Association for Information Systems
AIS Electronic Library (AISeL)

ECIS 2006 Proceedings

European Conference on Information Systems (ECIS)

2006

Analysing it and communities of practice

A. Syrjanen
liisa.syrjanen@oulu.fi

K. Kuutti
kari.kuutti@oulu.fi

ANALYSING IT AND COMMUNITIES OF PRACTICE

Syrjänen, Anna-Liisa, University of Oulu, Department of Information Processing Science, P.O.BOX 3000, FIN-90014, University of Oulu, Finland, anna-liisa.syrjanen@oulu.fi

Kuutti, Kari, University of Oulu, Department of Information Processing Science, P.O.BOX 3000, FIN-90014, University of Oulu, Finland, kari.kuutti@oulu.fi.

Abstract

The paper discusses the relationship between information technology (IT) and communities of practice. Most studies of information technology design take the professional and business-driven viewpoint, and often focus only on IT and neglect the actual practice IT is serving. This paper analyses IT from a perspective of a non-profit community and its practice, for which IT is subsumed. The paper examines whether Orlikowski's widely used IS framework can be used in analyzing such settings. The analysis shows that although Orlikowski's model is capable of grasping many aspects of community IT, it fails to recognize perhaps the most crucial aspect of integrating several practical community levels, the shared object of all activities. In this paper, we propose that by using the cultural-historical activity theory such a problem in analysis can be alleviated.

Keywords: community of practice, systems design, community IT, Activity Theory, dog breeding

1 INTRODUCTION

During the last decades, information technology (IT) and systems design have gone through several transformations. The fast development of computer and communication technology has moved IT from isolated islands of computing to networked organisational solutions and to activities with PCs, handheld devices and wireless networks which further penetrate new areas of human life. This has increased the interest in the relationship between IT and other forms of human activities, with informal, tacit and ambiguous structures. One such area that has recently gained visibility is the area of "communities". The interest in communities started with the idea of a community of practice (CoP, Lave and Wenger 1991), which has gained increasing support (Brown and Duguid 2000; Pitkin 2001; Wenger, McDermott et al. 2002). The increased interest is also shown by the emergence of a novel series of biannual conferences called "Communities and Technologies" (C&T, Amsterdam 2003; Milano 2005; next at Michigan State University 2007), and by a growing number of papers on other forums studying the relationships between communities and IT.

At the same time, the scope of what is meant by the term 'community' has been broadened beyond actual 'work' settings. For instance, in the Call For Papers of the next C&T conference it is defined as follows: "We focus on the notion of communities as social entities comprised of actors who share something in common: this common element may be geography, needs, interests, practices, organizations, or other bases for social connection" (C&T 2007). This extension brings forth new problems and challenges, such as how to understand, conceptualise and analyse the role of IT in such a community setting. Our conceptual toolkit has thus far been very much geared towards analysis of well-defined work routines, professionalized IT and its science-based profiles, and it is far from clear how well they can cope with the new community demands, and how they should be augmented.

In this paper, we approach this problem by means of an interest-based community IT. We take an existing analytical approach, developed within the IS tradition by Orlikowski, that shows a particularly high level of sensitivity towards social relations and issues associated with communities. We applied it to an empirical case of designing and using IT within an archetypical community of the "broadened" type (a voluntary community of hobbyists). Our analysis will show that although the approach is capable of grasping a number of issues, some important aspects seem missing. We analyse what might be behind this omission, and how the approach should be augmented to cover the missing parts. The paper ends by discussing development of an augmented version of the approach for CoPs.

2 A PRACTICE ANGLE FOR STUDYING COMMUNITY IT

Wanda Orlikowski with associates has developed an approach to study the relationship between (information) technology and organizational contexts (Orlikowski and Robey 1991; Orlikowski 1992). This work has been influential and it is frequently cited within the IS research field. Initially Orlikowski started with the theory of structuration by Giddens and it led to the framework for the study of systems development related to the impact of IT on organizations (Orlikowski and Robey 1991). The integrated subjectivistic (including social interpretations) and objectivistic (including material characteristics) position is grounded in the viewpoint of *duality of structures* understood as institutional properties of social systems. Subsequently (e.g. Orlikowski 2000, 2002) the approach based on Giddens' theory has been enriched using results from anthropological studies of Lave (1988), Hutchins (1991; 1995) and Suchman (1987).

The resulting approach has developed certain sensitivity to social issues and organizational relationships and it identifies subtle distinctions too. As popular sources for different analytical purposes, the four articles adopted for studying CoPs are supported by hundreds of research citations. Within the space limitations of a conference paper, it is not possible to review all of Orilikowski's approach, and we thus limit our consideration to three ideas regarding the CoP for IT angle and an

interest-based community studied in a distributed practice field. They are the duality of structures, the scope of knowing in practice, and the relationship between IT design and use. With regard to the material of our empirical case, they seem to have some limitations in practice, such as considering the actual object of practice and the actual 'end-users' of IT.

2.1 The duality of structures

One of the oldest parts of Orlikowski's approach is the interest in studying social structures stimulated by Giddens' theory. These abstract structures are created by humans acting together, shape future actions and recreate their properties anew. In recursive processes, actions are situated temporally, contextually and involved in the interaction between humans where the actors' meanings, values and power relations shape the properties of interpretive schemes, resources and norms. IT, by mediating (facilitating and constraining) organizational change processes, serves these interpretive schemes, resources (facilities) and norms.

Orlikowski and Robey (1991) identify several types of influences, roles or features of IT in organizations. IT serves human action and interaction processes, in some places it provides the media or conditions for them and in other places the uses of IT, consequences and outcomes, become more central. Within human interagency systems, the approach excels in revealing crucial social aspects per se. However, the approach seems to ignore the actual meanings of organizational and IT structures, the practical reasons for existence and the structuring of systems in collective practices in the first place.

In the structuration theory (cf. Giddens 1979), the focal axiom is that every member of the society, in which one participates, possesses the experience-based knowledge of its conditions to be 'knowledgeable', or capable of reproducing societal structures. In the study of the relationships between human practices and IT, Gidden's insight can be used in structural analyses of humans in their everyday practice. As participants of the wider societal praxis, however, people are not so free subjects and the relationship between development and change can be actuated by the societal renewing process. Many influential reasons for 'doing' can be linked to production systems. This means we have to look beyond the 'sociality' of IT per se.

2.2 The scope of knowing in practice

Orlikowski (2002) has discussed knowing in practice in the context of distributed organizations within IT-intensive fields. The essential structural dimension of distributed organizations is linked to the activities of knowledgeable persons realized in their everyday life. Based on the sociological and anthropological views of human knowledgeability, knowledge and practice coexist and actuate continuity of competence. A skilful practice is not given but achieved over time and across contexts. An essential part of the practice is the human capacity 'to choose to do otherwise' (Giddens 1984, 4) and the experience gained by reflection on action, experimentation and improvisation. Taken together these increase organizational innovation, learning, and change so that "when people change their practice their knowing changes" (Orlikowski 2002, 253). This also applies to complex, distributed organizations and shapes the practices of knowing how to be engaged in 'distributed organizing'.

In the software company (ibid), 'practices of knowing' related to the organization, players in the game, how to coordinate across time and space and develop capabilities and innovate. These practices were accumulated historically and they shaped the situationally enacted human capability, which helped practitioners to navigate and remove barriers in the work. In studying organizational change, we thus should 'focus on what people do, and how they do it', as organizational knowing can be linked to knowledgeable human agents, and not to any one of such things as some 'technology' or "infrastructure, objects, skills, or dispositions" (Orlikowski 2002, 271). The active human agency is the actual producer of change, rather than these abstract attributes.

The analysis of the high-tech product organization is sensible in many ways, also as knowing practices that are realized by professional IS-experts for similar IS-experts located in similar IT settings. The less important 'things' (not specialized by references in Orlikowski's work) belong to the already known, resourced, normalized, and common IT setting of practitioners who work by 'knowing' the needs, resources, answers, and solutions available to each other. It is clear that modern IT business would not happen without such prerequisites. On the other hand, in CoPs these aspects may occur differently (Lave and Wenger 1991). In the distributed company analysed by Orlikowski's certain community spirit was gained by direct contact with workmates (occurred at some point in time). As in CoPs, this helped in the sharing of the company goals, identity, aligning of efforts, rewarding systems, and participating cultures and might be one tacit factor for neglecting the 'things' in professional (IT) knowing practices. Yet, these features all together seem relevant attributes in analysing IT for CoPs.

In understanding the 'distributed organizing' aspects in CoPs, we have to approach it through IT design when it is 'infrastructuring' (Star and Bowker 2002), put in use somewhere. Usually this means that IT production is involved in some kind of participatory design (PD) so that the related practices, their purposes and differences are understood as parts of some wider and enduring setup.

2.3 The relationship between IT design and use

In following how design relates to use in IT setups analysed by Orlikowski (2000), the perspective of use is also shaped within distributed practice fields, such as consulting and software production. By assuming designers need to have a deeper understanding on certain use-contexts, Orlikowski has identified two main structurational modes of technology involving IT use. One is that IT uses are embodied in structures built by designers (designing IT for some use context). Another mode occurs when IT structures become appropriated by end-users (by using, misusing, or ignoring the given IT). Orlikowski extends the use scope beyond these modes by bringing people, technology and social practices into recursive interaction. Technology use becomes possible through *enactment* understood as a process of constituting, actuating, representing, performing or translating IT into uses where structures are emerging. This process is guided by sets of rules and resources (re)constituted by users when engaged with the technologies at hand. These "technologies-in-practice can be and are changed as actors experience changes in awareness, knowledge, power, motivations, time, circumstances, and the technology… through the same process that all social structures are changed–through human action" (ibid, 411).

Modes of changing IT by end-users are realized through the in-built provisional stability of IT artifacts (designers produce new plug-ins, parameters, tool combinations, etc. and continuously make new 'downloads' available to users). Proper possibilities arise when users learn and become more knowledgeable about IT (by training, courses, observing others' uses; new tasks or jobs bring shared files; as users participate in professional or industrial conferences, etc). The enacting of new communication norms, policies of use, media, channels and the like offer users new ways of choosing how 'to enact different technologies-in-practice'. This users' re-enactment process enables "the potential for innovation, learning, and change" (ibid, 412). Orlikowski identifies three types of enactment, *inertia* (users choose to use IT to retain the existing ways of doing things), *application* (users choose to use the new way IT to augment their existing ways of doing things), and *change* (users choose to use the new IT to alter their existing ways of doing things). Hence, the benefit of IT depends on how users realize their side of the enactment of new IT and react to the input given by IT design and by the norms, policies, etc. of the overall social settings in which they are acting.

For instance, in the case study the relationship between use and design was integrated and realized through the active use of the *Notes*™ artifact. It provided the *change* and advanced IT use, when users learnt to collaborate by utilizing in-built action modes of the *Notes* developers' local participative culture. Orlikowski's analysis was mostly about IT use/design within rather similar business domains. It shows that use and design should meet at some level in practice. Where continuous IT re-enacting is not the relevant (but even harmful) activity, we need to analyse the whole chain of related activities.

3 COMMUNITY IT FOR DOGS AND DOG BREEDERS

Our empirical case is about the co-evolution of IT and breeding knowledge in a community of Karelian Bear Dog (KBDC) enthusiasts within a distributed organization (Finnish Spitz Club, FSC) of about five thousand members and a non-profit practice field. It is a field where old and new IT coexists inherently, where hunting-dog enthusiasts (non-IT-professionals with varied social and educational backgrounds) try to understand collaboration with dogs, to share their world and develop field and IT system to record dog breeding data. In order to collect ethnographic data on voluntary systems design, use and other activities, a certain microcosm community was identified and analysed. In this in-situ case study, the informants were selected in relation to their positions in the community's natural structures and in relation to different activities, including experience in related hunting-dog-breeding practices (one author has earlier experience in the activities studied). The study data consists of field knowledge on organizing, breeding, hunting trials/hunting, IT design, use and outputs.

The fieldwork, seeking of infrastructural 'fringes' (Star 2002), was carried out during 2000-2004 when overlapping use/design/field activities have been documented (audio/video, field note recordings) and complemented by existing historical material and breeding databases. The common role was identified as a 'dog breeder' (DB). The data came from 'active' interviews (Holstein and Gubrium 1995), use/design and field activities in situ with two dozen informants and one author as a part-time field worker following their common everyday practices. Interpretational activity and community oriented analyses reflected the case in the light of 'sensitivity' to the substance of the study material (cf. Tesch 1990, 90-118). By using transcripts, 'dialoguing' with data and its parts took place also collaboratively in workshops (in qualitative data analysis sessions run by experienced researchers), recordings of which have served as an outsiders' analytical lens into grassroots IT for a CoP.

3.1 Culture of goal-directed breeding practice leading to a new way for IT

Breeding dogs often relies on informal, tacit, and cultural rules. The breeding of Karelian Bear Dogs in Finland has met some very special challenges. They identified the dogs' natural trait to hunt game (moose/elks, bears), 'to get food for the pack'. However, in the course of the long evolution and human-controlled gene-exchange, many of the dogs' behavior had changed unexpectedly. Their interest in hunting weakened and resulted in difficulties in identifying good hunters from the entire population. After the goal of breeding 'a sturdy dog that barks at big game' was set in 1936, two wars almost destroyed the breed, a large part of dogs' native area was lost and new dogs could not be found.

The hunting-dog enthusiasts and breeders began to implement 'the systematic approach' to breeding. By using the well-known, widely applied 'line breeding', organizing hunting field and data collection (e.g., dog registry, dog shows, and hunting trials–simulated hunts with free dogs and game in the wild are documented/judged by a group of trained judges), the new breed was born. Since the 1970s, the field has been served by the breeding counsel. Through several channels and in different formats the data from FSC's systems and from the Finnish Kennel Club's computerized database were 'available' to dog-buyers, dog-owners and breeders (many individuals maintained their own files on dogs too). After the good start and fifty years breeding, the conclusions were however that the 'top breeding dogs were still scarce' even though 'the practices were switched' several times, new pairs of dogs planned (by breeders and/or with the counsel) in new ways and ideas tested by producing 700-1000 new KBDs per year. In spite of all the efforts, some invisible matter began to destroy the breeding results.

The reasons for the situation could not be found, but it led to implementing a new IT system by the members with experience in hunting and hunting trials with dogs and an interest in IT. In the late 1980s, the programming started and a computerized breeding database was set up to enable better access to breeding results in ways suitable for the *members'* local practices. A strategy called the 'sure way' started by integrating the hunting, hunting trial, and breeding systems around a shared object of activities (to breed hunting dogs) and depending on local actors. "We definitely need people under

whose direction the whole system works… as mainstays for the community... which the field respects deeply… as they know the issues… and look after the things in the field" (DB3). When "the incentive comes from the dog world… the dogs themselves set the requirements for development via the breeders" (DB2) and not the data but the "dogs are the primary object of work… the other members' dogs" (DB5). Therefore, IT design is for *the dogs* (cf. end-users) too through practices (use/design, hunting/breeding, etc.) within the shared activity (where dogs/the nature are participants as well).

Comment on "knowing in practice". Even from this brief description, it is clear that a number of issues related to Orlikowski's study (2002) can be identified: knowing is not static, it is not dependent on official dispositions, knowing must be enacted and it emerges locally again and again, as all social processes do. There is no knowing without a practice or a practice without some knowing and as a practice changes, part of the knowing can change. The ability to act knowledgeably is dependent upon human choices and competence grows from bottom-up, rather than coming from outside.

In the case, there is something, which is not so visible in Orlikowski's study. Knowing does not emerge when some ingredients are missing, their multiple connections are invisible or focused on secondary, mediating practices and acts. Since human (rational) choice is bound to surrounding resources, the frames of references actuated by historical and material settings are settled by what is the object of the purposeful practice. If (and when) this object changes, and in particular when it changes from an individual to a communal, the condition of choices changes correspondingly. It becomes influenced by far more numerous interpretation frames, values, norms, and histories, and the competence to act collaboratively by 'knowing in practice' becomes more complex.

3.2 IT use and design changing the grass-roots breeding practice

After the Finnish Spitz Club developed a computerized information system, it became the basis for the development of the KBDC's information system: "the KBDs' system was at first only a reduced version of the red dogs' (Finnish Spitzs) database" (DB2). The members started *first* to use, *then* to program, and finally to transform the existing field knowledge on dogs and IT towards a community solution. It was integrated with the already computerized dog-register of the FKC, by modem lines and later by the Internet. Gradually the infrastructure (coexistence of manual parts, older and newer PCs, databases, software applications, sharewares, office tools, web systems etc.) increased and the unpaid voluntary design of 'thousands of hours' continued for decades (since the 1990s) with the attitude "nothing has been done for the sake of IT or only on its terms" (DB2).

"The fact that one owns a dog and takes part in the community's activities brings certain personality and motivation to the matter. If such an affinity is lacking, one is most likely to have a different attitude" (DB10). As 'you live with dogs all the time', take part in various practices, go to dog shows, take dogs to veterinary checks, go hunting, participate in hunting trials, and develop these and IT-systems, the information, technologies and the rational choices are constantly put to the test. "Information technologies are just tools and secondary to the more important philosophy for which they are used" (DB4). The design begins to be "a much wider job than one could imagine" (DB16). When these *other* practices show how much you must "know in addition to the computer side" and how numerous are 'the things' "to look after in the field" (DB3) outside the walls, it compels one to design for the community, the 'dogs important for everybody' and to inform about defects too.

"If we notice that we have made mistakes, whitewashing is not the solution. Instead, we should study where the defects come from so that we can avoid further mistakes… Only total unawareness (about the relevant practice that design/use should serve) offers you total knowing… the 'free and creative' breeding" (which may subject 'the objects' to unintentional harming too). (DBs)

Comment on IT design and use. When the case is contrasted with Orlikowski's study (2000), some clear differences can be seen. In her study, the practice lens was focused on a one-way experience-based learning, which starts from and centres on design, designers' IT and 'downloads'. When design, use, and other 'doings' are realized and measured in different processes, their gauges of success differ

fundamentally. As mentioned earlier, that is the law of specialized modern IT business. What the case illustrates is the relationship between use, design, and doing by 'living in the same world' where 'community knowledge' evolves, "when the knower is in the same world as and 'dwells' among the things and other human beings whose truth she seeks" (Lach 1994. 157). Where the indicators (use, design, doing) join together, there two-way knowing is in practice. The case shows that the way in which design, use, doing, and the human 'free will' involve each other, is the responsibility to seek also defects in resources, in collaboration, and in knowledge. That is, the (hard) way in which the distributed *use* community (field) knows whether it is supported by the IT or by some other means.

Orlikowski's community is a community of competent technology developers and similar users, which hardly need to meet. That may be the reason, why borders between development and use are blurred so that the understanding of the "field" seems no more be an issue at all. From the viewpoint of the case, this leads to a very technocentric interpretation. In our case, use and design blurred in actual user-designers and in their several field roles (as breeders, hunters, dog-owners, trial and show judges, etc). The change in the use and field practice was enabled by self-developed IT in a cumulative process. This integrated 'knowing' related to practices with the dogs and the IT developed in the same purposeful activity (breeding of hunting dogs), could be measured by the shared gauge of success, i.e., increased cooperation (Syrjänen and Kuutti 2004) that related to an increasing number of new, good, tested and less inbred hunting dogs in the field. The same quality measured the use of socio-technical (O'Day, Bobrow et al. 1996) IS as part of the infrastructure, the community PD (Karasti and Syrjänen 2004), the collected data and the 'sure way' strategy employed since 1990.

3.3 IT by sharing the object in the breeding activity

The old PC database was originally designed for a single user and one set of tasks (publishing the results of shows and hunting trials). After that it has been further developed by user-designers who implemented new functions and programs for the needs of breeding counsel and 'ordinary users', e.g., 'dozens of statistical functions' but "in my mind we don't have any useless statistics, rather there should be even more" (DB6). For instance, a program for calculating a coefficient of inbreeding (CoI) was designed applicable to measuring CoIs of dogs, pairs and the breed and the IT artifact to field usage. Implementing a technical solution was multiphase, took over a year but finally the application named "Breed" could be installed in low-priced field PCs and integrated into the existing database.

Additional statistical tools around CoIs and hunting trial results were implemented in several new combinations. They were needed to convince breeders to switch to the new 'diversity' thinking (from the long-lived line inbreeding) when user-designers found that too inbred dogs were less successful in hunting trials (though they or their offspring could win best prizes in dog shows). New innovations, on how to breed better hunting dogs by altering the line inbreeding and measuring the change by the new IT system, began to circulate via magazine articles, the breeding counsel, community meetings and later via the web, which reached many members who were not directly in contact with the FSC, nor used other community services. Today inbred KBDs are rare, younger and a lot more dogs pass the hunting trials per year, and KBDs can win best prizes in championships with other hunting dog breeds too. Today also the IT "plays such an important role and members' expectations are high" (DB6) as it could "open the eyes of many breeders" (DB4) to see and share the object of work and to cooperate.

In KBDC, analysis of IT use and other practices were not considered only at an action level (what people do with IT) but considered at levels of the relevant activity, which showed where tensions were rooted. For example, when there was some tension among web users "backbiting other breeders, breeding organizations… dogs… by making gibes" (DB11) in "the game that is (always) hard at the (dog) field" (DB5), the tension was alleviated by producing focused IT for the purpose. Such tensions demanded different handling and knowledge, other than the dogs' genetic history, but structures were needed to balance the 'many curial factors' in planning the future of the whole population. In that case, continuous IT design was necessary in order to keep the current community on track (Blackler, Crump et al. 1999) regarding historical reasons and references involved in current decision- making:

"Preserving diversity is one of the most important methods in KBD breeding… the reason why we need IT and involved members to take care of the tools - otherwise we cannot serve anybody… At least with this kind of system we can produce much better informed ideas than by the earlier (remote IT) system dependent on personal feelings… to give something to the joint venture… Usage of the new IT system has balanced possibilities (to act more knowledgeable in the field). So, all of us can know as much as the others… we do not want (back) the situation where there would be a few who know a lot about the dogs and everything else, and others would know nothing." (DBs)

Comment to the duality of structures. Again, it is possible to recognize familiar elements from the study by Orlikowski and Robey (1991): the use of IT is a social phenomenon and both material and social dimensions are contributing to the results. However, the case also shows that the structures are complicated and layered, and only partially visible in the actions of the participants. In this sense, our 'focus on what people do, and how they do it' does not make sense without understanding diversity in the *duality of structures,* how 'the engagement with technologies at hand' relates to the community's actual capability in practice–the why, which is the very reason for any kind of organizing.

In the case, the hidden structures became visible and meaningful only when seen against the object of the purposeful activity itself. The design IT for a community of practice was gained by implementing IT and other systems by locating the duality of structures at different levels of the activity. For instance, in one situation the domain structures around hunts with dogs, breeding of hunting dogs, judging in hunting trials, etc. were considered and linked with the incorporated, historical human relationships, the game played in kennels, and with the genetic history of the dogs. This situation involved the technical practice, when the 'code of code' (Brown and Duguid 2000, 248) in the source code opened for 'ordinary' users' programming and use structures were set in the field conditions.

The functionality of 'things', flexible integration of existing resources and social practices were not the key to the community IT in this case. Rather, what the case illustrates is the seeking of domain-specific 'fringes' (cf. Star 2002) of IT, aspects of knowledge enhancement that need a shared object of activity–enduring enough–that enables the CoP to organize, design, use, and carry out other practices.

4 TOWARDS IT FOR COMMUNITIES OF PRACTICE

The new IT where use and design merge supports CoPs where smaller and larger views are managed without losing the connections between and within them. With CoPs it is difficult to keep the individual and the collective separate, they should both be seen in an integrated set-up as shaping the practice. Orlikowski has studied separate cases at different levels, where success can be and often is measured by different indicators. When all levels are integrated, an indicator of success may change drastically. In the case of CoPs, separate success with design, use, and other activity does not matter as much as what has been achieved in the integrated meaningful activity.

4.1 The problem of analysing communities

The concepts developed by Orlikowski and explored in this work are used widely with success in analysing IT use and design in organisations. They can be used to recognize, reveal, and change community practices and we agree that Orlikowski's concepts enable sensitivity in identifying individual issues even in an archetypical community. However, we found also that a certain vital part for CoPs was not considered in the approach. A community is about sharing a practice but there is always a purpose, i.e. the why it exists in the first place. Such a purpose may exist with organised labour as well but apparently, it is an 'upper level phenomenon' and is so self-evident or so insignificant that in analysis meaningful results can be achieved without any reference to it. Yet, any attempt to leave the purpose out from an analysis of communities will lead to a partial, distorted view. The purpose is the object of a community's purposeful practice, consisting of both the 'field' and the

shared 'vision' of the participants: what they should do together for the field, the result of which enables the community to collaborate and continue the purposeful practice.

Thus, it is necessary to have conceptual tools capable of grasping the object of a shared practice and to follow its development. We suggest that the reason might be in the sociological origin of concepts used by Orlikowski: sociology is a study of social relations, and it has thus inherent difficulties in dealing with the material world. Even when the material world is brought into sociological theories in one form or another, there is a tendency that it will only be used as a background, a scenery in the front of which the real players perform, and not as a full participant in the action.

4.2 Use as design

In our case community, dog breeders' have learnt how to integrate IT into their own practices and sociomaterial structures, where–in the community–IT *use is design* (Allen 1993, 240). This means that the actors themselves 'translate' the social and material practices into new material forms and produce the IT (Suchman 2002). The outcome is meaningful only when it is used and when others' knowledge increases means the object of practice (and produced knowledge) is shared. People's knowledge increases especially regarding the field and domain and community structures. In this case, knowledge is related to the continuity of meaningful practices with dogs, and thus this IT is for dogs too.

The above account reports the use as a design situation where new knowledge is not given or taken but constructed step by step (Brown and Duguid 2000). This relates to knowledgeable persons as suggested by Orlikowski (2000). Whereas Orlikowski's practice lens focuses on IT use at hand, this view aims to reach beyond the objective organizational behavior and structures seen in IT use as such (cf. Hedfridsson, Holmström et al. 1997) allowing the focus on incorporated structures too. These structures are important for IT for communities of practices, in which practitioners with varying backgrounds can maintain the tricky power play for the sake of individual benefit. However, as their efforts are intentionally joined with the work done for the shared object of practice and 'community knowledge' (Lach 1994, 150), the desired change can better unfold. This cannot be served if IT design rests solely on some remote collegial work view inscribed in IT-artifacts handed down to the users.

Instead of enacting the structures (again and again) away from the designers' a priori intentions, as Orlikowski (2002) suggests, the alternative staring point for community IT is that they are conceptualized in situ by local actors (e.g. by user-designers cf. Nardi 1993) who see better the local infrastructural needs. Their incremental solutions to problems known only partially can offer a proper means to direct the desired change (Syrjänen and Kuutti 2004) when it relates to the way the community knows (Blackler, Crump et al. 1999) the shared object of activity and works for it. People's knowledge does not necessarily change when their practices change if the overall picture remains vague or it is recognized only through an individual's point of view. Enabling tools for discussion and clarification of the general 'vision' are very important but wider views as such may be useless if the means to enact a shared relevant focal point are lacking.

Fortunately, there is a tradition within the IS design where both the "field of work" and the community around it, and the design work and design community, and relation between them is emphasised. This tradition (e.g. Kuutti and Arvonen 1992, Blum 1996, Korpela, Mursu et al. 2002) is based on cultural-historical activity theory (CHAT). It can offer a good starting point for the development of tools for community IT, especially when several practices should collaborate.

4.3 Design in the small and in the large

KBDC's community PD (Karasti and Syrjänen 2004) rests on the IT setup where the identified shared object of practice is made understandable by grassroot actors involved in bottom-up design. What is gained by the shared object is that the systems' scope is scalable in different ways and by several structures. It ensures that user-designers and others are "working on the right problem" (Blum 1996,

375). When "the right problem" is confirmed, the need for fixed specifications and control decreases and IT designs keep their relations with the community, rules, division of labour and with other conceptual and material resources available. With the help of such an object, the diversity in the duality of IT and other structures can be considered on a local small scale design, it can serve the wider practice and vice versa, within the actual community of practice.

When designers really grasp that any IT artifact has a vital role in shaping other people's daily practice, the IT development itself will serve the means of clarifying an object of a purposeful practice. A genuine activity is always wider than just using a tool for a task. Therefore, IT artifacts should not be connected only to individual tasks, doing things at hand, but to some collective object of work. With it, design becomes *users'* information systems development that is practically involved in use domain knowledge. It may actuate users' customer practices (chains of practices), which should be supported rather than be subjected to arbitrary changes caused by artifacts developed "outside" and "handed over" to users.

In this case, 'diversity' was found to be the most important issue. However, even in the simplified form described here, we can see that diversity can hardly be a result of a pre-specification-free practice. In this case it was enabled and strongly guided by the raison d'être and historical, societal, and the like conditions of the community. It was very domain-specific, including differing meanings of resources and complicated reasons for organizing practices in certain ways. On the one hand, community IT occurs in a rather open, flexible, and dynamic way. On the other hand, the dynamic nature is gained by relationships between domain/field practitioners, who (being in the field) possess the methods for practical justification that ensures usefulness of IT in CoPs.

This work denotes that systems positioning by a shared object enables a sensible way of structuring IT for communities of practice and distributed agency (Engeström 2004) practices. The part of organizational work that is not reachable directly by focusing IT uses at hand is important in many content and material rich areas, such as healthcare and education (Blum 1996; Korpela, Mursu et al. 2002; Kaaber Pors and Simonsen 2003; Kollerbrau 2005) where IT is for living beings.

Concluding remarks

The sensitivity to social issues and organizational relationships of Orlikowski's approach studied here is widely used in identifying subtle distinctions in systems design, close to IT domain. Yet the sensitivity of the approach seems to be weaker in analysing how (remote) design actuates users' IT re-enacting and changing their collaboration. Different analyses of design, use, and practice by different indicators of success/usefulness of IT make it difficult to see the total impact, as success in one area may become harmful in another area.

In CoPs, the shared object joins several practices into a purposeful whole. When a practice broadens from an individual to a collective it comes under the influence of more numerous interpretation frames, values, norms, and histories. Thus, the competence to act collaboratively by 'knowing in practice' becomes more complicated and demands to integrate IT design, use, and the practice served.

Most accounts of information technology design take the professional and business-driven viewpoint, and often focus only on IT, neglecting the actual practice IT is serving. The IT for CoPs analysis here takes an alternative view. It shows that although Orlikowski's approach is capable of grasping many aspects of community IT, it however fails to recognize perhaps the most crucial aspect for integrating several practical community levels, the shared object of all activities. The community IT analysed here suggests that the practice scope of Orlikowski and associates possesses potential for systems design in other practice domains too. Yet, it should be extended by identification of some more enduring object of practice that would be capable of integrating duality of structures, several layers of IT designs, uses, and practice, with knowledge enhancement measured by the continuity of the relevant practice.

Acknowledgements

The work is supported the Academy of Finland award (no 112217 for Syrjänen's PhD work, 2006). We thank the data analysis groups at the University of Oulu for practical help, and the four anonymous reviewers for their constructive critique. Anna-Liisa thanks also the hunting dog community.

References

Allen, C. (1993). Reciprocal evolution as a strategy for integrating basic research, design, and studies of work practice, in: Participatory Design: Principles and Practices, D. Schuler and A. Namioka (eds), Lawrence Erlbaum Associates, Hillsdale, New Jersey, 239-253.

Blackler, F., N. Crump, et al. (1999). Organizational learning and organizational forgetting: Lessons from a high technology company, in: Organizational Learning and the Learning Organization. Developments and Theory and Practice, M. Easterby-Smith, L. Araujo and J. Burgoyne (eds), SAGE Publications, London, 194-216.

Blum, B. I. (1996). Beyond programming: To a new era of design, Oxford University Press, New York.

Brown, J. S. and P. Duguid (2000). The social life of information, Harvard Business School Press, Boston, MA.

C&T 2007. Call for Papers: the Third International Conference on Communities and Technologies, http://ebusiness.tc.msu.edu/cct2007/page1.html (the date accessed April 4, 2006).

Engeström, Y. (2004). Object-oriented interagency: Toward understanding collective intentionality in distributed activity fields, in: Developmental work research: Expanding Activity Theory in practice. ICHS Volume 12, 89-117.

Giddens, A. (1979). Central problems in social theory: Action, structure, and contradiction in social analysis, University of California Press, Berkley, CA.

Giddens, A. (1984). The constitution of society: Outline the theory of structuration, University of California Press, Berkley, CA.

Hedfridsson, O., J. Holmström, et al. (1997). Beyond the common-sense of practice: A case for organizational informatics. Scandinavian Journal of Information Systems 9(1), 47-56.

Holstein, J. A. and J. F. Gubrium (1995). The active interview. Qualitative Research Methods. Volume 37, SAGE Publications, Thousand Oaks, CA.

Hutchins, E. (1991). Organizing work by adaptation, Organization Science 2, 14-39.

Hutchins, E. (1995). Cognition in the Wild, MIT Press, Cambridge, Mass.

Kaaber Pors, J. and J. Simonsen (2003). Work practice characteristics: A framework for understanding complex issues of groupware integration, in Proceedings of the Eleventh European Conference on Information Systems, Naples, Italy, 11 p (digital source © ECIS Standing Committee).

Karasti, H. and A-L. Syrjänen (2004). Artful infrastructuring in two cases of community PD, in Proceedings of The Participatory Design Conference 2004, Toronto, Canada, 20-30.

Kollerbrau, A. (2005). IT for learning: A need for a new approach? History of Nordic computing (IFIP WG9.7, the First Working Conference on the History of Nordic Computing, Trondheim, Norway, Springer, New York, 223-238.

Korpela, M., A. Mursu, et al. (2002). Information systems development as an activity. Computer Supported Cooperative Work 11(1-2 Activity Theory and the Practice of Design), 111-128.

Kuutti, K. and T. Arvonen (1992). Identifying Potential CSCW Applications by Means of Activity Theory Concepts: A Case Example. Computer Supported Cooperative Work CSCW´92, Toronto, Canada, ACM Press, 233-240.

Lach, S. (1994). Reflexivity and its doubles: Structure, aesthetics, community, in: Reflexive modernization: Politics, traditions and aesthetics in the modern social order, U. Beck, A. Giddens and S. Lach, Polity Press, Cambridge, Oxford UK, 110-173.

Lave, J. (1988). Cognition in Practice, Cambridge University Press, New York.

Lave, J. and E. Wenger (1991). Situated learning: Legitimate peripheral participation, Cambridge University Press, New York.

Nardi, B. A. (1993). A small matter of programming: Perspectives on end-user programming, MIT Press, Cambridge.
O'Day, V. L., D. G. Bobrow, et al. (1996). The Social-technical Design Circle. Computer Supported Cooperative Work '96, Cambridge MA, USA, ACM, 160-169.
Orlikowski, W. J. (1992). The duality of technology: Rethinking the concept of technology in organizations. Organization Science 3(3), 398-427.
Orlikowski, W. J. (2000). Using technology and constituting structures: A practice lens for studying technology in organizations. Organization Science 11(4), 404-428.
Orlikowski, W. J. (2002). Knowing in practice: Enacting a collective capability in distributed organizing. Organization Science 13(3): 249-273.
Orlikowski, W. J. and D. Robey (1991). Information technology and the structuring of organizations. Information Systems Research 2(2), 143-169.
Pitkin, B. (2001). Community informatics: Hope or hype? in Proceedings of the Thirty-Fourth Annual Hawaii International Conference on System Science Maui, Hawaii (CD-ROM), IEEE.
Star, S. L. (2002). Infrastructure and ethnographic practice: Working on the fringes. Scandinavian Journal of Information Systems 14(2), 107-122.
Star, S. L. and G. C. Bowker (2002). How to infrastructure, in: Handbook of New Media. L. A. Lievrouw and S. Livingstone, SAGE Publications, London, 151-162.
Suchman, L. (1987). Plans and situated action: The problem of human-machine communication, Cambridge University Press, New York.
Suchman, L. (2002). Located accountabilities in technology production. Scandinavian Journal of Information Systems 14(2), 91-105.
Syrjänen, A-L. and K. Kuutti (2004). Trust, acceptance and alignment: The role of IT in redirecting a community, in: Social capital and the role of information technology, M. Huysman and V. Wulf, MIT Press, Cambridge, Massachusetts, 21-51.
Tesch, R. (1990). Qualitative research: Analysis types & software tools, Falmer Press, Hampshire.
Wenger, E., R. McDermott, et al. (2002). A guide to managing knowledge: Cultivating communities of practice, Harvard Business School Press, Boston, Mass.