

The role of Information Technology in building and sustaining the relational base of communities

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The popularity of the concept of communities is growing and so are ideas on how to support these communities with technologies. We can find this particularly in the field of management and organization studies, in which communities are more and more seen as a solution for rigid, hierarchical and conservative bureaucratic structures. In fact, communities can be seen as the latest wave in an ongoing evolution of organizational structures (Wenger, 2000, Lesser, 2000). In the age-old traditional functional organization, concentration of expertise was (and still is) under hierarchical control. In the decades after World War II, and in specific during the seventies, the multi-divisional organization was seen as the answer to the ever-expanding functional organization. Business units were introduced as an organizational structure alternative to the functional division. A decade later, project-based organization entered the organizational landscape. Project teams were designed in order to be closer to the market. Since the mid-nineties, knowledge based organizations have overshadowed the project-based organization, at least that is what popular business press tells us. Communities instead of teams are the dominant structure of the organization, also coined as communities of communities (Brown and Duguid, 1991). Communities differ notably from conventional units of organization, such as teams or work groups. Group theory in general (Hackman, 1990) perceives groups in an organization, as

canonical, bounded entities that are sanctioned and organised by that organization and its tasks. In contrast, communities are "often non-canonical and not recognized by the organization" (Brown and Duguid, 1991)

Next to its flexible informal character, communities are known for its ability to connect people in that way that knowledge is informally shared with one another. It was in particular the work of Brown and Duguid (1991) that introduced the concept in the field of Knowledge Management. Communities are often considered the logical step forward in the evolution of knowledge management (Ackerman et al 2003; Prusak and Davenport 1998, Cohen and Prusak 2002, Huysman and De Wit 2003, Wenger 1998, Brown and Duguid 1991). Whereas in the first generation of knowledge management, IT tools such as repository systems and Intranets were considered the means by which knowledge is being transferred, in the second generation expectations are centered around the possibilities communities offer to share knowledge, in particular its tacit dimension. The role of IT to support knowledge management in this second wave lies more in helping people to get and stay connected. As a result, more attention is given to systems that play a role in building and sustaining the relational base of communities than on systems that contain and help to distribute 'knowledge'. It could be said that this second wave of knowledge management interests has pushed the technological imperative away from its former central stage. Many researchers as well as consultants came to realize that in case of repository systems, knowledge cannot be stored into systems, and in case of Intranets and other groupware tools people will not use technologies only because they exist. At the same time, we cannot push IT aside that easily. Modern organizations are linked up to the rest of the world through various forms of IT, people are more often than not distributed by time and space and new organizational forms emerge based on infrastructures offered by the Internet.

The focus on connecting people instead of collecting knowledge (Davenport and Prusak 1998) has various important implications for understanding the relation between IT and communities as well as organizational impact and consequences. Most of the literature on communities and IT is focussed on designing IT applications to support knowledge sharing communities (e.g. Ackerman and Halverson 2004), on analysing the level of participation and the different roles people can play in communities (e.g. Butler 2001; Preece 2000), or on the motivation of individuals in contributing to these (distributed) communities (e.g. Wasko and Faraj 2000). These analyses

often overlook the more fundamental dynamics that connect communities and technologies. The danger of this is that the current popularity of the concept of community might soon be seen as ‘the next fad that forgot people’, just as what has happened according to Scarbrough and Swan (1998) with the Knowledge Management fad.

In order to beat the upcoming hype and to prevent that the baby will be thrown out with its bathwater, we believe it is needed to include more relational theories on the nature, development and impact of collective knowledge, shared practice, and social networks, in discussions about technology supported communities. By addressing in more detail how people relate to one another, how shared practices emerge and how communities evolve, we will be able to understand better if, when, how and why such communities use or do not use technologies. This special issue emphasizes this relational base of communities supported by information technology.

Two of the articles in this volume look at these aspects, one from a critical perspective (Paul Duguid) the other from a practice theory perspective (Carsten Osterlund and Paul Carlile). Both offer analytical tools that help us find our way through the community jungle.

Paul Duguid goes back to epistemological differences and difficulties in the debate about communities. According to Duguid the economic paradigm perceives knowledge as something that can be transferred from one unit to the other. Social scientists, or better practice based theorists look at knowledge as dependent of its environment and community in which it is created. With the growing attention from the side of economic scholars interested in knowledge in organizations, there is a tendency that economics will also jump on the community bandwagon while introducing a perception of communities as tools to transfer knowledge. There is a tendency among economics to decontextualize knowledge and to look at sharing of ‘know that’ within and across communities. Paul Duguid shows us that this could be a highly problematic viewpoint as ‘know that’ only becomes actionable through ‘know how’, and it is within communities where know how is created.

Carsten Osterlund and Paul Carlile’s article also emphasize social practice theories for a better understanding of the concept of communities. The article provides a helpful framework that serves as a guide to all those scholars seriously interested in communities and communities of practice in particular. They use the three most often cited studies on practice theories related to

communities of practice: Lave and Wenger (1991), Wenger (1998), and Brown and Duguid (1991 and 2001) to identify differences in their conception of CoPs. As most scholars doing research on communities have experienced: it is extremely difficult to find good theories on communities of practice as well as to differentiate among those already existing. Osterlund and Carlile provide a stepping stone for theory based literature on communities in general and technology supported communities in specific.

The other three articles are research based and provide empirical material on how IT can help support the relational base of communities. Technologies can support this relational base of communities in two ways: we can use IT to better understand the structure of existing but often hidden communities or it can be used to support existing communities as well as the emergence of communities. As an example of the first case Joshua Tyler, Dennis Wilkinson, and Bernardo Huberman analyze email traffic trying to identify communities of practice within an organization. In case of the latter, we refer to groups of people that find each other with the help of IT or whose social ties get strengthened by means of IT. The article by Andrea Kavanaugh, Debbie Reese, John Carroll and Mary Beth Rosson in this special issue, focus on IT support for existing communities while Ulrika Josefsson looks at the emergence of communities as a result of IT.

Many IT supported communities are virtual or online communities. Literature on online communities is perhaps one of the fastest growing area of research. Not all of these publications refer conceptually to NoPs, let alone to CoPs as described by Paul Duguid. Communities are characterized by their emergent structure as well as by a shared practice, either distributed or local. Every attempt to create communities out of people that have no intrinsic need to relate, are doomed to fail. Organizations and the Internet have witnessed many of such – often managerial biased - failed attempts to bring forward an open, and friendly environment where people are free to share their knowledge. At the same time, there are also a growing number of examples of informal groups that emerge as a result of the Internet and that take the characteristics of communities. A nicely related case study is given by Ulrika Josefsson when she describes the social aspects of patient online communities in Sweden.

Clearly, communities often already exist and use IT in addition to their repertoire of communication media. The interesting question than is, whether the use of IT will alter these existing communities, e.g. in the sense of increasing or decreasing social capital? In the study of

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the Blacksburg community, Andrea Kavanaugh, Debbie Reese, John Carroll, and Mary Beth Rosson found that the use of Internet indeed increases social capital of a local community.

In the rest of this article, we will discuss the concept of ‘social capital’ as a topic that is often referred at when discussing the relational base of communities but is seldom made explicit. In short, social capital is considered as a necessary ‘ingredient’ that binds communities over time (Huysman and Wulf 2004). Although communities may see the light as a result of IT (particular in case of online communities), it depends on the social capital that is being generated over time, whether people will continue using the technology to stay connected. Insight into the social capital of communities will provide better understanding concerning IT adoption and use by communities than the more traditional analysis of technological requirements, knowledge requirements and structural aspects of the community.

The Concept of ‘Social Capital’

Social capital, just like the concept of communities, has recently gained importance in a variety of different research fields. The concept was originally introduced by sociologists and political scientists. Lately, organization and management sciences show an increased interest in the concept. Social capital refers to networked ties of goodwill, mutual support, shared language, shared norms, social trust, and a sense of mutual obligation that people can derive value from. Social capital then is about value gained from being a member of a network. By being a member people have access to resources that non-members do not have. These resources range from e.g. access to potential career moves, access to resources in entrepreneurial start-up processes, to access to cooperative services in developmental countries. Lately, the concept has also been appropriated in the field of organizational learning and knowledge management where it is used in the discussion regarding technology supported communities, such as online communities, KM applications and social network analysis¹. In general, social capital is often seen as the glue that brings and holds communities together (Cohen and Prusak 2001).

Although the concept of Social Capital has a much longer existence (cf. Hanifan 1916), discussion on the topic spurred in the last two decades. Its emergence in the field of political science and sociology started as a critic regarding the narrow analytic perspective on economic activities which is immanent in the neoclassical school of macro-economic thinking (e.g. Bourdieu 1986; Granovetter 1985; Uzzi 1997). A basic assumption of main stream economic analysis sees the economy as an increasingly separate, differentiated sphere in modern society, with economical transactions defined no longer by social or kinship obligations but by rational calculations of individual gains. It is argued that industrial societies are distinct from pre-industrial societies by the fact that the social dimensions of economic activities are subordinated under atomic market transactions. With regard to research methodology, such an understanding marginalizes the analysis of sociological conceptions of economic activities. Social capital is a concept which challenges such a reductionist understanding of economic activities. Drawing on the capital metaphor it allows to analyse social aspects of economic activities. While not using the term “social capital” explicitly, Granovetter (1985) works out the concept of embeddedness of social action. He argues that “the anonymous market of neoclassical models is virtually nonexistent in economic life and that transactions of all kinds are rife with the social connections described” (p. 495). He criticises the limited analytic perspective of institutional economists, especially Williamson’s (1975) work. Granovetter (1985) shows how personal relations and networks of such relations generate trust and discourage malfeasance, undermine formal organizational structures, and shape inter-organizational transactions. So the embeddedness of social action offers a valid alternative explanation for institutionalisation in economic life.

Meanwhile there are many case studies that have proven the importance of social networks in explaining economic behavior. Loury (1977) contributes racial income differences to different levels of connection to the labour market and of access to relevant information. Portes and Sensenbrenner (1993) investigate the effects community participation has on the economic condition of Puerto Ricans in New York and Latin American minorities in Miami. Uzzi (1997) shows how social network shape inter-organizational cooperation in the New York textile industries.

On a theoretical level, Coleman (1988), Burt (1992) and Portes (1998) provide important contributions to the discussion on social capital. Coleman (1988) defines social capital rather

vaguely as a “variety of entities with two elements in common: They all consist of some aspect of social structure, and they facilitate certain action of actors - whether persons or cooperated actors – within this structure” (p. S98). Burt (1992) understands social capital as “friends, colleagues, and more general contacts through whom you receive opportunities to use your financial and human capital” (p. 9). While differing in the scope of their definition, both of these authors highlight the close interaction between social and human capital. The argument which was already developed by Bourdieu (1986), becomes increasingly more important in knowledge-intensive economies. In this sense Cohen and Prusak (2001) have suggested to see social capital as the main angle to improve knowledge management in organizations.

While the analysis had been grounded so far on the relationship between actors or between individual actors or between an individual actor and a social aggregate, Putnam (1993 and 2000) equals social capital with the level of civic engagement. He applies the concept of social capital to cities, regions and whole nations. He understands social capital as a set of properties of a social entity (e.g. norms, level of trust, or social networks) that enables joint activities and cooperation for mutual benefit

Although the ideas related to social capital can be routed back to either the Marxist or the communitarian tradition, the recent organizational and managerial interest in the concept of social capital seems to ignore these divergent philosophical traditions. The Marxist conception of social capital is provided by French sociologist Pierre Bourdieu (1986). The communitarian tradition, is stemming from American social scientists such as Etzioni (1993, 1995) and Putnam (1993 and 2000).

Bourdieu (1980 and 1986) perceives social capital as a specific form of capital. It has to be studied in relation to economic and cultural forms of capital. Bourdieu (1986) defines social capital to be „the aggregate of actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationship of more or mutual acquaintance and recognition” (p. 248). Like all forms of capital, social capital is accumulated labor. It has its own capitalists who accumulate it in the form of relationships, networks, contacts: „... the network of relationship is the product of investment strategies, individual or collective, consciously or unconsciously aimed at establishing or reproducing social relationships which are directly usable in the short or long term ...”(p. 249). Bourdieu (1986) is specifically interested in the way the

different forms of capital shape the social world, especially the aspects of class struggle and class nature. Whereas the upper class takes their high level of social capital for granted, lower classes usually are aware of their scarce resources in terms of social capital, e.g. lack of collective bargaining power or access to career jobs.

Against this conflict perspective stands the tradition of American communitarianism. In this tradition, social capital is community-centered. Communities in turn are seen as a voluntaristic social units that stimulate development of organizations and society as a whole. The community concept was studied not just from an 'objective' sociological perspective but also to provide the - in practice mainly American - society with a normative, organizational vehicle for revitalizing democracy. Advocates of this community view, known as the communitarians, protest against the decline of social trust, the loss of civic engagement, and seek to shore up the moral, social, and political foundations of society (Etzioni, 1995). This emphasis on unity and collectivism is in line with the communitarian perspective that surrounds the discussion on Communities of Practice (Lave and Wenger 1991; Wenger 1998). From a communitarian perspective, it is the community instead of the individual or organization that structures action and provides the key frame of reference. The perspective argues that 'we know what we know through our relationships with others in the community' (Etzioni 1993). The communitarian perspective also stresses the need to take social responsibility to support the community instead of striving to satisfy individual needs only. Communitarians are critical about the 'undersocialized conception of man', pointing to the dominant individual-oriented rational economic or utilitarian presumptions that underly neo-classical and transaction cost economics. Influenced by various sociological theories, such as the ideas from Durkheim, Tonnies, Granovetter, and Mead, Etzioni argues that human behavior, including economics, can only be understood in terms of the individual in relation to the social group. The perspective argues that 'we know what we know through our relationships with others in the community' (Etzioni, 1993). He summarizes this view as "The I's need a We to be" (Etzioni 1988)ⁱⁱ.

Social Capital and Managing Knowledge

The introduction of the concept of social capital in combination with the concept of community has led to a fundamental shift in thinking about managing knowledge (cf. Ackerman, Pipek, and Wulf 2003). While the notion of human capital (as individual expertise) formed the core ingredient of the first wave of knowledge management, social capital can be seen as the core ingredient of the second wave (Huysman and De Wit 2002). The first wave of knowledge management mainly centered on issues how to support the exchange of individual expertise for reasons to avoid unnecessary knowledge redundancy as well as to fill knowledge gaps that exist as result of mobility, globalization and distributed work. The first wave of knowledge management overlooked the importance of the community (more than the individual) as main knowledge producer and consumer.

As is usual with introduction of a new combination of ideas, such as social capital for knowledge management purposes, the literature typically has an optimistic flavor (Abrahamson and Fairchild 1999). In the broad field of ‘knowledge management’, social capital is introduced as the necessary ingredient for informal sharing of tacit knowledge that most typically takes place in communities of practice. Communities are seen as the prime source of a sense of membership and commitment, the source of mutuality and trust and the places in organizations where people feel most at home and most responsible for one another (Lesser 2000), providing enough safety to freely share and generate new ideas. This highly romantic and optimistic image of communities has lately been criticized (e.g. Contu and Willmot 2003) for example because of ignoring political processes, conflicts and negotiation that is inherent to communities.ⁱⁱⁱ We take the position that without addressing social capital as the ‘invisible glue’ (Adler and Kwon 2002), communities portrayed as harmonic entities, are not more than managerial constructs.

IT to Foster Social Capital

While the introduction and acceptance of the concept of social capital in various academic disciplines has been significant, the attention from the side of information technology research lacks behind. With some notable exceptions (e.g. Huysman and Wulf 2004; Lesser and Cothrel 2001; Preece 2002; Resnick 2001) the topic has not gained comparable attention from scholars

interested in the design of information technology in organizations or the society at large. This is on the one hand not surprising as we are dealing with rather different disciplines. Although computer scientists and IS scholars have shown to become more open to incorporate social science research into their discipline and vice versa, cross-fertilization between the various research streams is still not standard practice. On the other hand, this limited interest in the topic from the side of IT scholars is strange as the understanding of informal relationship is becoming more and more urgent in today's 'networked society'.

Although we agree with Cohen and Prusak (2001) that it is not so much the technology that brings people together as it is the existing social capital, we do not wish to see the relation between the technology and the social system as a oneway relationship. Several interesting case studies on online communities such as the one by Ulrika Josefsson in this volume, for example describe that often people need a technology (the Internet) to get connected to like minded people one would not have known without the technology. In the case of patient online communities as described by Ulrika Josephson, communities emerge over time in which its members help one another by sharing their own experience with a particular disease, create trust and a feeling of belonging, which as a result increases the social capital of the participants. In such cases it is the technology that creates communities and as a result improves the social capital of its members.

While computer science has not yet sufficiently referred to the social science discourse about social capital, there are many computer applications which have the potential to augment social capital among its users by supporting and/or visualizing relationships in communities. Most of the applications are designed to promote social capital in overcoming spatial or temporal boundaries by making users aware of each other or of artifacts others have created. Among the systems that bridge spatial and temporal boundaries, topic- and member-centered communication spaces are classical examples. While member-centered communication spaces, such as the Bubble or Loops system presented by Ackerman and Halverson (2004), foster social ties in an already well defined community, topic-centered communication spaces, such as news groups, allow people who are not necessarily well known to each other to exchange ideas or find solutions to problems. An important motivational factor to participate in topic-centered communication spaces seems to be the personal reputation to be gained. System design has to

take this fact into account. Beyond pure communication, applications may foster social capital by offering virtual spaces which allow to create, to develop, and to store topic-centered materials. These repositories of materials are typically augmented with communication and annotation functionality (cf. Buckingham Shum 1997; Pipek and Won 2000; Stahl 2004). Editing tools support the development of materials and may have additional functionality to distill content out of communication spaces (Ackerman et al 2003). The Answer Garden (cf. Ackerman and Malone 1990; Ackerman 1998) is one of the most influential approach in integrating shared repositories with communication spaces. It was mainly built to encourage learning within organizations. While the general functionality of these systems may be similar, their concrete implementation will be specific with regard to the topic to be dealt with and the application domain (e.g. Chapman 2004).

The systems discussed so far offer places in the virtual space where human actors can direct themselves to, strengthen existing social ties, or build up new ones. In another class of applications, the system takes a more active role in suggesting actors to establish or to refresh relations. Such applications require personal data of the different human actors and domain-specific algorithms to match actors appropriately. Several recommender systems have been designed to support the finding of human actors (cf. Yiman-Seid and Kobsa 2003). Systems like Who Knows (Streeter and Lochman 1988), the Referral Web (Kautz, Selman, and Shak 1997 and 1997a), Yenta (Foner 1997), or MII Expert Finder and XperNet (Maybury, D'Amore, and House 2003) extract personal data about human interests automatically from documents which were created by the actors. Vivacque and Lieberman (2000) have developed a system which extracts personal data concerning a programmer's skill from the Java code the programmer has produced. Based on these types of personal data the recommender systems allow to match actors. However, each system has hitherto dealt with specific matching algorithms for one type of personal data. Becks at al. (2004) have developed a framework which allows matching human actors based on a variety of different types of personal data.

While recommender systems apply personal data for automatic matchmaking, awareness features capture selected activities of individual actors and make them visible to their cooperation partners. Awareness features are typically built for groups which contain a high level of social capital and cooperate intensely. However, awareness data and the resulting histories of

interaction can also be applied to match people who are not yet well know to each other. For instance, the Social Web Cockpit provides awareness data which informs users about the presence of other users at a site of interest. Moreover, it allows for collaborative content rating and recommendation functionalities (Gräther and Prinz 2001). Won and Pipek (2003) suggest to collect data about those computer supported activities of users which are indications for their personal expertise. After different steps of aggregation, their Expertise Awareness mechanism supports finding of human actors who possess a required skill profile which is dynamically updated.

While the applications mentioned before are based on ordinary input and output devices, large screen displays and augmented reality applications offer another interesting approach to foster social capital. Churchill (2003) and Divitini and Farshchian (2004) argue that applications based on large screen display can serve an important community building function. Located in public places, these screens advertise services, events and people's interests, and invite community members to communicate, participate and interact. Fischer et al (2004) present the Envisionment and Discovery Collaboratory (EDS), an environment in which participants collaboratively solve problems of mutual interest. The EDC supports face-to-face problem-solving activities by bringing together individuals who share a common problem. The problem is discussed and explored by providing participants with a shared construction space in which participants interact with physical objects that are used to represent the situation currently being discussed. As users manipulate physical objects, a corresponding computational representation is updated by using technologies that recognize the placement and manipulation of physical objects. Computer-generated information is projected back on to the horizontal physical construction area, creating an augmented reality environment. The authors argue that such an application fosters social capital by putting owners of problems in charge and encourage the recognition and awareness of other participants.

Beyond this research work there are many mundane computer applications which can have a strong impact on social capital. Address book applications and systems of Customer Relationship Management (CRM) are intended to strengthen existing social ties. But also many other types of computer applications, like many other types of material artifact, can have an impact on the development of social capital in a given social aggregate. For instance, Syrjänen and Kuutti

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(2004) present a case study where the introduction of a database with a www interface changed the social relations among the member of a Finish dog breeding community.

Analysis of Social Capital

The applications discussed so far, are helpful to support the social capital of communities, either by connecting people or by gaining information about the degree and nature of the relationship. However, implementing such IT systems does not guarantee that people will stay connected. As mentioned earlier, although it might be the technology that helps to connect people, it is the social capital that helps them stay connected. This has implications for decisions to implement IT to support communities.

While requirement analysis are typically framed by formal organizational structures and focuses on the work tasks to be supported, in case of communities of practice knowledge sharing and creation is internally motivated by a feeling of social identity, a shared understanding, and shared practices (Osterlund and Carlile, this special issue). One important implication is that evaluating and/or designing tools to support communities requires a thorough analysis of the existing social capital of a target group that cannot be deduced easily from structures of formal organization.

The need for such socio technical requirement analysis has recently been related with the concept of 'info-culture analysis', as first introduced by Bressand and Distler (1995). Some researchers have argued that the disappointed results of tools such as Intranets are due to the fact that designers traditionally analyze the *infrastructure* (relating to the hardware/software that enables the physical/communicational contact between network members) and *infostructure* (formal rules governing the exchange between actors in the network), but neglect the underlying *infoculture* (relating to background knowledge actors take for granted and is embedded in the social relationships surrounding work group processes) (Choo et al 2000, Newell et al 2001, Ciborra et al 1996).

Introducing IT based on an analysis of the infrastructure only, would result in a technology-driven implementation of these networks. Infrastructure analysis has been succeeded by an approach that also analyses the info-structure. In terms of knowledge sharing and knowledge base

systems or networks, info-structure analysis implies examining e.g. formal business processes, hierarchies, coordination rules, and canonical knowledge sharing strategies (Choo et al 2000). Various authors have stressed the need for an additional info-cultural analysis when designing knowledge networks like intranets (Choo 2000, Ciborra 1996, Newell et al 2001, Kumar et al 1998)^{iv}.

The concept of social capital in relation to knowledge sharing (Nahapiet and Ghoshal 1998; Adler and Kwon 2002) lends itself nicely to address the various layers of IT supported communities (see also Lesser 2000, Newell et al 2001, Huysman 2004).

Nahapiet and Ghoshal (1998) introduce three dimensions of social capital: a structural dimension (network ties, network configurations and organization), a cognitive dimension (shared codes and language, shared understanding) and a relational dimension (trust, norms, obligations, identification). Studying the degree of social capital requires the analysis of the existing social networks and the corresponding ties (a structural analysis), the analysis of the existing shared language, frames of meaning and stories (a cognitive analysis), and an analysis of the existing level of trust and reciprocity (a relational analysis).

A *structural* analysis looks at ‘who’ shares knowledge and ‘how’ they do that. This dimension of social capital focuses mainly on the density of networks and on bridging structural holes (Wasserman and Faust 1994, Burt 1992). These aspects relate to the infra-structure of a community. Density of a network refers to the extent to which actors of a network are interconnected. Next to who communicates with whom, the structural opportunity dimension would also pay attention to the question how they do that. Connecting people in order to share knowledge brings an instrumental perspective to the fore. Different network tools exist that support peoples opportunity to connect with each other, such as those mentioned above. Next to these tools, various applications exist to analyse and map structural dimension of knowledge sharing (see for example the contribution of Tyler, Wilkinson, and Huberman in this volume). Although this ‘who’ and ‘how’ analysis forms an important part in surfacing IT requirements, analysing the structural opportunity dimension only informs us about the structural embeddedness of the system.

A *cognitive* analysis looks at ‘what’ is shared and relates to the ability to cognitively connect with each other in order to communicate effectively. To be more precise, the cognitive dimension

refers to the collective ‘know how’ of a community, which Paul Duguid in this special issue describes as the fundamentals of communities. Analyzing this dimension provides information about the info-structural dimension of a community. The higher a social group’s shared cognition is the more the members are able to share (tacit) knowledge. Shared cognition can be analysed by focussing on shared stories, language, communication regimes (Orlikowski and Yates 1994), etc. Cognitive barriers to sharing knowledge such as for example the difficulty to bridge the distance between expert and novice or the difficulty to express the tacit dimension of knowledge (Hinds and Pfeffer, 2003) highly influence the use for electronic networks. For more in-depth analysis of the cognitive dimension, the situated tacit knowledge, or the collective know how (Paul Duguid in this volume) need to be taken into account. Methodologies used within cultural studies such as ethnography, narrative methods, pattern recognition and matching support such reflectivity of the community of practice (Lanzara 1983).

The relational analysis looks at ‘why’ people share knowledge. It concerns the motivation to share knowledge based on socially attributed characteristics of the relationship, such as trust, mutual respect and generalized reciprocity (Putnam 2000). Analyzing this dimension provides more insight into the info culture of a community. In contrast to the structural aspects of networks that address the density of ties, the relational dimension refers to the ‘strength of ties’ (Granovetter 1985) and offers insight into the strategies people employ to share knowledge (Hansen 1999). Strong ties are important for the exchange of tacit knowledge while weak ties are important for the sharing of explicit knowledge. Ethno-methodological studies of shared practices are best suited to reveal the motivations of people to contribute to the relationship.

Conclusion

One of the most important potential fallacies of the debate on IT enabled communities, is the over-enthusiasm towards technological possibilities. The trap lurks particularly in the assumption that IT can positively support and improve knowledge sharing while ignoring the social conditions that trigger or hinder people to share knowledge. As many scholars have already argued, the tendency to perceive IT as independent from the social environment of which it is part, has caused disappointing acceptance rates (e.g. Ciborra 1996, McDermott 1999). It is not the

technology itself but the way people use it that influence whether or not and how IT will be used. Moreover, in case of communities of practice, it is not the technology itself that enables connecting people, it is the motivation for people to relate to each other (Lesser 2000).

While the current discussion on IT support has a strong focus on on-line communities, we believe that IT may play a role in face-to-face environments, as well. Face-to-face occasions are often essential to build and maintain a certain level of social capital. So community life consists of phases of proximity and dislocation. IT should support the transition between these phases of often varied intensity in community life in a seamless manner.

In general, research on the role of IT to support the relational base of communities is still in its infancy. In order to understand why, when and how people use IT to relate to each other, we need a better understanding of the social dynamics of communities. For example, how do communities learn over time when members are dislocated? To what extent can we re-apply the concept of Legitimate Peripheral Participation, once introduced by Lave and Wenger (1989) to describe 19th century collective work environments (Osterlund and Carsten this volume). To what extent can IT be used to support knowledge sharing in cross communal relations?

Furthermore, we postulated that social capital analysis of communities informs us better about the actual and potential use of IT. Based on theory we proposed that the higher the level of social capital, the more members are stimulated to connect and share knowledge. This implies that communities with high social capital will be more inclined to use – or continue using - ICT to share knowledge than in case of low social capital. Future research into the various dimensions of social capital will inform us in more detail about technical support of communities. For example, it is expected that distributed communities with a shared frame of reference and shared purposes, but with a sparse network, will be in need for communication tools and over time increase the level of density of ties (Brown and Duguid 2001). Also, tools that are meant to support CoP's with strong ties, but who lack a shared cognitive framework, might need to pay extra attention to applications that stimulate discourses. Distributed communities with, for example a limited willingness to share knowledge combined with a shared cognition might require extra attention in face to face meetings before tools are introduced. Furthermore, it is expected that the variance of these dimensions provide insight into possible IT support. For example, members who are

individually motivated to contribute to the community will use reputation systems more than those members whose motivation is more collectively oriented.

While the KM discussion has focussed so far on the positive outcomes of high levels of social capital, empirical research has revealed its dark sides, as well. For a survey on the literature see Huysman and Wulf (2004a). Taking these potential pit falls into consideration, the designers of IT support need to reflect critically their design rationales. Depending on the social dynamics of a community, support for bridging or bonding social capital maybe appropriate.

Finally, analyses of the relational base of IT supported communities poses a serious challenge on the applied research methodologies. Since the boundaries of communities are not given by a definition but by shared practices (Osterlund and Carsten, Duguid this volume), analyzing how shared practices create relations over time requires indepth process based research which is quite different from the usual analysis of community's structure, individual motivations, and variations in community members' roles. Although the selected papers in this volume do not give the answer to all these questions, they show the importance of looking at the (limited) role of IT in building and supporting a relational base of communities.

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ⁱ See also the proceedings of the International Conference on communities and Technologies (Huysman, Wenger and Wulf 2003) and the editorial book on Social Capital and IT (Huysman and Wulf eds. 2004)

ⁱⁱ Of course, Etzioni's ideas were not at all new. Indeed, they are closely linked to the 'substantivistic' school in anthropology that sees economic relationships as embedded in social relationships.

ⁱⁱⁱ Those authors who introduced the notion of COP's: Lave and Wenger (1989) did explicitly stress the power issues related to communities (see also the article of Osterlund and Carsten in this volume). This aspect has been ignored at later stages by many authors.

^{iv} Including an analysis of the information culture or 'info-culture' of a social group corresponds to what Kumar et al (1998) refer to as 'the third rationality of IT'. Their research on the merchants of Prato inspired them to argue that traditional IT development approaches need to be augmented with additional strategies which, as a precursor to development, examine the existing patterns of culture, relationships, and trust (or distrust) in the development situation, and take them into account for devising a development and implementation strategy. This third rationality introduces trust, social capital, and collaborative relationships as the key concepts.