Abstract
This deliverable describes the specification and initial design of a clinician dashboard that facilitates the co-decision making between the patient and the clinician. It covers the purpose, functional specifications and drafts of the web frontend of the dashboard. The document also describes personas of a clinician and patient to exemplify how the dashboard could be used in practice.
## Document History

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>14/05/17</td>
<td>Kerstin Bach</td>
<td>Initial version of the document</td>
</tr>
<tr>
<td>0.2</td>
<td>24/05/17</td>
<td>Kerstin Bach</td>
<td>Added tailoring content and screens; extended section 1: objectives</td>
</tr>
<tr>
<td>0.3</td>
<td>26/05/17</td>
<td>Barbara Nicholl</td>
<td>Added description of personas</td>
</tr>
<tr>
<td>0.4</td>
<td>01/06/17</td>
<td>Paul Jarle Mork</td>
<td>Added text to introduction Revised objectives Minor changes to functionalities</td>
</tr>
<tr>
<td>0.5</td>
<td>13/06/17</td>
<td>Kerstin Bach</td>
<td>Added wireframes and explanations to the screens</td>
</tr>
<tr>
<td>0.6</td>
<td>14/06/17</td>
<td>Paul Jarle Mork</td>
<td>Added chapter 6: Co-decision and decision support systems in clinical practice</td>
</tr>
<tr>
<td>0.7</td>
<td>21/06/17</td>
<td>Barbara Nicholl</td>
<td>Added potential conversation topics and synopsis of clinical guidelines update on group meeting 21.6.17</td>
</tr>
<tr>
<td>0.8</td>
<td>29/06/17</td>
<td>Kerstin Bach</td>
<td>Revised version after review from Mette Jensen Stockkendahl</td>
</tr>
<tr>
<td>1.0</td>
<td>30/06/17</td>
<td>Kerstin Bach</td>
<td>Final version submitted to the EC</td>
</tr>
</tbody>
</table>
# Table of Contents

1. **Introduction** 4  
   1.1 *Co-decision and decision support systems in clinical practice* 5  
   1.2 *Objectives* 5  

2. **Specification** 6  
   2.1 *Functionalities* 6  
      2.1.1 *Restrictions for Co-Decision Making* 7  

3. **Input** 8  

4. **Wire frames** 9  
   4.1 *Starting page* 9  
   4.2 *Retrieve patient data* 10  
   4.3 *Dashboard* 11  
   4.4 *Tile Example: Physical Activity History* 12  
   4.5 *Tile Example: Physical Activity Group Comparison* 13  
   4.6 *Example additional information for clinician* 15  

5. **Co-Decision Making: Clinician – Patient interaction** 17  

6. **Personas** 18  
   6.1 *Patient* 18  
   6.2 *Clinician* 18  

7. **The implementation of the SELFBACK Clinician Dashboard in Clinical Practice** 20  
   7.1 *Patient generated data* 20  
   7.2 *Barriers for implementation* 20  
   7.3 *Exploitation of the clinician dashboard* 21  
   7.4 *Summary and Future Work* 21
1 Introduction

SELFBACK primarily targets the personalised self-management of low back pain (LBP) for patients, but will also showcase or demonstrate how the overall data from patients can potentially help in co-decision making between the patient and the clinician. Figure 1 illustrates the data processing in the SELFBACK system and how the patient-directed modules link with the co-decision module. The patient will regularly score pain and functional ability in the app (module 3). These data can, with permission from the patient, be shared with clinicians as input to the co-decision module (5). In addition, the physical activity data collected by the activity-detecting wristband and the self-management plans can also be made available to the clinician with permission from the patient.

The captured data may provide valuable insight for the clinician when a patient seeks help for LBP. In the decision support system of the co-decision module, the history of one particular patient can be compared to the histories and outcomes of similar patients and can be used to support decisions about the patient’s treatment plan. This insight will position the progress of symptoms of the patient in a large patient population and help the clinician to decide about further treatment. Furthermore, this information can assist the clinician in making decisions about referral to specialist health care for further investigation. Eventually, it may also aid in decision making for granting of sickness leave and prescription of medication.

Figure 1. Illustration of the data processing in the SELFBACK system and how the four patient-directed modules (1-4) and the one co-decision module (5) link together.
1.1 Co-decision and decision support systems in clinical practice

It has been over 50 years since the first clinical decision support systems (CDSSs) were implemented. Historically, these systems were built to assist clinicians with various tasks, such as diagnosis, therapy planning and critiquing, drug prescription, information retrieval, and image interpretation. They have provided reminders of preventive measures (e.g., prescribing antibiotics before surgery) and alerts about potential dangers (e.g., adverse drug interactions) [7]. Traditionally, it has been assumed that the human decision maker using the CDSS is a physician, although sometimes, other clinicians are supported as well. Clinician resistance to the use of CDSSs has been a longstanding problem, with technical, institutional and cultural barriers to system adoption [8]. The use of CDSSs by patients is a relatively recent development.

Over the past decades, health care systems and politicians have placed increasing importance on the relationship between patient choice and clinical decision-making [7]. Such co-decision or shared decision making has been defined as: “an approach where clinicians and patients share the best available evidence when faced with the task of making decisions, and where patients are supported to consider options, to achieve informed preferences” [7]. Thus, by promoting shared decision-making, patients are encouraged to assess the benefits and risks of different available treatment or management options. This will increase patient engagement and ensure that patient autonomy is respected. To facilitate shared decision-making, the patient and clinician can utilise different ‘decision aids’, e.g., customised software that can aggregate current best evidence and inform the process. IBM Watson is probably the most well-known recent example of computerized assistance for clinical decision-making.1 However, despite the focus on and interest in the use of computerized assistance and shared decision-making, implementation in clinical practice has proved difficult [7,8], and several challenges remain to be solved.

1.2 Objectives

The selfBACK project targets the clinicians in primary care, including general practitioners (GPs), physiotherapists, and chiropractors. The objectives of the clinician dashboard are to:

1. facilitate co-decision about the treatment and especially the self-management plan between the patient and the clinician
2. facilitate discussion about barriers and/or expectations for self-management
3. help the clinician to reinforce selfBACK advice and self-management
4. provide data that can inform the clinician about the effect of the current approach and facilitate consideration of other treatment options or referral to specialised care if deemed necessary

1 https://www.ibm.com/watson/health/
2 Specification

2.1 Functionalities

In accordance with the HONcode\(^2\) principle, the SELFBACK system is not intended to replace the clinician-patient relationship. Rather, it facilitates the clinician-patient relationship by enabling the clinician to work jointly with the patient to review progress and develop effective pain management plans. The clinician applying the SELFBACK approach is equipped with a web-based dashboard to be used for co-decision making with the patient. The SELFBACK server is accessed via a secure connection through this web interface. It will typically be run on a PC and can therefore display more comprehensive information than the app. The web interface will be able to display statistics on 1) symptoms progression (e.g., pain, function), 2) physical activity level, and 3) adherence to exercise plans for the consulting patient and similar patients under treatment or follow-up by the clinician.

The use of SELFBACK is initiated when a clinician (a GP, physiotherapist, or chiropractor) refers a patient with LBP to the system. This referral associates the patient with the practice and limits access to the patient’s data to clinicians in the practice. The clinician logs into the system with a username and password. The clinician only has access to detailed data for patients in his or her own practice who consent to data sharing. To maintain the privacy of patient data, a unique patient ID is generated for each patient every week and provided to the patient via the app. During a consultation the patient shares this current weekly ID with the clinician to enable data access to all the patient’s data, including all historic data about the patient, for the duration of that week, via the clinician dashboard. Once a new weekly ID is generated, the clinician can no longer access the patient’s data, until and unless the patient shares a new ID during a subsequent consultation. The timing of consultations will be dependent on the particular patient needs and clinician’s practice. The patient may choose to share their ID with more than one clinician, e.g., their GP and their physiotherapist.

For co-decision making, the clinician logs into the system with the ID provided by the patient and then accesses data for that individual patient during their appointment. This enables the clinician and the patient to review and discuss the data together. Because appointment duration is limited, the dashboard has a simple and intuitive interface that quickly focuses users in on problems that warrant mutual discussion. As illustrated with wireframes in the next section, an initial screen graphically displays the patient’s progress with respect to physical activity, exercise, sleep, function, pain, pain self-efficacy, fear avoidance, and mood. This helps to clarify, at a glance, which aspects of self-management are progressing well and which are not. Users can then choose to click on only those aspects that are not progressing well for additional detail that may help to inform co-decision making. Upon clicking, detailed data for the patient is displayed over time. For some co-decision items, where an external reference could be helpful, there is an additional plot of the

\(^2\) http://www.hon.ch/HONcode/Patients/method.html
patient's progress in comparison to that of a reference group of similar patients (e.g., physical activity). Further on, each plot is printable, so that the clinician can offer the patient to create a printout, which the patient can take home. The printout will only contain the annotated plot, but no further patient information.

2.1.1 Restrictions for Co-Decision Making

The following restrictions are key to ensuring patient privacy and data confidentiality. First, clinicians can only see detailed data for their own patients. This is enforced through individual weekly patient ID's, which must be explicitly shared by patients with clinicians. Second, when data is shared, the clinician is only granted access to the data for, at most, one week. The app provides a new ID to the patient each week, along with their weekly self-management plan. The clinician's data access automatically expires when a new ID is issued. Third, aggregated data for progress comparison must come from patient groups containing at least 10 patients. This is to ensure that aggregated data cannot be traced back to any individual patient. The aggregated data is only used for reference so that the patient can gauge his or her progress against that of similar patients. Similarity measures will be tailored to select similar patients for inclusion in the reference groups.
3 Input

The co-decision module that feeds the data into the dashboard is based on services that will use the same data sources as the app, but aggregate and prepare the data differently in order to display historical data and to identify similar patients or groups. The goal of the dashboard is to create a tool for the clinician to easier communicate treatment goals.

Information about the patient – mostly focusing on tailoring and self-monitoring:

- Physical Activity (Activity vs. Inactivity)
- Exercise
- Sleep
- Function (Patient specific functional scale (1 item))
- Pain (Numerical pain rating scale (1 item))
- Pain self-efficacy questionnaire (2 items)
- Fear Avoidance (Tampa (1-item))
- Mood (Patient Health Questionnaire (2 items))
4 Wire frames

In this section, we will present wireframes that describe the general concept of the clinician dashboard. Figure 1 shows the flow through the dashboard during a co-decision session between a clinician and a patient. First, the clinician has to log on to the dashboard. Then, he or she has access to data for all of the patients associated with his/her practice. In order to obtain a patient dashboard, the patient’s ID has to be entered. The patient can find the ID in the SELFBACK app. Next, the dashboard opens with a general view providing patient details as well as a set of nine tiles for navigating through the system. Sub-pages can be reached from each tile, as well as from the navigation panel.

4.1 Starting page

The clinician dashboard is only accessible for registered users. Therefore, a user has to sign in, before access to the dashboard is granted. Figure 2 shows the login page for the clinician dashboard.
4.2 Retrieve patient data

A patient is expected to use the app settings and show the clinician an access code to his or her latest data. This access code will pull the latest information from the server and present it to the clinician. Figure 3 shows the “home” page from which the clinician can start the co-decision session.
4.3 Dashboard

Once a valid patient ID for the clinician’s practice is entered, the patient view opens with an overall dashboard. The dashboard, as shown in Figure 4, contains four components:

- The header displaying the name of the clinician.
- An extended navigation bar on the left with access to all sub-dashboards.
- A patient summary displaying patient specific information. This information is used for comparing patients in the background.
- An overview of patient generated data indicating how frequent user data has been provided.
- The main screen containing nine tiles. Each tile addresses one co-decision field. Additionally, each field has a bar on top indicating the status of the patient in this field. Green (6-8 filled blocks) indicates good progress, yellow (3-5 filled blocks) indicates some challenges, and red (1-2 filled blocks) indicates a strong need for an intervention.

In order to start the discussion with the patient, the clinician has to click on the tile to open the next screen. Each tile has a question mark, which links to further information on the co-decision topics and summaries of clinical guidelines for that particular area.

Figure 3: Fetching patient data
4.4 Tile Example: Physical Activity History

Once a co-decision tile has been selected, more detailed information is displayed. In the history view, the achievement of the physical activity is displayed (Figure 5). It shows to which degree the goals have been achieved. The history view includes the baseline and the first three weeks as well as the most recent weeks. The baseline describes the initial number of daily steps the patient is able to do when entering the SELFBACK program. The dashed line in the middle indicates that the view can be expanded to include more weeks if desired during the co-decision session. This view keeps the patient summary in place and only updates the center screen. Further, the links on the left stay in place, so the clinician can either go back to the home screen or move directly to one of the other co-decision items.
4.5 Tile Example: Physical Activity Group Comparison

In the group comparisons – as depicted for physical activities in Figure 6 – we use the current patient and retrieve similar patients’ cases from the case base. The set of most similar patients is then used to define the minimum and maximum achievements in order to show how the achievements of the current patient compare to those of similar patients. This retrieval only uses cases with positive outcomes from the case base, thereby providing an argumentation guideline that, if the patient is within the boundaries, we foresee a positive outcome. If the patient is above the maximum for his/her group, this provides either very positive feedback for the patient, provided other aspects of their self-management plan are also doing well or feedback is given that the patient is over active and should try to comply with the given self-management plan. If the patient is below the minimum, the clinician should address that. Likewise, if the patient is very active and symptoms still are high (e.g., pain), it may be that the patient is over-doing and should reduce the activity. In order to achieve a positive overall outcome, the patient should try to adhere to the self-management plans as closely as possible.
Figure 6: Group Comparison View - Physical Activity Example
4.6 Example additional information for clinician

The content and self-management plans of the SELFBACK decision support system are developed from international clinical guidelines. In order to ensure that the clinician has easy access to such guidelines they will be available via the Clinician Dashboard. However, these documents are lengthy and are not necessarily suitable for consideration during a time-limited patient appointment. To provide GPs with the summary recommendations from these guidelines there is a on each tile. Hovering over this area with the cursor will bring up a recommendation from this area based on the respective national guidelines, which are mandated by the national health authorities (e.g. NICE clinical guidelines\(^3\)). Examples from function, exercise, mood and education modules are:

- **Function**
  - Encourage a patient with LBP to continue with normal activities; including returning to work or normal activities of daily living

3. https://www.nice.org.uk/guidance
• **Exercise**
  - Take people’s specific needs, preferences and capabilities into account when choosing type of exercise
  - Biomechanical, aerobic, mind–body or a combination of approaches

• **Mood**
  - Consider cognitive behavioral approaches but best when combined with other self-management approaches
  - Encourage a combined physical and psychological programme
  - The Patient Health Questionnaire (2-item) has been used in SELFBACK, scores of ≥3 suggest further investigation may be required

• **Education**
  - Provide information on the nature of LBP
  - Ensuring that the LPB is non-specific and ruling out cancer, fracture, infection or inflammatory disease process
  - Reassure – non-specific LBP is likely to have a good outcome; but you can also “live well” with LBP
  - Importance of self-management
  - Ensure advice and information is tailored to individual needs and capabilities
5 Co-Decision Making: Clinician – Patient interaction

Based on the information available via the SELFBACK Clinician Dashboard, it is expected that this will facilitate discussion between clinician and patient, particularly around what barriers may be preventing patients from engaging with all of the self-management advice provided. The following are scenarios from the dashboard that the clinician might consider instigating a conversation with the patient about:

- The patient is not reaching their number of steps goal:
  - Why might this be? Are there ways that this could be overcome? Does the patient understand the benefits of activity?
- The patient is achieving the recommended goal of activity but their mood is not improving
  - Why might this be? Has the patient taken part in the educational component of SELFBACK? Does the clinician need to investigate the patient’s low mood symptoms in more detail? Is the patient doing too much activity, could they consider pacing their activity? Is there a different type of activity that the patient might prefer? Are there other problems that might be effecting their mood?
- The patient is achieving the recommended goal of activity but their function is not improving
  - Why might this be? Has the patient taken part in the educational component of SELFBACK? Are they doing the strength/flexibility exercises as well as the walking?
- The patient is not achieving their activity goal and their mood and function is also poor
  - Has the patient been engaging with the advice given? Could they consider small steps towards their goal and concentrate on the educational component? Does the clinician need to consider seeing this patient more frequently until symptoms improve?
6 Personas

Here we have described two personas – one patient and one clinician - to show how we envisage the Clinician Dashboard being used in everyday practice.

6.1 Patient

A female patient (age 38 years, body mass index $31 \text{ kg/m}^2$, cleaner) was advised by her GP to start to use the SELFBACK tool to help her manage her LBP. She has had her LBP for almost six months and it doesn’t seem to be getting any better. She has always found that walking makes her LBP worse and believes she gets enough activity from her job as a cleaner. She reports using over the counter pain killers to help her to be able to do her job and she reports low quality of life as she is unable to enjoy activities with friends and family. She has been using the SELFBACK tool, wearing the wristband and using the app for one month, she says that she has been following the advice but is not able to achieve the steps goals because it aggravates her pain. She wants to discuss her LBP with her GP.

The GP is able to bring up her SELFBACK profile on the computer after she gives the GP her ID from the app and they can look at the computer screen together. The patient finds this useful and can see that she is gradually increasing the number of steps that she is taking and is getting closer to her first goal. The GP starts to talk to her about what it might be that is stopping her from doing more exercise and he shows her some graphs on the screen. Her belief that exercise will result in pain has remained constant over the past month and the GP suggests that she watch some of the educational videos on the SELFBACK app again to try to understand more about the causes of LBP to see if that might help her try to do more walking. The GP suggests to the patient that the exercise would be helpful not only for her LBP but for her weight and mood as well. The GP shows the patient a screen where she can see her pain score compared to other people like her and sees that if she keeps using the app it looks as though her LBP will improve. The patient takes this as encouragement but is also confused about how the GP can be sure about this. The GP explains that this information is based on other patients who are similar to her in terms of age, sex, and other important characteristics such as her weight. The patient says that she will try to do this and will come back and see the GP again in about two months’ time.

6.2 Clinician

A GP has been recommending use of the SELFBACK tool to a number of patients, some with new episodes of acute LBP and others who have had LBP for a long time or who have had a recent flare-up in their pain. The above patient has been coming to see the GP regularly (every one to two weeks) for their LBP for 6 months; one month ago, the GP suggested that she start to use the SELFBACK app. When the patient comes into the consulting room, the GP asks her how she is and how is her LBP. She reports that she has been using the app but that her pain has not got any better. The GP asks the patient if she can look at her SELFBACK profile with her. The patient provides the GP with a personal ID code and then the GP enters
this code into the system and brings up the patient’s profile. The GP can see on the pain intensity progress graph that her pain has actually gone down from 7 when she first started using the app, to 5 just two days ago. Showing this to the patient, allowed the GP to highlight this. As this patient has a physically active job but doesn’t think that exercise helps her, the GP asked about her exercise and walking routine. The GP brought up the activity progress screen and sees that the patient is not making her target number of steps, but she has increased her activity from the first week. The GP shows her activity in relation to other people like her, similar weight and age, and she can see that she could be more active. The GP asks her why she is not doing as much and she reiterates her worry that it will cause more pain and indeed the GP can see this when they looks at the TAMPA score graph, this has not changed from the first use of the app. They discuss why this might be and the GP is able to reassure the patient and encourage her to pay special attention to the educational component on the app to understand more about what causes LBP and that physical activity isn’t damaging. The patient leaves the consultation with the GP feeling positive as she can see that other similar patients who have followed the guidance have had an improvement in their pain. The GP suggests that she leaves it for two months before coming back, unless there is something different or changed about her LBP.
7 The implementation of the SELFBACK Clinician Dashboard in Clinical Practice

Below, we describe the main challenges and how exploitation of the results from the SELFBACK project may help to advance the implementation of computerized support and shared decision-making in clinical practice.

7.1 Patient generated data

To facilitate precise and well-informed decisions, it is important to have access to valid and relevant data for the consulting patient. Some of these data may be collected by the patient him-/herself, i.e., patient generated data (PGD). For conditions where self-management constitutes a core component, such as for LBP, it will be particularly relevant to have time-series PGD about the self-management process when the patient has regular follow-up consultations. Such time-series PGD should take the form of repeated achievement (self-management) and outcome (symptom progression) measurements, such as the PGD captured by the SELFBACK system. When clinicians have access to PGD in a structured setting, they report three main benefits with direct relevance for shared decision-making:

1) Improved insight into the condition of individual patients,
2) Improved general and clinical information about the patient,
3) Better insight into symptom variation and health behaviour between consultations, enabling revision of treatment plans to improve outcomes and avoid unnecessary consultations.4

In summary, this is likely to facilitate the shared decision-making between the patient and the clinician.

7.2 Barriers for implementation

The main barriers for implementing PGD in clinical practice are centred around the following aspects:

1) Technical/ethical issues (collection and storage of PGD, patient privacy concerns),
2) Time constraints and usability of PGD in clinical practice (access to the PGD during a consultation, how to use and interpret the PGD data), and
3) Cultural issues within the clinical community (lack of practice workflows and protocols related to collection and use of PGD).1,4,5

To facilitate the implementation of shared decision-making and the use of PGD in everyday clinical practice, at least four requirements must be met:

1) Easy access to PGD that ensures patient privacy,
2) Easy access to evidence-based information about treatment options,
3) Guidance on how to weigh the benefits and risks of different treatment approaches, and
4) Acceptance within the clinical community to use the clinician dashboard
5) Encourage clinicians to engage in co-decision making.

These data will allow clinicians and patients to gain insights into the progression and impact of symptoms.\(^6\) Thus, although some promising results have been presented, there is still need for further research to understand how access to such data can be implemented and utilised in clinical practice.

A potentially important input to the process of shared decision making between the patient and clinician is data collected over time by wearable activity tracking devices. Such data may be of particular relevance for follow-up of patients with chronic conditions and diseases where self-management is a basic ingredient of disease management. Recent studies show that about 21% of adult Americans use technology (smartphones, smartwatch etc.) to track health indicators (exercise, routines, sleep, etc., weight, diet, or exercise routines in some manner).\(^4\)

7.3 Exploitation of the clinician dashboard

In the selfBACK project, the co-decision module is developed as a showcase and will not be implemented in the randomised controlled trial. However, the potential for implementing such a tool in clinical practice in the future is promising. The barrier for its implementation is first and foremost the time constraints and privacy issue related to sharing of data. A GP will typically have 10 minutes available per patient. From a patient perspective, the privacy issue seems to be less important if they see a value in it. A recent study by PwC showed that 88% of patients are willing to share data from, e.g., their activity tracker device and smartphone, if this can improve treatment and help other patients in similar situations.\(^5\) However, the technical solution for such data sharing is still a challenge.

7.4 Summary and Future Work

Here we have developed an in-depth proposal and demonstration of the potential of a Clinician Dashboard to work alongside the selfBACK decision support tool for the self-management of LBP. We have created wireframes and provided examples of how the dashboard could work in practice, including potential challenges to its implementation. Based on our findings, we will use the wireframes and review them with clinical practitioners and patient user groups. After their feedback, we will create a demonstrator connected to the selfBACK backend in order to display patient's data. Further on, necessary data security measures have to be implemented and tested.

\(^4\) [http://www.pewinternet.org/2013/01/28/tracking-for-health/](http://www.pewinternet.org/2013/01/28/tracking-for-health/)

\(^5\) [https://www.pwc.com/il/en/pharmaceuticals/assets/healthcare-unwired.pdf](https://www.pwc.com/il/en/pharmaceuticals/assets/healthcare-unwired.pdf)
References