Framework Definition

When an understanding of the user needs was gathered, the next step was to develop the first design concepts. This was primarily done with Low-Fidelity prototyping.

6.2.4.1 Low-Fidelity Prototyping

During the Low-Fidelity prototyping work a process was followed to set the interaction framework of the application. The process was iterated until the final Low-Fidelity prototype was set.

The first step in the process was to decide where the different data types should be placed in the application. In short to decide on the data hierarchies in the application. To accomplish this the students had a discussion, and with help from the personas and requirement list it was decided on where each data type should be placed. There were two main options for the data to be placed. Either the data fitted into the trends view which should display data summaries and trends over time, or the data should be placed inside a specific training. To help the structuring discussion a whiteboard was used (see Figure 6.10), where each of the data types were placed in either of the two options.

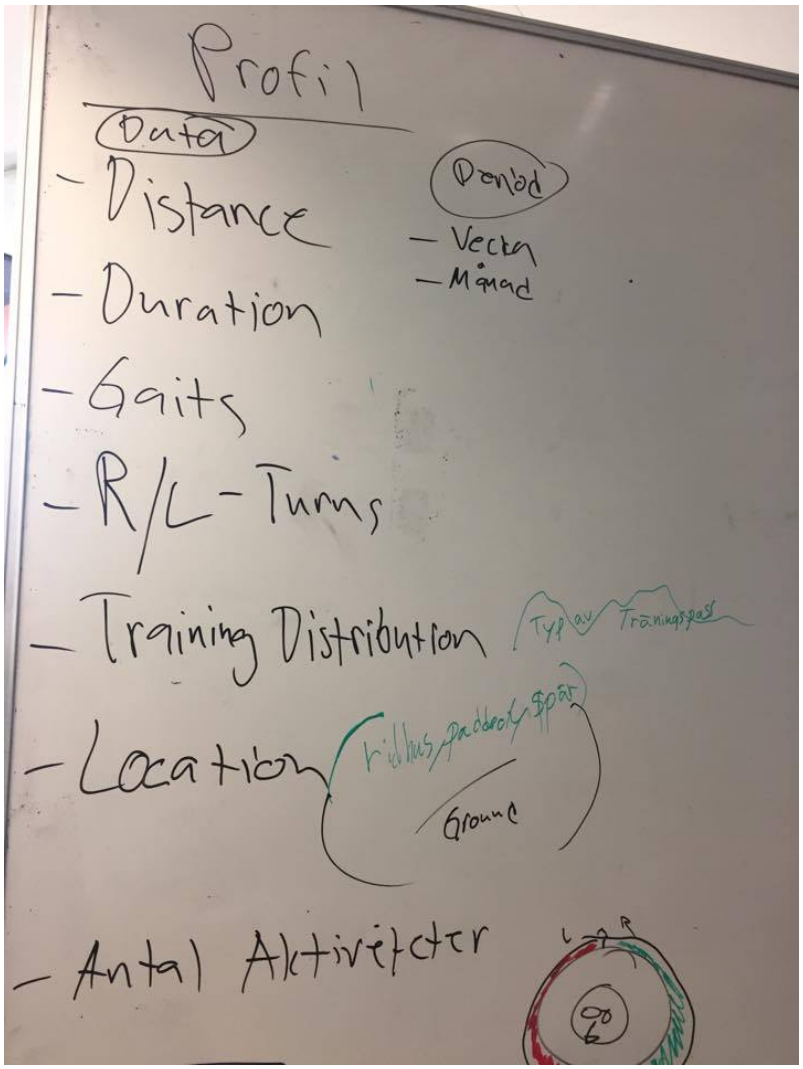

Figure 6.10: The applications data structuring.

When the data structure and hierarchies was set, the next step was to find inspiration and ideate around the new design. It was decided to conduct this work individually to not affect each other with design ideas. To help the ideation three main sources was used. Two of them were the design community websites Dribbble.com (Dribbble, 2017), and UpLabs.com (Uplabs, 2017). Even if these sites consist of mostly High-Fidelity prototypes, they gave a lot of useful inspiration regarding data structure and smart solutions for data visualization. The third source of inspiration was App Store, by looking at other workout applications the students gained inspiration in how to present workouts and trends over time. These three sources were helpful for the ideation in how to sketch design proposals.

The third step was to start sketching, this was done individually to provide as many design proposals as possible. The sketching strategy was to first determine grouping, and placement of the data on the screens, see figure 6.11 for an example of sketching during this process. After that, digging deeper into details for each sketch. When the design was detailed enough it was discussed with the stakeholders

and they provided the students with feedback. During this work, the design was tested against the context scenario to make sure it was possible to complete with the current sketches. The requirement list and personas was used to check that the design fulfilled the needs and requirements elicited. This process with individual sketching, stakeholder feedback and validation was iterated during a couple of weeks until all parties were satisfied, and the final interaction design framework was set.

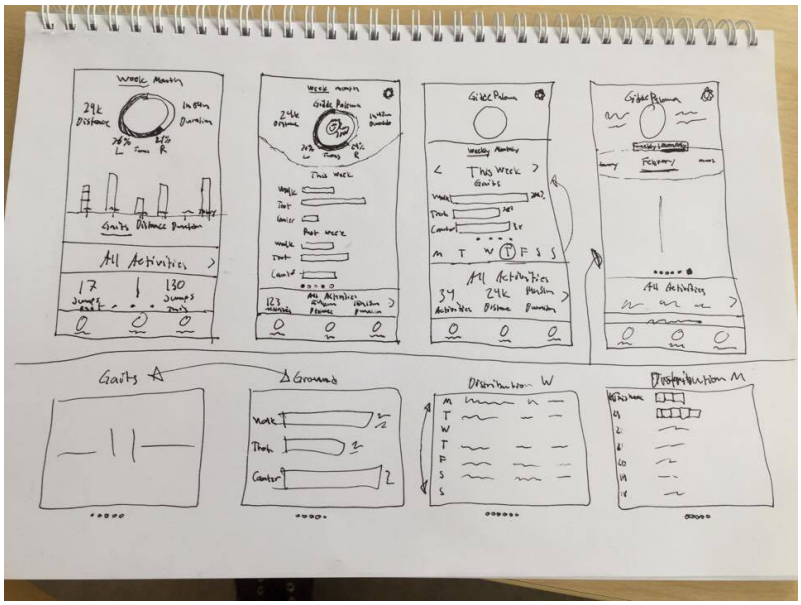

Figure 6.11: A sketch from the Low-Fidelity prototyping work.

6.2.5 Design Refinement

This chapter describes how the Design Refinement work was conducted. It describes how the methods of High-Fidelity Prototyping and Heuristic Evaluation were.

6.2.5.1 High-Fidelity Prototyping

During the High-Fidelity prototyping Sketchapp (Sketch, 2017) and Figma (Figma, 2017) were used as tools to create pixel High-Fidelity prototypes (see figure 6.13 and 6.14). Figma and Sketchapp are both prototyping software for creating pixel graphics. With the help of the High-Fidelity prototyping tools it was possible to test the designs look and feel on a mobile device. The prototypes were designed for an iPhone 7, this mobile has a screen size of 4.7-inch and 1334-by-750-pixel resolution (Apple, 2017). 60% of Equilab's iPhone users have a mobile phone with this screen size and resolution. During the implementation phase, the design was tested to work on a iPhone with 4 inch and 5.5 inch screen. According to iOS Version Stats (David Smith, 2017) 52

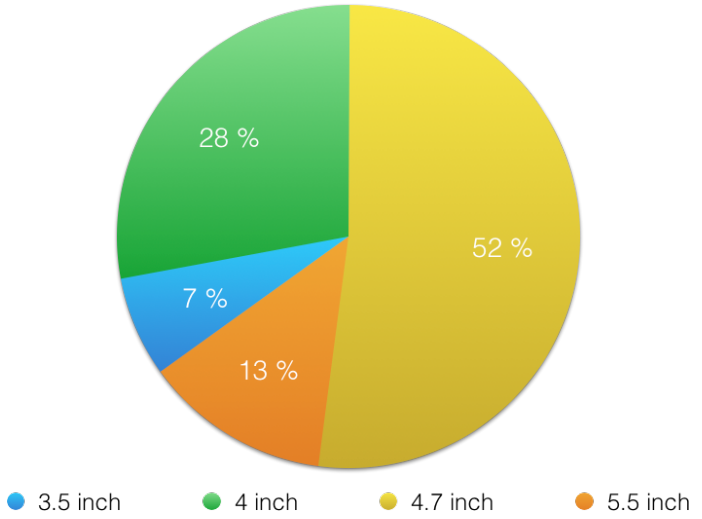

Figure 6.12: iPhone screen size distribution by inch from iOS Version Stats by David Smith.

The High-Fidelity prototyping began with each student taking their own interpretation of the decided Low-Fidelity prototype, and made their own design out of it. This was done so each member could give their own take on how the final design could look and feel and not be influenced by each other. With the Low-Fidelity prototypes the interaction design framework was set, this is now to be translated into High-Fidelity pixel versions. Even when creating an own interpretation of the Low-Fidelity prototypes the students still needed to be aware of the interaction design framework when creating their design. Each student gave the design their own touch, especially regarding size, form, colors, buttons, text layout, and alignment.

The High-Fidelity prototypes were done in iterations, first each member made their own design suggestion based on interpretation of the Low-Fidelity prototype. After a few iterations with discussions of improvements the designs were shown to the stakeholders. The different solutions were discussed in terms of what was good, bad, and possible improvements. Lastly the different design solutions were combined into one. This design underwent the same design iteration process with the stakeholders until both parties were satisfied.

The design and implementation was carried out in two phases, stakeholders wanted a faster release for their users, since a previous release date was set and they wanted to include parts of our solution in the first release. Therefore, the first step included redesign of the Trends view and All Trainings view (presented in section 7.2.1 and 7.2.2). In the second step, the Specific Training view were redesigned and implemented (presented in section 7.2.3).

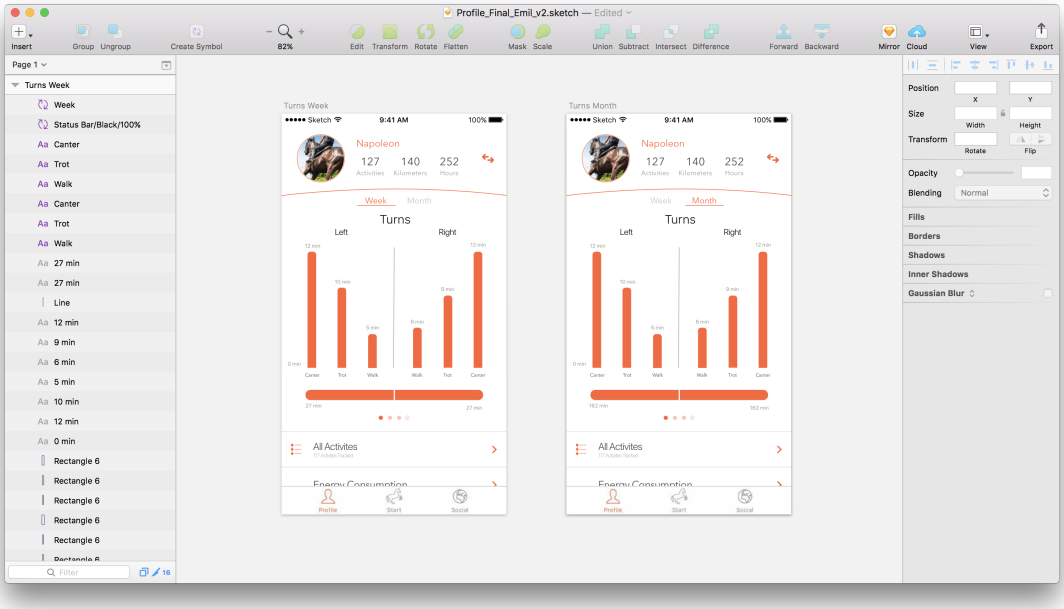

Figure 6.13: Sketchapp in use.

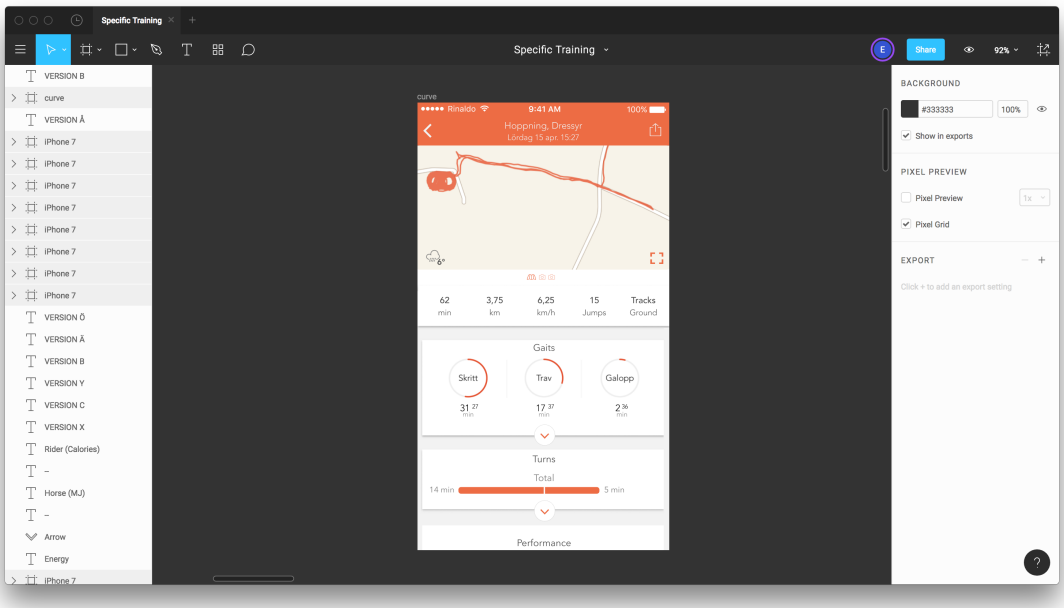

Figure 6.14: Figma in use.

6.2.6 Heuristic Evaluation

Jakob Nielsen (1990) heuristic guidelines were used for the heuristics evaluation. Due to lack of time and pressure to begin with implementation, the evaluation was shortened and simplified. The goal was to use six experts in the area who were independent from the project that would have carried out the evaluation in form of Nilsen's guidelines (see section 4.1.5.4). Due to lack of time and access to experts, we did the evaluations ourselves. This implied that the heuristic evaluation will not be as accurate and detailed as it could have been. The evaluation was done in iterations. First, the two students made the evaluation for themselves for all the new designed views and charts, this was done separately to not be influenced by each other. The errors that was found was discussed, this was followed by a new design iteration to solve the problems that arose. The evaluation process was done when all the errors were resolved and all members were satisfied.

Using Nielsen's heuristics, we found that texts, images, and objects in the views we designed used the same color accent as clickable buttons and objects. This could be confusing for the user and interfere the interaction. However, this was dependent on the context of its use in the application. We learned that there was inconsistency in our design in the way we present data on the different views. Date and time periods did not use the same scale, which is not totally clear for the user. For example, the data in turns distribution is not intuitive enough, and it can be difficult to understand. There were problems with the application's views, that they are not culturally adapted, for example, date and time are not correctly displayed for different cultures. These are just some examples of what we found during the heuristic evaluation. With the results of this evaluation, the design process was made again to fix the problems that were found. The design process was done in iterations with help of the heuristic evaluations, this is to find and fix the problems that arise. This was done until the errors were resolved and all partners in the project are satisfied with the final design.

6.3 Implementation

The implementation work was done during a six-week period. These weeks were spent on implementation of the design developed during the previous phases.

6.3.1 Work Process

The process started by having a meeting with a stakeholder at the company to decide on what views to prioritize, and setting preliminary deadlines for the implementation phases. During the meeting, it was decided that the implementation should be divided into two phases. This since the stakeholders wanted to bring some of our work into an important release for the company.

After deciding that the first phase would include implementation of the All Trainings view (see in section 7.2.2) and Trends view (see in section 7.2.1), the students then divided the implementation work into individual tasks. The implementation was done individually to being able to implement as much as possible during the amount of time that was deposited for implementation. Thereby each member got assigned a part each of the design to implement. It was important to work in separate files since working in the same files can cause trouble when using a versioning tool (described in section 6.1.2).

During implementation, the students agreed with the company to only focus on the front-end programming, an employee at the company with knowledge in back-end provided us with the necessary data. This made the implementation more effective since the students could focus on translating the design to code, without a need of implementing the back-end parts.

When the first phase of implementation was done and briefly tested it was time to release it for their users. This was done by merging our code into to the master branch of the application, the company and the students made sure that it worked smoothly together and uploaded it to App Store for release.

After the first phase was released the work started to design and implement the second and last phase. This implied the development of the Specific Training view (see in section 7.2.3). This phase was implemented with the same process as the first phase, and was released in middle of May 2017. During the implementation, the design has been implemented using the iPhone 7 screen size, and then tested on the other screen sizes to make sure that the design fits and looks good.

After the releases, the students had to act as support in case of any upcoming bugs, and also to support the company for the implementation of the Android version, since the android version is intended to look and function as the iOS version, is therefore possible to use the same logic.

6.3.2 Tools, Languages and Libraries

The company uses a GitHub repository (GitHub, 2017) as version control repository, which therefore was used for our project too. By creating a separate branch for the master thesis, the students could implement and test new implementations without affecting the release version. When the implementation of the first phase was implemented and tested, it was merged into the release version of the application. Xcode (Xcode, 2017) was used for the programming during the implementation phase, and Swift 3 (Swift, 2017) was used as the programming language. Swift 3 is the third version of Apples latest programming language for iOS. This object-oriented language was released in 2014 with the intention to replace the previous iOS programming language Objective-C (Objective-C, 2017).

Much of the design created in the earlier phases of the project was dependent on data visualization with charts. Therefore, it was important to find a diverse chart library that could be modified to represent our design in code. Therefore, the students selected the open source library Swift Charts (GitHub - danielgindi/Charts, 2017) as the main chart library during implementation.

7

RESULT

This chapter presents the result of the project that answers the research question. First the result from the user research phase with the elicited user needs, which describes what information that should be presented in the application. Secondly, the final application that shows how the information is presented to satisfy the user groups different needs.

7.1 User Needs

This section presents the result of the initial user research, which examines what information that should be presented in the application. The goal with the user research phase was to gain a deep understanding about equestrians and their horse training. This includes understanding of what kind of data the different disciplines find relevant for the application to present, and how the users plan, structure, and document their training.

The user needs result builds on all elicited data from the research phase. The primary data is from the Semi-Structured interviews, and the Field Study. These were complemented with an extensive initial background study and continually meetings with the stakeholders at the company, which have great knowledge in both the horse related field, and about their current users. From the user research phase the students analyzed and summarized the elicited knowledge about each discipline and equestrian, into information needs the application should fulfil. These are presented below.

7.1.1 Data Needs

It was realized that the data the application currently presents was found interesting among all interview participants, although it differed in how important the data is between the disciplines. The data that was found interesting among all disciplines interviewed is called primary data types (Figure 7.1). This is data the Equilab application should provide for their users to fulfill their information needs.

Data Type	Explanation
Distance	Distance ridden during a specific training or over time
Duration	Duration of a specific training or over time
Map	A map with a track of a specific training
Gait distribution	The distributions of the different gaits for a specific training or over time
Right and left turns	The distribution in time of right and left turns during a specific training or over time
Training type	The type of training that has been carried out during a specific training or over time
Ground	The type of ground a training has been performed on
Performance	The equestrians own feeling in how well the rider and the horse performed during a training
Jumps	Number of jumps
Pace	The average pace during a specific training
Speed	The average speed during a specific training

Figure 7.1: The primary data types.

7.1.2 Data Overview Needs

The overview data needs explain how the data should be presented to satisfy the user needs. This section presents the needs regarding for what time periods the data should be presented. It presents the needs in how the data should be presented to give a clear overview for the users. In addition, it presents the need of personalization since there were differences between the disciplines in how important the different primary data types were.

Trainings History
In addition to the primary data types presented above there was a need of getting a clear history overview of performed trainings for a specific horse. It was clear that the users wanted an easy way to display number of trainings per week, and being able to look back at trainings for a longer period. This implies an overview of what type of training that has been performed, and being able to see trends over trainings.

Time Periods
Regarding time periods, it was found that the equestrians in general were looking back at a seven days' period to help them plan the next seven days of training. Some equestrians were also looking back up to 30 days or a year in time, to make sure that the horse gets the best variation in training over time.

The primary data types were also relevant for different time periods. Some of them were only relevant for a specific training, while others were more interesting over a longer time span.

Trends
The users emphasized the importance of getting an overview of data for their performed trainings. Since planning is a very important incitement for the equestrians to log their training. It was found that one of the strongest goals from the interview objects was that the application should support their planning of their training. This implies that the application should provide the users with the relevant data for relevant time periods, to help them reach their goals by planning the training correctly. Each group of data should be provided with a summary, and provide a clear trend over time. Since the users need to plan their training based on the previous period to give the horse variation in their training.

Variations
Even though the primary data types presented above was found interesting among all disciplines, there were differences between disciplines, and individuals within the same discipline. None of the respondents found all the data types relevant, but because of the variation and different interests among the interview objects, none of the data types could be removed. Except from the differences within disciplines, there were still characteristics and patterns between the disciplines in which of the primary data types they found more interesting. There were also individuals within the same discipline that found the primary data types more or less important or interesting. There were also some characteristics regarding the interview objects ambition level, more ambitious equestrians were more likely to appreciate the data. These differences require the design to be customizable. To fulfill the needs of all the equestrians within the target group.

7.2 Final Application

The final application resulted in a redesign and implementation of parts of the current Equilab application. In this section, each of these views that answer the question in how the information should be presented will be explained. The screenshots are taken from the implemented application. Figure 7.2 illustrates the navigation between the three redesigned and implemented views.

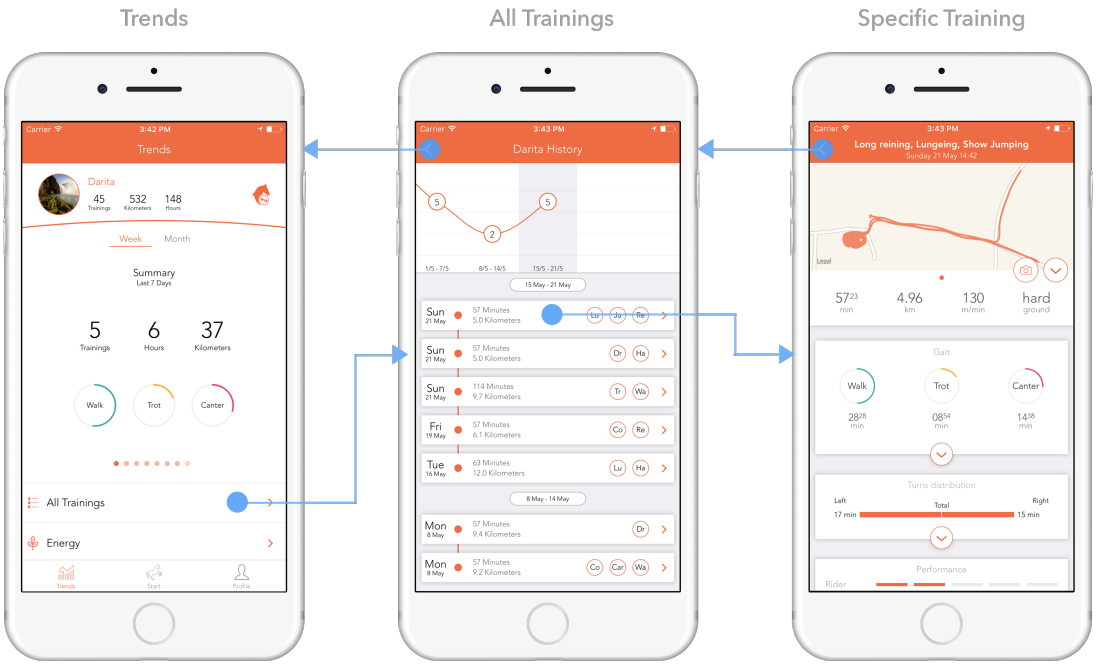

Figure 7.2: Navigation between the implemented views.

7.2.1 Trends

The Trends view presents an overview for the selected horse over time. In this view (Figure 7.3) the user can follow up on how a horse has performed by inspecting data trends. The view consists of three parts. At the top, the user selects which horse to display data for, this is presented together with the horse name, and a picture of the horse. The user is provided with the total number of trainings, distance, and duration of trainings for a chosen horse. In the middle of the view there is a page controller placed where the user can swipe between the different trend charts, each page displays data on a weekly or monthly basis. At the bottom, the user can navigate to All Trainings (Section 7.2.2), or the Energy view.

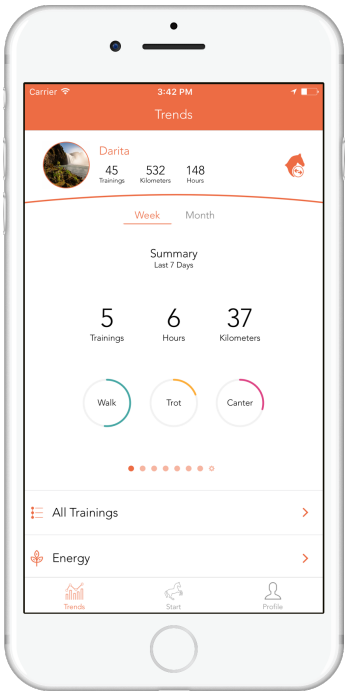

Figure 7.3: The Trends view.

7.2.1.1 Trends Data Charts

The trend views page view controller displays data over time for the user. This section presents, and explains each trends chart in the page view controller. The last page, which is the Settings view, is presented last in this section.

Gait Distribution

The gait distribution view (Figure 7.4) presents gait data for the user. The different gait types are color coded, and presented in a bar graph that represents the duration in each gait. The bar graph can be adjusted to present data per week or month. If week is selected the last seven days of data is displayed. If month is selected a summary of gait data for each week the last seven weeks is displayed. To the top left the highest value is presented for the user.

The gaits are color coded to help the user compare the gait distribution between days or weeks. The same color is used for each gait throughout the whole application to ease the users cognitive load. Staple graphs are used to keep the chart as simple as possible, but also since equestrians usually looks at daily or weekly distribution.

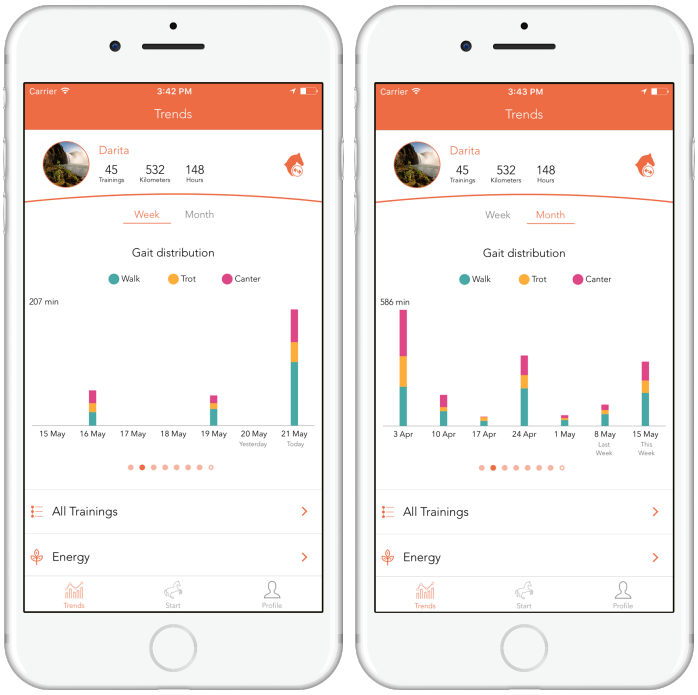

Figure 7.4: The Gait Distribution view. Week selected to the left, and Month selected to the right.

Type of Training

The type of trainings view presents the type of training the user has tagged their trainings with. If week is selected the last seven days of training tags will be presented (Figure 7.5). If month is selected a frequency of the tags for the last thirty days will be presented.

The reason for showing the frequency of tags in the month view is because there is not enough space for weekly summaries. The month view should instead give the user an understanding about what kind of training that has been prioritized during the last thirty days.

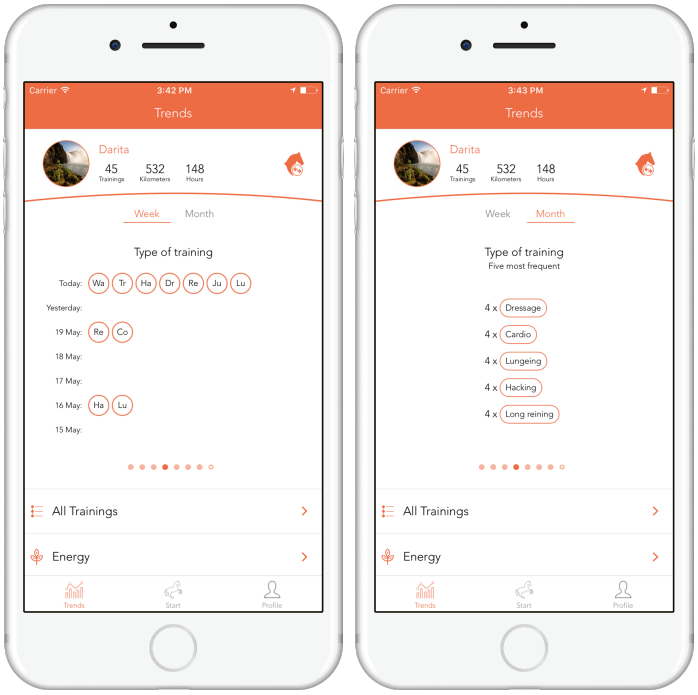

Figure 7.5: The Type of training view. Week selected to the left, and Month selected to the right.

Ground Distribution

The ground distribution view (Figure 7.6) presents a duration summary of the distribution ridden on different grounds for the last seven days, or the last thirty days. The aim of the view is to keep it as simple as possible. For example, the gait distribution and type of trainings view are more important for the equestrians, and therefore the ground view had to be simplified. By having too many complex views the user will need too much focus to interpret the data. This view still provides an overview by looking at the modified pie chart, or the exact values by looking at the labels.

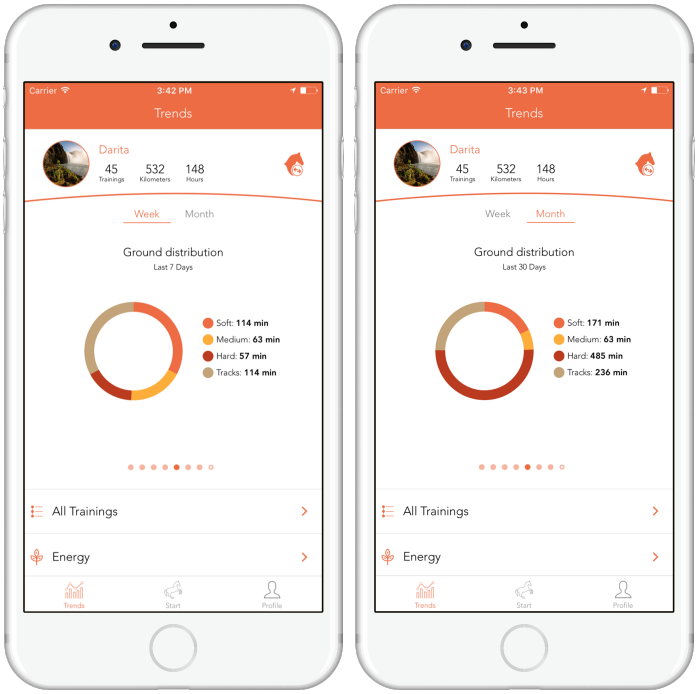

Figure 7.6: The Ground Distribution view. Week selected to the left, and Month selected to the right.

Distance

The distance view (Figure 7.7) presents the distance ridden. If week is selected a summary of each day the last seven days is presented. If month is selected the last seven weeks are presented.

The distance is represented by a bar chart, since equestrians prefer to look at the data on daily or weekly basis. By providing it for the last seven days, the user gets a quick overview of the horse distance and can compare between the days or weeks to get an understanding about the intensity of training.

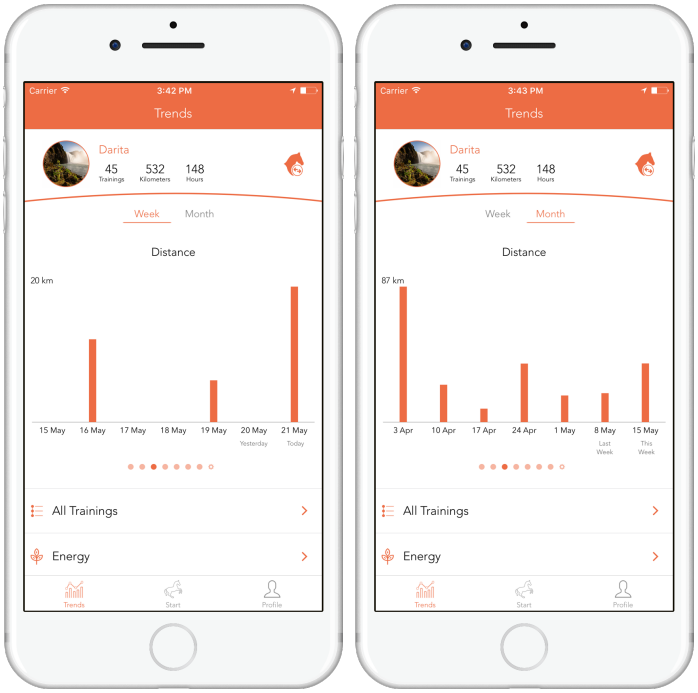

Figure 7.7: The Distance view. Week selected to the left, and Month selected to the right.

Performance

The performance view (see figure 7.8) presents the equestrians estimation of the performance, both for the horse and the equestrians themselves. This is presented either for the last seven days, or the last thirty days.

After a training, the equestrian estimates the performance in a five-step scale, for the horse and the equestrian. This is presented in the performance view. The scale is represented by a bar chart to provide the user with accurate information. A natural choice could be to present the data with a line-chart. But since the data is not constant over time, it would look like there is data between the actual data points, which would give the user a biased view of this data type.

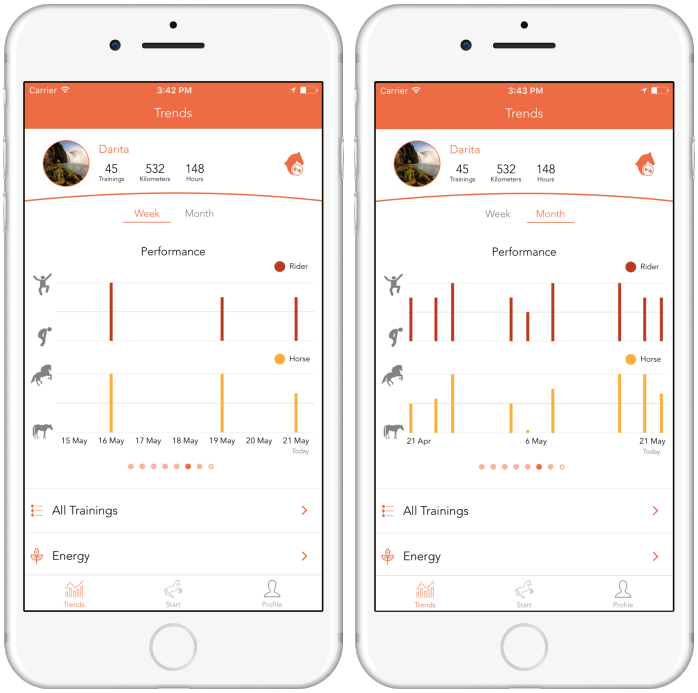

Figure 7.8: The Performance view. Week selected to the left, and Month selected to the right.

Jumps
The jump's view (see figure 7.9) presents number of jumps for the current and previous period. On weekly basis, it presents number of jumps the last seven days, and the previous seven days. On monthly basis, it presents number of jumps the last thirty days for this month, and the last month it displays the previous thirty days.

The jumps view provides a simpler data representation to balance the cognitive load among the views. By letting the user compare between the weeks or months, it gives a clear view of the intensity of jump training, which is important for the user to keep balance in training.

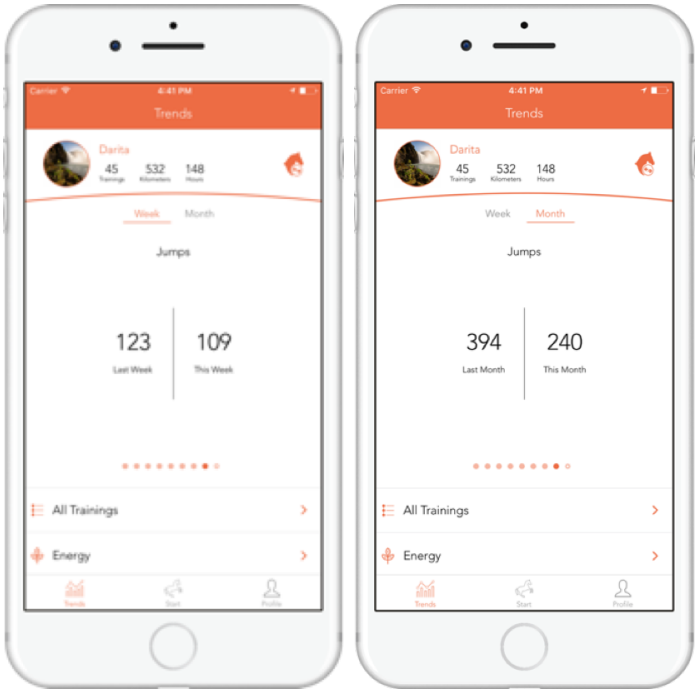

Figure 7.9: The number of jumps view. Week selected to the left, and Month selected to the right.

Turns
The turns view (see figure 7.10) presents a summary of the duration distribution between left and right turns for the last seven days, or the last thirty days.

The turns are presented by a horizontal bar chart, this to make it easier for the user to connect the turns to left and right. The gaits are color coded to enhance the interpretation of each specific gaits individual turns, and to keep consistency of the gait color throughout the app. The data is presented in a summary since it is more important that the user gets an understanding about the proportion between left and right to keep the horse training balanced.

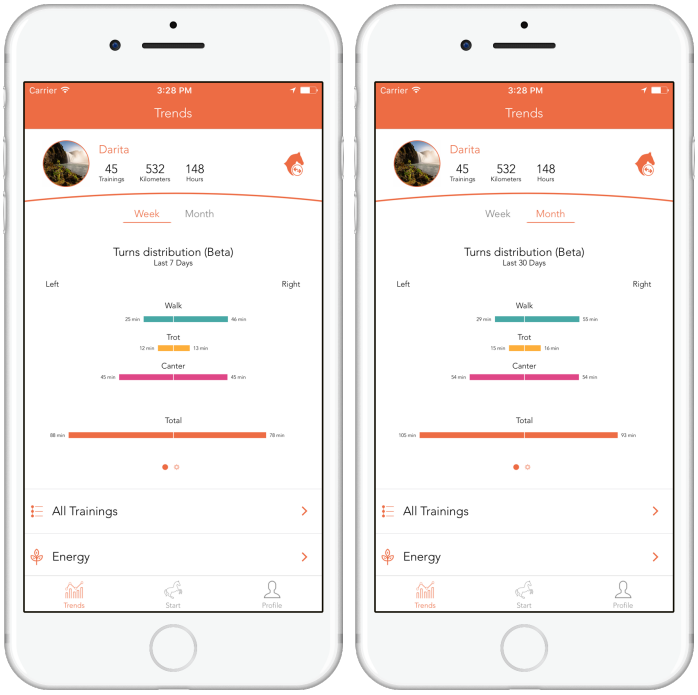

Figure 7.10: The Turns Distribution view. Week selected to the left, and Month selected to the right.

Settings
The last page in the page controller is the settings view, where the user can manage which views to display or not (Figure 7.11). In this view, the user can hide views, and change the order in which the views are presented.

By letting the user hide views and change the order, it creates a customization dimension of the application which makes it easy to adapt to any user independent of the discipline or ambition level.

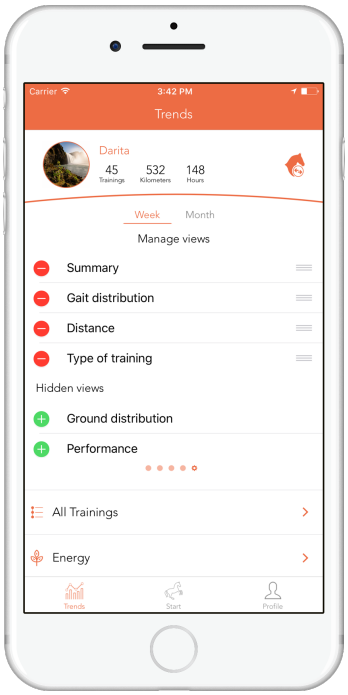

Figure 7.11: The Settings view, were the user manage views.

7.2.2 All Trainings

From the Trends view the user can navigate to the All Trainings view (Figure 7.12). In this view is provided with a list of all the performed trainings. The view consists of two sections. The top section contains of a line chart of number of trainings per week. The top section chart is connected to the bottom section that consist of a table view with all the trainings divided per week. The connection between these two implies that when the user scrolls, either horizontally in the top chart, or vertically in the bottom table view to a specific week. Then the other section automatically scrolls to the same week.

Figure 7.12: Screenshot of the All Trainings view.

By tapping on a card in the tableview the user navigates to that specific training.

7.2.3 Specific Training

The Specific Training view (Figure 7.13) presents detailed data for a specific training. At the top, there is a navigation bar where the user sees which type of training they have performed, and at which time and date. Underneath the navigation bar there is a map of the training. By scrolling to the right in this view, images that is attached to the training will be presented. The user can either swipe down or tap the map to expand it. When expanded the user gets a more detailed view over the map, and can inspect the training in satellite mode. The gaits are visible on the map in the form of a layer of colored lines. Under the map there is a table view with expandable cells of data. The standard setting is that all cells are collapsed and displays basic data for each category is displayed. The user can tap on each cell that is expandable, this is indicated with a down arrow, to expand them and see more detailed data.

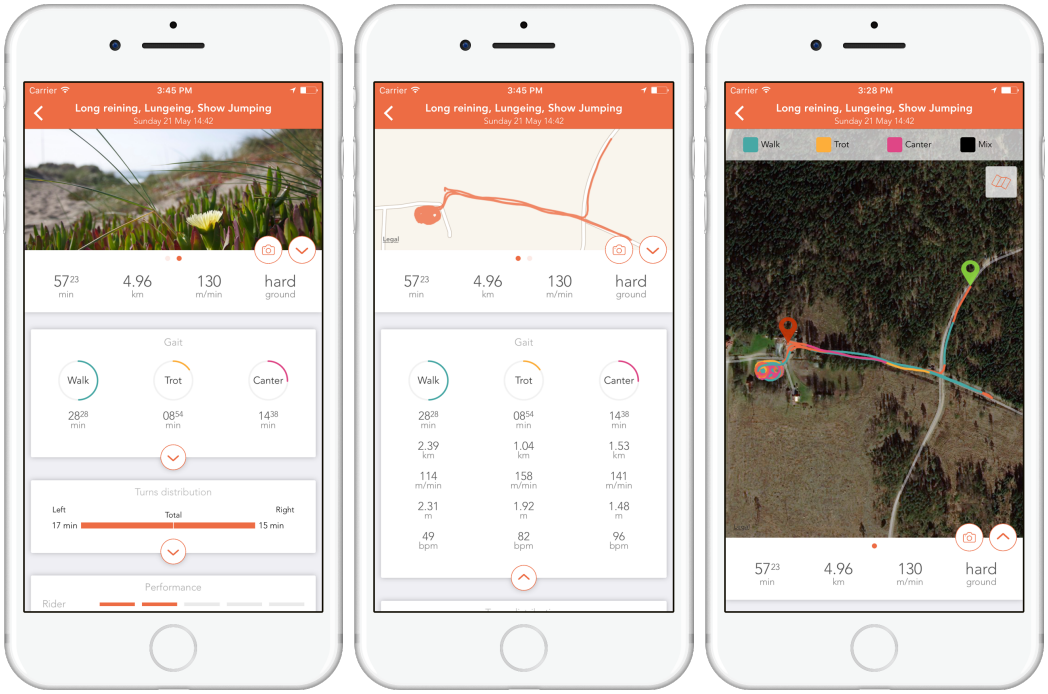

Figure 7.13: Screenshots of the Specific Training view.

8
DISCUSSION

In this chapter, we reflect and discuss the parts of the design process that we think have been problematic, extra rewarding for thesis work and what is needed for future work. We begin by reviewing the results of the work, we discuss how a dynamic user interface affects the user, how the Type of Training data type can help the user to vary the training, and lastly how the new overview provides a better picture of the equestrians' workouts. Then the process is reviewed, here the user research is discussed in how it affected our result, and how the Goal-Directed Design Process suited our thesis.

8.1 Result Discussion

This section discusses and reflects on Dynamic vs Consistency, Type of Training, and Information Overview. This includes why it is good to let the user influence the views they see, but at the same time do not give them too much freedom to disturb the consistency in the application. We discuss the Type of Training data type, how we found out that there is something that is needed and how it can be improved. Lastly, a reflection on the Information Overview.

8.1.1 Dynamic vs Consistency

The trends view of the final application had to tackle the challenge with the wide user base. As mentioned in the introduction and in the second supportive research question, there was not only a challenge in finding the user needs regarding information, there was a challenge in how to design for a wide user base with different needs and interest. As understood during the user research phase, the needs of the users differed since the needs shifted both between the disciplines of equestrians, and within the disciplines. There was not any general design that could be applied among all users, the interface to design had to be dynamic regarding each specific user's interest.

The challenge of designing a dynamic interface was to keep the consistency of the interface. It is easy to confuse the user when data appears in different places or disappears without any actions from the user. As an example, to illustrate this challenge is the data type number of jumps. This data is probably more interesting for an equestrian in the jumping discipline, compared to an equestrian in the dressage discipline. But dressage riders might also jump with their horses, and finds this

data type relevant from time to time. The challenge to make the interface dynamic and adjustable is not only dependent on the discipline, but also on the individual user. Our challenge was to not do a lot of background changes in the interface regarding what data type that are presented, this would make the interface confusing and inconsistent. Our solution was to let the user adjust their own interface by hiding and moving data themselves, based on their own personal preferences. One challenge was to give them freedom, without giving them too much freedom to make the interface inconsistent.

The solution to the challenge of customization versus consistency was to implement a dynamic page controller at a fixed part of the trends view. A page controller is a view that includes multiple views the user can swipe between as pages. By dynamic we mean that the user can modify which views of data to display, and at which place a view should be placed in the page controller. This was accomplished by adding a settings page as the last view in the controller (see figure 8.1).

The content of the page controller are the primary data types elicited from user studies. These are always visible as standard setup, and the user does not have to do any customization. This gives a strength to the interface since the users are not forced to do any settings, but if some data feels unnecessary, it is possible to hide it in the settings page. Another strength with the page controller solution is that it is a very natural interaction for the user to swipe. We noticed during tests on real devices that it was not a problem to include many views in the page controller, since swiping is a very natural interaction on a phone. Another strength of this solution is that it only displays one data type per page (see figure 8.1). This makes the data visualization clear, and it makes it easier for the user to interpret the data presented.

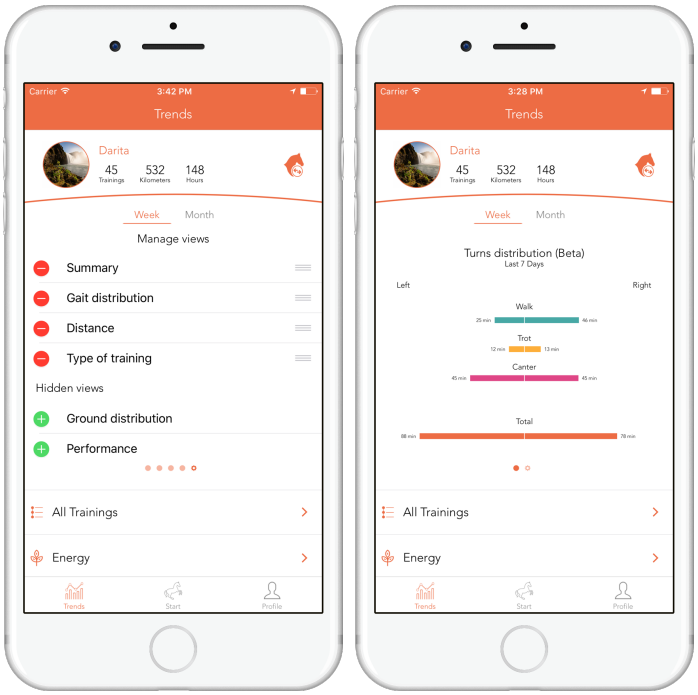

Figure 8.1: To the left, shows how it looks when the user can select the data to be displayed. To the right a picture of what it looks like when one data type is displayed.

To sum up the discussion about making an interface dynamic without losing consistency. We think that a page controller with a settings view is a good solution to this problem. It is consistent since it is always placed on the same place at the screen, so the user always knows where to find the data. But it is still dynamic since the user can change the order of the data and hide it. This together with the benefit that the user is not forced to conduct any settings, everything is optional, makes this solution good and can probably be applied to other types of interfaces with other types of wide user groups with different needs.

8.1.2 Type of Training

The concept to let the users tag their workouts with what type of training they have performed, was an idea that came up during ideation. After analyzing the data elicited from the interviews it arose a need to add this new data type. When the students talked to riders of different ambition levels and disciplines, it was consistent that everyone had a training plan. The plan varied depending on the equestrian's ambition level. To keep variation and maximize their training, it was discovered that most of the equestrians had a plan with what type of training to perform. This plan was based on what type of training that has been previously done with a specific horse. This included how much the horse had trained, how hard, how intense, and on what ground and location the training was conducted. These parameters can all be elicited if the rider knows what type of training that has been performed. Because of this, it was understood that there is a need to easily display this data type in the redesign of the application.

During the interviews, it was noticed that equestrians keep track of this information by writing it down on a whiteboard, or writing it down in the "Stallboken", which is a type of calendar (see figure 8.2). It was also common that the equestrians kept track of this information in their head, and based their upcoming trainings on their gut feeling, which is a problem for equestrians. With this knowledge, it was realized that the application should provide them with this information. Therefore, it was decided to introduce the functionality of letting the users tag their training with what training type that has been performed during a training session.

Figure 8.2: "Stallboken"

To fulfil the need of tagging a training with training types, parts of the application was redesigned to implement this function. First a tag system was implemented in the after-training view, were the user can add multiple tags to their training. The next step was to provide the users with an overview of their training types, to replace the need of writing this information down in their calendar or on their whiteboards. To accomplish this an extra view in the trends page view controller was added, which displays the training types for the last seven days, or the last thirty days. The last step was to add this function in the specific training view. Here the training type information was placed at the top of the view to act as a label for the training that has been performed (see figure 8.3 for placement of type of training data).

As interaction designers, we believe that this was a good complement to the application, which would provide the users with a function that they have been missing. We are confident that this is a big lift for the application regarding fulfilling the users' information needs. Mainly because all riders included in the study documented their type of training in some way.

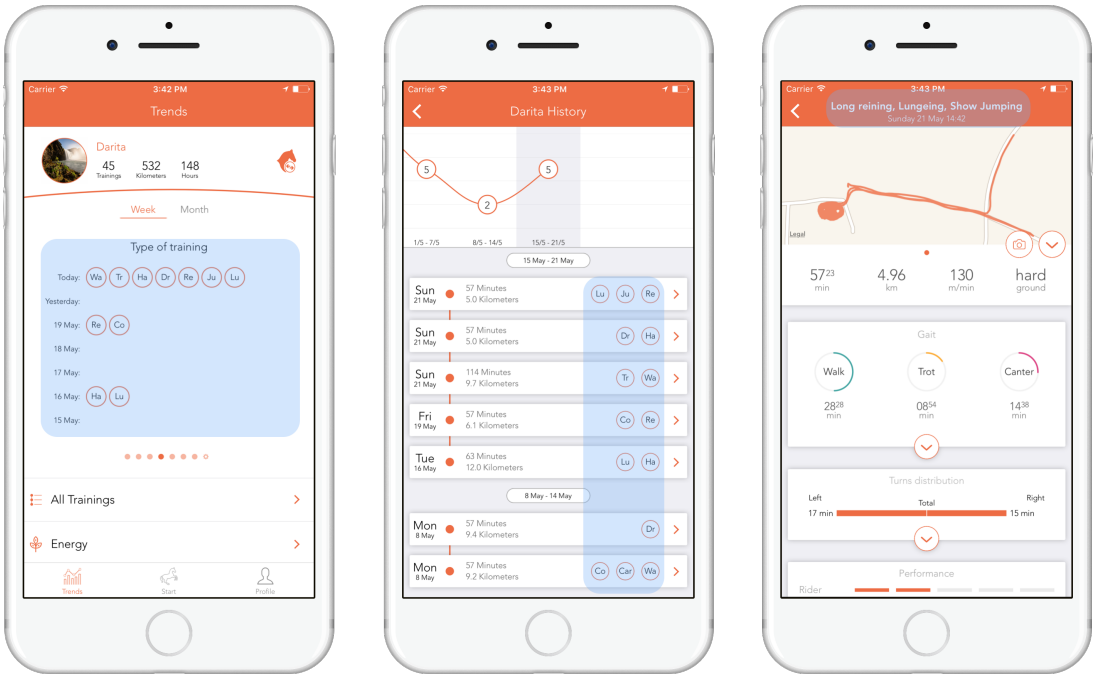

Figure 8.3: Here we see how the user gets an overview in all views of what type of training they performed, from left to right we have Trends, All Trainings and Last Training View.

Even though the feedback so far has been positive from the users, no user test has been conducted on this function. This is something that should be done to verify that the feature fulfils their needs of documenting in a good way, and that is something they will use. It is also important to check that the eleven predefined training types to choose from are relevant, and that no types are missing. It was decided to have fixed values of training types, this is due to parts of the designs are based on using abbreviations of the trainings types. The bottom line of the training types implementation, is that it needs to be made user tests proving that it is a useful function in its current form. The students believe that this data type is needed, but the question remains if the current implementation is the best solution. That is for usability tests to decide.

8.1.3 Information Overview

One of the more important knowledge gathered is that equestrians plan their training carefully based on what type of training the users previously have performed. Therefore, it was decided to change the layout of the views that presents an overview of the training data over time. This complemented with the introduction of the data type, type of training, made it easier for users to keep track of their previous training.

By letting the users have the ability to swipe between the different views to get the information they are interested in, it gives them the feeling that they are in power of the application and can chose what they want and when they want it. It is easier to grasp information if it is only presented by one data type at the time, which is

the case in the Trends view. The users have the opportunity to choose which views to be included and in what order they should be presented. This allows users to get the information that they found more important, and lets them sort the order of the data types. Being unable to influence what they see and that they see additional information they do not want to, is not a good solution. Therefore, we chose to let them have control over the trends views. Now the users can get a clear overview of how the training has been performed over time.

The users have the option to see detailed information day by day for the last seven days or for the past seven weeks. We chose this because it appeared that it was more common to check what they did in the last few days in more detail and then a broader overview what they did over a longer period of time. In the All Trainings view, it was decided to use a line chart showing how many trainings a horse has performed for a chosen week. The chart is linked to the table below which shows all completed exercises, there each section represents a week. Where to give the user a clear overview of number of trainings over time.

We believe that the users now can get a good overview of the intensity of a training in All Trainings View using the type of training tag. This tag shows the users a tag that they themselves have chosen to add, and it shows what kind of training that has been performed and will provide indications of how intense the training was. In combination with for duration, and the distance for a training, gives the user enough information to determine how intense the training was.

8.2 Process Discussion

This section reviews the process, discusses the User Research, and the choice of methods for our user research. We will lastly review how the Goal-Directed Design Process has worked throughout the work.

8.2.1 User Research

During the planning of the project we were convinced that a questionnaire was the best choice to understand the needs of the users for this case. We thought that a questionnaire would provide us with hard facts about what information to present in the application.

When we started to create the questionnaire, and after the meeting with Pontus Wallgren during the planning work, it became clear that a questionnaire was not the best approach. The questionnaire became too complex, and it would not result in any knowledge about the users' lifestyle, how they plan their training, or how they think about their training. In short it would not provide any deep understanding about the target group. Neither would it have gained any understanding about how the users want the information to be presented in the application. Therefore, semi-structured interviews became a better choice of research method, which worked well for the user research. By having semi-structured interviews, we covered all fields we

needed knowledge about, and it made it easy to compare the interviews since they used the same form independent of discipline.

The choice of using qualitative data sources were positive in many aspects. It generated knowledge that we did not understand the importance of until reaching later phases of the project. The students were maybe to focused on understanding which data type each discipline of equestrians thought was important. But when reflecting on the project it was the other types of data that generated the most important information. The interviews gained us knowledge about the equestrians view on training, their lifestyle, how they plan their training, and what goals they have with their training. It was this knowledge that helped us understand the value of the equestrians training plan, and gave us insights in the importance of a clear overview. It did not only help us develop the type of training data type, but it changed our general view on what the redesign should fulfil in terms of the user needs. During the start of the project we were heavily focused on eliciting the data type needs, but this helped us understand that it is providing a clear overview to help their planning that is the most important aspect. This does not mean the data types are unnecessary, but they should be a tool to give the equestrians a solid overview of their performance. In addition, the interviews generated an empathy with the users', which of course is important when designing for them to understand their needs.

The students are positive to the choice of using qualitative data sources for the user research, but everything was not positive. We found it hard to get a clear picture in what data types the users found relevant, it was not possible to elicit any hard facts. By using a questionnaire or similar quantitative sources, it might have been a way to get a clearer view in how the differences between the disciplines looks like. Another drawback is that qualitative sources occupies a lot of the project time, it was a struggle to find participants that can spare time for an interview. The analyzing work, which implies transcribing the interview recordings, and interpret the citations also took a lot of effort and time. The interpretation of the interview answers is also subjective, and a citation might be interpreted differently depending on who of the students that read it.

Regarding the selection of interview participants, it was a bit of a struggle since it was hard to find equestrians in the different disciplines, without any personal contacts. Our solution was to reach out in horse related Facebook group and ask for volunteers. In total, the message was posted in five Facebook groups of 29881 members in total. From that we got twelve volunteers, which implies an answering rate of 0.04%. This is not any scientific numbers but it illustrates the struggle of finding participants for the interviews.

The problem of finding participants made it harder to gather a statistical representation for the sample of interview objects, we decided to interview all those who were willing to participate. To get as much knowledge as possible about their lifestyle and view on horse training, which is not discipline specific data. This distribution

of participants might have affected the result from the user needs phase. But we still managed to find participants in all the major disciplines which was the most important aspect for the interviews.

8.2.2 The Goal-Directed Design Process

The Goal-Directed Design Process felt like the process structure that should suit us and our project best, that is why it was chosen. As it seems now, it has also been shown to be a good work process for this kind of work, it worked well for us as it helped us get through all the necessary design phases, from eliciting user needs, to creating a redesign of the Equilab application. The early phases; research, modelling, and context description, laid a solid ground for us to start understanding Equilabs user group and equestrians in general. The world of equestrians is a new domain for us, so it was important that this phase was carried out properly, the research phase lays the foundation for how the application will be designed. With the help of The Goal-Directed Design Process it went smooth for the students to conduct a solid research ground work for the upcoming phases. With the help of the guidelines and framework of the Goal-Directed Design we could easily do a well formulated summary of the user needs for the product. This is due to the help of the framework that gave us a leading hand in what was needed to be done.

The final step in the design process was to translate the interaction design framework into the final redesign of the application, which worked well for us. With the help of a well implemented design process, this meant that we did not miss important data about what the users are interested in. The Goal-Directed Design Process implied that we systematically went through all the procedures needed to make a new design. This made us iterate the design in several steps to ensure that personas and users' requirements were met.

This design processes uses a predefined framework to be followed, where we inserted methods for each phase that we thought fitted our project and the different phases of the design process most. This design process was straightforward, and it included all the phases we needed to redesign the application, which made it easier for the students to get the project structured and to select the right methods.

One of the more important phase of the project and The Goal-Directed Design Process for us was the requirements phase, it was in this phase that we set the requirements for the entire design. The requirements are based on the results from the research phase, so it is important that the research was conducted properly. It was during the user research that we found how users plan their trainings. It was because we performed this phase well, we discovered that the Training Type data type was something we believe the users would be interested in, to gain an overview of what type of training they have performed. By using and implementing the guidelines of the Goal-Directed-Design process we found the need for this data type.

8.3 Future Work

This section discusses future work, with focus on how the evaluation of the final design and implementation could be performed.

8.3.1 Evaluation

For future work, the application needs to undergo comprehensive user evaluation and user testing to validate if our design solution works and satisfies the users' needs. For the current implementation, there has not been any user evaluations, and therefore we cannot argue that the design of the application is intuitive enough and that users understand the information presented better. During the project, we only performed a Heuristics evaluation to validate if the new design meets the new requirements we have developed. That the design works and meets the requirements does not necessarily mean that the users experience with the new solution is great, neither does it suggest that the solution is bad. It can be better than the old one but does not have to be good. Making user evaluations is something that should have been conducted during the thesis but had to be deprioritized due to lack of time.

9
CONCLUSION

This chapter answer the research question stated at the beginning of this thesis. First a conclusion of the two different phases of the project, followed by a conclusion about how the research question was answered.

9.1 Information Needs

The first phase was focused on understanding the users' needs, and what information that is relevant to fulfill these needs in the application.

The answer to this question builds on data from the twelve semi-structured interviews with equestrians in five different disciplines, a field study, and an extensive background study. It was found that there were a lot of similarities for the whole user group of equestrians, and that most of the available data was relevant to present in the application. The different data types were relevant among all equestrians. It was also found some characteristics that differed between the disciplines regarding how important they thought the different data types were. In addition to this there were also differences within disciplines, often dependent on ambition level and skill.

Except from the specific data needs it emerged a pattern regarding what the equestrians found important to document about their trainings. The need to document what type of training that has been carried out, and being able to look back on what type of training the horse has performed in the past. The reason for this was that equestrians are very careful in giving their horses variation in training, it is therefore important to get an overview in what type of training the horse has performed the last couple of days to help planning the future.

9.2 Presentation of Information

The second phase was focused on how the information that the user found relevant should be presented in the application to satisfy the different needs of the users.

Since the students learned from the user research that the needs shifted between disciplines and within disciplines, it was clear that the information presentation must be customizable. This to provide a good user experience for the entire user group. To provide good usability, there was a challenge to make it possible for the user to customize their interface without losing the consistency of the interface. It was clear

that the interface had to provide an overview of the data over time, both for specific data types and over trainings performed.

Regarding the information presentation, it was important to only display the relevant data. This since the charts are relatively complex for being displayed on a phone, which serves much smaller screen sizes than for example a computer. To lessen cognitive load for the user, the solution was to present the information in a clear and minimalistic way. First, the interface only provides one chart representing one data type at a time. Secondly, all detailed data is hidden at first glance which implies that the user must act to display it.

9.3 Research Question

The research question stated in the beginning of the project was:

What information should be presented in the Equilab application to satisfy the user group's different needs, and how should this be presented to provide good usability for the entire group?

To answer the research question, the students has performed an extensive user research with equestrians. This includes interviews, a field study, and background research. The equestrians in the study has shifted in ambition level and discipline, to gain a broad picture of Equilab's target group. This was followed up with ideation and prototyping work carried out in multiple iterations with feedback from stakeholders until the final design was reached.

The work resulted in a redesign of the Equilab applications information visualization parts. This includes a redesign of the Trends view which displays data over time. A redesign of the All Trainings view which displays a history over all trainings performed by a horse, and a redesign of the view for a Specific Training which displays data collected during a specific training. The final redesign includes an additional data type which focuses on which type of training a horse has performed during a training. It also gives the user more flexibility, and an improved overview of the training. The final design aims to ease the user's cognitive load by hiding detailed information, and presenting the data more clearly.

An important conclusion about the redesign is that it is based on the target group needs, and not only estimations about the target group. This design builds on meetings with equestrians in their natural environment, and interviews over phone. This gives the application a better chance to succeed in meeting the target group needs, and to fulfill their goals.

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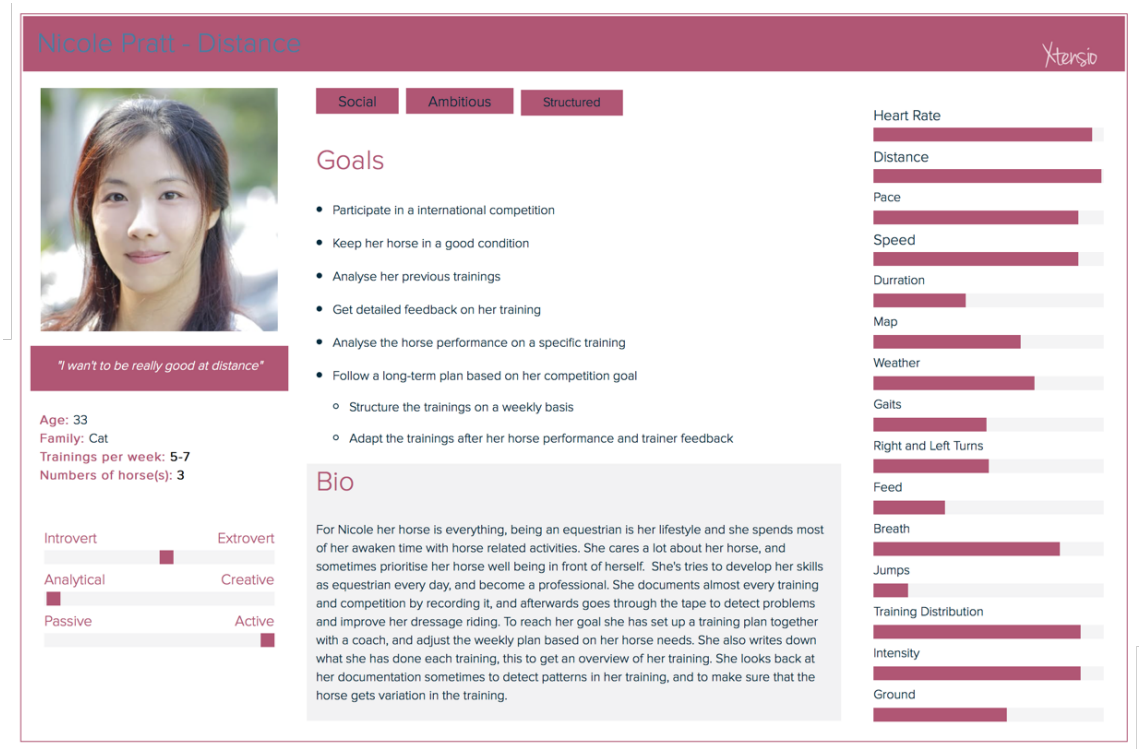
A

Appendix

A.1 Secondary Personas



Kate Jonsson - Dressage

Xtersio

"Repetition is the key to success"

Age: 36
Family: Married, kids
Trainings per week: 4-6
Numbers of horse(s): 1

Introvert	Extrovert
Analytical	Creative
Passive	Active

Social | Ambitious | Emotional | Accurate

Goals

- Compete in Prix S:t Georges
- Complete all training elements independent from the weather
- Analyse her previous trainings
- Get feedback on her training
- Estimate the horse performance on a specific training
- Follow a long-term plan based on her competition goal
  - Structure the trainings on a weekly basis
  - Adapt the trainings after her horse performance

Bio

For Kate her horse is everything, being an equestrian is her lifestyle and she spends most of her awaken time with horse related activities. She cares a lot about her horse, and sometimes prioritise her horse well being in front of herself. She's had her horse in many years now and tries to develop her skills as equestrian every day. Mostly she base her horse performance on her gut feeling, but she sometimes also look at some basic data. To reach her goal she has set up a training plan together with a coach, and adjust the weekly plan based on her horse needs. She also writes down what she has done each training, this to get an overview of her training. She looks back at her documentation sometimes to detect patterns in her training, and to make sure that the horse gets variation in the training.

Heart Rate
Distance
Pace
Speed
Durration
Map
Weather
Gaits
Right and Left Turns
Feed
Breath
Jumps
Training Distribution
Intensity
Ground

Emma Sullivan - Jump

Xtersio

"My goal is to be the new Rolf-Göran"

Age: 31
Family: Single
Trainings per week: 4-6
Numbers of horse(s): 2

Introvert	Extrovert
Analytical	Creative
Passive	Active

Social | Ambitious | Structured

Goals

- Participate in a international competition
- Keep her horse in a good condition
- Analyse her previous trainings
- Get detailed feedback on her training
- Analyse the horse performance on a specific training
- Follow a long-term plan based on her competition goal
  - Structure the trainings on a weekly basis
  - Adapt the trainings after her horse performance and trainer feedback

Bio

For Emma her horse is everything, being an equestrian is her lifestyle and she spends most of her awaken time with horse related activities. She cares a lot about her horse, and sometimes prioritise her horse well being in front of herself. She's tries to develop her skills as equestrian every day, and become a professional. She documents almost every training and competition by recording it, and afterwards goes through the tape to detect problems and improve her riding. To reach her goal she has set up a training plan together with a coach, and adjust the weekly plan based on her horse needs. She also writes down what she has done each training, this to get an overview of her training. She looks back at her documentation sometimes to detect patterns in her training, and to make sure that the horse gets variation in the training.

Heart Rate
Distance
Pace
Speed
Durration
Map
Weather
Gaits
Right and Left Turns
Feed
Breath
Jumps
Training Distribution
Intensity
Ground

A.2 Interview Form

A.2.1 Swedish Form

*** BERÄTTA ATT SVAREN ÄR ANONYMA OCH ATT VI VARFÖR VI STÄLLER DESSA FRÅGOR.**

FRÅGA 1: VILKEN DISCIPLIN SKULLE DU SÄGA ATT DU TILLHÖR?
(hoppning, dressyr, distansritt, islandshäst, hobby/konditions ridning, fälttävlan, western eller dylikt)

FRÅGA 2: HUR RIDTRÄNAR DU?
(går på ridskola, ridskola med egen häst, medryttare (egen träning), medryttare (ridskola), privat träning med egen häst, jag ansvarar helt för min egen ridträning)

FRÅGA 3: HUR OFTA RIDER DU? [GGR/VECKA]
(notera om detta är för alla hästarna om hen har flera)

FRÅGA 4: HUR MÅNGA HÄSTAR TRÄNAR DU?
(gäller då hen har egna hästar, är medryttare eller liknande)

FRÅGA 5: VILKEN AMBITIONSNIVÅ HAR DU MED DIN RIDNING?
(kul/hobby(inga tävlingar), Ambitiös men utan tävling, Kul/hobby (någon tävling/-clear round), tävlar på låg nivå, tävlar på medel nivå, tävlar på hög nivå, proffs)

FRÅGA 6: KAN DU BESKRIVA EN TYPISK TRÄNINGSVECKA/TRÄNINGSPASS?
(vilka olika typer av träningar gör du?)

FRÅGA 7: HAR DU EN TRÄNINGSPLAN? (J/N)
(J) Vart?
(J) Hur dynamisk är den? Hur mycker varierar den från verkligheten?
(J) Hur beskriver du passen? (visa listan och be hen resonera kring de olika typer av träningspass vi tror är relevanta)
(J) Hur byggde du upp den? tog du hjälp av någon annan?
(N) Varför inte?

FRÅGA 8: ÖVER VILKA PERIODER STRÄCKER SIG DIN TRÄNINGSPLAN?
(månader, veckor eller år? om de svarar år - be dem ge exempel på vad som utvecklas över åren)

FRÅGA 9A: HUR SER ETT TYPISKT BRA TRÄNINGSPASS UT?
(beskriv ett bra träningspass och ett lite sämre pass)

(notera vilken typ av träning och vilka element den innehåller (typ uppvärmning, tempoväxlingar etc))

FRÅGA 9B: HUR SER ETT TYPISKT DÅLIGT TRÄNINGSPASS UT?
(beskriv ett bra träningspass och ett lite sämre pass)
(notera vilken typ av träning och vilka element den innehåller (typ uppvärmning, tempoväxlingar etc))

FRÅGA 10A: HUR BEDÖMER DU KVALITETEN PÅ ETT TRÄNINGSPASS?
(Är det känsla, är det något speciellt annat? Kan bli att se svarar på fråga 10b här om vi har tur.)

(OM DET BEHÖVS) FRÅGA 10B: VILKA FAKTORER BASERAR DU DITT OMDÖME PÅ? VAD TITTAR DU PÅ VID TRÄNINGEN?
(lösgjordhet, reaktionsförmåga, teknik, balans, takt, bjudning, avslappnad, rakriktning, böjning, stelhet, humör, uppförande etc)

FRÅGA 11: HUR FÖLJER DU UPP DIN TRÄNINGSPLAN?
(tittar hen på den i efterhand?)

APP-FRÅGOR
FRÅGA 12: HUR/VARFÖR ANVÄNDER DU APPEN IDAG?
FRÅGA 13: VAD TYCKER DU OM APPEN?
FRÅGA 14: VAD SKULLE DU VILJA SE FÖR FUNKTIONER I APPEN?

A.2.2 English Form

*** STATE THAT THE ANSWER IS ANONYMOUS AND WHY WE ARE CONDUCTING THIS INTERVIEW.**

QUESTION 1: WHAT DISCIPLINE WOULD YOU SAY YOU BELONG TO?
(showjumping, dressage, distance rides, island horse, hobby / fitness riding, eventing, western))

QUESTION 2: HOW DO YOU TRAIN?
(Riding school, riding school with own horse, co-rider (own training), co-rider (riding school), private training with own horse, I am entirely responsible for my own riding training)

QUESTION 3: HOW OFTEN DO YOU RIDE? [Times / week]
(Note if this is for all the horses if they have more)

QUESTION 4: HOW MANY HORSES DO YOU TRAIN?
(Applies when they have own horses, co-rider or similar)

QUESTION 5: WHAT AMBITION LEVEL DO YOU HAVE WITH YOUR RIDING?
(Fun / hobby (no competitions), Ambitious but without contest, for fun (competitive / clear round), compete on low level, compete on middle level, competes on high level, professionals)

QUESTION 6: CAN YOU DESCRIBE A TYPICAL TRAINING WEEK / TRAINING PASS?
(What different types of exercises do you do?)

QUESTION 7: DO YOU HAVE A TRAINING PLAN? (Y / N)
(Y) Where?
(Y) How dynamic is it? How does it vary from reality?
(Y) How do you describe the trainings sessions? (View the list and ask for reasoning about the different types of workout we think are relevant)
(Y) How did you build it? Did you get help from someone else?
(N) Why not?

QUESTION 8: OVER WHAT TIME PERIODS DOES YOUR TRAINING PLAN STRETCH?
(Months, weeks or years? If they answer years - ask them to give examples of what's evolved over the years)

QUESTION 9A: HOW DOES A TYPICAL GOOD TRAINING LOOK LIKE?
(Describe a good workout and a slightly worse pass)
(Note what type of training and what elements it contains (type of heating, tempo changes, etc.))

QUESTION 9B: HOW DOES A TYPICAL BAD TRAINING LOOK LIKE?
(Describe a good workout and a slightly worse pass)
(Note what type of training and what elements it contains (type of warmup, tempo changes, etc.))

QUESTION 10A: HOW DO YOU EVALUATE QUALITY ON A TRAINING PASS?
(Is that feeling, is it something special?)

IF NEEDED) QUESTION 10B: WHAT FACTORS DO YOU BASE YOUR EVALUATIONS ON? WHAT DO YOU LOOK AT ON TRAINING?
(Solitude, responsiveness, technique, balance, tact, bowling, relaxed, straightening, bending, stiffness, mood, behavior, etc.)

QUESTION 11: HOW DO YOU FOLLOW UP YOUR TRAINING PLAN?
(Look at it afterwards?)

APP QUESTIONS
QUESTION 12: HOW / WHY DO YOU USE THE APP TODAY?
QUESTION 13: WHAT DO YOU THINK ABOUT THE APP?
QUESTION 14: WHAT WOULD YOU WANT TO SEE FOR FEATURES IN THE APP?

A.3 Context Scenario

- While Lisa eat breakfast and prepare for the day, she checks the application to see what she and her ride-companion have done in the last seven days. Since the application is easy to navigate, understand and use, she easily gets an overview of her performed workouts. In the overview she sees what training she has done with the horse, how much time, how far and the intensity of the training sessions for the selected period. With this information she can better plan todays and the week's training program. What exercises, how hard, how much or if the horse needs rest, it is easy to see if she has missed anything.

- Lisa comes to the stable, she first prepare everything, prepare food and water for the next day, clean the horsebox by clearing out the dung. The goal of today's training session is to distance riding, ride 2 mil gallop at 25 km/h. She takes in her horse from the grass paddock to prepare the horse for today's training. Starts with the grooming the horse and then equip the horse with the necessary equipment, such as a saddle, bridle and a heart rate monitor to measure the heart rate during the trainings session. Now it is time to ride, when Lisa has jumped up on the horse to start her training session she starts the application to log her workout. It is a nice sunny spring day, the ground is perfect for training, the temperature makes the workout can be done without hassle or without concern for injuries. The application is used without interaction during the training.

- Lisa arrives back at the stable again with her horse, she now stops the activity in the app. After she jumped off her horse she writes some notes and estimates the performance for her and her horse in the app. She thought that the horse felt great, probably because of the variation in her training, which makes the horse motivated even on these condition focused workouts. But it might also be the good weather that makes the horse motivated. She also briefly looks at the completed training, to see the duration, tempo, gait distribution and some other basic data. This gives her a good overview of facts in how well the horse performed during this specific training. Then she locks her phone and put it back in her pocket.

- When Lisa arrives at home she brings up her phone and opens the application-again. Now when she is in a more relaxed environment, she starts to analyze her horse performance the latest weeks and month. Therefore she looks at a summary of her horse training to make sure the horse has got enough variation in the training. She also looks at specific trainings to see how well the horse has performed on specific moments in the training. But also to make sure that the horse follows the long-term development plan. Sometimes she also looks at the applicationtogether with her trainer, to give the trainer a better insight in the horse performance.

A.4 Requirement List

Overview Requirements

- Get a clear overview of performed trainings
- Help planning of the training
- Make sure the horse gets variation in her training
  - Type of training
  - Location
  - Ground
- Get an overview of previous trainings in calendar/date format

Functional Requirements

- Be able to see information during training when phone is locked
- Compare specific training sessions
- Share workouts with other equestrians
- Share your location with other equestrians
- A reminder to start the activity in the application
- Edit previous training sessions
- Get inspiration for workouts
- Set a main goal(s) for the training
- Set a secondary goal(s) for the training

Documentation Requirements

- Video record a workout
- Document the following for a specific training:
  - Exercises
  - Flexibility
  - Perceived Performance
  - Feedback
  - Duration
  - Distance
  - Speed/Pace
  - Comments
  - Ground
  - Workout type

Data Requirements

- Be able to see the following data dependent on discipline:

Dressage

- Pace
- Feed
- Right / Left laps
- Gait Distribution
- Total time
- Intensity

- Distance
- Time
- Exercise Distribution - Time
- Speed
- Average Pace
- GPS - Map
- Heart Rate
- Breath

Jumping
- Leap
- Number of jumps
- Distance
- Gaits
- Right / Left laps
- Pace
- Time - At the competition
- Precision - At the competition
- Exercise Distribution

Distance
- Speed
- Pace
- Distance
- Heart Rate
- Gait distribution
- Right/Left laps
- Map
- Weather

Eventing
- Pace
- Speed
- Distance
- Gait distribution
- Speed
- Map
- Duration

Island
- Pace & pace changes
- Distance
- Map
- Duration
- Speed

- Gait distribution and location of gaits

Other Requirements

- Make sure the horse gets correct feeding
- Plan the training dependent of the weather

A.5 Chittaro's Checklist

- Mapping: How is information visually encoded? A visualization turns data (numbers, strings, data structures,...) into graphics that can be characterized by several visual features (lines, colors, lengths, positions, curvatures, animations,...). A precise mapping among data objects and relations and visual objects and relations needs to be defined and followed consistently all over the application. A mapping has to be found in such a way that conceptually important aspects are made perceptively important.

-Selection: Among the data available, what is relevant to the considered task? On one side, visualizing insufficient data would lead users to take suboptimal or plainly wrong decisions; on the other side, burdening users with unnecessary data will make it more difficult to reason about the problem at hand. Although the selection problem is important in any visualization, it becomes even more important in mobile visualizations because limited screen space allows one to show a much smaller amount of information that needs to be chosen wisely.

- Presentation: How is the visualization laid out on the available screen space? Even if one has identified a clear, intuitive visual mapping, and selected the data the user really needs, the application can still be ineffective because the display is too little to show everything. A convenient way to present the visualization on the available screen is thus needed. The presentation problem becomes so serious with mobile devices that we devote an entire section to it in the following.

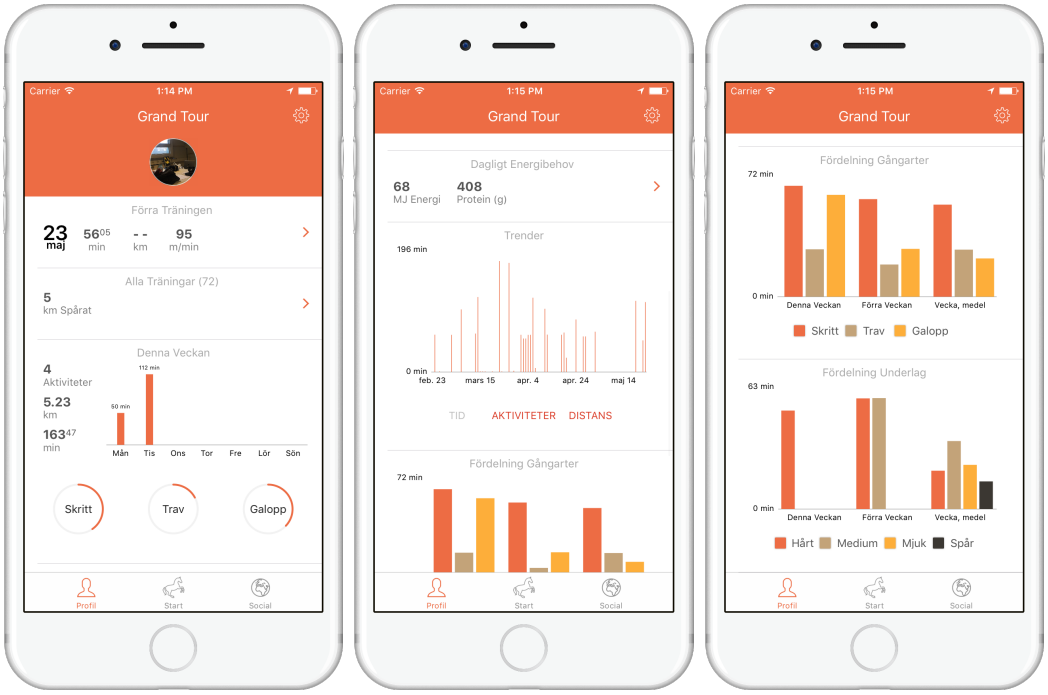
-Interactivity: What tools are provided to explore and rearrange the visualization? An high level of interactivity is important to increase the engagement of the user in the observed data and enhance her exploration abilities.

-Human Factors: Are human perception and cognitive capabilities being taken into account? A visualization must be quickly browsed by the human eye and easily interpreted by users, so knowledge about human visual perception and cognitive aspects can make it easier to design an effective visualization. General knowledge about visual perception can be easily found in textbooks. Research results that are specifically targeted at mobile visualizations are becoming available, e.g. to determine what one can communicate with a very limited number of pixels.

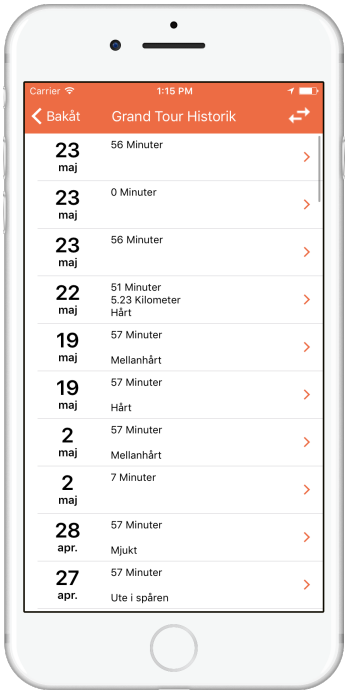
- Evaluation: Has the effectiveness of the visualization been tested on users? Tests should be carried out following the rigorous user evaluation procedures that are common practice in the field of Human-Computer Interaction. A survey of visualization evaluation challenges has been recently proposed by Plaisant. Evaluating interfaces on mobile devices requires additional considerations, e.g. the use of phone emulators might lead to unreliable results or additional complex variables should be measured such as distraction.

A.6 Old Design

A.6.1 Trends



A.6.2 All Trainings



A.6.3 Specific Training