Lightweight Design Methods in Integrated Practices

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Introduction

The relevance of engaging users in the development of information systems is well recognized. On the one hand, users are expected to provide designers with valuable insight into the users' work practice. On the other, users need an understanding of the technical possibilities and limitations of a new system. This collaboration is facilitated through a range of techniques, spanning from traditional requirement specifications to state-of-the-art, agile methods.[1] Agile methods are seen as "lightweight" methods characterized by short development cycles and by continuous releases of working software. This method enables users to regularly assess and give feedback on the quality of the information systems throughout the whole development process.

As a branch of design studies, the Participatory Design field has been particularly concerned with giving users a direct role in decision making about the development of new systems. Participatory Design generally adheres to "bottom-up" approaches to ensure "empowered" and satisfied users, on the basis of a general belief that this approach leads to better systems.[2] This paper is positioned in this tradition, and, in accordance with the theme of the 2008 Participatory Design conference, "Experiences and Challenges," we call for the Participatory Design field to broaden its range of interest and intensify its research efforts on large-scale integrated systems in complex organizational settings.

The rationale for this call is that the general tendency in the Participatory Design community has been to report on small-scale experimental and prototype-based projects of limited scope and duration.[3] We acknowledge the value of these contributions while also suggesting that they do not reflect the challenges that many current organizations face when implementing new information systems. First, many new information systems presuppose integration with a large portfolio of existing systems. Second, small-scale Participatory Design projects ignore the full organizational complexity of establishing robust and sustainable systems.[4] Because Participatory Design researchers are not active in this arena, their

1 Kent Beck, *Extreme Programming Explained: Embrace Change*, Second edition (Boston: Addison-Wesley, 2004).

2 Jeff Howard, "Toward Participatory Ecological Design of Technological Systems," *Design Issues* 20, no. 3 (2004): 40-53, at 41.

3 Finn Kensing and Jeanette Blomberg, "Participatory Design: Issues and Concerns," *Computer Supported Cooperative Work 7*, no. 3-4 (1998): 167-85, at 179 and Anne-Marie Oostveen and Peter van den Besselaar, "From Small Scale to Large Scale User Participation: A Case Study of Participatory Design in E-Government Systems," in *Proceedings of the Eight Conference on Participatory Design: Artful Integration: Interweaving Media, Materials, and Practices*, 1 (New York: ACM Press, 2004), 173-82, at 174. For concrete examples on small-scale projects, see Erling Björgvinsson and Per-Anders Hillgren, "On the Spot Experiments Within Healthcare" in *Proceedings of the Eight Conference on Participatory Design: Artful Integration*, 93-101; Magnus Irestig, Henrik Eriksson, and Toomas Timpka, "The Impact of Participation in Information System Design: A Comparison of Contextual Placements," in *Proceedings of the Eight Conference on Participatory Design: Artful Integration*, 102-11; Thomas Riisgaard Hansen, "Strings of Experiments: Looking at the Design Process as a Set of Socio-Technical Experiments," in *Proceedings of the Ninth Conference on Participatory Design: Expanding Boundaries in Design*, 1 (New York: ACM Press, 2006), 1-10; and Jesper Simonsen, "Reconfiguring Cooperative Work by Visualizing EPR on Large Projected Screens," paper

valuable insights have less effect. Dan Shapiro argues along similar lines, suggesting that the Participatory Design community establish a program of action to achieve more influence in this more complex area.[5] In addition, because of the narrow, small-scale nature of many Participatory Design projects, the political dimension of design and implementation is increasingly neglected. This lack of attention marginalizes one of the key foundations of the Participatory Design field: its political heritage.[6]

The aim of this paper is to contribute to an understanding of how Participatory Design plays out in emerging, large-scale information systems projects. We argue that even if many of these projects start out on a well-founded, small-step methodological basis, such as agile methods, complex organizational issues inevitably become part of the process, especially as the scope and size of the system increase. More specifically, we discuss this implicated infrastructural complexity as the system scales up, recognizing the challenge of mobilizing participation in an integrated environment. We also critically examine the traditional neutral vendor role, which is an assumption of agile engineering methods.

Empirically, we focus on the design and implementation of the DIPS Interactor—a system that makes it possible for general practitioners (GPs) to electronically order analyses from hospital laboratories. The system was developed by the vendor DIPS, in close collaboration with GPs in the North Norwegian health region and the University Hospital of North Norway (UNN). We elaborate on the conditions for user involvement in the project as the DIPS Interactor evolved from a local, small-scale system with a few GPs and one laboratory to include many GPs, laboratories, and hospitals.

Information Systems Development and Participatory Design

The social character of the design of technical systems is emphasized in several studies.[7] On the one hand, social processes shape the designers' assumptions about future use, leading to technical design decisions. On the other, they shape how users perceive, use, and potentially reject a new technology. Hence, the relationship between designers and users embodies deep assumptions about the relationship between the technical and the social.[8] Not surprisingly, then, a recurrent concern in many projects for information systems development has been to determine a strategy for interacting with the users. Traditionally, the waterfall model has been applied to the process of developing information systems,[9] unfortunately leaving a less influential role for users. Here, customers specify in advance what they need, and then the designers develop the system according to what is specified. User involvement is limited to providing input to the initial requirement specification. An

presented at the PDC 2006 Workshop on Reconfiguring Healthcare: Issues in Computer-Supported Cooperative Work in Healthcare Environments, Trento, Italy, 2006.

4 Finn Kensing and Jeanette Blomberg, "Participatory Design: Issues and Concerns," 179.

5 Dan Shapiro, "Participatory Design: The Will to Succeed," in *Proceedings of the 4th Decennial Conference on Critical Computing: Between Sense and Sensibility* (New York: ACM Press, 2005), 29-38, at 33.

6 See, e.g., Gro Bjerknes and Tone Bratteteig, "User Participation and Democracy: A Discussion of Scandinavian Research on System Development," *Scandinavian Journal of Information Systems* 7, no. 1 (1995): 73-98, at 74; Eevi E. Beck, "P for Political: Participation Is Not Enough," *Scandinavian Journal of Information Systems* 14, no. 1 (2002): 77-92, at 79; and Jørgen Bansler, "Systems Development Research in Scandinavia: Three Theoretical Schools," *Scandinavian Journal of Information Systems* 1, no. 9 (1989): 3–20, at 13.

7 For examples, see Geoffrey C. Bowker and Susan Leigh Star, *Sorting Things Out: Classification and Its Consequences* (Cambridge, MA: MIT Press, 1999); Ina Wagner, "A Web of Fuzzy Problems: Confronting the Ethical Issues," *Communications of the ACM* 36, no. 6 (1993): 94-101; Jeff Howard, "Toward Participatory Ecological Design of Technological Systems," *Design Issues* 20, no. 3 (Summer 2004): 40-53; and Esko Kurvinen, Ilpo Koskinen, and Katja Battarbee, "Prototyping Social Interaction," *Design Issues* 24, no. 3 (Summer 2008): 46-57.

8 Jeff Howard, "Toward Participatory Ecological Design of Technological Systems," 40.

9 Kalle Lyytinen, "Different Perspectives on Information Systems: Problems and Solutions," *ACM Computing Surveys* 19, no 1 (1987), 13.

obvious disadvantage with this method is therefore that it allows little flexibility for changing the course along the way, based on design suggestions from users.

In contrast, agile methodology is a conceptual framework for software development that has evolved as a reaction against "heavyweight" methods like the waterfall model.[10] While traditional waterfall methods are seen as bureaucratic and slow, agile methods are seen as the opposite. The idea is that short iterations make the methods receptive to changes in the environment. An agile approach implies that the developer gives high priority to satisfying the users' needs through early and continuous delivery of valuable software, where changes of requirements are welcomed. The method shares some features with prototyping, such as sketching ideas for user interfaces on paper or computer screens. However, a crucial difference is that, while prototyping generally involves representations of a design made *before* final artifacts exist,[11] agile methods aim to create working software already from the first delivery. Two major agile methods are Scrum and Extreme Programming (XP). Scrum focuses on project management in situations where it is difficult to plan ahead. XP focuses on best practices for development—for instance, by being responsive to changes in the environment and developing only what is needed at that time. The planning and design process consists of small releases and iterations that take from one to four weeks. This process is informed by so-called user stories, which are informal descriptions of feature requests written and prioritized by the customer. As in Participatory Design, involving users in agile methods is considered very important for obtaining good functionality.[12]

However, health organizations today increasingly have to deal with a complex, integrated portfolio of information systems that support many different cross-organizational practices and thus a heterogeneous array of users. The notion of information infrastructure is a promising framework for analyzing these large-scale systems, which are deeply embedded in different practices.[13] An *infrastructure has reach beyond a single event or on-site practice*.[14] Accordingly, practices are interconnected with each other to a high degree, through both manual procedures and various information systems. This interconnectedness makes it nearly impossible to focus on only one of these systems in (Participatory) Design phases. Another important aspect of information infrastructures is that an existing portfolio of information systems (the installed base) *heavily influences how a new infrastructure can be designed*.[15] Many of these systems have different vendors and users, who

10 Kent Beck, *Extreme Programming Explained*, 1.

11 Kurvinen et al., "Prototyping Social Interaction," 47.

12 Markus Rittenbruch, Gregor McEwan, Nigel Ward, Tim Mansfield, and Dominik Bartenstein, "Extreme Participation – Moving Extreme Programming Towards Participatory Design" in Proceeding of Participatory Design Conference PDC 2002: Inquiring Into the Politics, Contexts and Practices of Collaborative Design Work (Palo Alto, USA: Computer Professionals for Social Responsibility, 2002): 29-41, at 29.

13 See Susan Leigh Star and Karen Ruhleder, "Steps toward an Ecology of Infrastructure: Design and Access for Large Information Spaces," *Information Systems Research* 7, no. 1 (1996): 111-34, at 113; and Ole Hanseth and Kalle Lyytinen, "Theorizing About the Design of Information Infrastructures: Design Kernel Theories and Principles," *Sprouts: Working Papers on Information Environments, Systems and Organizations* 4, no. 12 (2004): 207-41, at 208.

14 Bowker and Star, Sorting Things Out, 35.

15 Hanseth and Lyytinen, "Theorizing about the Design of Information Infrastructures," 210.

potentially have varied agendas that may diverge from the overall goal in new design projects. In total, this may influence the extent to which Participatory Design is possible.

This perspective also challenges the traditional and relatively homogeneous user role—a key characteristic of the Scandinavian Participatory Design tradition. Historically, this approach has considered participation a political instrument in the working class struggle between management and workers, often referred to as the Scandinavian or critical tradition.[16] User participation is therefore seen as an instrument for maintaining and increasing workplace democracy.[17] Presumptions for this approach included relatively homogenous workforces, a high level of unionization, and strong national trade union federations that could play an active role.[18] Instead of considering Participatory Design as a two-sided struggle between a homogeneous user group and managers, users should instead be recognized as having specific goals that reflect the different practices they come from,[19] especially because different users are expected to work together across organizational boundaries using infrastructural systems. Bowker and Star remind us that users from different practices need to negotiate and compromise to reach an agreement on the use of certain technologies.[20]

Method

Our research was mainly carried out at both Well Diagnostics, later renamed DIPS, and the University Hospital of North Norway (UNN). Well Diagnostics, a small company with 14 employees, specialized in systems for communicating and interaction across organizational boundaries in Norwegian healthcare. During the course of this study, the company was bought by the larger vendor, DIPS, and the name DIPS is used for both the company and the product throughout this paper. UNN is the largest hospital in the northern region of Norway, with approximately 5,000 employees and 600 beds. The hospital has seven laboratories that conduct approximately 3 million analyses a year.

The study adheres to an interpretive research approach.[21] Data were gathered from December 2007 to March 2008 and consist of participant observations (work settings and project meetings), interviews, and informal discussions. The authors conducted eight in-depth semi-structured and unstructured interviews with members of the development team, as well as with pilot users in the hospital and in general practice. The first author had an office in DIPS, allowing her to participate in informal discussions (e.g., on lunch breaks), which facilitated awareness of emerging situations and issues.

16 Jørgen Bansler, "Systems development research in Scandinavia: Three theoretical schools," *Scandinavian Journal of Information Systems* 1 (1989): 3–20, at 13.

17 Enid Mumford, "Participation—from Aristotle to Today" in *Beyond Productivity: Information Systems Development for Organizational Effectiveness*, T. M. A. Bemelmans, ed., (North-Holland, 1984): 95-104.

18 Pelle Ehn, "Scandinavian Design: On Participation and Skill" in *Participatory Design: Principles and Practices*, Douglas Schuler and Aki Namioka, eds. (Hillsdale, New Jersey; Lawrence Erlbaum Associates, Inc., 1993): 41-78, at 43.

19 Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, MA: Harvard University Press, 1999).

20 Bowker and Star, *Sorting Things Out.*

21 Heinz K. Klein and Michael D. Myers, "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems," *MIS Quarterly* 23, no. 1 (1999): 67-94, at 70.

Establishing Electronic Laboratory Requisitions from GPs to Hospital Laboratories

*The DIPS Interactor projec*t

An internal investigation at UNN, completed in 2002, revealed that the paper-based laboratory requisitions from GPs in the North Norwegian health region often contained errors or lacked clinical information about the particular case. A mismatch often arose between the content of the paper-based requisition and that of the sample tube. In addition, manual and repetitive work in receiving the samples was considered a waste of resources. Because there were 180 GP practices in total, often with many GPs in each practice, UNN saw great potential in receiving the requisitions electronically. Accordingly in 2006, UNN initiated a two-year project with the vendor DIPS, with the aim of designing a system for electronic requisition of laboratory requests. The system was called DIPS Interactor and enabled GPs to choose and order laboratory services directly from their computer. An essential part of the design strategy was to integrate DIPS Interactor with the portfolio of laboratory systems in the hospital, as well as with the GPs' electronic patient records. In the process of laboratory ordering in the GP practice, the system printed labels with a barcode to be glued onto the sample tube. The GPs sent the sample tubes using the regular postal mail or a delivery service, and when the tubes were received at the laboratory, the barcodes on the sample tubes were scanned, enabling access to the electronic requisition.

In the following sections, we focus on how user involvement evolved in the three different phases of the development of DIPS Interactor. Initially, the project was fairly small, comprising only a few manageable user groups. Later, as the vendor experienced increasing success with DIPS Interactor in the healthcare market, new levels of complexity emerged, resulting in new levels of challenges regarding the users' influence.

First Phase: Starting from Scratch

In their agile development approach, DIPS worked in three-week iterations, and new versions were downloaded to the users every three weeks. The first step in an iteration was to collect user stories and estimate the work involved in making the features that the user stories described. According to agile methodologies, user stories are to be written and prioritized by the customer and serve as a communication channel between developers and customer. In the agile methodology, the "customer" generally is understood to be the actual user of the system. DIPS produces user stories in a slightly different manner, basing them on requests or feedback from the users, but letting the development team formulate them.

On the hospital side, a user group consisting of physicians and bioengineers from the Medical Biochemistry laboratory worked closely with the vendor. On the primary care side, the user group included GPs, their secretaries, and local laboratory personnel. The GPs in particular were identified as key participants because the success of the project depended on their daily use of the system. A complicating factor in creating the new system, however, was that most GPs in Norway are private businesses, and new technology that does not benefit the GPs directly is more likely to be rejected. Accordingly, the GPs had to be recruited carefully, based on both their previous interest in such projects and their proximity to the vendor and the hospital. In total, 4 GP practices with a total of 26 ordering physicians in the area around UNN, were recruited to pilot the system from an early stage of the development.

With the development of the DIPS Interactor, the vendor could for the first time implement full-scale use of agile methods from the start of the design process. After a short initiation period of four months, DIPS started to make the very first version of the DIPS Interactor. The choices about the first functionalities and user interface were made after discussions among the members of the project group, and the solution was very simple, satisfying the minimum requirements for sending an electronic requisition:

> Make it as simple as possible to illustrate the intentions. When the users start using it, they will see how this suits their daily work, and they will correct us and give feedback on how it should be. (Designer, DIPS)

For the GPs, features such as data security, resemblance to paper-based requisitions, easy access to electronic patient records, electronic receipt of sent requisitions, status messaging, and access for all user groups proved to be important. In an iterative way, new functionalities and user interfaces were added or changed, based on the feedback stemming from the actual use; gradually, the resulting product was fully integrated with the GPs' electronic patient record, so that only a few extra clicks were needed to produce and send laboratory requisitions. Although time consuming, this part of the design process was relatively straightforward. This progress was auspicious, in that one of the key problems DIPS encountered when involving users from general practice was their limited availability for participation in the design process. Because GPs' earnings depended on patient consultations, participation in design projects resulted in a loss of income for them. DIPS therefore decided to pay the GPs on an hourly basis to participate in the first phase of the design project. Subsequent involvement has been based on GPs' interest in the product and willingness to leave their workplace for short periods.

Second Phase: Encountering a New Level of Complexity in the Laboratories

After the initial phase, the designers encountered a much more complex situation in the hospital laboratories. The different laboratories at UNN had different laboratory information systems, making it necessary for DIPS to collaborate with the vendors of these systems to establish a well-functioning integration for the DIPS Interactor. Basically, DIPS depended on the adaptation by the other vendors of their systems, and this adaptation was not always given priority. For instance, when the microbiology laboratory was to be integrated with the DIPS Interactor, the vendor of the microbiology system encountered delays in receiving the parts of the systems that were needed for using electronic requisitions. Another vendor had shifted its priority to upgrading other parts of the system. This reprioritizing and delays caused some frustration among the DIPS designers. One of them complained:

> …they [the other vendors] have their own agendas and their own products. And we, who have to make it work together, are often dependent on their priorities. That is the problem: to get a reaction from the vendors. (Designer, DIPS)

After the microbiology laboratory was included, another complex issue emerged. Managers of the laboratory saw the potential for using the DIPS Interactor to control the volume of requisitions from the GPs. In Norway, GPs have a reimbursement system that provides incentives for ordering more laboratory tests; hence, these users wanted a system that would make it as easy as possible for them to order laboratory tests. In contrast, the hospital laboratories are financed mainly through a general grant, and an increase in laboratory orders from the GPs increases the costs to the laboratories but not their income. As a result, the hospital wanted to receive fewer orders from the GPs, and the laboratory staff wanted to incorporate a message showing the hospital's cost for each analysis that the GP ordered in the system. The intent was to encourage GPs to think twice before ordering particularly costly analyses. The laboratory staff's goal generated much resistance among the GPs, and ultimately the vendor sided with the GPs, which effectively terminated the idea. One of the designers commented:

> If we use two months to enforce some functionality requested by the laboratory, but that we know will meet resistance out there [in primary care], then it is wasted. (Designer, DIPS)

Moreover, the different practices in the medical biochemistry and microbiology laboratories resulted in different requirements for the design of the requisition forms. These design schemes contain

the analyses offered by the laboratories and appear in the GPs' user interface in the ordering process. While the medical biochemistry laboratory required a minimum of clinical information from the ordering physicians, the microbiology laboratory required extensive clinical information. The different requirements, in turn, required that the requisition schemes and the presentation on the GPs' screens could be tailored to each laboratory's need. The medical biochemistry laboratory started out as the first laboratory, and the vendor edited the requisition schemes manually. However, when the microbiology laboratory was about to start, the vendor realized the need for a more flexible editing tool—one that would allow each laboratory to design the requisition schemes and presentation on the screen to suit its specific needs. The vendor therefore devoted considerable resources to developing such a tool. Nevertheless, the users in the laboratories faced some core challenges in the design of the requisition schemes. They had to define the content of the requisition schemes, but they did not know how this information could best be presented to match the GPs' work process. However, because the GPs were not a homogenous user group, they had different ideas about how the offered services should be organized. Some GPs preferred a structure corresponding to the former paper-based ordering forms; others preferred a layout based on organs of the body, while others suggested a completely new structure enabled by the new technology.

Third Phase: Commercialization and Increased Distance from the Users

The number of users has been increasing, and 13 offices in the northern health region presently use the DIPS Interactor to order laboratory services electronically at UNN. In addition, nine other Norwegian hospitals, including each hospital's associated GPs, have started to use the system.

The escalation of the product scope required extensive cooperation between the vendor and several general practices, hospitals, and other vendors. It also required cooperation among the different actors in the healthcare organizations. The new customers (the nine other hospitals) bought what had been developed at the time of purchase, and from then on, they were part of the further design of the system. This larger market imposed new challenges for the vendor because there were several new customers to relate to and a much larger number of users. Faced with a system that included many different user groups, each with different ways of using the system and limited time to spend on design, the development team needed to find ways to enable all users' voices to be heard. More people at DIPS needed to get involved, especially in the marketing group. For each customer, DIPS appointed an internal project leader for the adjustments and implementation phase. The project leaders stayed in close contact with their customers

and took care of technical problems, as well as acting as the customer proxy in the development team. This process was challenging, as the person responsible for marketing of DIPS recalled:

> When we started out at the University Hospital of Akershus, I had a hotline to the designer 24 hours a day because I did not know the product. There were so many errors that we did not foresee, but we learned. Now I feel that I can manage much more on my own.

Still, the marketing people did not have detailed technical knowledge of the system and encountered challenges in responding to users' problems. The long-term consequences were that the users increasingly lost contact with the developers, which diminished the users' ability to influence the process.

The large number of users resulted in an increasing number of new user stories. Some stories were of general interest while others were based on the specific needs of one particular user. The designers also had to make choices between user stories that entailed new functionalities the customers would pay to get, and improvement of old ones with no incoming cash flow. Although the users thus far have been able to contact the designers or marketing people directly with feedback or needs, the need might soon arise for a system that allows user proxies (e.g., marketing personnel) to collect and refine user stories before they go to the design team for development. This change would increase the distance between users and designers even more.

Discussion

Complex Organizational Issues: Limitations for Participatory Design

In many organizations, new information systems are supposed to be integrated and able to play along with the organizations' existing information systems portfolios. This need for compatibility implies that existing technological and organizational constraints might shape the design flexibility of the new system—and consequently, the degree to which Participatory Design is possible.[22] In this project, as the scope of the DIPS Interactor project grew, such consequences became apparent. Over several years, the laboratories at UNN had built up a well-functioning laboratory infrastructure with a high degree of integration and mutual dependencies among different laboratory systems, analysis machines, procedures, and more. This complexity made it nearly impossible for single user groups to have a full overview of the possibilities, the constraints, and not least, the consequences of user requests. Consequently, because of the inter-organizational scope of the project, maintaining this overview was very much up to the vendor, DIPS, and not up to the users. Also hampering user participation was

22 Bowker and Star, *Sorting Things Out*, 35 and Hanseth and Lyytinen, "Theorizing about the Design of Information Infrastructures," 214.

that a well-functioning DIPS Interactor depended on integration with different systems delivered by other vendors. These vendors did not share the interest of DIPS in attending to the DIPS Interactor users; instead, they were primarily concerned about their own market segments and completely different user groups. The extent to which these vendors implemented anything resulted not from the requests of the users of the DIPS Interactor, but rather from their collaboration with the product's vendor. In addition, because several user groups were involved, that users in these different groups would be granted the influence they wanted was far from a given. Sometimes the interests of these different users were directly opposed to each other, including when the many user groups in the GP practices had different preferences for the layout of the requisition schemes designed by the laboratory users. A final point is that on the way to commercialization of the DIPS Interactor, many new hospitals and practices have been involved, thus building a larger user mass. This growth has increased the pressure on the vendor to handle a larger number of user requests. The vendor has responded to this demand by building up an organization and an infrastructure to receive and coordinate these requests. This capability obviously is necessary, but at the same time, it creates greater distance between the vendor and the users, making the vendor's agile approach more difficult.

The Challenge of Mobilizing Participation in an Integrated Environment

A cornerstone of Participatory Design is to include users in the decision-making for the design of new systems.[23] However, this goal presupposes that the users are interested in taking part in the process, which basically reflects the extent to which users find the new system beneficial. When a system is developed for a single work practice, the benefits for users might be quite clear. In contrast, in an inter-organizational setting with many stakeholders, the benefits may not be evenly distributed, inducing some user groups to question whether participation is worthwhile.

In this project, the users in the laboratories were easy to engage because they saw the potential for quality and efficiency improvement. This interest was also reflected in the fact that the hospital staff had initiated the project, together with the vendor. In contrast, the vendor experienced greater difficulty in involving the GPs—not because the GPs did not find the DIPS Interactor useful, but simply because they did not find it useful enough. Norwegian GPs are self-employed, and time spent participating in the project meant lost income. To handle this situation, the vendor chose to pay out of its own pocket to compensate them for participating. Although this approach ensured that knowledge about the GPs' practice was conveyed to the designers, it simultaneously raised

23 Bjerknes and Bratteteig, "User Participation and Democracy, 73 and Bansler, "Systems Development Research in Scandinavia.

some critical issues about the degree of user influence: If users are paid to participate, how much influence do they really have? Because of both the compensation and the fact that the hospital was the actual customer, the conclusion might be that GPs had little real influence. Consider an observation from one of the designers in DIPS, who clearly ascribes the central power to the hospital:

> It is business, of course. If the hospital is very strict on what they want, and has paid for the solution, then we have to yield. (Designer, DIPS)

Still, the situation is more complex than this observation suggests. Although the laboratory staff ostensibly exercised greater influence over the design of the DIPS Interactor than the GPs, the hospital still depended on the GPs to *use* the system. In this sense, the GPs exercised substantial influence in relation to the laboratories because they could send their laboratory requests to other hospitals if they were dissatisfied with the services the hospital provided through the DIPS client. Accordingly, the laboratory staff had to design the requisition schemes in line with what the GPs wanted. In this way, the user and designer roles were not explicitly given but entailed more of a relational approach.[24] For instance, the laboratory staff had both a user role and a designer role, depending on the ones with whom they were interacting.

The Vendor Role: Taking a Stand on Organizational Consequences

According to agile development methods, the customer is the one making and prioritizing user stories, leaving vendors in a neutral position in which they design what the customer or users want, within the range of what is technologically possible. This position is challenged in many science and technology studies, as well as in the Participatory Design research community.[25] We believe that the political aspects come to the fore as the design projects grow in size and scope and that these political aspects also become more apparent in the case of the vendor role:

> There are examples where the hospital has made an organizational change and we [the designers] find ourselves in the middle of debates about personnel in the hospital. (Designer, DIPS)

Accordingly, different and potentially conflicting issues force vendors to take a stand and side with specific user perspectives. One illustration of such a situation is when the microbiology laboratory wanted to include a feature in the system presenting the costs of expensive analysis to the GPs before the GPs could order the analysis. Although this feature made perfect sense for the laboratory carrying the financial burden, the GPs felt that it represented a

24 Latour, *Pandora's Hope.*

25 Wagner, "A Web of Fuzzy Problems," 100.

kind of monitoring of their work that they did not want. In this case, the vendor sided with the GPs and convinced the laboratory not to insist on this feature. One of the designers at DIPS elaborated on what he perceived the vendor's role to be in such matters:

> We are not impartial; we listen to the arguments and decide what sounds reasonable. Then one may lobby for one or the other [...] Then it becomes our role as mediator in the middle to try to tell them what is the most convenient thing to do.

Consequently, vendors have to maneuver carefully among different user groups, sometimes serving as a go-between and sometimes siding with one of the groups. This mediation role imposes a particular responsibility on vendors to understand the different perspectives and to try to find a middle way. Of course, vendors also must recognize an issue of self-interest. They know that ensuring that all user groups in an integrated setting are satisfied is important for them to keep their product in the market. If one of the groups (e.g., the GPs) refuses to play its part in an integrated environment, the value for the other participant is at risk, clearly highlighting that a networked environment is not stronger than its weakest link.[26]

Conclusion

The aim of this paper has been to elaborate on some of the challenges of involving users in the design of evolving information systems, including challenges for vendors committing themselves to agile methods. We have shown that mobilizing the users in the design process can be a challenge in itself, particularly when a system spans several organizations and when only one of these organizations is the actual customer of the system. We have also shown that Participatory Design can be a challenge when the system in question has to be integrated with other systems. In addition, as development projects and systems increase in size and scope, we also believe that the neutral vendor role ascribed in agile methods vanishes. Throughout the design process, vendors sometimes have to deal with problematic organizational issues and consequences. On this basis, we promote *design* as an activity that is collectively negotiated among many stakeholders. Here, the roles between designers and users are not automatically given or fixed but depend on the mutuality of the relationships among the stakeholders. In turn, the nature of the roles can vary, depending on the phase of the design process, possibly resulting in greater influence given to users in the early stages and less in later ones.

26 Bruno Latour, *Science in Action* (Harvard University Press, 1987), 124.