

Collaboration through ICT between Healthcare Professionals: The Social Requirements of Health 2.0 Applications

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Abstract. Social requirements are defined as the users' needs related to the use of an application in interaction with others. This paper aims to formulate social requirements of health 2.0 applications for professional healthcare workers. Collaboration is seen as the central characteristic of these applications. To detect the social requirements, we first identified four features that determine how healthcare professionals collaborate: (1) the professional status of healthcare professionals; (2) patient centeredness; (3) ambiguity in medicine and (4) complex organisation of healthcare. Based on these characteristics and findings of Computer-Supported Cooperative Work (CSCW) research in healthcare, we were able to formulate three social requirements for health 2.0 applications: (1) supported autonomy; (2) rationale in context; and (3) fluid collaboration. These requirements will serve as input for health 2.0 scenarios.

Keywords: CSCW, healthcare, social requirements, health 2.0.

1 Introduction

1.1 Health 2.0

In the aftermath of the dot-com bubble, Dale Doherty argued that all the companies that had survived the collapse had some characteristics in common. These characteristics could be called 'web 2.0' [1]. In no time, it was examined what sort of value web 2.0 applications could add to the domain of healthcare [2, 3].

Currently, definitions of health 2.0 vary widely [4]. From a healthcare point of view, several characteristics that web 2.0 enables and facilitates have been identified as especially relevant by eHealth specialist Gunther Eysenbach [5]. He mentions social networking, participation, apomediation (networked collaborative filtering processes), collaboration and openness as characteristics of health 2.0.² The health 2.0

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² Eysenbach prefers the term 'medicine 2.0': some authors see it as a broader concept than health 2.0 since it more explicitly includes 'science 2.0'. But he quickly adds that most authors do not see a significant difference between the two terms.

discourse is diverse and many different interpretations are attributed to the concept [6]. Some see health 2.0 applications as empowering tools for patients: they may change the dynamic between patient and physician and in doing so ideally make healthcare more patient-centred. Others, however, prefer to see health 2.0 applications as a tool to create a more efficient, lower-cost healthcare, a tool for healthcare reform [6]. This research was done as part of the Share4Health project, which aims to develop a collaboration space for healthcare professionals: a platform that facilitates the exchange of clinical data. However, within the project we also look into forms of collaboration that go beyond the mere exchange of data. Therefore we chose to focus less on the empowering qualities of health 2.0 applications, and more on the possible advanced forms of collaboration health 2.0 offers.

In our view, collaboration is the central characteristic of health 2.0 applications. When we look at the health 2.0 as described by Eysenbach, we see openness, participation and social networking as preconditions or partial concepts of collaboration. To collaborate, there need to be at least two people (social networking) who engage (participation) in some sort of exchange of information (openness). Furthermore, the use of networked collaborative filtering processes can only be the result of such collaboration and therefore we see it as a deduction from collaboration.

With the growth of healthcare specialities, it becomes common and even indispensable for healthcare professionals to work in groups in varied settings [7]. Collaboration will have to grow across organizational, cultural and geographical borders, and health 2.0 applications could play a part in facilitating this collaboration.

'Groupware' or applications that facilitate collaboration through ICT have been the focus of a lot of research [8, 9], as it was frequently observed that, while groupware offered interesting possibilities for individuals and organisations, the groupware was not used or not used correctly. Often, it was seen that failed applications ignored the needs of the users. One way to avoid this and to bring in the user's need in the development process of groupware is the formulation of social requirements.

1.2 Social Requirements

Social requirements are the users' needs related to the use of an application in interaction with others. Hereby, the users are regarded as a group of people that pursue a common goal, which is embodied in the application that they use. Social requirements focus on social interaction within the use of the application. Therefore, they go beyond the classic human-computer interaction (HCI) perspective.

As we said, our attention for social requirements should be seen as part of a tradition in design research that underlines the importance of user involvement in the design process [10]. These research traditions all refer to the user to drive, inspire and inform the design development process. The main focus in these traditions is to bridge the gap between the user research and the design process, which has been called the *social-technical gap*. Ackerman defined this gap as "*the great divide between what we know we must support socially and what we can support technically*" [9].

More specifically, our approach can be framed in what has been called the 'third paradigm of HCI': a situated perspective where "*the artefact and the context of the artefact are both defining and subject to interpretations*" [11]. This means that we look at the practices and activities within the world of the users the application is aiming at, look at how their interactions can be supported by the application.

How an application should look, operate and feel is an iterative process, a process of mutual shaping between an application and its users. As a result, the process of requirement formulation is also an iterative process: users shape an application, but the new application again changes the users and their requirements.

2 Method

This paper was written in preparation of user research to be conducted in the Share4Health project. We took the overview article of Ackerman on CSCW [9] as a starting point. Based on his findings, we scanned the literature and brought all findings on CSCW research in healthcare and collaboration in healthcare together.

This allowed us to identify some characteristics of collaboration in healthcare. Through combining these characteristics with the CSCW findings we were able to formulate some hypotheses on social requirements of health 2.0 applications.

The future user research will be used to further refine the social requirements and to further reformulate these rather abstract and to a certain extent speculative social requirements to more concrete technical and social recommendations.

3 CSCW in Healthcare

As we pointed out before, we see health 2.0 applications as a variation of groupware or CSCW in healthcare. Grudin identified eight challenges for adoption and domestication of groupware that are still relevant for web 2.0 application [8]. These challenges shed a first light on the reasons why applications that support collaboration often fail in practice: (1) Groupware often requires additional work of individuals who do not perceive a (personal) benefit; (2) groupware needs a certain number of users before the application proves to be useful; (3) groupware may bring changes in the social structure and social hierarchy, and touch upon social taboos; (4) groupware may not accommodate the exception handling that is inevitably part of group work; (5) group work features are used less frequently than other features, requiring unobtrusive integration with more heavily used features; (6) analysis and evaluation of groupware is difficult, which makes it difficult to learn from experience; (7) design decision makers lack of good intuition for groupware applications, which results in bad product development; (8) the introduction and implementation of groupware requires more care than other applications.

In his 2000 paper *'The challenge of CSCW'* Ackerman further elaborates on these challenges and provides an overview of the CSCW findings that are most relevant for the social-technical gap [9]. We looked at how these findings were applied in the field of healthcare and were able to distinguish four elements that characterize collaboration in healthcare:³

³ Although we speak of 'healthcare' as if it were one single system, it is clear that there are large differences in the tasks and work environments of different types of professional healthcare workers. The focus of the Share4Health project has mainly been pharmacists and GPs and that has also been our main focus in the reviewed articles, although we did not excluded information on collaboration between other types of professional healthcare workers when this seemed relevant. Also, due to the early stage of this work, it was not possible yet to focus on a specific context within healthcare.

- **Professional status or the 'art' of being a healthcare professional.** There is a general sense among healthcare professionals that the profession and the status of the healthcare professional is threatened [14]. New tools to support professionals are therefore often regarded with suspicion: Kaplan noticed that certain doctors fear that their professional status will be undermined by ICT tools [15].
- **Patient centeredness.** For most healthcare professionals, a new ICT tool or system should directly benefit patient care. When a system takes up too much time, a doctor might think that he or she "*could have done a hip replacement instead*" [16]. If a tool does not directly benefit patient care, chances are that the healthcare professionals will ignore it, even though it might for example lower healthcare costs, and so help the total population of patients. In other words, benefits incentives are to be considered on every level, both institutional and individual. And while a system might be beneficial for the healthcare system, doctors and pharmacists see patient care as the central task of their job, and will try to avoid most of the administrative tasks.
- **Ambiguity in medicine.** Medicine as a science is characterized by a lot of uncertainty: while most of medicine is evidence based, it is also partly based on interpretation and opinion [16]. Both diagnosis and treatment are often disputable. This makes collaboration more difficult, as more information needs to be exchanged on the reasoning of the healthcare professional and the line of thought that decisions were based on.
- **Complex organisation of healthcare.** Healthcare is increasingly becoming more specialised. This advanced division of tasks results in a higher need for collaboration and information exchange [17, 18].

4 Social Requirements of Health 2.0

Based on these characteristics and CSCW findings on collaboration in healthcare, we propose three social requirements for collaborative ICT systems in healthcare, or in this case, health 2.0 applications: (1) 'supported autonomy', (2) 'rationale in context' and (3) 'fluid collaboration'. Before we further elaborate on these social requirements, we wish to underline that these are hypotheses, based on the characterising of collaboration in healthcare and the findings above. Figure 1 illustrates how these hypotheses are related to the characteristics of collaboration in healthcare. These relationships are further explained at the end of each paragraph.

4.1 Supported Autonomy

By introducing the social requirements 'supported autonomy' we want to underline the need for support of many healthcare professionals in their profession. The number of self-employed doctors is decreasing because of the lack of support [14]: healthcare is a highly specialised field and its complexity can be discouraging. However, doctors are reluctant to accept support, as they fear that this means that they will also lose control. Doctors fear that extra support comes at a price, and it will take them away from their core task, namely, taking care of the patient [16]. Doctors especially do not see it as their job to take care of administrative tasks.

Doctors highly value their autonomy. This is shown in a study by Dreiseitl and Binder [19] on the use of clinical decision support systems (CDSSs) by doctors. In 24% of the cases the doctor did not agree with the result of the CDSS, especially the more experienced and confident doctors did disagree more easily. From the viewpoint of this paper, we could conclude that doctors value the support they get, certainly when they do not feel certain about a diagnosis, but they feel that they should have the liberty to disagree with the system.

A similar indication of the importance of supported autonomy can be found in a study on the use of a semi-standardised discharge letter as a communication tool between the hospital and the GP [20]. It was noticed that the GP domesticated the discharge letter upon receiving. The GP interpreted the data by highlighting certain parts of the discharge letter. This way, the information became more useful and the GP protected his or her field of expertise [20].

In conclusion, we state that a health 2.0 application should bring a doctor in contact with other healthcare professionals, but at the same time protect his or her individuality. Professional autonomy is highly valued in healthcare and any system that diminishes this autonomy will be regarded with suspicion.

Relationship to the characteristics of collaboration in healthcare: As GPs and pharmacists feel that their *role as a professional healthcare worker* is threatened, they want to concentrate more on their advisory role and they need support to fulfil it. When the medical information is *ambiguous*, a GP or pharmacist may in certain cases want to know the opinion of a colleague because he or she is not certain of doing the right thing. This also means that different healthcare professionals can have different

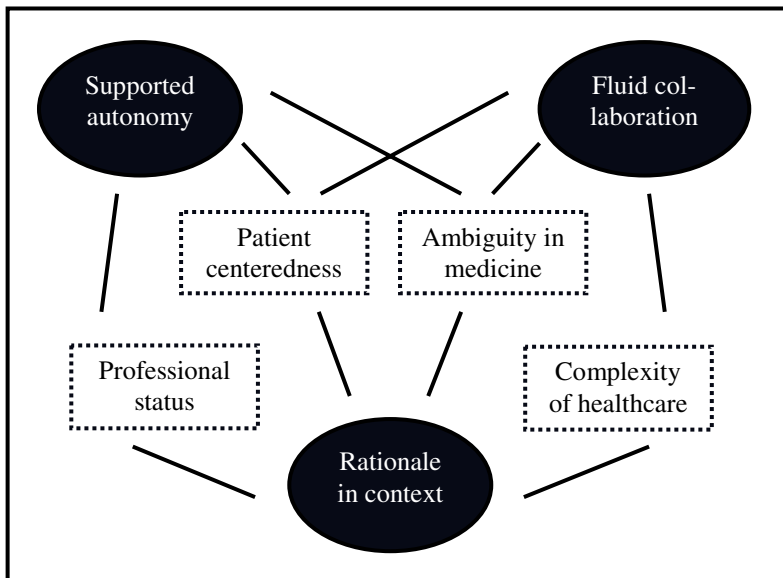


Fig. 1. The relationships between the social requirements of health 2.0 applications and the characteristics of collaboration in healthcare

opinions. These differences are important, they are the result of the *patient centeredness* of the healthcare profession: healthcare workers will sometimes disagree because they see different ways to pursue the wellbeing of their patients.

4.2 Rationale in Context

The complexity and ambiguity of the medical profession results in a high need for insight in the arguments on which decision of colleagues are based. This means that a healthcare professional needs more than the mere facts, but he or she also needs to get insight in what line of thought that was followed, and by who [20]. That is why, as a second social requirement, we propose 'rationale in context'.

For example, it became clear that standardized documents often successfully fulfil their bureaucratic task, but that a higher standardization could also lead to a reduction of the clinical value of documents, due to the lack of a 'core narrative' [20]. In communication, the 'core narrative', rationale or 'meta communication' serves as a guideline for the party that receives the information and is essential in the recontextualisation process of information. The awareness of activities of colleagues also serves as a source of information and guidance for one's own actions.

Relationship to the characteristics of collaboration in healthcare: The *complexity of healthcare* makes that professional healthcare workers often have to rely on information from colleagues. As the medical information is *ambiguous*, it is very important to know who the information comes from, in order to be able to interpret the information and fully judge its value. Therefore, they need to understand 'rationale' behind the medical information: to be able to interpret medical information is what separates the layperson from the *professional* healthcare worker. Professional healthcare workers put *patient care first*: they will therefore sometimes disagree with colleagues.

4.3 Fluid Collaboration

The last social requirement we propose is 'fluid collaboration'. It is clear that much of the work healthcare professionals do cannot be captured in procedures: much is being done ad hoc and tailored to the patient's needs [12]. Therefore, a system should be as least constraining as possible, as too much constrain will lead to a user boycott and a system failure. This was observed by Trivedi and colleagues [21], who saw that considerable treatment flexibility is necessary in order for a software program to be used in all cases in a real world setting.

This is not to say that workflow should altogether be ignored. On the contrary, the system should be adjusted to the workflow, and prior to implementation, users should evaluate the system for further customisation [21]. When workflow is ignored, a system can impose a 'new reality' and precisely increase the rigidity of the work organisation [22].

However, it is very hard to detect a 'core' workflow, especially in healthcare [18]. So while developers should clearly pay attention to the workflow of the system users, there should always be room for exceptions, and easy adaptations.

Relationship to the characteristics of collaboration in healthcare: Healthcare professionals will always put the *patient's wellbeing* before imposed procedures or

systems. This makes it hard to formalise procedures in healthcare. The ambiguity of findings further impedes formalisation. However, collaboration is an inevitable part of current work in healthcare, as healthcare has become *highly specialised and complex* and patient will often have to visit several professional healthcare workers.

5 Discussion

Collaboration in healthcare is an inevitable challenge. With healthcare becoming more complex and specialised, the need to exchange information, knowledge and practice between healthcare professionals will most likely further increase in the years to come. Health 2.0 applications can be a welcome help in this process, but only if the designers behind these tools also take the social requirements of their users into account. Therefore we have proposed three social requirements: supported autonomy, rationale in context and fluid collaboration.

These are to a certain extent hypothetical and future user research planned in the Share4Health project will serve to validate these social requirements and to further translate them into more detailed recommendations. In order to attain this, we will sit together with technical groups who have explored the possibilities of web 2.0 technology. By combining the technical knowledge with these social requirements, several health 2.0 scenarios will be developed that will further build on the information exchange currently planned within the Share4Health. These scenarios will then be presented to focus groups of GPs and pharmacists for feedback. This should allow us to further specify the social requirements to certain settings in healthcare and profession.

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