

From Digital Pen to User Interface

A qualitative study of patient's and healthcare provider's attitudes towards a user interface based health reporting system

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Abstract

Healthcare is increasingly moving towards an online based service. Such services already exist for the average person regarding issues such as warts, urinary tract infections, acne, and back pain. Elderly, however, who are under supervision from their healthcare providers, often need to report their values to their providers on a daily basis, but have difficulties with traveling to their care center or hospital. The services already available are not adequate for these patient's specific needs. This paper is a result of our collaboration with the company Phoniro, that aims to fill this gap, and the aim is to judge the feasibility of this concept. We did this through interviews with healthcare providers and patients, and designed a prototype of how the application attached to such a service could look. Patients were provided with the prototype after the interviews and observations were conducted upon their interactions with it. Through our research, we found that the concept is feasible, but we question its necessity due to comments left by patients. Today the patients use a digital pen which transfers information written on pieces of paper to the hospital. Our aim was to judge the feasibility of transitioning to a user interface instead of the digital pen. If this service was to be implemented we recommend a stepwise transition for the sake of patients as well as for the personnel.

Introduction

Technology has integrated itself within human's daily life, whether it be in the workspace – professional or academic, or facilitating interpersonal communication socially. Technology has made lives easier by eliminating an extra step that one must take to relay information. The world is moving towards a paperless society. Because of this, topics concerning health and well-being must be equally accessible, if not more. Although, given

that there exists a widespread availability of fitness protocols, applications and guides, this study aims to explore the fields of healthcare within the elderly community through the design and development of user interfaces for their betterment and convenience.

Background

The project was conducted in collaboration with Phoniro, a Swedish communication/tech company that is dedicated towards solving problematic areas surrounding elderly care. Regarding our fieldwork, we are working with Phoniro's project called the Health

Diary, which is a daily written log in which the patients record the health parameters that are pertinent to their disease. The patients write on ordinary paper, while using Phoniro's digital pen that reads and registers the values written on the paper. "The scanned information is transferred from the pen to the central system and is thereby available to the staff of the caregiver" (Phoniro, 2018). Due to healthcare moving increasingly towards an online based service (Noergaard et al., 2017), questions regarding the feasibility of a change to a more technical solution of the Health Diary has become progressively relevant. The aim of this study is therefore to answer the following question: Would a transition from the current Health Diary to a tablet-based system be feasible, and what would such a system look like?

Another collaborator on this project was LAH Linköping (Swedish abbreviation for Lasarettasnuten hemsjukvård (eng. Hospital connected home care)). The role of LAH within the Swedish health care system is to offer palliative home care for patients. This includes patients with diseases such as cancer, COPD and various heart diseases. What all these patients have in common is that they require immediate medical attention and individual assessments every day (Region Östergötland, 2018). Due to the requirement of medical attention every day, some patients connected to LAH use the Health Diary to report their daily values, related to their specific disease.

The palliative approach is relevant to all patients with incurable conditions. It emphasizes the importance of considering psychosocial and spiritual aspects as well as the purely physical. It includes consideration of family and domestic careers (Finlay & Jones, 1995). It is a resource for anyone living with a serious illness, such as

dementia or Parkinson's disease, and this type of care can be helpful at any stage of the illness and is best provided from the point of diagnosis. In addition to improving quality of life and helping with the patient's symptoms, palliative care can help patients understand their choices for medical treatment.

Theory

We have established that technology is governing the future of communication whether it be a simple text message or a medical healthcare system that is striving to transition into the digital world. Phoniro's target audience is the elderly – who have a disadvantage when it comes to technology and its usage, due to the lack of exposure they have towards technology (Charness & Boot, 2009).

Interpretative phenomenological analysis (IPA) is a methodological framework used for qualitative research. The most frequently used method to collect data for an IPA study is through semi-structured interviews. In this method, meaning is central, and the aim is to try to understand the content. The main concern in IPA is giving full appreciation to each participant's account (Pietkiewicz & Smith, 2012).

Method

In order to investigate the research question, semi structured interviews were conducted with patients and personnel connected to LAH, which were later transcribed and analysed using the IPA framework. For the patients, a usability test according to Arvola (2016) was applied as well. For the sessions with the patients both a semistructured interview, and a usability test were conducted. The sessions with the personnels consisted of interviews. The

methods we deployed were: A prototype design, interviews that followed the Interpretative Phenomenological Analysis (IPA) framework, and observations centered around a usability tests. At the end, we analyzed the content of the interviews in accordance to the IPA protocol.

We performed usability tests in addition to the interviews for validity. The first step was simply inquiring with the patients on their thoughts about the feasibility of implementing the Health Diary as an interface rather than using the system in its current implementation, with the digital pen.. By conducting a usability test we could thoroughly investigate what a possible transition could look like.

Prototype

To investigate the feasibility of the transition from the paper-based framework that is centered around the digital pen, to a digital system that consists of a user-interface, we produced a prototype of the Health Diary.

Interviews

Interviews were conducted with both patients currently using the Health Diary, and personnel from LAH. These interviews were all recorded and later transcribed.

We decided on three themes around which the interviews would be centered. The three themes were Technology, The Current Health Diary, and Future System. We reasoned that the questions for the technology theme would give us an understanding of the patients technological habits. For the Health Diary theme questions about the current system were asked to understand both how the patients and the personnel experience the system. For the last theme, questions about attitudes and wishes for a future more advanced system were asked.

The interviews from the LAH personnel and the patients differed in the following ways; the interviews with the patients were conducted in their homes, with two interviewers present for each interview. The interviews with the personnel from LAH were conducted at their workplace (in the University Hospital in Linköping) with two interviewers and two staff members. The personnel were interviewed in pairs to facilitate discussions between the interviewees to gain richer and more diverse answers (Morgan, 1997).

Observations

After the initial interview with the patients, observations were held in the same session in the form of two usability tests. This consisted of us observing patients while they completed tasks related to the prototype and for the application Aftonbladet that was used as control. If patients were not able to complete a task or were struggling, the observer guided the patient through the task. During the observation, if a patient said anything relevant in regards to the prototype or provided any insightful information, we noted it and later analysed it according to the IPA framework along with the data from the interview.

Conducting analysis of interview and observation

We have done separate analysis for, both the personnel and patient interviews. Initially, we selected three superordinate themes, these are the same themes that our interview guide was based on, namely 'Technology', 'The current Health Diary' and 'A future system'. After selecting these superordinate themes we read through our transcribed interviews and looked for interesting quotes, taking notes in the

process. The quotes were later divided into subordinate themes which were more narrow than the superordinate ones, most of the time only containing a couple of quotes. These subordinate themes were then used when interpreting the meaning of the quotes, to later produce a conclusion.

The data from the sessions with the patients was analysed through IPA, and parts of it was also compiled into a template for a usability test in order to be able to be referred to when designing an actual application. It is somewhat important to differentiate between these two different types of data; while IPA was used to analyse the patients' opinions and thoughts regarding the idea of a Health Diary interface in general, the usability test was used to evaluate the design of the prototype. We analysed the observations of the prototype using a template from usability.gov (Usability.gov, n.d.). In the template we filled in how well the participants had performed on each task. For every task we wrote down which problems we noted and what solutions we identified that could solve those problems. We analysed the observations of the application for Aftonbladet using our notes from the interview. The findings from the observations of the application for Aftonbladet has been used to interpret the findings from both the interviews as well as findings from the usability test of the prototype.

Prototype Development

Before designing our application, certain functions were deemed as essential for the functionality of the application, for example:

1. Reporting daily values
2. Contacting caretakers (LAH)
3. Viewing previously reported values

4. The ability to view comprehensive statistics of the patient's health (based on previously reported values)

The aspects mentioned above are the main purpose of the Health Diary, however, when implementing these functions in the application, it is imperative to consider other complementary functions such as an instructions section for the users, and the ability to make changes based on the user's preferences. In our application/prototype the complementary functions include:

- 1) Setting an alarm
- 2) Changing the sound output from the application, and other sound settings
- 3) Video instructions intended to guide the user through the application

These functions were decided upon through divergence sketching (Arvola 2016).

Analysis

The analysis of the personnel interviews have shown that they believe patients have different attitudes towards technology; patients who have worked with technology before enjoys it, but the ones who have not, have a negative attitude towards technology. The personnel said that patients who had a negative attitude in the beginning of the usage often change their attitude later on. The personnel also expressed that the elderly would probably not be able to use a more advanced system. In regards to the current system, they felt like the routines for working with it had yet not been well established, and that it had not improved their working conditions, perhaps due to the swift introduction. However, a tablet based solution seems to be desired by the personnel as it could be made to be flexible in the sense that it would be possible for the personnel to individualize the

content of the reporting for each patient. Through this, a tablet based system would be of greater support for the personnel. Another aspect that was mentioned by the personnel as an opportunity for improvement was the communication part. A tablet based system could collect multiple sources of communication at the same place, and it would be possible for the personnel to provide care for their patients without having to visit them, through video chat.

We found a general uninterest among the patients regarding technology, and suggest that this uninterest can be explained by their limited exposure of technology. This is in combination with their age seems to prevent them from learning to use technology, with several patients expressing that they are too old for technology, and that it was neither a part of their upbringing nor occupation. Besides this general uninterest, we also discovered that the patients found it difficult to use technology, and that it could sometimes result in stress or anxiety. Although most patients expressed these feelings of negativity, uninterest and difficulty, some also expressed that they had previously used technology when it was needed.

The major issues that we found during the observations were problems with identifying clickable objects on the screen. The participants also had troubles with understanding what the labels and icons of the buttons meant, they also seemed to click randomly on the user interface. Another issue we noted was that the participants showed unwillingness to complete the tasks, and that they had problems with closing the application.

Discussion

It might be suggested to be an issue that the relatives of the patients were allowed to

affect the interview, but it proved to have some advantages and few disadvantages. It sometimes provided a second person perspective on top of the first person perspective provided by the patients. The relatives sometimes also helped the patient account for their habits and previously expressed opinions. This could of course be a cause of bias, but since there is a huge benefit from the patients being comfortable as well as them being thorough with their answers and since the presence of the relative contributed to both of these we deemed the benefits to outweigh the disadvantages.

In hindsight, we probably should have showed the healthcare staff the prototype as well and conducted an observation with them. The staff could've had much insight and pointers and shouldn't be too unfamiliar with the system that is being presented to their patients. Maybe they would've disliked the idea of patients being able to book video meetings with them. Maybe they wouldn't have enjoyed the staff being able to comment on statistics. Maybe they would've wanted patients to be able to do something more, that would've aided the staff. This does however lead to the designing of the staff members' system, which wasn't part of our purpose due to our delimitations.

We wonder if we would have achieved more relevant results by using a paper prototype instead of an implemented application. By using an application, we were limited in what we could and couldn't do, and the system failed the participants on several occasions. Because of this we wonder if it resulted in us testing the device as well as atomic.io instead of our particular design. We therefore suggest testing a further improved prototype in low fidelity in the future, such as with paper.

Conclusion

Our conclusion which is based on the analysis of observations and interviews, is that a change to a tablet based system is indeed feasible, in the sense that it is possible, but we are not sure if such a change is recommended. However, if a change is decided upon, one should follow the advice given by the personnel at LAH. Namely, to still keep the old system for those not able to use a tablet, and make it a stepwise transition, which will take time, but it will also guarantee that no patients will be left behind in the process.

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