Project no: 689043
Acronym: SELFBACK
Title: A decision support system for self-management of low back pain
Activity: PHC-28-2015 Predictive modelling RIA

<table>
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Abstract
This deliverable describes the functional requirements, development, design and final features of the SELFBACK app.
## Document History

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1 Introduction

This work was initiated by the former consortium partner KIO, but assigned to TRX in June 2017.

A revision of the existing design-related material was undertaken. This process led to a change in the development approach from focusing on a narrow product for the randomised controlled trial only, to developing a more versatile product suitable for commercialisation. This approach enables a more flexible and rich development process, as it is easier from a technological perspective to downscale the application (for the first prototypes) than to upscale and add functionalities (end product).

Specifically, we defined the functional requirements of the application, conducted interviews with users and clinicians, and reviewed similar and competing applications. The combined findings were used to create matching personas and a user journey map. The user journey map served as a blueprint to guide the development of the application concepts, wireframes, and visual identity and design. Finally, the front end content was developed.

The final version of the app is presented as a “walk through” in the following video: D4_6_DEMCON_Deliverable_PU_300618_walkthrough.mp4
2  App specifications and development

2.1  Functional requirements

The functional requirements constitute the base functions in the application and were structured according to the program theory (intervention mapping, deliverable 3.8 and the User intervention modelling framework, deliverable 2.4). Further, the functional requirements guided the development of wireframes. Table 1 contains the primary categories together with sub categories.

Table 1 Primary functional requirements with specified categories and subcategories

<table>
<thead>
<tr>
<th>Primary functional requirements</th>
<th>Categories</th>
<th>Subcategories</th>
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</thead>
<tbody>
<tr>
<td>Registration</td>
<td>User Name Password</td>
<td></td>
</tr>
<tr>
<td>Login Screen</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercises</td>
<td>Strength, Flexibility</td>
<td>Set allocated time to exercise</td>
</tr>
<tr>
<td></td>
<td>Relief &amp; Relax</td>
<td>Set number of repetitions</td>
</tr>
<tr>
<td>Plan</td>
<td>Weekly Exercise Plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plan Options</td>
<td></td>
</tr>
<tr>
<td>Physical activity - goals</td>
<td>Step Count</td>
<td>Set goal daily</td>
</tr>
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<td></td>
<td>Achievements</td>
<td>Streak</td>
</tr>
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<td>Educational Content</td>
<td>Application content</td>
<td>Step record goals</td>
</tr>
<tr>
<td></td>
<td>Website</td>
<td></td>
</tr>
<tr>
<td>Settings</td>
<td>Set active Hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Set questionnaire Day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Basic Information</td>
<td></td>
</tr>
<tr>
<td>Notifications</td>
<td>New Content</td>
<td></td>
</tr>
<tr>
<td>Tip of the Day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekly Questionnaire</td>
<td></td>
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</tr>
</tbody>
</table>

2.2  User and clinician interviews

2.2.1  Objectives

To get a better understanding of the target group, their experiences and preferences in relation to back pain treatment, use of social media in general and in relation to back pain, we explored these issues using both face-to-face interviews with both patients and clinicians as detailed below.

The analysis of interview responses informed the creation of both the personas and a user journey map. These in turn form the blueprint that supported the development of the SELFBACK application
2.2.2 Methods

We conducted unstructured, face-to-face interviews with five sufferers of low back pain. Participants were recruited from a physiotherapy clinic and through our personal network. Eligible persons were contacted in person or through telephone and invited to participate in the interview. The unstructured interview schedule allowed for a relaxed atmosphere and an easy conversation giving the participants an opportunity to speak freely.

Similarly, we conducted unstructured interviews with two general practitioners and one physiotherapist about their experience working with low back pain patients.

Finally, we drew on the clinical experience of SELFBACK consortium members, who had experience in working with low back pain patients, who gave input and qualified findings from the interviews and helped create personas.

2.2.3 Participants

The participants’ characteristics are described in table 2.

Table 2 Participant characteristics.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Age</th>
<th>Occupation</th>
<th>Recruitment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Female</td>
<td>23</td>
<td>Student</td>
<td>Recruited through personal network</td>
</tr>
<tr>
<td>2</td>
<td>Female</td>
<td>42</td>
<td>Office Assistant</td>
<td>Recruited from local practitioner</td>
</tr>
<tr>
<td>3</td>
<td>Male</td>
<td>48</td>
<td>Project Leader</td>
<td>Recruited from local practitioner</td>
</tr>
<tr>
<td>4</td>
<td>Female</td>
<td>34</td>
<td>Teacher</td>
<td>Recruited from local practitioner</td>
</tr>
<tr>
<td>5</td>
<td>Male</td>
<td>25</td>
<td>Waiter</td>
<td>Recruited through personal network</td>
</tr>
</tbody>
</table>

2.2.4 Results

We identified the following salient issues:

Understanding the problem

Some participants explained how they used their personal network to gain an initial understanding of their low back problem, while others went online and searched the internet for information. The latter was often the case with the younger participants. Other participants directly reached out to their general practitioner. The participants stated they often thought their back pain was due to either bad posture or heavy physical activity.

“The whole concept of doing physical activity while having pain is also something that I struggle with understanding. One thing is that it hurts already, but having to push myself over the limit and at the same time that it should help my condition, when normally when having pain, I would rest, seems extreme for me.” - Participant 2
“At first, I just thought it was due to having done some rather intensive physical activity, but then after almost a week, my wife advised me to seek help. A bit ignorant as I am, I just waited for even longer, but then in the end gave in and made an appointment” – Participant 3

**Barriers for physical activity**

Time was repeatedly mentioned as a barrier for being physically active. This was especially seen in participants with children. They described how their days were fully occupied from morning till evening. They described postponing their exercises to a point where they would either reduce the amount of daily exercise or completely skip them. Some participants mentioned out-of-pocket expense as a barrier for seeing a physical therapist to get instructions in exercises.

“To find time to do the exercises is one of my biggest problems. I have two kids, so most of the day is already occupied when I have to take them to day care and kindergarten, together with most of the evenings also being allocated to them.” - Participant 2

**Motivation**

Lack of motivation and level of engagement was described as one of the major barriers for doing exercise at home. The participants described knowing that exercise is for their own good, but still not following their prescribed exercise plan. They described lack of a tangible end reward as a main reason. Some felt uncomfortable and insecure, and ultimately discouraged, when left to follow written instructions on their own for several weeks without any feedback or communication with a clinician. On the other hand, some found great motivation in doing their exercises, and even felt it improved their quality of life by having something new to commit to. One mentioned that her goal with doing the exercises was to be able to enjoy and spend time with the family over longer periods again.

“After the first treatment, I got assigned a couple of exercises that I had to follow in the coming weeks. To start with it went fine, but after some days it became something that I often postponed, which gave me bad conscious afterwards.” - Participant 2

“The thing is that I don’t really get feedback when I’m doing my exercises at home, I’m not completely sure if I do them correctly or not, which is kind of frustrating to deal with.” - Participant 2

**Healthcare providers**

The healthcare providers expressed that the patients’ level of commitment was often the biggest issue. They told how the patients were often surprised when told to exercise when having pain, but also very positive after actually having experienced an improvement after
doing so. Some patients see the providers expecting a miracle treatment or “quick fix”, and are therefore not very motivated when they have to do some of the work themselves. Usually, the providers found the patients to be very honest if they had not been doing their exercises on the regular basis. Patients’ knowledge about the condition itself was another major issue expressed by the providers, since the patients often thought the pain was due to hard work or wrong postures.

“People are often surprised that the best treatment is actually being rather active, even when experiencing pain. Especially older patients hold this belief, since that's what they've always been taught. Getting people to change their perception of how to treat pain is definitely one of the biggest problems.”

2.2.5 Review of existing applications

In order to revise the application’s visual identity, we performed a scoping review of existing applications, including the existing design documents of the SELFBACK application.

We searched Google Play and App Store for the most popular health-related applications that included elements of back pain exercises, general exercises, meditation, mindfulness or general health.

The applications were qualitatively evaluated using the Apple Human Interface Guidelines, Apple Research Kit and Google’s Material Design. These guidelines are considered state-of-art documents and trendsetters within application design.

We identified the layout and colour schemes, overall visual identity, presentation of content, and usage of user interface elements (e.g. quizzes or gamification) of related and/or competing applications. An example of an application using quizzes is Primer, where after each audio session, the user will be asked a question related to the material they just heard.

The most successful application with the closest resemblance to the SELFBACK application is Kaia, a German-made application, which target treatment of low back pain through instructions in exercises and coaching. In its’ design and incorporation of elements, the application refers strongly to the Apple Research Kit. By using soft tones and classic light blue colours, the Kaia application conveys a softness that predominantly appeals to female users.

2.2.6 Personas

Based on the interviews of users and clinicians we created four personas to reflect the SELFBACK user group.
The personas are two males and two females 28 to 57 years of age. They are representative of typical low back pain sufferers. In addition to their demographic characteristics, their low back pain problem and their healthcare seeking behaviour in relation to low back pain is described. Further, we describe their use of mobile phones and social media. Most importantly, we describe typical barriers of physical activity and exercises. Thus, the personas are created to match not only typical low back pain symptoms, but also the typical user journey and user experience.

The personas can be found on the following pages.
Line Gadegaard
46, Elementary School Teacher, Aalborg, Denmark

Line Gadegaard is an Elementary School Teacher from Aalborg, Denmark. Her work is her passion as she loves teaching, and highly values everything she gets in return. She loves learning new things, especially culturally related, often in the company of her family. Having a daily routine to follow is her way to go in order to balance family, work, friends and spare time interests. Despite this, she often feels stressed.

She started to encounter problems in her lower back in her late 20’s. It fast became a constant annoyance in her every day resulting in an increase in days off work, and reduced social engagement levels overall. During the first episode of pain, she sought treatment resulting in several consultations with her general physician and regular visits to a chiropractor. Knowing the impact of having pain causes her to neglect her work and family life, she feels that continuous care seeking isn’t a solution that is sustainable in the long term. And she now mostly takes pain killers to counter the worst spikes.

Phone Usage

She always has her phone on her, both during work hours, and in her spare time. It’s one of the most important tools for her, and she always make sure people can reach her, be it friends and family, or people from work. First thing in the morning and before bedtime, she checks her phone to the point where she finds herself almost addicted to staying within reach of it.

Social Media

Facebook and Instagram being the biggest two platforms she uses. She regularly posts on both medias, places she has visited, attractions, or something she finds beautiful or important to her. Facebook is use for work as well. She is member of groups made both for students and their parents. This results in social media being an important work tool for her also.

"I have a hard time prioritizing and allocating time to do my exercises."
Jorien van der Heijden
32, Graphic Designer, Amsterdam, Netherlands

Jorien van der Heijden currently work as a graphic designer for a startup company in Amsterdam. Trying balance work, social life and her relationship, leaves her pretty limited on spare time, and often her schedule is full. Whenever time allows, she love to learn new things and explore the world and live life to its fullest. She is a perfectionist and enjoy seeing the effort of her work being valued and approved. Always trying to up her game, she finds her biggest competitor to be herself. Motivation is something she find in the end result, to strive to achieve a certain goal, is the biggest factor for her.

She has suffered from lower back pain since she was 19 years old, and has learned to live with it ever since, however with recurring pain spikes, she sometimes has to take time off work. Quite fast after it first occurred, she seeked medical advice from her general physician, which refered her to a chiropractor in order to receive manual treatment. The chiropractor gave her a few pain relieving-exercise to do at home, but she hasn't been too consistent doing them.

Phone Usage

Her phone is something that is necessary, both when it comes to her private life, but also work. When she isn’t occupied with something, she spends her time with her smartphone, either browsing social media or work related content. When she is on the go, she often uses it to capture different motives or things she finds inspiring.

Social Media

She is very active on Instagram, having a fair number of followers, where she often publish her work, together with inspiring material. When it comes to her social life, it's primary Facebook and Snapchat that she uses to communicate with her friends.

“I often lose motivation when it comes to my home exercise after a couple of days.”
Harry Cooper
57, Carpenter, Manchester, England

Harry Cooper is a carpenter from Manchester, England. Working as a carpenter and has been doing so most of his life. He enjoys going to the local pub, enjoying a pint and watching football, and generally has a very laidback lifestyle after work. Change isn’t something that he welcomes, unless he sees the necessity of it, being rather conservative.

When he first started suffering from lower back pain, he assumed it was due to his physical work load. He only sought medical treatment from his general physician, after he had had recurring periods of pain over a span of a couple of years. The general physician prescribed him painkillers, but only for a limited amount of time. When the pain becomes too much, he usually takes time off work, but try to still do some work around the house, instead of being completely idle.

Phone Usage

He primary use his smartphone to call and text from. He uses the phone only as device for communication, and only very limited as a multimedia tool. The majority of his interactions with his phone, is based on receiving notifications and generally incoming communication.

Social Media

Facebook is the only social media that he is active on, but in a limited amount. He only checks it once awhile, often on the initiative of others asking if he has seen a specific post, but he never really contributes with any content himself.

“I don’t wanna invest in a wide variety of equipment and other accessories”
Henrik Damgaard
28, Business Analyst, Aarhus, Denmark

Henrik Damgaard is a newly educated business Analyst from Aarhus Denmark. He currently focuses on his career and therefore spends a lot of time working, both during his official work hours, but also after. He is, by nature, a rather competitive individual, and often like to compete with friends, or himself, which often helps encourage him and is reflected in his results.

He first encountered lower back pain in his late teenage years, and it has been rather consistent ever since. During the first encounter, he sought his general physician for advice, who referred him to a physiotherapist. The physiotherapist gave him a set of exercises to perform at home. Due to lack of time, and lack of trust in the real efficiency of the exercises, and resulting in lack of motivation, this hasn’t been something that he has done on a regular basis. During days of high pain intensity he tries to stay as active as possible, but often gets hindered in his activities due to pain.

Phone Usage

His iPhone is a necessary tool for him both private and professionally. It’s the first thing he check when he wakes up, and one of the last he does when he goes to bed. Whenever he get a notification he instantly reacts on it, in case it’s something important that needs to be addressed fast.

Social Media

Social media is something that he uses to stay in contact with friends on a daily basis. Often sharing the good times on platforms such as Instagram and Snapchat. He is rather passive on Facebook when it comes to posting content, and is mostly lurking.

"I don’t really feel an effect of doing exercises, so I’m not really sure if it’s working or not"
2.2.7 User journey map

Based on the specified functional requirements, the interviews and scoping review of applications, we created a user journey map that match the personas (Figure 1).

The user journey map is also available in high resolution in this pdf-file: D4_6_DEMCON_User_journey_map.pdf

The map serves as a blueprint for the design and development phase of the application. The map depicts an overview of the journey a user embarks on from experiencing back pain for the first time to finding an individual solution to the pain, and how that journey may be guided towards using the SELFBACK application. The map was created using the concept of a sales funnel, in which a customer (user) goes through four steps when purchasing a product (application) (i.e. awareness, interest, decision and action). The focus of the map was to depict the journey toward the end-product in the form of a fully developed product ready for commercialisation. Included in the map are all potential touch points, i.e. all time-points at which a potential user or user comes in contact with the SELFBACK application either before, during, or after they download and use it.

We identified seven distinct phases of various length in time and number of touch points (Looking for help; selection; first action; engagement 1; Aha moment; engagement 2; and sharing), and pinpointed all touch points that the user interacts with throughout the usage of SELFBACK. This enables us to keep track of the different forms of contact and potential risks to completing the journey. The result is a visualized path that reflects the user's journey along with solutions that address the risks.
Figure 1: User journey map
Within each phase and based on the touch points, we have identified five layers of insights and ownership:

- **User situations**: Describing the situation, the user is in during the specific stage of the journey

- **Contact point**: The specific points of interaction the user has on the journey, be it before, during or after the use of the SELFBACK solution

- **Drop off factors**: List of the different things that can be a deciding factor for the user to stop their interaction with the different platforms

- **Content type**: The various types of content that will be present on the giving platform

- **Business & technical infrastructure**: An overview of the different services and accounts that need to be acquired in order to make everything above happen

Each layer contains the risk factors that may hamper or facilitate the user journey ranging from reach out to the user, drop off factors, the “aha moment” (i.e. the moment the user realises the value of the application) to the sharing of the application with other potential users. The end-result of the user journey map is a graphic overview of the various tools needed to make the application a success.
3 Application concepts

Based on our research we decided to include the following types of content concepts into the application.

3.1 Overviews

The user will be provided an overview of daily activities and their progress. Each main component (physical activity, exercises, and education) has an individual progress tracker showing current status.

The application will also provide the user with a weekly overview of their use of the application components, which will allow the user to track their progress. This serves the dual function of showing activity levels and acting as a motivational component. This feature will be present at the home screen at all times.

3.2 Quiz

For the educational part, we introduce a short and easy 1-item quiz (the question will continuously be replaced by new ones). The quiz serves the purpose of directing the users’ attention to the educational components without patronizing or niggling the user. Further, it informs and guides future development of educational material.

3.3 Skip

In the education part of the application, we have introduced a “skip” function. This function allows the user to skip a proposed exercise. If the user uses the skip function, they will be prompted to provide a reason and given the option to choose an alternative exercise. This feature will make the application even more personalised. Further, if specific exercises are skipped by many users, or many users skip all the exercises, the exercise (or the instructions) will be replaced by more suitable alternatives in future iterations of the application.

3.4 Gamification

To give the user a sense of reward, we have imbedded element of gamification in the weekly overview base on their levels of activity. We will reward the users and acknowledge their interaction and usage of SELFBACK by giving symbolic tokens in the application. Something that is a common element in fitness and behaviour changing application. For example, if the user completes 10 exercises, they will receive a reward. The rate of which these will be rewarded will increase over time, so in the start the user will receive them more often, which can result in higher commitment rate to the application. Where later it will give them an aim to go for, if they want to achieve a specific reward. We provide a “statistics” page for the user in the application, which will serve as a reminder of what the user has accomplished.
3.5 Wireframes

The specifications of the functional requirements lay the foundation for developing wireframes. The following wireframes depicts the key features of the application. The wireframes and preliminary interface elements were combined in a low fidelity solution, which was discussed over several iterations with consortium members.
3.6 Visual identity and design

The SELFBACK application’s visual identity was redesigned in consideration of the target users, self-management focus, and competition. The primary changes were the amount of content presented on each screen and the colour scheme.

The visual identity of the application is one of a simpler appearance. The goal of making it a simpler and user-friendly application is twofold: 1) to decrease the amount of content and
create a better overview for the user (instead of an application that is overloading the user with information); and 2) to align with a more contemporary style.

The colour scheme was changed from green, which is traditionally used in medicine and, thus, signals a medicalisation of back pain, to blue, which is better aligned with the de-medicalisation of low back pain and a self-management focus.

In addition to the personas and user journey map, the visual identity was created using tools such as Béhance, Dribble and Pinterest to inspire the design team regarding visual elements and general trends within user experience and behaviour changing design.

### 3.7 Colours

As primary colour, we have chosen a dark blue, known as Oxford blue with the hex code of #3A425D. The blue colour symbolizes trustworthiness, knowledge, relaxation and professionalism. It’s used for the buttons, illustrations and backgrounds.

The secondary colour used is a light red, known as Wild Watermelon with the hex code of #FF6773. It symbolizes joy, passion, confidence and help increase enthusiasm. It’s generally used as a feedback colour, e.g. on the plan screen, where the circles get filled out, and during the tailoring session, where it is used highlight progress.

The primary and secondary colours combined with a dark grey used for texts create good contrast and helps with readability across the whole application.

The colours are further used to signal progress, and to enhance the user’s experience of progression and involvement.
3.8 Typography
For the typography, the chosen font is Roboto. It's a free-to-use font, which can be used on all platforms. All versions of Roboto (from the light to the bold) are very well suited for text on screens. In the application, we use the light, regular and medium versions.

Roboto Light

abcdefhijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ

Roboto Regular

abcdefhijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ

Roboto Medium

abcdefhijklmnopqrstuvwxyz
ABCDEFGHIJKLMNOPQRSTUVWXYZ

3.9 Videos
Videos of the full set of exercises were recorded using a professional greenroom and equipment. To depict a large group of potential app users, models were purposefully chosen to reflect both men and women of different ages and body types. They wore simple, neutral coloured outfits void of logos and labels.

The videos were record in 1080p and 60 frames per second in a neutral colour mode to facilitate post production. To ensure correct display of the exercises, all videos were reviewed by exercise specialists among consortium members during and after the shoot. In the post production, colours were adjusted and the frames cropped. Finally, video files were reduced in size to enable display in a app format.
4  Front-end development

The SELFBACK app was developed in React Native, a JavaScript (JS) framework, which enabled the development of a large part of the code in a single development environment.

React Native is a cross-platform framework that uses the same fundamental building blocks as iOS and Android apps, and allows for a fast build-up and modification/adaption of only small parts of the code to suit the specific platform requirements. React Native framework is developed by Facebook and has a community-driven environment. Further, the framework supports reusability, maintenance, and sports an intuitive user-friendly architecture.

4.1  Coding

The app was developed in a mix between JavaScript (JS) and native iOS or Android code. Each app feature is compiled of blocks of coding treated as native components, and in the following translated into Java for Android and Objective-C for iOS.

4.2  Deployment

Changes in the app were deployed either by using code push or releasing a new app version. Minor changes were deployed using code push, which updates the app directly to the user’s device and does not require a reinstallation of the app. Major changes were deployed in separate release cycles, which involved compilation of several changes in new versions downloadable from a closed website.

As we use React Native for development, part of the app code is contained in a JavaScript file. This JavaScript file can be fetched from a remote server while the app is running, and replace the original before launching the app. CodePush provides a fast and easy service to deploy these JavaScript files and keeping track of the versions. When changes are needed to the native part of the app, a compiled build is needed from Xcode or Android’s Gradle CLI.

4.3  API implementation/communication

The SELFBACK app uses a SSL encrypted HTTP protocol for all communication with the SELFBACK API. For all calls except the login request, it includes an authorization header, which identifies the user on the API server and delivers content specific for that user.

The authorization header will transport a token received during log in. To minimize data exchange, the data received from the calls is cached in the phones local storage and retrieved from the backend only once. Similarly, videos and images will be stored on the phone.
4.4 Automated code test
The source codes have been placed in GitLab CI and Bitrise. Any new code has automatically been pulled from GitLab CI and Bitrise and pushed into a code repository. Further, these services have been used for continuous integration and code test, and a seamless integration with the code repository.

4.5 Integration and end-to-end testing
Each release of the app has undergone integration tests with a main focus on the app and server communication and subsequent changes. Further, end-to-end testing with simulated user input was applied to test the intended flow of the app, and the integration of data in the various system components. To detect any discrepancies in the functionality or the user interface and to validate the output, a structured, step-by-step approach for each feature in each release cycle was followed. This included definition of specific steps in the interaction with the app, identification of edge-cases and potential user experience problems.

4.6 Internal Testing
A prototype was developed using the software Flinto, a program that allow import of Sketch files to create interactive and animated prototypes of application designs. We used the Flinto App to preview the application on smartphones. The combined work resulted in a high-fidelity prototype made available for download and presented to the consortium members.

Over the course of the development process, the app has been subjected to internal testing by the selfBACK consortium members in closed sessions outside of AppStore/Google Play, and feedback relating to content, functionality and design has been continuously collected on Trello. The bug recording tools Crashlytic and Sentry was built into all test releases. All required changes have subsequently been implemented in either the backend or frontend as applicable.

4.7 User Testing
The iOS version 0.1.12 (19+v52) was tested by three users during 1-hour sessions at the UoSD. The aim was to evaluate the users' first engagement with the app and their initial impression of the design and functionalities. The test users were low back pain sufferers recruited from local physiotherapy clinics and the research team’s personal network, and they were familiar with low back pain treatments and back exercises. The research team handed over test phones to the users. While the user navigated through the app, they were encouraged to think out loud. Further, probing questions about the colour scheme and design, their understanding of key symbols, introductory material, texts were asked. Specific attention was given to the presentation of the exercises and the content and frequency of notifications.
As part of the planning phase of the randomised controlled trial (described D5.1), 10 persons with low back pain were recruited in a feasibility study in Trondheim, Norway. Following four weeks of daily use of the MiFit wristband and the SELFBACK app, users were interviewed using semi-structured interviews about their use and overall impression of the wristband and the app, design and layout of the app, functionalities, weekly plans and provided content.

As a consequence of the user tests and the feasibility study, the following alterations were made:

- **Onboarding:**
  To simplify and reduce the time spent on the onboarding process, the explanatory text was shortened and technical terms were rephrased or obliterated. The process of connecting with the Apple Health app was simplified by guiding the user directly to the settings panel, where they have to allow access to Apple Health.

- **Introduction Session**
  The introduction session with the run-through of the app was well perceived by the users. A minor revision in the number of exercises presented initially to the user was done (a reduction).

- **Steps**
  More statistics on the step count were requested by the users. Consequently, statistics of step counts over the past weeks and months have been implemented in the app.

- **Exercises**
  The exercise videos in combination with the short, written instructions were very well received by the users. The instructions were deemed clear and the “normal people” models received positive feedback. A minor revision of the presentation of the number of exercise repetitions was needed.

- **Educational content**
  The educational content was positively evaluated for being short and relevant, and thus effectively delivered.

- **Weekly Overview**
  The weekly overview was not well received by the users, who did not understand the symbols in the overview and were not able to track their progress. A major revision of the app was implemented in version 1.0. The changes consisted primarily of a revised
layout of the weekly overview and of adding a presentation and explanation of the weekly overview in the app introduction.

- **Toolbox**
  The content of the toolbox was well received by the users. Especially the option to view previous exercised and pain relieving exercises were mentioned. No alterations were made.

- **Design**
  The users’ impression of the design and overall layout of the application was positive. Users evaluated the design and colour scheme as neutral and appealing to both male and female participants. The hierarchy of the elements were perceived as logical. No alterations were made.