

Motivational Goals for using Electronic Health Record Applications

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Abstract

The deployment of Electronic Health Records (EHRs) across Australia has provided a platform of possibilities for new technology developers. However, the lack of enthusiasm by multiple health-care providers and patients reveals how many existing applications fail to address the needs of these stakeholders. We conducted interviews with GPs and software company representatives (being partners of our Living Lab) to understand their goals of engaging with EHR-enabled technology, with a focus on their emotional goals. We then constructed a motivational goal model to represent the technology goals that are relevant to our case study. This approach to gathering technology requirements enabled us to elicit, organise and communicate the functional, quality and emotional goals for EHR-enabled technology. Results illustrate our living lab process and reflect on a variety of goals that may be supported by EHR-enabled technology. The goal model will be evolved and utilised in the planning of future phases of this living lab project.

Keywords: *Goal Model, Living Lab Case Study, Electronic Health Record, Emotions*

1 Introduction

The role of healthcare providers as ‘information gatekeepers’ is changing (Bomba, 2001). The ever-widening access to our own health information brings a shift in power from health care providers to their patients. These changes are often met with great resistance (McGinn, 2011; Barrett, 2018). One particular shift in power has accompanied the deployment of Electronic Health Records (EHRs), which has brought new ways for patients to access their health information online. This new dynamic---i.e. people being able to access their health information at will---provides a platform of possibilities for novel telehealth applications. A broader question surrounding EHRs is therefore: How can we utilise this platform in order to improve how people manage their own health?

Significant governmental funds are continually being directed towards the deployment and appropriation of EHRs into health care facilities. However, many stakeholders have concerns about using such technology; especially, within a traditional GP consultation time slot (Linder, 2006; McGinn, 2011). The increased pressures on health care facilities to adopt EHRs have been met with resistance on part of health care providers and patients alike. In particular, emotional goals are frequently overlooked during development; technology developers often focus on functional goals (i.e. what a solution does) as opposed to quality and emotional goals (i.e. how a technology solution should be and feel to the user) (Miller et al, 2014). The emotional aspects affecting the uptake of EHRs are not thoroughly understood and instead stakeholders are blamed for lack of engagement.

In this paper, we report on work-in-progress towards the design of an app that supports patients to self-manage their health. This project is in association with the Future Self and Design Living Lab and Elthi, a software company developing an app to support people in self-managing their health. We conducted interviews with seven GPs and two software developers to gain insights into their emotional perceptions associated with EHR- enabled technology. The findings are then used to construct a motivational goal model (extended form the work of Sterling and Taveter, 2009 and Marshall, 2018) to represent the design challenges and complexities of this (and similar) applications when considering the different living lab parties. The motivational goal model represents the elicited functional, quality and emotional goals that need to be incorporated in the design of EHR- enabled technology.

2 Background

The uptake of EHRs across Australia is faced with disparate challenges related to

social aspects, workflow, technical and professional issues (Linder, 2006). In spite of the commendable goal of improving health and wellbeing, many believe that bringing additional technology into the patient–GP consultation as a basis would result in the natural conversation being interrupted (McGinn, 2011). In particular, the loss of eye contact during a consultation may negatively impact the conversation. Similarly, some patients feel that having a computer in front of them would be ‘rude’ (Linder, 2006). Other issues affecting the uptake of EHRs include the introduction of further inefficiencies into an already short consultation timeslot. For instance, there would be a risk that the retrieval of relevant information may be too slow, or that the patient themselves would spend too much time typing information (Linder, 2006; McGinn, 2011). A recent report outlines common goals that may help future technology design overcome these barriers to engagement. These goals include improved communication, improved health education for patients and, ultimately, improved ability for patients to self-manage their health (AH&C Report, 2017). The focus of existing work places great emphasis around a GP consultation, yet these goals do not necessarily need to be supported from within a GP consultation. Instead, EHR applications may be used before, during or after a consultation which significantly increases the possible number of use scenarios.

One major factor that influences engagement with new technology lies in the emotional goals of the stakeholders (Norman, 2013). A number of existing techniques can be used that allows ethnographers to elicit and represent emotional goals of technology stakeholders in the form of a goal model (Marshall, 2018; Sterling, L., & Taveter, K., 2009; Mendoza et al, 2014; Miller et. al, 2014, Pedell et al, 2017). Goal models can subsequently be used throughout the design process to steer exploration, experimentation and evaluation strategies (Lopez-Lorca et. al. 2014). In the context of health technology, positive emotional experiences during visits to the clinic were shown to visibly increase patient motivation to self-manage their health (AH&C Report, 2017). Supporting positive emotional experiences is not easy. Patients sometimes feel anxious because they cannot remember what they wanted to communicate to their GP. These issues were frequently reported by elderly patients who, as a result, felt stressed and dissatisfied with the overall consultation experience (Bomba, 2001). In such cases, EHRs could provide an additional relevant information to support a positive emotional experience.

More generally, the emotional perceptions of technology stakeholders need to be thoroughly considered to ensure that engagement is sustained in the long-term and an impact through technology can be perceived. Emotional perceptions may refer to primary emotions (Ekman, 1992) such as the desire to have fun while playing a game (e.g. Callele, 2006), while other emotional perceptions may refer to less-immediate reflective emotions that rely on higher levels of reflective, cognitive processes (Plutchik, 2003) such as the desire to feel trust in shared information (Saffarizadeh,

2017). Unfortunately, the emotional goals of EHR stakeholders are not fully understood. This is at least partly due to the complexities surrounding the health care system in Australia, and a separation between wellbeing, quality of life and health – the latter being assessed at distinct points of time instead of being monitored long-term. Like most countries, the Australian health care system is a socially- complex problem domain with competing views on how to best support people in managing their own health and even views that this should be left to health care professionals.

3 Case Study and Method

In this project we focus on My Health App. My Health App is an application owned by a software development company. The aim of this application is to provide patients with an improved ability to self-manage their health. Unfortunately, My Health App faces similar challenges to other applications that aim to build on top of EHRs and therefore the emotional goals of stakeholders need to be carefully considered during design. Our aim is to alongside the software development company, health care providers and patients during the full timeframe of this living lab project. By negotiating all stakeholder views, we aim to design a solution that can reconcile different points of view towards an integrated health care pathway. Currently, our research is in the first phase of the process where activities aim to explore the problem domain and emotions.

We interviewed nine participants and elicited their emotional perceptions related to EHR technology. Each interview was semi-structured and lasted about 30 mins. GPs were selected to represent a range of situations including urban and rural clinics, single and multiple clinics, shorter and longer consultations, short-term versus longer term patients. The two members of the software development company had a wealth of knowledge working with their target user base over a number of years. We discussed topics spanning: (1) their health- related activities, (2) what information they would see as important inside and outside of a GP consultation, (3) how new technology may improve health outcomes, and (4) how they would want it to feel. If they had negative perceptions of EHRs, we asked for their reasons. Results were analysed following a thematic analysis approach to find common themes in the data (Braun and Clarke, 2006).

The results were used to construct a motivational goal model. The use of goal models has been refined in a variety of applications over recent years. They contribute a practical way of communicating (visually and verbally) the functional, quality and emotional goals that need to be addressed in the design of new technology for adoption. Further details of their applications, notations and construction processes

are available (Marshall, 2014; Sterling, L., & Taveter, K., 2009; Pedell et al, 2017; Miller et al 2014). In short, the entities shown in goal models represent what a system should do (parallelogram), how a system should be (cloud), and how a system should feel (heart) These goals are associated with roles (person icon) of people in the surrounding socio- technical system.

4 Results and Analysis

The interviews were transcribed and a goal model was constructed by two authors of the paper. After discussion we merged results into a single agreed model. Figure 1 presents a high-level view of the goal model, while Figure 2 presents a more detailed view of the functional goal to *Improve Consultation Outcomes*. This model will be used to summarise and design challenges that were elicited in the interviews. It will also be used to steer exploration, experimentation and evaluation strategies in subsequent living lab activities.

The top-level functional goal was labelled as *Improve Health* and this encompasses all goals that were elicited. Both patients and GPs aspired to achieve this goal and they wished to feel *in control*, *resilient* and *capable* while doing so. The remaining goals are presented in the following text. Based on the interviews, we divided the core motivations for utilising EHRs into five main functional goals. These goals are: (1) Access Health Data, (2) Improve Consultation Outcomes, (3) Understand Health Situation (4) Stay Informed, and (5) Improve Health Care Provision across Australia. Starting with the first functional goal on the top left (Figure 1); the ability to *access health data* is something that GPs already have the capability to achieve, although it is new to many patients. A participant from the software development company advocated for patients to own and access their health data, regardless of its' further utilisation. It is possible that this goal could have been considered as part of a larger goal; yet the need for patients to feel that they owned their own health data was considered a significant goal in its' own right. Creating this *sense of ownership* was therefore added as an emotional goal to this functional goal.

The second goal is to *improve consultation outcomes* for both GPs and patients. Further details of this goal are shown in Figure 2. Patients may wish to prepare relevant information on their device prior to a consultation. Also, they may wish to refer to their health information during a consultation to support communication. Finally, they may wish to record advice and outcomes of their consultation so that they can refer back to it afterwards.

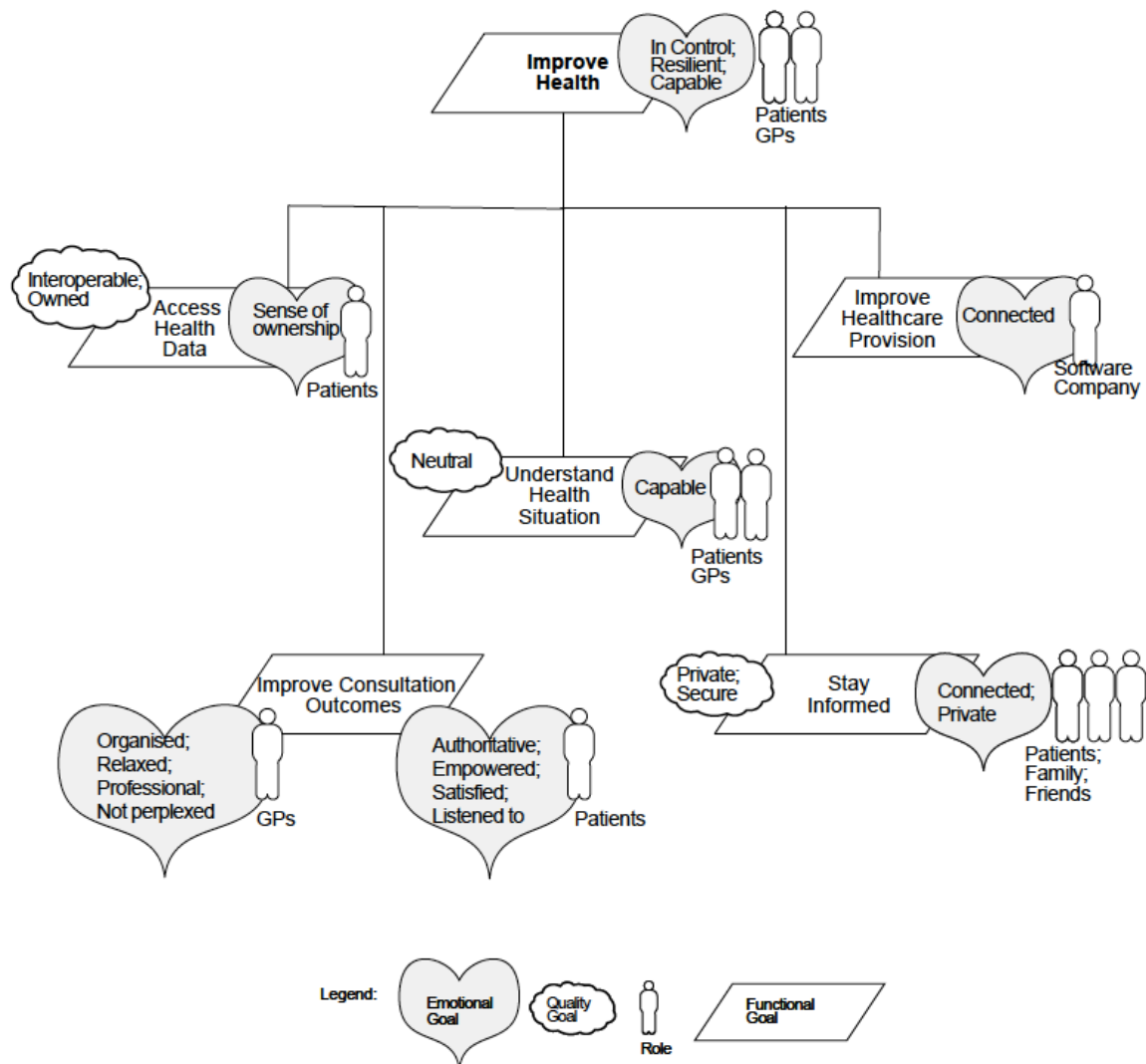


Figure 1. Motivational Goal Model for My Health App

Face-to-face communication is important and it is valuable for a GP to hear patients explain things ‘in their own words’. Therefore, there needs to be a balance on the role that any new technology takes to ensure the communication within a consultation remains effective. The need for information to be *organised*, *accurate*, *relevant*, be a *historical perspective* and *efficient* are the elicited quality goals that are associated with one sub- goal of *support communication*. Participants also referred to key

emotional goals; they wanted to feel *organised, relaxed, professional* and to *not feel perplexed*. One GP discussed the opportunity of technology to support patients in becoming more organised. If the information that is accessible via the application supported existing conversations in an organised way without detracting from the natural conversational flow then this could reduce the anxiety within a consultation. This GP stated:

“it’s very confronting when someone comes and they are all over the place” [...]

“They assume you have some magical power for you to decipher [their medical problem without the relevant information]”

[...]

“The more organised a client is, the more organised I feel, and that makes for a better consultation.”

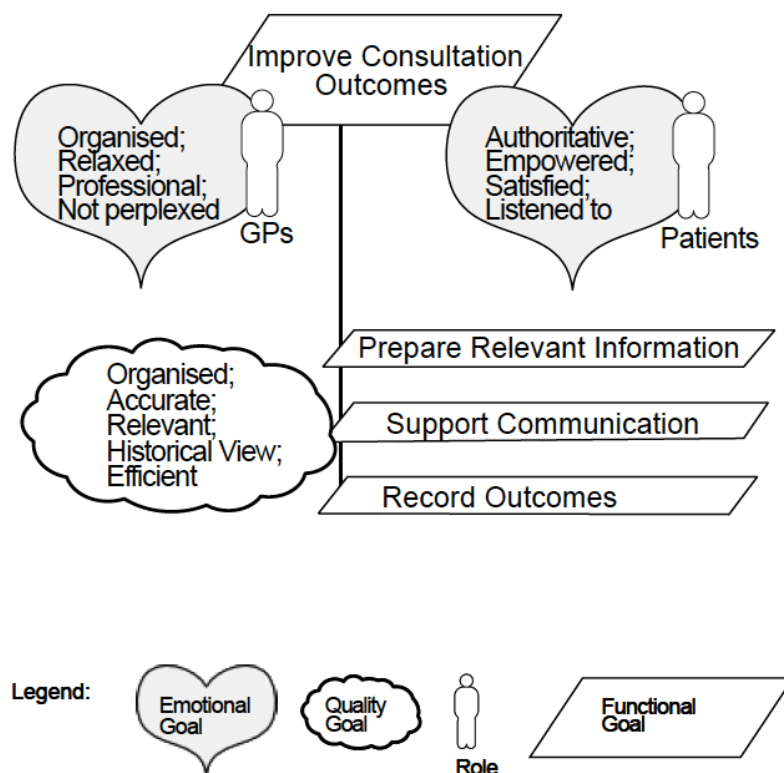


Figure 2. Detailed view of one goal

Both GPs and the software company described their experiences with different cohorts of patients. Based on these experiences they explained how their patients seemed to desire different levels of responsibility when it comes to their health. For those with lower health literacy they thought that they wanted to feel *listened to* and for the GP to take greater responsibility for their health decisions. Other participants proposed that patients wanted to feel *empowered* to make these decisions themselves. Conflicting goals for software applications are not unusual, however, in the realm of emotional goals, they are perhaps even more common due to the very nature of reflective emotions belonging to individual people, rather than the application. These goals will need to be validated in future interviews with patients themselves.

The third goal was for patients to better understand their current health situation. This is a necessary step to improve the ability for them to self-manage their health. For a patient, this could include the ability to explore their health information with or without a specific question in mind. Visualising and discovering relationships in health data is believed to be a core motivation for patients; Patients want to feel empowered while navigating their information. While objective data (e.g. blood pressure measures) are frequently cited as being important to decide on a specific treatment, the 'soft information' often guides questions to provide the initial understanding of the problem. Soft information may be mood, pain, lethargy, anxiety or energy levels and can help the GP to structure and navigate the conversation towards an understanding of the problem. One GP stated: "How is your mood?' That is my most highly weighted question".

Next, participants noted that it would be useful for patients to *stay informed* about important health events and information. While *staying informed*, participants discussed an underlying motivation of feeling *connected* to others while sharing health news. They may wish to *share* health information with others, including friends or family. Consequently, an appropriate level of *privacy* will need to be carefully considered in the next phase of the project. Finally, the broader goal to *improve health care provision* was articulated by the software company themselves. Achieving this goal may involve contributing to research in health care and contributing new technological solutions for the Australian Healthcare Service.

5 Conclusion

This paper presents an emotion-led exploration of the design challenges for new technology that utilises Electronic Health Records. The aim is to understand the emotional goals of EHR-enabled technology. We conducted a series of interviews

with GPs and representatives from a software company. Results from the interviews were analysed to construct a motivational goal model that structures the elicited goals that should be considered throughout the design process. The model maps emotional, quality and functional goals in order to represent this information visually. The model outlines five overarching goals. This approach to gathering technology requirements enabled us to elicit, organise and communicate the functional, quality and emotional goals effectively.

The five high-level goals elicited were: (1) Access Health Information, (2) Improve Consultation Outcomes, (3) Understand Health Situation, (4) Stay Informed and (5) Improve Health Care Provision across Australia. For each of these functional goals we described the emotional and quality goals that need to be considered during the technology design process. Emotional goals included the need to feel in control, organised and to have a sense of ownership, amongst others. We propose that realising these emotional goals will lead to shifts in the health care system as patients will get a better understanding of the impact of their actions on their own health. It is possible to see how certain emotional goals span many of the desired functionalities. In other cases, it is possible to see that some emotional goals are only associated with one isolated aspect of functionality. The goal model will be evolved and utilised in the planning of future phases of this living lab project and their main stakeholder.

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