Socio-Technical Challenges in Designing a Web-Based Communication Platform

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Abstract. This paper takes a socio-technical perspective to analyze the ongoing practices of making an eHealth infrastructure, namely a web-based communication platform, which aims to improve healthcare delivery in Norway. The platform is planned to support interaction between patients and healthcare providers, patient access to personal health information, and dissemination of health knowledge to the public. The analysis is based on the 'scales of infrastructure' concept found in Information Systems research, which shows the complexity of the design, development and implementation process across three scales of activities for achieving durability: institutionalization, organizing work, and technology enactment. The case analysis brings the non-linearity of the ongoing practices to the foreground, enabling a more in-depth understanding of the relationship between technology design and infrastructural work.

Keywords. co-construction, eHealth, flexibility, durability, scales of infrastructure

1. Introduction

Recently there has been an increased focus on the development of web-based eHealth solutions for on-line patient-provider communication. In Scandinavia, examples of such technology are the national Danish portal sundhed.dk, the national Swedish portal 1177.se, and the hospital-based minTRSSIDe portal at Sunnaas Hospital in Norway. The main purpose of these web-based solutions is to offer patients health information of high quality, a secure communication channel with health providers, and on-line access to a variety of services: booking of exams and visits, prescription renewal, direct access to one's own medical record. The underlying vision is directed towards fostering patient empowerment by making patients more informed and proactive.

However, health organizations face significant challenges in providing effective eHealth services. Challenges are related, for instance, to developing solutions that comply with privacy and security regulations [1], defining successful strategies for patient enrollment [2], and facing structural barriers [3]. Responses to these challenges shape design, development and implementation strategies of eHealth solutions. In this paper we are concerned with how decisions taken during the design, development and implementation process affect the *durability* of web-based eHealth solutions, in our specific case a patient portal.

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We understand durability in a socio-technical perspective [4][5]: we argue durability is not only a matter of monitoring system performance and utilization over time, but it is the critical process of co-constructing long-term use where participants are involved in a complex web of institutional, technical and organizational practices. In order to analyze the complexity of these socio-technical activities we use the concept of scales of infrastructure [6]. This concept has been developed to make sense of the everyday practices of participants involved in developing e-infrastructures. Scales of infrastructure analytically differentiate participants' actions with a specific focus on the temporal dimension, the "long term" [7]. The three scales are specified as: institutionalizing, organizing work, and enacting technology. Institutionalizing indicates actions aiming to achieve institutional persistence and permanence; organizing work indicates actions of articulating project work as it complexifies over time; enacting technology indicates the everyday actions of making technology work in practice by both developers and users. We take this lens to develop a socio-technical analysis of the activities illustrated by our case study, and contribute to understand the complexity of processes of designing, developing, and implementing a durable patientprovider web-based communication platform. The paper is structured as follows: first the case description and methodological approach are presented, then the case is analyzed according to the three different scales of infrastructure. Finally, we bring in the discussion the theme of socio-technical flexibility and conclude by specifying our preliminary (as the study is still ongoing) contribution to current medical informatics literature on web-based platforms for patient-provider communication.

2. Method and Case Description: MyHealthRecord

The case reported in this paper is based on an ongoing (at the time of writing) study on the design, development, and implementation of MyHealthRecord (from now on MHR). MHR is a patient portal developed since 2005 by the IT department of a major Norwegian hospital and specifically tailored to the needs of selected patient groups and clinical units. MHR is designed to be a highly adaptable, configurable and scalable platform (selected functionalities and content are available to specific groups), and a secure, private, and trusted environment for communication between patients and health professionals.

The research is designed as a case study [8] with focus on the shaping of MHR as technological object along social, technical and organizational dimensions. The research design was planned in order to regularly perform data collection over a one-year period (September 2010-2011) following the main activities in the MHR project. The empirical material generates from qualitative data gathering: interviews with the project management as the primary method, review of documents and presentations, and observation of workshops with the users, as the secondary methods. All interviews were recorded and fully transcribed. We adopted an interpretive approach for the analysis of the data [9][10] going through transcripts, notes and documents in order to identify relevant themes. Relevance was determined by the use of the analytical concept of 'scales of infrastructure' in its three dimensions of practice (institutionalizing, organizing work, enacting technologies). The three scales were used as a sensitizing concept guiding our interpretation, revealing the complexity of co-existing practices, and serving as basis to discuss the relevance of a flexible approach to durable platforms.

3. Results

Our analysis of the case focuses on how the participants' practices are directed towards constructing a solution for long-term use. At the same time, the analysis brings to the forefront how the concern for durability translates in practices related to designing and developing a solution that is socio-technically flexible: technically and organizationally scalable and extremely adaptable to users needs. The analysis is organized according to the three scales of: institutionalizing, organizing work, and enacting technology respectively.

3.1. Practices of Institutionalizing

A critical aspect part of the work of the participants in the MHR project is their reflection and definition of the role of MHR, and how this relates to the on-going discussion in the Norwegian health policy scenario on patients' active use of Internet, their right to have access to medical records, and the need to develop a national patient portal. This discussion is partially driven by the positive experiences reported from neighbouring countries, Denmark and Sweden. MHR has originally been developed with the idea to offer a portal solution for online access to patient records. One of the managers says: "Access to record was definitely part of MHR from the beginning and one of the very first sketches we did showed the record access. Not only access but also possibility to control others' access to your record".

MHR is also based on the idea that record access is not enough. The same manager continues: "And it was also from the beginning thought not as just another door into the hospital where to get some information, but it should be a meeting point where also the hospital personnel should meet half ground, and the patient should be able to set the premises to decide how this meeting takes place". Setting such vision for the platform is instrumental for its longevity: a new personal and secure communication channel between patients and health providers is the basis for improving existing services as well as developing new ones over time. Moreover, strategically patient representatives and patient associations have been involved in designing services together with clinical personnel. Directing it even more towards delivering a long-lasting solution, MHR is envisioned as a portal for "a life time". The same manager states: "it should adapt to different users, users' needs and ideally also throughout a life time and taking into account that a person is not sick most of his life, so when one is not sick MHR, should be about health maintenance and prevention, more that disease and treatments".

Thus in practice, MHR strategically locates itself within the health policy debate, but proposes in addition to offer a platform that will support patient-health provider communication stretching both in time (a life time) and in space (independently of how many providers are involved in the delivery of care). This ambition translates into presenting MHR concretely as 'record access', but also more visionary as interaction tool, which is patient-centred, supports transparency (in relation to access to data), accountability, and continuity of care.

3.2. Practices of Organizing Work

Another important 'scale' for the MHR infrastructure activities is related to the internal organization of the project as such. The project organization of MHR has been

arranged to 'survive' in the context of the many other IT related initiatives of the Norwegian healthcare system. One of the managers explains: "We did organize this as independently as possible from everything else; we wanted the whole process to be influenced by other processes as little as possible. And that meant doing this 'guerilla' tactic: few people involved and designing the system as independent from other systems as possible. Because that is what we see with other projects, if you have a project going on for over three years the environment you work in is going to change drastically in three years, like merging with other hospitals or new management".

Organizing work with this "guerrilla tactic" allows the platform to be flexible and responsive. The team is able to swiftly respond to evolving needs without having to go through cumbersome management procedures and without compromising key MHR characteristics to accommodate other projects' requirements. This type of work organization addresses the adaptability problem, the aim to "assure that the emerging system will remain adaptable at 'the edge of chaos' while it grows" [11].

3.3. Practices of Enacting Technology

A third scale concerns the everyday practices of making technology work. This scale focuses on how project participants work with the users during design, development and implementation in order to stay as close to actual work practices as possible: MHR needs to be configured to fit existing work practices. At the same time, users involved in MHR adoption use MHR activities as an occasion for reorganizing and rethinking through their own routines, forms, and information practices: they are required to actively participate in the tailoring process. Discussing users' involvement, a manager says: "It is so difficult to attain involvement of clinical departments (...). For each clinical department we need at least one, preferably more, champion! Champions that really want to do it and think it is a splendid idea. Champions that can talk to their patients and to their colleagues and tell them to go for it. We are not in a position (and we should not be) to push this directly to the patients". The commitment required on the part of the users is a critical factor of the long-term use of the solution.

The way participation and commitment is constructed in practice is by promoting both short-term and long-term benefits from MHR-use. Short-term benefits are for instance given by the opportunity to digitize simple paper-based procedures, as the requirement of certain patients to fill out questionnaires before coming to visits. Longterm benefits are related, for instance, to the secondary use of data in the long term. Furthermore, we also see how MHR develops out of user requirements in a very specific and gradual way. Both the technology and the practices of infrastructuring coevolve and become gradually more complex over time.

4. Discussion

The three scales of infrastructure, which we presented in our empirical case, make sense of the infrastructural work in the process of designing, developing, and implementing MHR. Project participants co-construct MHR by enacting different practices at the same time. The use of the "scales" concept for analyzing our case study enables us to base our understanding on a co-construction approach rather that linear models of interests and events as proposed in the literature [12], and to identify the concurrency of different concerns that trigger different coexisting practices. A further

finding emerging from our data, which we understand as an emerging from the coconstruction process, is the centrality of flexibility.

First, in the institutionalizing scale we see how MHR project management relates the new platform to the evolving Norwegian health policy by keeping a flexible image and identity and articulating its merits and impact in relation to broader objectives. Secondly, the "work organizing scale" helps reveal how the project itself is put together and kept going as participants reconcile independence with interdependency, local contingencies with universal aspirations and everyday task coordination with visionary work. This is achieved by "guerrilla tactics" aiming again for flexibility and thus allowing responsiveness and dedication. Finally, the "enacting technology scale" exposes the way user enrollment and commitment is constructed in practice by promoting both short-term and long-term benefits from MHR-use, but also how a flexible technical design renders MHR adaptable and configurable to the various situations of use. Within this more complex co-construction view we get a more in depth understanding of the role of flexibility for the long-term use (durability) of the system. This 'project-wide' flexibility is enabled by the ongoing co-shaping of technology design and infrastructural work making possible to carry through despite priority shifts, project contingencies and unanticipated requests.

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