Who's Users? Participation and Empowerment in Socio-Technical Approaches to Health IT Developments

Andre W. KUSHNIRUK[a], Paul TURNER[b]

[a]School of Health Information Science, University of Victoria, Victoria, Canada

[b]eHealth Services Research Group(eHSRG), CIS, University of Tasmania, Australia

Abstract. Health informatics researchers advocating socio-technical approaches to the design, implementation and evaluation of health information technology (HIT) consistently promote the important role of users. Aside from conventional ethical and legal considerations around their involvement, there are a number of philosophical and methodological issues that have received less attention because of the tendency for researchers to assume the term 'user' is well defined and understood. It is however, evident that there are significant differences amongst users, and differences in how researchers engage, involve and interact with them during health IT developments. Failure to acknowledge these differences and their impact on Health IT developments makes comparisons across different studies problematic and raises fundamental questions about participation and empowerment of end-users in our developments. This paper re-examines the term user in the context of socio-technical approaches to HIT and presents a preliminary approach to differentiating between types of users and our changing expectations of their roles in enhancing different HIT projects across design, implementation and evaluation.

Keywords. socio-technical design, user-centered design, system design and evaluation.

Introduction: Bridging the Knowledge Gap

Acceptance within academic and business circles that approaches involving users are valuable for informing the design, development and implementation of health information systems highlights the maturation of user-centred approaches. These approaches have been shown to enhance technology adoption and use by influencing developments in ways that increase users' satisfaction, trust and ease of use with particular applications/technologies/systems. Beyond these successes however, there remains some concern about the process of translation from the user insights generated through socio-technical analysis to the health information systems that are finally produced and implemented. How users are defined, engaged and their participation mediated by health information technology (HIT) projects may relegate the rich

insights advocated to simply adjuncts of conventional usability testing. Without care in analysis, opportunities to open up genuine dialogue on innovative ways of thinking, designing and empowering may be marginalised [1]. These 'failures in translation' are partly because many HIT developments are too often uncritically framed as problems with technological solutions. It is also evident that while 'lip-service' to user- and/or patient-centred approaches are common, business/career imperatives strongly encourage and/or reward developers for feature and functional complexity whether users require it or not. More prosaically, there is always the risk that in the name of technical, financial or other factors research insights end-up being used to subvert, marginalise or even obscure the very 'user' issues they identify [2].

In the health care domain, socio-technical approaches have been strongly advocated in the development of health information systems. Following Berg et al. these approaches argue for the importance of users and share a number of common starting points including that: '(i) health care work is seen as a social, 'real life' phenomenon guided by a practical rationality that can only be overlooked at a high price (i.e. failed systems), (ii) technological innovation is a social process, in which organizations are deeply affected, (iii) in-depth, formative evaluation, of these approaches can help improve system design and implementation.' [3].

Involving users in HIT research and development is clearly complex and difficult. In order to make the rich insights that can be obtained from socio-technical analysis applicable and useful in the lifecycle of health information systems, we argue that greater consideration of who the user is and how the user is involved and their inputs mediated needs to be further articulated [4]. To address these issues it is useful to try to be more precise about who the users are, when and where they are engaged, what expectations we have about our users and why.

This paper re-examines the term user in the context of socio-technical approaches to Health IT to draw out the complex and dynamic interplay between social, cultural, political and technical factors available for observation and analysis. This work is part of a larger research program aimed at helping to provide aid and assistance to developers and designers of systems when contemplating the selection and role of users in complex healthcare information systems projects. Towards this end, we have developed an initial framework for considering the user in socio-technical design.

1. Towards a Framework for Considering the "User" in HIT

There are several dimensions in our framework for considering users in socio-technical design described below. The first dimension is consideration of the important question of exactly "who is the user"?

1.1. Who is the User?

Socio-technical approaches and in particular participatory design have rightly taken into account the important role of the potential users of a system in the design process itself [5]. However, this has also lead to complexity and blurring of the distinction between design and evaluation when considering and envisaging who the user of the system will be and how to recruit representative users (who will also serve in the design process itself).

In contrast to more strictly prescribed subject identification approaches used in some methodologies (such as usability testing) [6], where detailed target user profiles are created to delineate classes of potential users who will be "sampled" during such system testing), in socio-technical design a restricted number of users (restricted due to issues of practicality) may be engaged to serve both as representatives of the end user community, and participate in the design process itself. This complicates important decisions regarding exactly which classes of users will participate in the design and which users will be the target for the completed system and its evaluation.

This is particularly true in the case of healthcare IT where the range and distinctions among possible user types are potentially greater than in other organizational domains. In addition to wide possible variance in demographics (e.g. age, sex, computer literacy) healthcare brings in variance due to specialty, nature of healthcare (e.g. chronic versus acute) and considerable local, regional, and national practice variation [7].

We also need to consider who the user is in terms of motivation, (i.e. whether they are altruistic (volunteers), self-selecting participants (leading to a range of possible biases), mandated users by their employers and/or whether they receive remuneration for use [8]. Each of these distinctions has important implications for the meaning of the results obtained from the participation of the users regarding how generalizable the results from any one set of subjects will be.

1.2. What Expectations are There in Relation to Users?

The role of potential users and what researchers expect from them during the design and evaluation process of the systems development cycle is also an implicit assumption that is often left unexplored by those advocating socio-technical approaches to the development of HIT. Given the importance that is associated with the "user" it would seem to be critical for the success of our studies and development work that there is an explicit articulation of researcher expectation. Unfortunately, this poses its own problems, including how, and to what extent researcher communications about his/her expectations of users, impacts on the outcomes. Clearly the role of the user will also depend to a great extent on the software development methodology employed as there are marked differences in the involvement required between, for example, extreme programming and agile methodologies as compared to more conventional system development methods.

Beyond this it would also seem sensible to consider in detail the motivations and expectations held by users. As Heaven et al. have argued in the context of health trials 'participants bring their own coherent models of understanding about trial participation' [9]. It seems likely that this is also the case for users involved in the health IT developments and that this has an impact on the results and outcomes from our studies that requires further consideration. This is particularly the case given that the result of most IT developments involves a change of behaviour that goes beyond participation and into engagement, similar in some ways to that expected of patients who participate in health behaviour modification trials [10].

1.3. When do We Engage the User?

The complex issue of when to bring in different types of users to the design, development and evaluation processes can be considered in our framework within the

context of the basic activities common to all system development lifecycles, whether they adopt a traditional approach, a socio-technical approach or whether a more flexible iterative agile approach is utilised.

We therefore consider the question of when to engage users in the activity of early design and system envisagement, requirements gathering and modeling, design and testing of early and late prototypes, and testing of early releases of a new healthcare system/application/service. The intent of each of these different activities has important implications for who we select as users, what we expect of them, and when they appear during the overall design, development, testing and evaluation processes. Some approaches to system development, for example extreme programming, have very specific recommendations regarding when and for how long to engage users [13]. In contrast socio-technical approaches are less explicit about this and its potential impact on the results of the user studies are often less well-defined.

One perspective for considering when to engage different types of users involves consideration of the stages that healthcare IT projects go through as this will have important implications for choosing the type, number and role of users to be engaged in system design and development. One potentially useful approach here is to consider these decisions along the continuum of the System Development Life Cycle (SDLC) [11]. When considered within the context of the SDLC, we can develop a more explicit analysis of the type of users we may need to engage and their potential role [12]. For example, in the early system planning and envisagement stages, criteria for selection of type of users (and also consideration of the number of users) that are needed to aid in design processes may differ from later in the SDLC, e.g. during the detailed design process, or later yet, during beta-testing and through to final system release. Both socio-technical and user-centered design processes and activities need to keep this consideration in mind when "engaging the user", as for complex healthcare system design, this may involve engaging multiple classes of users, at multiple stages in system development, and for multiple purposes. These considerations further highlight the complexity of 'user-studies' and their roles in HIT developments.

It is also evident that rarely do our studies recognize and/or respond to the impact on users of extended participation in our approaches. Co-design, user-engagement and iterative feedback are potentially useful processes for obtaining important insights. They do however run the risk of a kind of 'Hawthorn Effect' or in extreme cases a 'Stockholm Syndrome' whereby our users become overly willing to reflect back to us our own biases and expectations. The key question here is not whether this happens but rather how should we remain sensitive to it when it occurs and how should we accommodate it in our analyses.

1.4. Where do We Engage Users?

Consideration of where we engage users obviously depends on the design methodology chosen but there are a number of emerging trends, including the move towards examination of user goals, understanding and complex workflow (particularly in HIT) in-situ within the rich social and cultural milieu of the workplace. Traditional approaches to evaluation of user needs and requirements within artificial settings, fixed usability laboratories and meeting room locations (for holding participatory design focus groups) has lead to a move towards interviewing and interacting with users within rich cognitive and social settings, including use of more realistic simulations

and within the actual healthcare environment itself. Consideration of the impact of naturalistic recording however also requires careful understanding of when users' behaviours are truly natural and users are not responding to the "lens".

Recent work has argued for implementing highly unobtrusive recording devices and the running of extended baseline recording periods prior to analyzing data collected using such ethnographic techniques [12]. In addition, the level and extent of intrusion introduced in the environment by the analysis varies from extremes of direct participant observation to use of highly unobtrusive and "invisible" recording methods (not covert surveillance). This may lead to requirements for formal opt-in and op-out agreements with users as the move to unobtrusive naturalistic analysis continues.

1.5. Why Engage Users?

Ultimately we must ask what our intentions are in engaging users in design and development at each stage in the process of envisaging, designing, implementing and deploying healthcare IT systems. Furthermore, the reason for working with users will vary along each of the dimensions described above. This may lead to the need to consider involving a greater variety, number and range of users to participate throughout the life-cycle of the system development. However, it is likely that this will actually involve the identification of users most appropriate to different development activities when considered along the entire timeline from early project planning through to deployment, beta testing and full-scale release. This in-turn potentially increases the research burden for those engaging in user- or patient-centred systems developments.

2. Conclusions

Health informatics researchers deploying socio-technical and related approaches to the design, implementation and evaluation of health IT need to ensure that in promoting the importance of users in their work, they ensure that the who, what, where, when and why of those involved is articulated explicitly. Significant differences amongst users, and differences in how researchers engage, involve and interact with them during health IT developments makes comparisons across different studies problematic and raises fundamental questions about participation and empowerment of end-users our IT developments. Issues related to identification of the role of users at different stages of system development warrant careful consideration. Engagement of a limited number of users through participatory design (i.e. due to practical constraints related to optimal size of design teams [13]) needs to be considered in the context of the generalizability of the design decisions made through their engagement. On the other hand, user involvement in user-centered evaluation processes, where the role of the user is more circumscribed, need to be better integrated with participatory design processes.

This paper has presented our thoughts towards an initial framework for considering the user in healthcare system design. It is anticipated that the considerations described in this paper will assist researchers to more accurately distinguish among types of users in their work and to be more explicit about researcher expectations of their roles in enhancing different health IT projects across design, implementation and evaluation.

We would argue that such consideration will ultimately be necessary for more effective engagement and empowerment of Health IT users.

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