A Better Way to Implement ACT as a Web Application

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ABSTRACT
By evaluating and developing a new prototype for an implementation of an ACT behavior sustaining program as a web application this study aims to find the ultimate way to do this. The goal with the web application is for it to be intuitive and motivating for its users and administrators. This was done by usability testing, prototyping and evaluation of an existing application. The study resulted in a high tech prototype with features supporting a steady workflow, which concluded in higher user motivation.

INTRODUCTION
Pain is a very fuzzy word and is experienced in many ways. According to Beivik et al (2006) about 18% of the Swedish population suffers from some kind of chronic pain.

> *"Pain is whatever the experiencing person says it is, existing whenever the experiencing person say it does"*
> (McCaffery and Beebe 1989, s. 7)

According to Gustafsson (2005) having chronic pain means that the affected person experienced pain in more than three months. This plays a crucial role in the affected person's everyday life and due to the pain even easy chores become difficult resulting in a loss of life quality. There are a number of reasons why chronic pain can occur. It may for example occur after a nerve damage, cancer, osteoarthritis, chronic infection or even after a previous injury which has healed badly. When chronic pain occurs in the body our normal pain signal cease to be helpful. The most common treatments for chronic pain are cognitive behavioral therapy (CBT), especially acceptance and commitment therapy (ACT) and physiotherapy. Since chronic pain by definition is not curable these treatments help the patient to accept and to live with the pain. This kind of treatment demands a serious commitment from the patient. Sometimes the healthcare complements the treatment with a behavior sustaining program as a way to achieve an as normal and meaningful life as possible.

Steven Hayes (2005), the front man of ACT, writes on the ACBS website that if you accept your handicap, you can aspire to live a normal life. One of the keys to the therapy is to achieve a psychological flexibility, which for example involves seeing the reality as it is today. You can achieve this by doing specially designed exercises. Hayes (2005) writes that earlier studies show that this treatment has been very successful in many ways such as users with different needs. He means that instead of eliminating difficult thoughts ACT helps us modify them. A big factor when working with ACT is motivation. All aspects of the rehabilitation must work smoothly for motivation to take place.

Remote treatment is common in therapeutic treatments such as cognitive behavioral therapy and ACT. According to Carlbring et al (2006) there are two different ways remote treatment can be implemented. First there is self-administrating therapy where there is little or no psychologist help involved. In self-administrating therapy the psychologist is only involved in the initial state. The other way is for the psychologist to have personal contact with the patient throughout the remote treatment. He argues that remote treatment makes it possible for more people to get psychologist treatment. To be able to sit at home is according to Carlbringer (2006) both easier and less time consuming than regular psychologist treatment.

We wish to explore, at a client's request, how to best implement an ACT behavior sustaining program as a web application. We also want to create the possibility for further development, both from a technological and a therapeutical standpoint. It should be possible to adjust the application for the needs that appear.

METHOD
According to the client the main concern was that the current program lacks the needed efficiency level. Today there is virtually no possibility for development of the design or technology within the system. There is however a strong need for the possibility of development so that the rehabilitation can be adjusted for the users' needs. This results in the following issues:

1. How can we best implement an ACT behavior sustaining program as a web application?

2. How to renew or develop the application so that it is adaptable and intuitive for the user?

Although the main goal of this study is to find answers to the questions stated above, we also got a number of objectives we wish to achieve:

- Creating good guidelines for the implementation of the web application.
- Creating a prototype for the client
- Creating guidelines for further development

This study will hopefully result in both an implementation of the prototype and open up for further development.

Design process

"Design is choice, and there are two places where there is room for creativity:

1. *the creativity that you bring to enumerating meaningfully distinct options from which to choose*
2. *the creativity that you bring to defining the criteria, or heuristics, according to which you make your choices. "*

(Buxton, 2007 p. 145)

When designing the prototypes Buxton's (2007) model was used. This model show us how to work efficiency without getting stuck at one thought. Visually you can explain this process as a spruce.

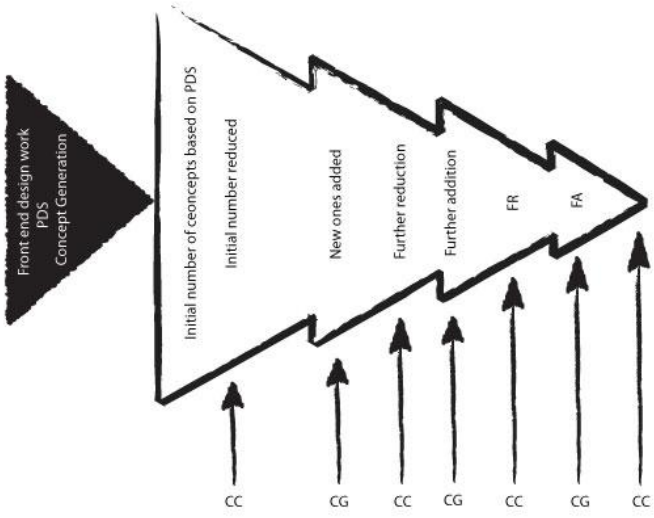

Figure 1 Here the Buxton's (2007) spruce illustrates how you start very wide and work towards a narrower goal. New concepts are added in what is called Concept generation (CG). In Concept convergence (CC) some concepts are eliminated and others are merged in correspondence with the feedback.

Before we could go further within the model we had to generate an apprehension of the current application and its problem. Based on this concept we could then conceptualize the first batch of solutions. In order to achieve this we had to divide our design process into two stages. The first stage is usability testing of the current web application and the analyzing and processing of the information gained. In the second stage low-tech prototypes were created and evaluated. The resulting prototype was usability tested and modified repeatedly. When all major usability problems were eliminated a high-tech prototype was created.

For the usability testing of the current web application the relevant informants for our study were its user and administrators. The informants were selected by a sample of convenience which is according to Tullis and Albert (2008) one of the most common sample selection strategy. In total five informants participated in this stage of the study. Three were users and two were administrators. Five informants were considered to be sufficient given that, according to Tullis and Albert (2008), a selection of five informants can identify about 83% of the usability problems. This is called "The magic number 5" rule.

The usability testing was conducted as an observation featuring storytelling and measuring of task success. The idea behind storytelling is that a lot can be revealed when a person can speak freely about an issue. Saffer (2007) writes that the simplest questions can result in very informative answers. Tullis and Albert's (2008) measuring of task success is one of the most common usability metrics and it is a method which is easy to apply. The observations were concluded with the informants answering the System Usability Scale (SUS). They write that SUS is a test which allows designers to compare the usability of different systems. It contains five positive and five negative claims and you answers it by how much you agree with each of the claims. The resulting score is between 0 and 100, with 100 being perfect usability. The SUS scores from this stage are used to compare the usability with our prototypes throughout the design process.

As the poor usability of the current application was previously known, more effort was spent on retrieving information regarding the needs of the users and administrators. Notable aspects concerning the development of a new prototype were documented from the collected data. These aspects were based upon three factors; the purpose of the application, what needs it should fill and the informants experience of the existing application. All of these aspects were compiled and compared to illuminate what the informants had in common.

At this stage a general apprehension of the current application and its problem had been formed. This allowed us to go further within the model (Figure 1) and to start the first concept generation process. We started broadly by creating five prototypes that suggested layouts and features suitable for the application. Prototypes for both users and administrators were made, because of their different needs. Evaluations of the prototypes were made based upon the benefits and disadvantages each of them had. Löwgren and Stolterman (2004) write about a number of affordances important when designing user interfaces. In this study we used affordances such as *effectiveness*, *flow* and *functional minimalism* among others. The benefits and disadvantages were found using these affordances.

To generate new vivid ideas in the early stages of prototyping we used the Random word technique, recommended by Islam and Trolley (2006). This is a technique that is used to create new thoughts and stop us from getting stuck in the same track.

In order to converge the different design concepts the best layouts and features were merged into a smaller amount of prototypes. To extend the opportunities for new information and input we often changed our responsibilities and a person who first worked on a user prototype worked the next time on the prototype for the administrators. After each new prototype an evaluation took place which was based on the previously mentioned affordances. After every evaluation the responsibilities alternated. The design phase was concluded with four prototypes that were merged into one.

Usability testing was done on the prototype. After each round of usability testing the prototype was modified to adjust the problems that had occurred. Yet again the sample of convenience was used. None of the earlier informants participated in this phase of the study. In total there were three iterations of testing, first with eleven, then five and finally three informants. After these three iterations the usability was found sufficient. The low-tech prototype was developed into a high-tech prototype using Adobe FireWorks.

RESULT

As stated earlier one of the objectives with this study was to create a prototype for the client. In developing this prototype changes were needed in the way the behavior sustaining program was implemented as a web application. The current application is, according to the users and administrators, ineffective and has a insufficient workflow. The major change that had to be made was the way that information was presented to the users and administrators. One thing we did to improve this was to reorganize the information by dividing the earlier worksheets into different sections of the application. This was done in order to increase the previously mentioned affordances.

A training journal, a weekly goal planner, stages and resources were features extracted from the original worksheets.

The training journal includes several motivating aspects such as a statistical graph that shows the users progression. The feature also allows the administrators to see the training progression and they will be able to give feedback to the user. We expect that the statistical graph is going to increase the playability in the application. In our initial usability study opinions were expressed about the lack of feedback on the weekly goals set by the user. This was the main reason to construct the weekly goal planner so that the administrators can take part of the users' goals on a weekly or monthly basis. The feature will enable the users to set goals and to evaluate them.

A stage contains a text with questions for the user to answer and includes a timeline that gives the user a good view of the treatment. Complaints about uncertainty of where the user is in the treatment led us to the idea of a timeline. Resources contain information that the administrators deem to be beneficial for the user. Both stages and resources can be individually adapted if needed by the administrators. This was a positive aspect of the current application that we chose to keep and simplify.

A big change in the prototype is the way the work is done. The first page that confronts the users and administrators is a to-do list which enables them to easily get a view of what needs to be done. Compared to other features in the prototype, that partly emerged from the worksheets; this feature is solely based on needs of the users and administrators. Its purpose is to create an optimal workflow while doing the tasks on the list. The to-do list has a reminding effect. Since it will automatically send the users and administrators to the next task, the to-do list helps to navigate through the tasks.

Although previously mentioned results to a great extent are based on experiences of users and administrators the SUS-score also indicates an improvement in the usability of the application. Our final prototype obtained a SUS-score almost 24 units higher than the current application.

DISCUSSION

One of the questions we asked ourselves in the beginning was how to best implement an ACT behavior sustaining program as a web application. We believe we have accomplished this by improving the affordances and by simplifying the features. We have by reorganizing the information represented in the web application showed in numerous ways how affordances can be increased. By reorganizing the information the application is now self explaining with a largely improved workflow. This result was not entirely unintended but the effect was surprisingly strong. There is also reason to anticipate an increase in motivation. This by both amplifying the playability and to increase the amount of feedback given to the user from the

administrator. There is also reason to believe that introducing a timeline in the stages feature increases the motivation. This timeline enables the user to get an overview of where he or she is in the treatment. There is reason believe that this will have a positive effect on the treatment by allowing the user to see an end to the treatment. They now have a goal.

One big advantage with the prototype is the possibility to personalize the treatment. The personalization involves almost all of the features. To which extent varies amongst the features. An example of this is the weekly goal planner where the administrator has the ability to choose whether the user should be able to work with the weekly goal planer simultaneously with the stages, or not. The administrator can also vary the frequency of commenting the users' goals depending on the individual needs. This is virtually impossible in the current application. This could however have a slight disadvantage as it is possible that it will increase the workload of the administrator. On the other hand the overall workload for the administrators has decreased since the workflow has been substantially improved. Although these disadvantages do exist we find that the beneficial aspects of personalizing are greater and with more value for the treatment.

Overall many improvements were made to what we believe can help and assist this behavior sustaining program for treatment of chronic pain. Even though our prototype is designed to fit the specific treatment of our client we have consistently tried to create the prototype with the vision of it being able to be used in other treatments as well. A treatment based on ACT or CBT should be able to use our prototype as a template for creating a remote self-help program. However, if we had unlimited resources the template could be further developed. For example the use of a mobile application could bring the treatment closer to the user and eliminate the need to sit in front of a computer. This could allow the user to more easily live according to his or her visions and thereby living a more fulfilling life..

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