

# User Participation in Implementation

Benedicte Fleron, Rasmus Rasmussen, Jesper Simonsen and Morten Hertzum

Department of Communication, Business and Information Technologies

Roskilde University

Universitetsvej 1, P. O. Box 260, DK-4000 Roskilde, Denmark

{bff, rasmura, simonsen, mhz}@ruc.dk

## ABSTRACT

Systems development has been claimed to benefit from user participation, yet user participation in implementation activities may be more common and is a growing focus of participatory-design work. We investigate the effect of the extensive user participation in the implementation of a clinical system by empirically analyzing how management, participating staff, and non-participating staff view the implementation process with respect to areas that have previously been linked to user participation such as system quality, emergent interactions, and psychological buy-in. The participating staff experienced more uncertainty and frustration than management and non-participating staff, especially concerning how to run an implementation process and how to understand and utilize the configuration possibilities of the system. This suggests that user participation in implementation introduces a need for new competences. Our results also emphasize the importance of access to fellow colleagues with relevant experience in implementing systems.

## Author Keywords

User participation, Organizational implementation

## ACM Classification Keywords

K.6.1 [Management of computing and information systems] Project and People Management

## INTRODUCTION

User participation in the development and implementation of information technologies (IT) has been claimed to result in three overall effects on system success (Markus & Mao, 2004): (1) An improvement of the quality of the system, (2) emergent interactions and “good” relationships between designers and users, and (3) a psychological buy-in regarding the user’s acceptance of the system. As participatory design (PD) becomes an increasingly popular approach to both developing and implementing IT systems (Simonsen & Robertson, 2012) it simultaneously becomes interesting to explore the role, competencies, and needs of users’ participation in the implementation of IT. Dittrich et al. (2002) avoid a distinction between development and implementation by instead extending design to also include design in use. They propose that design in use, which resembles how we talk about implementation, comes with its own challenges, which, for example, include how to support design-in-use

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

PDC '12, August 12 - 16 2012, Roskilde, Denmark

Copyright 2012 ACM 978-1-4503-1296-7/12/08 ... \$10.00

activities organizationally.

We have investigated the result of the user participation in the processes of designing and, especially, implementing an electronic whiteboard at Danish emergency departments (EDs). This process was perceived differently depending on which group of clinical staff we interviewed and which role they had in the process. We relate our findings to the arguments for user participation given by Markus and Mao (2004) but here applied to an implementation context. In relation to Dittrich et al.’s (2002) concerns we describe what went wrong and right in this process from the perspectives of management, the clinical staff participating in the implementation process, and the clinical staff who did not participate in the process but were merely informed about the system and expected to use it. Our results extend the understanding of applying a PD approach from design to an implementation process in which the users are in charge of the installation, configuration, and organizational implementation of IT. We emphasize the role of the participating staff, their needed skills and competences and the organizational support therein.

## CASE DESCRIPTION

We report from a case study of an IT project initiated by the Danish healthcare region of Zealand and carried out in collaboration with Norwegian IT vendor Imatis and Roskilde University. The goal of the project was to design and implement an electronic whiteboard as a replacement for the dry-erase whiteboards previously used in coordinating patient care and clinicians’ work in the healthcare region’s four EDs. The project was carried out in two main phases. The first phase, completed in early 2011, aimed at designing and pilot implementing the electronic whiteboard at two of the four EDs (ED1 and ED2). In this phase selected clinicians participated as clinical advisors and co-designers of the electronic whiteboard’s functionality and user interface. The work in the first phase was driven by a project group consisting of these clinicians together with representatives from the healthcare region and the IT vendor, see Rasmussen et al. (2010).

In this paper we focus on the second phase of the project in which the latest version of the electronic whiteboard was implemented at the two remaining EDs (ED3 and ED4). At this point the system was in a state where it could be implemented and used without needing further development, except local configuration. In an attempt to ensure a proper fit between the electronic whiteboard and the EDs the responsibility of configuring and implementing the system was assigned to the individual EDs. In practice, a few clinicians at each ED were responsible for the local implementation of the system.

ED3 and ED4 are located at two larger hospitals in Region Zealand and provide a single point of entry to the hospitals for all acute patients. This includes patients who are brought to hospital by ambulance, walk-in patients and patients referred to the hospital by their general practitioner. ED3 employs 35 nurses and 25 full-time physicians and has 10 patient rooms. ED4 employs a total of 120 nurses and 13 full-time physicians. In addition, it allocates physicians from other departments on an on-call basis. ED4 and has 21 patient rooms.

#### **EMPIRICAL APPROACH**

We conducted 17 semi-structured interviews with three clinicians directly participating in the implementation process (one from ED3 and two from ED4), ten clinicians not participating in this process (five from each ED), and four managers (two from each ED). The interviews were loosely structured, audio-recorded, and lasted 0.5 - 1.5 hours. We made unique interview guides for each of the three groups of interviewees.

In analyzing the interviews we first perused and coded the notes taken during the interviews. This provided an initial set of coding categories, which we used in the following coding of the audio recordings. Each recording was coded using a grounded theory (Strauss and Corbin, 1998) inspired approach, meaning that we constructed coding categories on the basis of the recorded material as well as our notes. We were especially aware of descriptions of how the clinicians had been involved in the implementation process, how they had fulfilled this role, their satisfaction with the electronic whiteboards, whom they felt had been responsible for the implementation process, and how the process had been organized in general. The resulting set of categories was applied recursively to the audio recordings using Nvivo9™ to ensure that all relevant statements had been found. The final coding was discussed amongst the authors, and statements that were especially exemplary were selected and transcribed for use as examples in this text.

#### **QUALITY OF THE SYSTEM**

Markus and Mao's (2004) system quality explanation basically argues that user participation provides designers with an improved understanding of the system requirements, and this is expected to result in higher system quality. They further note, as a 'gap' in this explanation, that research gives ample evidence that high-quality requirements produced via user participation does not necessarily mean that these requirements are borne out in a high-quality design of the system itself.

In our implementation context an equivalent explanation would be that user participation should provide an improved understanding of the organizational implementation process expected to result in a high-quality system configuration and organizational implementation. An equivalent gap would be that the result of the implementation to a lesser extent met the technical and organizational change potential.

Our interviews show that while the management and non-participating staff at the two EDs experienced a rather successful implementation, those who were locally re-

sponsible for the implementation process – the participating staff – experienced a chaotic and challenging task.

#### **Management**

The management's view at both EDs was that of a smooth and easy implementation – *"I've never been part of anything that easy to implement, I really haven't."* (Mgmt, ED4). This refers to the ease with which the staff adopted the system and took it into daily use, which management expresses was due to the simple and intuitive design of the electronic whiteboards. *"...It's so user-friendly that you can almost figure it out by yourself"* (Mgmt, ED4). The user-friendly design along with the utility of the system was the reasons for its smooth implementation, even though some skepticism existed prior to the arrival of the whiteboards. *"If you have to implement something that your staff thinks is wide off the mark, then it's difficult to implement. In this case, however, everyone could see right away that this helps us in our daily work with the patients – and then it's easy to implement"* (Mgmt, ED3).

At ED3 the main managerial issues concerning the process of implementing the electronic whiteboards involved a lack of resources, coordination, and management support from the project group. They were especially referring to a lack of IT know-how, which was evident in the process of configuring the whiteboards and making the system function on the computer in the patient rooms. Though the local coordinator had some personal knowledge and interest in IT, it was not his main work area, and the person who helped them the most was from ED1 and had to divide his time between his engagement in his support of ED3 and ED4, and his daily work at his own ward, ED1. *"Maybe we should have had an extra IT supporter, instead of the load lying heavily on one and a half man's shoulders"* (Mgmt, ED3).

#### **Participating staff**

The participating staff involved a few key clinicians who were locally appointed as being coordinators responsible for system configuration and organizational implementation. They have collectively described the implementation process as one where no one knew who was responsible for what, along with a feeling of not really knowing what it entitled to be locally responsible for such a process. So for this user group a link between successful implementation and the participation of designers seems important.

Though the implementation process was initiated differently at ED3 and ED4, the participating staff had similar experiences of the process with all its practicalities. At both EDs they voiced an absence of proper information and communication from the project group to the local coordinators, who felt unprepared for handling the task of implementing the whiteboards. At ED3 the local coordinator experienced the whole process as *"... something, which kind of crept up on us. We vaguely heard here and there that something was on its way and then there was a meeting where some were invited and others weren't, and then we were suddenly in the middle of it. Though, we had not even had time to organize. And, nobody had really taken responsibility for it"* (Participant, ED3). This local coordinator was informed quite late in the process

and, therefore, did not attend the mentioned meeting, at which the electronic whiteboards and their introduction at the ED were initially described, discussed, and related to the overall project. The experience of the participating staff at ED4 differed from that of ED3 because they took part from the beginning. Hence, they did not feel side-tracked, though it was unclear to them who were responsible for the different tasks related to the implementation. *“It was, for a long time, very unclear who actually should get the ball rolling and get IT [i.e. the IT department] going because they were apparently not part of the project”* (Participant, ED4).

#### **Non-participating staff**

Contrary to the statements from the participating staff at ED3 the non-participating staff had a good experience of the process and mentions a satisfying information flow prior to taking the system into use. Members of all staff groups mention being informed about the upcoming electronic whiteboards at several morning meetings or conferences as well as having received emails on the subject. At ED4 the non-participating staff had a more diverse experience of what happened prior to the introduction of the whiteboards. Some of the staff expressed no recollection of having been informed or having received any introduction prior to when they had to start using the electronic whiteboards. *“Not much, I think. I can’t remember it. I only remember that we went down to the secretaries’ office..., and then we could draw on one of the participating staff who could tell us a bit”* (Non-participant, ED4). Some of the staff mentioned an introduction day facilitated by the participating staff and an email with the date for the setup of the screens.

#### **Discussion**

Management unanimously experienced the implementation process as successful. Due to a lot of other obligations they did not engage much in the local implementation process, which they delegated to the participating staff. Also, management had no specific competence in managing IT implementation processes and as their colleagues from ED1 and ED2 had demonstrated the quality and usability of the system it seemed unthreatening to the staff because it did not introduce drastic changes to the daily work practices. But the participating staff experienced a lack of organization, structure, and management. From their point of view the process was chaotic and problematic.

The challenges experienced by the participating staff resulted in a limited system configuration and, thereby, in a system supporting a modest level of potential change. Their struggle in managing the many practical implementation issues did not leave much incentive for extensive technical configurations or innovative experiments with new ways of organizing work.

#### **EMERGENT INTERACTIONS AND BUY-IN**

According to Markus and Mao (2004) user participation fosters emergent interactions that give rise to “good” relationships between designers and users. During the design phase active participation also fosters a positive attitude toward the new system, which often makes participants feel committed and inclined to adopt and use the

system. This positive attitude and desire to use is known as psychological buy-in. Emergent interactions result in relevant requirement information and designers who can incorporate these requirements in the system (Markus and Mao, 2004). However, *“the emergent interactions explanation [...] cannot bridge the gap between participation’s role in the development of a system and its effects on system acceptance and use”* (Markus and Mao, 2004, p. 521). In addition, the users who do not participate directly do not have the same incentive to buy in to the system – in our case all users appeared to do so. The designer-user relation was, however, perplexing and included relations among multiple roles and stakeholders.

#### **Management**

At both EDs, neither management nor the non-participating users participated directly in the implementation process. At a managerial level ED3 experienced that too much was left for themselves to figure out with no guidelines, introduction, or information from the project group. This increased their dependence on their contact to ED1. In addition, they experienced some political bureaucracy, which for example resulted in a 14-day delay of taking the system into use. The regional IT security department decided that the electronic whiteboards could not be used until they had inspected them and ensured that the setup conformed to the hospital’s privacy legislation.

#### **Participating Staff**

The participating staff at both EDs acknowledged the crucial importance of the personal help and engagement from some of the individuals in the project group. At ED3 they received tremendous help and assistance from the participating staff from ED1. *“My hat’s off to him. If we call and tell that we’re desperate then two hours later he’s here – in spite of him also being the managing nurse at [ED1]. So it’s not that we haven’t had support if we needed it. We just didn’t have that focus ourselves”* (Participant, ED3). ED3 was, however, disappointed with the lack of project management assistance from the Region. In contrast, ED4 received helpful and appreciated support from the Region’s project manager during the implementation process. *“I was glad that the project manager was there, because the screen was a bit of a hassle. Had it not been for her then we would just have been standing there...and euhm fish. But then she could contact Norway [i.e. the IT vendor] to get things fixed, so we used her numerous times”* (Participant, ED4).

#### **Non-participating Staff**

The non-participating staff at both EDs expressed a wish for an earlier introduction and training in using the new whiteboards as well as a possibility for trying out the whiteboards before they went into daily use. They also missed a coordinated and collective introduction to the system instead of being introduced to it in an ad hoc manner by a colleague when they first encountered the system. Thus, their buy-in cannot be based on any first-hand experience or close relation to other participating stakeholders. Instead, they might have based their assessment of the system quality on reputed credibility (Tseng and Fogg, 1999) because it was developed and well-liked by their colleagues at ED1 and ED2. The non-participating staff did not resist the system, and the par-

ticipating staff gradually took ownership of it in spite of the challenges they faced: "We have been hesitating in taking ownership, so we have also only very slowly reaped the possible benefits of the screen... Implementation-wise we should have assumed responsibility much earlier, but we didn't. There're several reasons for that but essentially I think it was because we didn't understand what we had started" (Participant, ED3). We interpret the transfer of psychological buy-in from their colleagues at ED1 and ED2 as crucial to the largely positive adoption of the system at ED3 in spite of the participating staff's initial hesitation. In addition, ED1's participating staff played a significant supporting role in the implementation at ED3.

### Discussion

The experiences uttered by all three user groups in our case point to the importance of having engaged and involved participation by designers during both development and implementation. The term 'designer' in our case includes the roles of project management, local IT security, configuration, and peers engaged in facilitation and knowledge sharing – especially the participating staff who took part in the process at ED1 and ED2. The role of the participating staff resembles what Dittrich et al. (2002, p. 130) term shop floor IT management, that is "the everyday work of making IT work". The role of the participating staff was intricately interwoven with use and shows how the implementation and local adoption of the system evolved as a process of design in use.

### CONCLUSION

We have analyzed how the effects of user participation traditionally associated with IT design relate to user participation in the implementation of a clinical system.

The main implication of our case concerns the role of the participating staff, which has previously been characterized as shop floor IT management. To fulfill this role the participating staff need new skills as well as resources and support from their management. In our case the support needed was mostly provided by the project group, which suggests a strong link between their participation and the largely successful implementation process. The help and guidance from their colleague who had been central to the implementation of the electronic whiteboard at ED1 was particularly important to the participating staff's ability to manage the implementation process. This indicates a need for support in the process of envisioning how a new system can support improved ways of working and a need for new skills, unrelated to their clinical profession. The areas in which the participating staff at ED3 and ED4 needed support and new skills included:

- Deciding on the number and location of the electronic whiteboards, and figuring out the need for additional hardware such as keyboards and login devices.
- Collaborating with the local IT department.
- Learning the configuration possibilities of the electronic whiteboards and using them to adapt the whiteboard to local needs and practices.
- Introducing their colleagues to the electronic whiteboards and assuming a role of system champion to overcome barriers and uncertainties.

- Adjusting procedures and transferring these procedures into their colleagues' daily work practices to capture the benefits provided by the electronic whiteboards.

The new role and skills required from the managerial level would in our case be to allocate resources to and support the establishment of a network among the participating staff at the four EDs. Such a peer-to-peer network could have supported the participating staff at ED3 and ED4 in understanding and fulfilling their role. A central benefit of such a network would be as an official and acknowledged forum for exchanging experiences, collaboratively finding solutions, and otherwise helping and guiding each other. This could also help foster a base for "shop floor IT management" (Dittrich, Eriksen & Hansson, 2002) in the further development of the electronic whiteboards when they are transferred and adapted to the other departments at the Region's hospitals, throughout which they are gradually to be implemented.

What we take with us from this study is the knowledge that PD in implementation is about providing resources to support a peer-to-peer network among the designers with whom the users form emergent interactions. This network should, in our case, include the project group members, the regional project manager, the participating staff from the EDs, developers from the IT vendor, and the local IT department. The purpose of the network is to help the individual participating clinician in acquiring the skills needed in performing their role as clinical shop floor IT managers.

### ACKNOWLEDGEMENTS

We thank the interviewees at ED3 and ED4 for their participation and time. We also thank Region Zealand and Imatis for their participation in the overarching project, and Vækstforum Sjælland and Innovasjon Norge for their co-funding.

### REFERENCES

- Dittrich, Y., Eriksen, S. and Hansson, C. (2002) PD in the wild; Evolving practices of design in use. In *Proc. PDC 2002*, pp. 124-134.
- Markus, M.L. and Mao, J.Y. (2004) Participation in development and implementation - updating an old, tired concept for today's IS contexts. *Journal of the Association for Information Systems*, 5(11), pp. 514-544.
- Rasmussen, R., Fleron, B., Hertzum, M. and Simonsen, J. (2010) Balancing tradition and transcendence in the implementation of emergency-department electronic whiteboards. In Molka-Danielsen, J., Nicolajsen, H. W., and Persson, J. S. (eds.), *Selected Papers of IRIS 2010*, pp. 73-87. Trondheim, NO: Tapir Academic Publishers.
- Simonsen, J. and Robertson, T. (eds.) (2012) *Routledge International Handbook of Participatory Design*, Routledge.
- Strauss, A and Corbin, J (1998) *Basics of qualitative research: Techniques and procedures for developing grounded theory*, Second Ed. Thousand Oaks, CA: Sage Publications.
- Tseng, S. and Fogg, B.J. (1999) Credibility and computing technology, *Communications of the ACM*, 42(5), pp. 39-44.