



Weblogs for organizational knowledge sharing and creation: a comparative case study

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Abstract

The use of weblogs as an information and communication technology for knowledge sharing and creation is a novel social and organizational phenomenon. In this paper, we identify and explain contingency factors that influence the successful use of weblogs for knowledge sharing and creation. We start from the assumption that successful knowledge management requires the motivation of people to engage in knowledge-related communication. Based on a comparison of two antithetic cases, we identify and discuss four contingency factors that directly influence the motivational impact of weblogs on organizational knowledge sharing and creation.

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Introduction

Knowledge has become an omnipresent term within the discourse of organizational research (Grant, 1996; Spender, 1996), while being widely acknowledged as an important strategic asset for organizations (Nonaka, 1994). Recently, it is argued that the sharing and creation of knowledge in organizations are not as much an individual and cognitive process, but a social phenomenon (Lave & Wenger, 1991; Cook & Brown, 1999; Gherardi & Nicolini, 2000). Actually, following Gherardi & Nicolini (2000), one can state that knowledge is situated in practices. These practices are conceived as a complex 'system of activities in which knowing is not separate from doing' (Gherardi, 2000, p. 215). In this context, we suggest that organizational knowledge sharing and creation can be traced back to discursive practices that stimulate the sharing and creation of knowledge in organizations (Boland & Tenkasi, 1995).

In order to support organizational knowledge sharing and creation, organizations have been investing in information and communication technologies (ICT) (Bernard, 1996; Davenport & Prusak, 1998). Its successful implementation, especially in the context of new product development, has been documented by a number of case studies (Hameri & Nihtilae, 1997; Boutellier *et al.*, 1998; Malhotra *et al.*, 2001). However, several studies also indicate that ICT does not always improve knowledge sharing and creation (Davenport, 1997; McDermott, 1999), as employees resist sharing knowledge (Connolly & Thorn, 1990; Ciborra & Patriotta, 1998; Jian & Jeffres, 2006) or are habitually reluctant to actually make use of the ICT (Markus & Keil, 1994). Still very little is known about how to overcome these barriers (Raub & von Wittich, 2004).

Against the background outlined above, the aim of the paper is twofold. First, we outline which features of an ICT – in our case weblogs – are

particularly crucial to motivate users in order to engage in knowledge work. Second, we aim at identifying contingency factors that are decisive for stimulating an individual person to engage in knowledge sharing and creation utilizing weblogs.

The structure of the paper is as follows. First, we describe the general features of weblogs. In the second part of the paper, we outline motivational aspects of knowledge creation and sharing. Observations from the field of open source software (OSS) are presented, as they allow for some important resemblances to motivational aspects. The third part of the paper presents our research settings, the Microsoft Longhorn Blogosphere (MLB) and the weblogs of the Intranet of a European research institute (ERI), as well as the methodology of our comparative case study analysis. Subsequent to the discussion of empirical findings on differences in motivation towards weblog usage, we draw conclusions on contingency factors in the fifth part of the paper. The paper concludes with a discussion of the contribution of the paper to theory, outlining managerial implications for the successful implementation of weblogs in organizational knowledge sharing and creation. Finally, limitations of our study as well as future research directions are presented.

Technological features of weblogs

Jorn Barger coined the term 'weblog' on his Robot Wisdom website in 1997. The neologism stems from the contraction of the words 'web' and 'log'. Concerning the definition of weblogs, Dafermos (2003) proposes several constituent features. First, weblogs refer to websites that publicly display individual thoughts. The frequencies vary profoundly, although entries are added periodically in the form of a log in reverse chronological order. In most cases, a single person renders the initial content of the site. In addition, readers can write in designated sections accompanying commentaries that often entail vibrant discussions analogous to the discourses that can be observed in the form of threads in the field of OSS development (Herring *et al.*, 2005). Moreover, each post (also called entry) is time-stamped and archived so that old content remains accessible and attributable to the author. The entries are predominantly text-based and usually possess a title in the form of a large header, followed by text fragments that are often augmented with pictures, and more recently with audio or video formats.

However, the most striking feature concerns the ability to establish diverse virtual references to other weblogs by means of various functions, namely blogrolls, permalinks and trackbacks. Blogrolls constitute a list of links to those weblogs the author recommends and reads frequently. In contrast, single-static links, called permalinks, refer to other posts or even particular sections of a post in other weblogs or websites and emanate from a particular section within a post. In a similar manner, in- and outbound-trackbacks are a third form of coalescence.

Trackbacks allow webloggers to see who has referred his or her original post by writing a reply. This feature habitually appears below a post and shows a summary of what has been voiced on the target weblog in conjunction with the URL and name of the respective weblog.

The various means of interlinking constitute a phenomenon termed 'blogosphere', alluding to the fact that all weblogs in the Internet represent a distinctive ICT-instantiated media ecosystem (Herring *et al.*, 2005). Because of the interlinking there are multiple, intertwined weblog networks. Although the term 'blogosphere' encompasses, according to our understanding, all existing weblogs, within this complex system clusters of various smaller blogospheres exist. This observation seems feasible because some weblogs are densely connected, frequently around a certain topic or field of interest similar to communities of practice (CoP) (Lave & Wenger, 1991; Amin & Cohendet, 2000; Ardichvili *et al.*, 2003).

Apart from this active means of referencing and interlinking, there exists another form, which we refer to as passive referencing. This alludes to the possibility of being automatically informed about new posts or comments aired on other weblogs. Owing to one's own preferences, it is possible to gather new information by subscribing to the respective weblogs using RSS (short for 'rich site summary' or 'really simple syndication'). RSS represents a file format that serves as news aggregator free of charge and provides the news almost instantaneously to the persons who have subscribed to this service. A prerequisite for this form of referencing is that the respective weblog is subscribed to a kind of meta-weblog directory. Consequently, these directories are informed via the transmission of signals (the so-called 'pings') each time a new post has been added to the weblog that has been registered.

Motivational aspects of knowledge sharing and creation

A critical factor for the successful implementation of ICT in knowledge sharing and creation is the employees' motivation towards its usage (Ardichvili *et al.*, 2003). We argue that motivational aspects in the context of OSS development serve as a role model for the successful implementation of weblogs in product development. Overall goal of various OSS initiatives, such as Apache, Linux and Mozilla as prominent examples, is the development of commonly shared software. It is particularly worth noting that many top-notch software developers make their knowledge openly accessible and, as a rule, without any remuneration in these communities (Lakhani & von Hippel, 2003).

In order to analyze motivational aspects in the context of OSS development, we refer to Deci (1975), borrowing the dualistic concept of intrinsic (i.e. activities and behaviors that people naturally engage in for their own sake) and extrinsic (i.e. where direct compensation

for the work or actions a person undertakes is expected) motivation.

With regard to intrinsic motivation, contributors to OSS projects often indicate that they just enjoy creating an improved part of the source code (Lakhani & Wolf, 2005). Furthermore, altruism and prosocial behavior – as a variant of intrinsic motivation whereby a person seeks to augment the welfare of other people – might lead to further contributions (Kollock, 1999; McLure Wasko & Faraj, 2000; von Krogh *et al.*, 2003; Zeitlyn, 2003). Closely connected to this aspect is the observation that most software developers are highly idealistic, often manifested in a libertarian or anarchic way (O'Mahony, 2003). The central motive is to antagonize capitalism that developers deem to be epitomized by huge software corporations, such as Microsoft or Intel. Moreover, evidence exists that computer-mediated communication actually allows the establishment of intimate relationships in virtual communities (Hiltz & Turoff, 1978; Wellman *et al.*, 2001). According to Granovetter's social network theory, these relationships emerge in the form of either weak or strong ties (Granovetter, 1973; see also Wellman & Wortley, 1990; Wellman *et al.*, 1996). As situational clues, that is, age and socioeconomic status are not conveyed within the scope of computer-mediated communication, weak ties originate (Hiltz & Turoff, 1978; Garton & Wellman, 1993; Sproull & Kiesler, 1998), which are based on same interests instead of same social status (Hiltz & Turoff, 1978; Jones, 1995). However, already in the course of formation of strong ties, people are chosen on the principle of similarity (Granovetter, 1973). Eventually, the feeling of belonging to a (virtual) community motivates people towards contributing their knowledge and, in turn, deriving benefits from it (Lakhani & Wolf, 2005).

Personal as well as future rewards can be considered as extrinsic motivation. The benefits of improving one's own code can be regarded as a personal reward (Lerner & Tirole, 2002; Weber, 2004). Thereby one's own tacit knowledge becomes visible, whereas the evolution of thoughts remains accessible within the threads. A further external reward can be the social recognition among peers (Lerner & Tirole, 2001). For example, while constantly updating the source code with valuable additions, a project member might enhance his reputation in the respective community (Lerner & Tirole, 2002). Furthermore, the existence of reciprocal exchange relationships entices people to engage in knowledge work (cf. Ekeh, 1974). Studies substantiate that individuals who give advice to other people often get support to their own problem faster and more comprehensively in return (Wellman & Gulia, 1999). In addition, it gets obvious that benefits derived from the comments of one person do not have to be reciprocated by the beneficiary but can be reciprocated by someone else in the community. One can refer to this phenomenon as 'generalized exchange relationships' (Rheingold, 1993; Kollock, 1999). The risk that assistance will not be rewarded is alleviated by the

existence of community spirit (Wellman & Gulia, 1999). Finally, feelings of self-efficacy can serve as extrinsic stimuli. Studies document that motivation towards participating in knowledge sharing and creation is increased when individuals can attribute changes in their environment to their own activities (Bandura, 1995; Kollock, 1999).

A comparative case study analysis – contrasting two antithetic cases on product development

We utilized a comparative case study approach because it offers the prospect of new insights into the connections among motivation and contextual factors by providing detailed explanations that survey methods miss (Glaser & Strauss, 1967; Eisenhardt, 1989; Yin, 1989).

Case A: Microsoft Longhorn Blogosphere

One of the most prominent examples of weblogging is the development documentation (i.e. weblog entries) of Microsoft's upcoming software 'Microsoft Longhorn' (www.longhornblogs.com), recently launched as 'Vista'. The MLB is officially administered by Microsoft and consists of Microsoft employees (labeled as 'experts'), as well as non-Microsoft members, the so-called most valuable professionals (MVPs) (Microsoft, 2005). The intention of the MLB was to provide potential customers, voluntary contributors and developers with a platform to air their views regarding the different features and designs of the upcoming software. All members communicate predominantly via this platform, but they are also partially interlinked via their private weblogs. In this paper, we have concentrated on webloggers who registered themselves voluntarily as members of the MLB, in order to have a clear definition of the actors and weblogs analyzed. In total, the MLB consisted of 60 registered members, of whom 43 are MVPs and 17 are Microsoft employees. In addition, 36 of them are active webloggers (25 MVPs and 11 Microsoft experts). For our purpose, we labeled those MLB members 'active webloggers' who contributed at least once to the MLB via a permalink, post or comment. Furthermore, we excluded other webloggers due to technical reasons. Consequently, we were able to contact webloggers directly for the purpose of our semi-structured interviews.

Case B: European research institute

Our second research object is the weblogs of the Intranet of one division of the ERI, which develops mission-oriented research trendsetting technologies and innovative applications for diverse industrial sectors. Approximately 200 researchers are working within the division of the ERI, on a large number of interdisciplinary projects. In June 2005, weblogs were implemented in the Intranet to support not only the search for and the categorization of information but also the participation of researchers at knowledge sharing activities as well as division-wide networking. Therefore, the Intranet is segmented into seven micro-blogspheres, each covering a certain

subject. In the micro-blogsphere, 'employees', for example, researchers, can introduce themselves by portraying their research interests as well as qualifications. The weblog 'projects' make all relevant information on current projects available. The exchange of private messages takes place on the weblog 'notice board'. The purpose of weblogs, 'employees' as well as 'projects' is to enable a link between project descriptions and the profile of the respective employee, who works on the project. Moreover, employees have the possibility of operating their own personal weblog.

Regarding the actual usage of the weblogs, between June 2005 and October 2006, 169 unique visitors were counted on average. This adds up to 84.5% of potential users, whereas each visitor accessed the Intranet seven to eight times a month, but 53% of the visits lasted only the maximum time of 30 s.

Research method

Within our comparative case study approach, we chose two antithetic research objects, differing deliberately regarding several distinctive characteristics. First, in contrast to the weblogs of the ERI and other blogspheres within the corporate realm, the weblog entries of the MLB are publicly accessible. Thus, it was possible to examine the blogsphere without any hindrance. Second, knowledge work within the MLB focuses on developing specific software, whereas weblogs of the ERI aid knowledge work within multiple interdisciplinary research projects.

We will demonstrate that although the MLB case serves as an archetype for successful implementation of weblogs in organizational knowledge sharing and creation, the case of the Intranet of the ERI constitutes the counterexample. Owing to the exploratory nature of this research, we chose to analyze and triangulate quantitative as well as qualitative data (Eisenhardt, 1989). Our empirical research strategy is subdivided into three stages: data collection, data coding/preparation and finally data evaluation.

(1) Data collection

With regard to quantitative data, we analyzed weblog usage by enumerating posts and comments for the MLB during September 2003 to March 2005 and for the ERI during June 2005 to October 2006. Considering qualitative data, we were able to achieve a qualitative content analysis of the various modes of communication in both blogspheres. Furthermore in July 2005, we approached 27 MLB bloggers and in December 2006 nine employees of the ERI in order to conduct semi-structured interviews. In addition, we also contacted 22 bloggers who were not involved in the MLB.

(2) Data coding/preparation

To systematically analyze qualitative data in the form of fixed communication, content analysis procedures were used for coding data from different sources (Diesing,

1972; Taylor & Bogdan, 1984; Lincoln & Guba, 1985; Strauss, 1987). We used qualitative software (Atlas.ti) to support the coding process and to enable a systematic interpretation. In analogy to the grounded theory approach, theoretical considerations made in the first part of the paper were incorporated into the coding of the interviews (Eisenhardt, 1989). Therefore, we were able to interpret the resulting coding scheme with regard to our research focus.

(3) Data evaluation

In the MLB, 695 posts and 4115 comments were posted from September 2003 to March 2005, whereas in the ERI, 800 posts and 247 comments were posted from June 2005 to October 2006. With regard to the ERI in the weblogs, which is most important for knowledge sharing and creation, namely 'projects' and 'employees', only 43 posts and zero comments, respectively, 87 posts and 24 comments were published. Only 87 of the 200 employees created their own profile.

Empirical findings of the comparative case study analysis

Overall, we can first report on a blogsphere (MLB) with users who intensively engage in knowledge-related communication and second on a blogsphere, where users do not start comprehensive knowledge conversations (ERI).

Contrasting motivational aspects towards weblog usage

We argue that organizational members and MVPs of the MLB blogsphere are intrinsically motivated to engage in knowledge conversations, thereby sacrificing their resources in the form of time and thoughts. We propose that MLB bloggers experience *enjoyment* that occurs while reading, commenting and writing weblog entries. In this spirit, one MLB blogger noted

I spent a ton of time reading blogs and newsgroups and trying to help clarify things when I could. I loved talking to people about Avalon.

In line with other researchers, we claim that weblogging is fun, partly because it is not technically challenging and partly because the process invigorates people (Ojala, 2005). On the contrary, as the following statement outlines, we found that members of the ERI blogsphere are not intrinsically motivated:

Experiencing enjoyment from communicating in the intranet [...] does not apply in my case.

Bearing in mind that 'knowing is a collective accomplishment' (Gherardi, 2003, p. 352), we presume the MLB blogsphere to be a *community of practice* where social participation by means of knowledge-intensive conversation, regarding software development, occurs. The following post illustrates this point:

This Community Rocks! Hello! First of all a huge thanks to Robert McLaws for the site, my blog, and the introduction!

I really like this site and I think it's a wonderful idea, I am extremely happy to be a part of this growing community.

According to the statement given below, we were able to substantiate that no intimate relationships emerged within the ERI:

I am of the opinion that the establishment of social relationships does not satisfactorily work online.

Concerning extrinsic motivation, we find, on the one hand, arguments that MLB webloggers talk about their practices in order to signal competence, which in turn makes them gain direct recognition, as well as long-term *reputation*. We conclude that, the more an individual weblogger writes about knowledge practices, the higher will be the chance of attracting attention. For example, our data on the MLB blogosphere show that intensive webloggers are increasingly included into blogrolls and permalinks. In addition, several comments of our interviewees provide evidence that they are conscious about the competence-signaling effect:

It is how I show my expertise in upcoming technology and distinguish my name.

On the other hand, we conclude that ERI researchers perceive that the establishment of an expert status within the blogosphere is not possible, due to the lack of overall usage of weblogs. The following statement undermines this conclusion:

Because the usage of the intranet is so low, researchers are not motivated by the possibility of establishing an expert status!

Moreover, the analysis of the MLB case study indicates that webloggers who are more active, in terms of number of written posts and comments, are more likely to get significant assistance and support. To put it differently, one can assert a high degree of reciprocity within the MLB. Moreover, the reciprocity leads to the emergence of subgroups or clusters around specific knowledge topics and practices in the blogosphere. Taking a closer look at our interview data, we can describe reciprocity as generalized (Gouldner, 1960), which seems to be altruistic at first glance. This is because there are altruistic and prosocial webloggers who seek to augment the welfare of other people, or rather the development of the Longhorn software (McLure Wasko & Faraj, 2000, 2005), obviously without expecting any short-term or direct response in the form of feedback or assistance. Moreover, these webloggers do not post very frequently, so they cannot expect to attain reputation. This assumption is best exemplified by the comment of an MLB participant who stated that he has 'important information to share with the community', or another weblogger who simply voiced 'I like to divulge'. Therefore, talking about knowledge practices can be altruistic as it is not solely for one's own sake, but also provides potentially relevant information for co-workers and/or other developers.

Regarding the ERI, we conclude that researchers do not expect to get something as a reward for their participation in knowledge sharing and creation. In this connection, one employee stated the following:

I do not believe that I get a reward for my contribution. I did not expect that from the beginning.

However, the establishment of reciprocal exchange relationships is a necessary precondition for the individual's motivation towards participating in knowledge work. Employees of the ERI perceive that deriving an own benefit from weblogging serves as a strong extrinsic motivational stimulus for engaging in knowledge sharing and creation. As the statement below shows, some preconditions have to be met in order to ensure that reciprocal exchanges can take places:

One of the preconditions that entice employees to engage in weblogging is the fact that the blogosphere should not be a kind of playground, but that it is a serious place where knowledge exchanges can take place.

In order to establish reciprocal exchange relationships, we conclude that it is inevitable that researchers have the impression that they can derive an own benefit from weblogging.

Identification of contingency factors

By means of contrasting the motivation of webloggers to engage in knowledge sharing and creation in both research objects (Case A and Case B; cf. Table 1), we were able to identify four contingency factors, namely the process of implementation (CF 1), the rule of membership (CF 2), the type of work supported by ICT (CF 3) and the distribution of knowledge (CF 4).

(1) Process of implementation

In contrast to the top-down implementation of the ERI, mandated by corporate management, Internet users interested in participating at knowledge sharing and creation in the context of developing software inspired Microsoft to setup the MLB. Therefore, we label the latter approach as 'bottom-up'.

Regarding the experiences of *enjoyment* as intrinsic stimuli for engaging in knowledge work, we argue that the ordered implementation of the ERI impairs the employees' autonomy as regards decisions on media choice. As the following quotation outlines, it is argued that autonomy directly leads to motivation: 'intrinsic motivation will be operative when action is experienced as autonomous' (Deci & Ryan, 1985, p. 29). Thus in order for ERI employees to experience motivation, it is essential to have the opportunity of self-regulating one's own activities as in the 'bottom-up' implemented MLB.

As regards extrinsic stimuli, we state that based on the perceived organizational support towards collaboration within the MLB, *altruistic generalized reciprocal* exchanges exist. Our argumentation is in line with the empirical

Table 1 Comparing motivational stimuli for the identification of contingency factors

Motivational stimuli		Case A - MLB	Case B - ERI	Contingency factors and their characteristics in the respective Case
Intrinsic motivation	Enjoyment	<ul style="list-style-type: none"> - Implementation inspired by bloggers - High degree of novelty - Voluntary weblogging - Feelings of self-efficacy <p>→ Experiences of enjoyment</p>	<ul style="list-style-type: none"> - Arranged implementation - Low degree of novelty - Vocational weblogging - No feelings of self-efficacy <p>→ No experiences of enjoyment</p>	<ul style="list-style-type: none"> - Bottom-up (Case A) vs. top-down implementation (Case B): CF (1) - External (Case A) vs. internal weblog (Case B): CF (2) - Voluntary (Case A) vs. vocational work (Case B): CF (3) - Excellent (Case A) vs. marginal feasibility of codification of contents (Case B): CF (3)
	CoP	<ul style="list-style-type: none"> - Common goal: software development - Relationships emerge virtually <p>→ Existence of community spirit</p>	<ul style="list-style-type: none"> - No common goal: diverse projects - No relationships emerge virtually <p>→ No existence of community spirit</p>	<ul style="list-style-type: none"> - Shared goals (Case A) vs. individual interests (Case B): CF (3) - Online (Case A) vs. offline networking (Case B): CF (4)
Extrinsic motivation	Reputation	<ul style="list-style-type: none"> - Desire to stand out from the crowd - Voluntary weblogging <p>→ Establishment of reputation online</p>	<ul style="list-style-type: none"> - Webloggers are already experts - Vocational weblogging <p>→ No establishment of reputation</p>	<ul style="list-style-type: none"> - Legitimation required (Case A) vs. established expert (Case B): CF (2) - Voluntary (Case A) vs. vocational work (Case B): CF (3)
	Reciprocity	<ul style="list-style-type: none"> - Altruistic generalized reciprocity - Active webloggers are likely to receive feedback in return <p>→ Dynamic reciprocal exchanges</p>	<ul style="list-style-type: none"> - No altruism and prosocial behavior - Webloggers do not expect to get feedback in return for past help <p>→ No dynamic reciprocal exchanges</p>	<ul style="list-style-type: none"> - Organizational support (Case A) vs. no organizational support (Case B): CF (1) - Shared goals (Case A) vs. individual interests (Case B): CF (3)

Contingency factors	CF (1) Process of implementation:	Motivational stimuli vary due to differing approaches on the implementation of weblogs associated with varying organizational support towards its usage in knowledge sharing and creation
	CF (2) Rule of membership:	The intended audience of weblogs influences motivational stimuli to a great extent
	CF (3) Type of work:	Characteristics of job design as well as work environment exert an influence on motivational stimuli
	CF (4) Distribution of knowledge:	Differences in media choice for collaboration and networking purposes entail motivational implications

findings of Constant *et al.* (1994), arguing that information sharing is influenced by both rational self-interest and the social as well as the organizational context. According to the following statement, we found that altruistic reciprocal exchange relationships have not been established on the Intranet of the ERI:

People have to share their [knowledge] voluntarily without focusing on their own advantage. Altruistic reasons have to take center stage.

Furthermore, we found that a necessary precondition for successful knowledge work is the belief that information sharing constitutes socially expected workplace behavior (cf. Constant *et al.*, 1994). The following statement outlines this fact:

People will not participate without a small impulse from management. The lack of commitment from the management is part of the problem.

As no dynamical reciprocal exchange processes take place within the ERI, researchers are not motivated to sacrifice their time for making contributions to the blogosphere without the guarantee of receiving an equivalent value.

(2) Rule of membership

The MLB constitutes an external blogosphere, granting access to anybody interested. Therefore, its members are spread globally and are most likely not acquainted with each other, in contrast to the restricted access to the ERI blogosphere, in which its members know each other personally with the utmost probability.

Experiencing a high degree of novelty while browsing the MLB – as regards content and people – webloggers experience *enjoyment*. They are fascinated by the things they can explore and to be able to spread their ideas not only free of hindrance but also very quickly. Features such as RSS lead to a very quick diffusion of information within the MLB and webloggers seemingly rely on these technological features. As one weblogger aired:

We're going to be doing a really big expansion, to bring you even more Longhorn-related content. So, if you write Longhorn-related blog entries, please make sure you're categorizing your posts, and leave me a comment with your Longhorn-specific RSS feeds.

Furthermore, the existence of weak ties enables access to new and interesting content, unlike strong ties which often know each other in person and probably

have the same information at their disposal (Weenig & Midden, 1991). Moreover, the ability to reach a huge audience might be a further trigger that elicits motivation for conversation on practices, as the following post epitomizes:

Calling All Microsofties! With word coming down that Microsoft is closing the Blogs@GotDotNet, lots of Microsofties are finding new homes in the blogosphere. Well, guys, if you're working on Longhorn, might I suggest that you set up shop here? You'll have a wide audience made up of much more than just developers, and it's a great place to get started. Want to sign up?

The limited access of ERI decreases the degree of novelty a weblogger can experience while browsing the blogosphere and with it the experiences of *enjoyment*. Limiting access to a blogosphere has two consequences. First of all, the genesis of a large number of weak ties is restrained, resulting in a limitation of problem-solving approaches to narrow perspectives. As the researchers of the ERI are similar, as regards education and social status, they have similar ideas as well as perspectives towards research projects. Second, the amount of content available in the blogosphere is, to some extent, correlated with the number of webloggers.

Regarding the establishment of *reputation* by means of weblogging, we made the observation that because the MLB is an anonymous as well as homogeneous crowd of software developers, webloggers have a strong desire to stand out from the crowd to gain legitimacy in product development. Our case study gives evidence that the establishment of reputation, which leads to entries in blogrolls and permalinks, results from prominent positions in the networked blogosphere. If these people write about their practices, most members of the blogosphere will follow the conversation. Regarding the ERI, we found that chances of establishing an expert status do not serve as motivational stimuli, since most of the employees are already perceived as experts. As one weblogger stated:

Half of the people hold a doctorates degree or maybe even one third. They have attended university and have a lot of knowledge on diverse subjects.

Herein, our results are contra-intuitive insofar as the signaling of one's own competences, by means of transparent knowledge management approaches, is usually deemed crucial in conventional organizational settings (Lakhani & von Hippel, 2003; Oravec, 2004). In line with Davenport *et al.* (1992), we reason that people are less likely to share information in case their job as well as role within the corporation is defined by their expert and unique information. Employees of the ERI are aware that their expertise in certain subjects entails a competitive advantage within the research institute (cf. Davenport *et al.*, 1992), which is comparatively worth more than building up a favorable reputation. Therefore, sharing expert knowledge with co-workers, in order to

establish a favorable reputation, does not serve as motivational stimulus.

Considering the influence of the rule of membership on the development of *reciprocal exchanges*, we detected no correlation in the MLB as well as the ERI case. Thus, for engaging in reciprocal exchange relations, it does not make any difference, whether people know each other or not (cf. Constant *et al.*, 1996).

(3) Type of work

As the membership in the MLB is based on organic growth, not being connected to an employment at Microsoft, webloggers voluntarily contribute to the MLB. Engaging in software development, members pursue one common goal, whereby contributions are easy to codify in the form of source codes. In the ERI blogosphere, weblogs assist work-related practices in the context of various highly complex interdisciplinary research projects. Therefore, researchers pursue their own goals relating to their assigned projects.

As MLB webloggers participate voluntarily, they consider weblogging as their hobby and accordingly experience *enjoyment*. In the ERI, on the contrary, product development and research constitute daily work. According to the following statement, weblogs are not a nice gimmick to spend time in the evenings with:

Deriving an own benefit from weblogging is most important to me.

We propose that an essential precondition for experiencing *enjoyment* in work-related contexts is the existence of feelings of self-efficacy (see Bandura, 1995). We claim that these perceptions are highly dependent on the type of work supported by ICT. As contributions to software development in the MLB are easy to codify, MLB webloggers perceive to alter the course of the software development. Therefore, they experience self-efficacy, which stimulates motivation even further. This is well voiced by one interviewee who aired that he is weblogging for:

Specific reasons, something that interests, something I have a passion for and it's also as a result of what's going on in the community. [...] I see blogging as a way for me to be able to be a driving force that can help to make a point or address a problem. Basically, blogging is my way of spreading my gospel.

Simply because projects within the ERI are highly complex, most knowledge is tacit and consequently not easy to codify. As one weblogger stated, the problem is that:

The information in the blogosphere is not really useful.

Owing to lack of quantity as well as quality of the contents available, researchers are not able to draw an advantage from using the Intranet and therefore do not experience self-efficacy as well as *enjoyment* for that reason.

As webloggers pursue one common goal in the MLB, namely the development of the Longhorn software, a *community of practice* emerges. Researchers at the ERI do not consider themselves as belonging to a *virtual community*, as they neither share one common goal nor have the desire to interact within a virtual community that has been implemented top-down. In this regard, one employee stated the following:

I think that my working group has particular research interests. Therefore there are not many areas of contact to other working groups. We cannot profit by the results of the latest research of other working groups.

Considering extrinsic motivation, we come to the conclusion that the establishment of *reputation* is solely an important motivational stimulus in the MLB because participants do not receive monetary remuneration for their contributions in the blogosphere. Stemming from the freedom of speech is the observation that webloggers in the MLB can, to a certain extent, circumvent traditional hierarchies. For instance, webloggers who were extraordinarily active could become influential in providing new perspectives and changing or initiating practices. They were able to have a substantial impact on the development of the software, without necessarily being a Microsoft member or being in a dominant position within the Microsoft hierarchy.

In line with the existence of a community of practice is the development of *reciprocity* within the MLB blogosphere. As webloggers work on one project, there exists reciprocity due to mutual goals. But we noted that reciprocity is, for the most part, fostered by the contingency factor 'the process of implementation'. With regard to the ERI, we claim that employees are not motivated to engage in reciprocal exchange relationships. In case dynamic exchanges in the Intranet would be realized, the acceptance of the weblogs for knowledge sharing and creation could be improved:

To get a reward for my contribution would be the crux, a dynamical exchange has to emerge in the intranet [...] but this dynamic has not been achieved yet.

In addition to the organizational support, we have identified as an important contingency factor (compare 1), pure rational self-interest also promotes reciprocal exchange relationships. We suggest that an individual experiences higher benefits of reciprocity from knowledge sharing and creation, in case the person's work depends on the efforts of other people. This implies for the ERI that employees are more motivated to use the ICT, due to differing projects demanding to work independent of others (Goodhue & Thompson, 1995; Jarvenpaa & Staples, 2000).

(4) *Distribution of knowledge*

As members of the MLB are spread all over the world, collaboration and networking is solely possible online. On the contrary, webloggers at the ERI occupy offices

very close to each other and therefore have plenty of chances to meet in person.

Given that social networks evolve from conversations among individuals sharing a common affinity (Kimball & Rheingold, 2000), we claim accordingly that a *community of practice* has been established within the MLB although people cannot meet in person. As community spirit is positively associated with the identification with the respective corporation, individual motivation is increased towards knowledge sharing in mutual exchange relationships (van Lange *et al.*, 1992; Constant *et al.*, 1994; Wellman *et al.*, 1996; Cabrera & Cabrera, 2002; Ardichvili *et al.*, 2003). However, a community in real life instead of a virtual one exists at the ERI. As the below statement outlines, the majority of researchers at the ERI prefer networking in person:

Having a joint cup of coffee or lunch is more effective than using the intranet for social networking purposes.

In line with our findings are other studies outlining that spatial proximity has a direct impact on media choice. It is argued that individuals are more likely to choose a low interactive medium (e.g. e-mail) in case the distance between communication partners is high, such as in the MLB blogosphere (Straub & Karahanna, 1998). Regarding the potential of weblogs in dissemination of knowledge, previous studies found out that in the past, a primary strategy for ensuring a high level of knowledge dissemination was the co-location of R&D staff (for detailed discussion, see Song *et al.*, 2007). Antithetic to this perspective are the empirical findings on knowledge sharing and creation in high-technology settings such as the MLB (cf. Song *et al.*, 2007). It is argued that ICT is favorable over co-locating R&D staff for knowledge dissemination in case a large number of people are involved:

[weblogs] allowing for open access to my work from people who work outside the company. It allows a direct connection with users and other people within the company.

Concluding discussion

Theoretical contribution of the paper

The main concern of this paper was to analyze the impact of a novel ICT, namely weblogs, on knowledge creation and sharing. Hereby, our research makes two important contributions to the existing literature. First, this study represents one of the few attempts to shed light on a comparatively novel phenomenon, that is weblogs, a social software, which has only received scarce attention so far (for an exception, cf. Kaiser *et al.*, 2007). Second, in contrast to previous studies in the context of OSS (Lerner & Tirole, 2001, 2002; Hertel *et al.*, 2003; Lakhani & von Hippel, 2003), we explicitly account for contingency factors that influence the motivational impacts a novel ICT can offer for its users. Thus, our study can be directly linked to other studies on information

technology acceptance (for detailed discussion, see Venkatesh *et al.*, 2003).

Referring to two antithetic cases, we suggest that in the case of the MLB, the blogosphere represents a network where information, or rather knowledge, is successfully created and shared. However, weblogs are by no means a panacea for knowledge sharing and creation. As we were able to depict in the case of the weblogs at the ERI, a blogosphere might also be unsuccessful regarding knowledge management activities.

Thus, our comparative case study aimed at illustrating the significantly different levels of intrinsic and extrinsic motivation that are decisive for the inclination to use weblogs for knowledge-related communication. In this connection, we can report that diverse insights from the field of OSS (e.g. Lerner & Tirole, 2001, 2002; Lakhani & Wolf, 2005) could be applied to the MLB, whereas the weblogs of ERI were lacking such a stimulating environment. The fact that the observations of OSS research cannot be applied to the ERI is surprising because at a first glance this blogosphere was set in a similar field, that is, both arenas are dealing with knowledge-intensive topics. As a reason for that insight, we could identify and discuss four contingency factors that determine the motivation to create and share knowledge in a virtual corporate environment. We argue that these contingency factors differ in settings that are characterized by the absence of hierarchical structures, such as in OSS development. Therefore, we propose that for the successful implementation of weblogs in knowledge sharing and creation in a corporate context, a suitable strategy could be the simulation of contingency factors similar to the OSS context.

Managerial implications

Based on our empirical findings regarding the existence of four contingency factors that directly influence individual's motivation towards participating in knowledge work, we set forth managerial implications for a successful implementation of weblogs in organizational knowledge sharing and creation.

Considering the 'process of implementation', we suggest that for implementing weblogs in knowledge sharing and creation, a bottom-up approach is more promising and helps to overcome well-known barriers of ICT implementation (cf. Raub & von Wittich, 2004). As a result, employees have to bear a positive attitude towards knowledge sharing as well as towards the respective ICT. Empirical studies document that corporate culture and organizational support (i.e. attitude of senior management) have a positive impact on computer usage (Anakwe *et al.*, 2000) and that lacking management support will restrain the integration as well as the use of knowledge management tools (Fulk & DeSanctis, 1995; Constant *et al.*, 1996; Alavi & Leidner, 2001; Armbrecht *et al.*, 2001).

Alluding to our findings with respect to 'rule of membership', we claim that it is beneficial to open the

weblogs to a huge audience. We propose that an external weblog, that is, one that is not officially administered by the respective company, is better suited for knowledge sharing and creation because unlimited access enables more people to collaborate. However, we are aware that this does not imply an unhindered revelation of critical information. Hereby, it is rather advisable to define *ex ante* what kind of information will be subject to an external weblog.

Referring to the 'type of work' supported by ICT, we claim that weblogs are only of use in knowledge sharing and creation if the feasibility of codification of information is high (Hansen *et al.*, 1999). We argue that the perceptions of information exert a fundamental influence on the actual use of computer-based information. In case, individuals discern information to have a high quality and a great accessibility, the perceived usefulness of information increases (Kraemer *et al.*, 1993). In order to ensure high-quality information, we hypothesize that it might be advisable to employ editorial staffs who take care of the provision of useful content.

Regarding the 'distribution of knowledge', we maintain that on implementing weblogs, existing media for communication and collaboration within the corporation, as well as media-usage habits of employees have to be taken into consideration. Although new ICT tools increase both, problem-solving capacity and productivity, these have to be integrated into daily work routine in order to reap benefits (Thomke, 2006). We base this proposition on the assumption that conventional media, for example e-mail, competes with weblogs for utilization (Mackay, 1988). Furthermore, decisions on media choice for knowledge work are based on individuals' perceptions about the effectiveness of the respective media (Daft *et al.*, 1987; Goodhue & Thompson, 1995). We claim that the chronological storage of information in weblogs is not only beneficial, as hailed by advocates (e.g. Dafermos, 2003), but also complicates the categorization and organization of information. We conclude that the technical features of weblogs seem to be obstructive in a setting that is characterized by a huge amount of diverse information entailing large-scale collaboration.

Limitations and future research directions

Critically re-examining the limitations of this study, various options for future research endeavours can be identified. One major shortcoming concerns the lack of quantitative data to substantiate the exploratory results. For instance, a more substantial quantitative validation of the motivational stimuli might be rewarding to compare both blogospheres more rigorously. In addition, regression analyses with regard to the organizational mechanisms in both arenas might reveal the causes for the various stimuli.

Moreover, our argument that weblog technology might incorporate the potential to overcome barriers of knowledge management, depending on characteristics of contingency factors, might be true for other social

software technologies. For instance, wikis (collaborative exchange platforms) are another area of application that might deliver further illuminative results while it offers ample opportunities for volunteers to exchange ideas likewise. However, it is by no means certain that the same contingency factors, let alone motivational drivers, are valid in these cases likewise. Therefore, a comparison of weblogs, wikis and other forms of social software might be worth pursuing.

Another critical aspect is the fact that the research objects we have chosen differ with regard to crucial characteristics that have a tremendous impact on motivational stimuli towards weblog usage. First of all, the MLB represents a prominent exchange platform while it is supported by Microsoft getting considerable media attention *per se*. As a result, other firm-sponsored blogospheres that receive less public attention might also be taken into account. This might lead to different results with regard to behavioral patterns in weblog usage for knowledge work. Second, the MLB and the ERI blogospheres vary as to the topics at stake. This might hold true

particularly for those blogospheres where non-IT-related information is exchanged, that is, themes that are less knowledge-intensive. For example, the weblogs of General Motors might be intriguing while they are centered on automotive products. However, the content is also comprehensible for laymen and not only for IT experts while no information about the source code is exchanged, but mechanical-engineering-related advice. Thus, we claim that the feasibility of codification of contents is decisively lower than in the MLB case. Therefore, drawing a direct comparison of empirical findings to the ERI case gets easier, as the composition of the contingency factor 'type of work' supported by ICT appears to be similar.

Taken altogether, the observations set forth in this paper led us to conclude that the contingency factors we discussed are crucial for the successful dissemination of weblogs. In this connection, our study represents one of the first attempts to elucidate the impact of the so-called 'social software' with regard to knowledge creation and sharing in two differing for-profit settings.

References

- ALAVI M and LEIDNER DE (2001) Knowledge management and knowledge management systems: conceptual foundations and research issues. *MIS Quarterly* **25**(1), 107–136.
- AMIN A and COHENDET P (2000) Organisational learning and governance through embedded practices. *Journal of Management and Governance* **4**(1–2), 93–116.
- ANAKWE U, IGBARIA M and ANANDARAJAN M (2000) Management practices across cultures: role of support in technology usage. *Journal of International Business Studies* **31**(4), 653–666.
- ARDICHVILI A, PAGE V and WENTLING T (2003) Motivation and barriers to participation in virtual knowledge-sharing communities of practice. *Journal of Knowledge Management* **7**(1), 64–77.
- ARMBRECHT FMR, CHAPAS RB, CHAPELOW CC, FARRIS GF, FRIGA PN, HARTZ CA, MCLIVAIN EM, POSTLE SR and WHITWELL GE (2001) Knowledge management in research and development. *Research-Technology Management* **44**(4), 28–49.
- BANDURA A (1995) *Self-Efficacy in Changing Societies*. Cambridge University Press, Cambridge.
- BERNARD R (1996) *The Corporate Intranet*. Wiley, Chichester.
- BOLAND R and TENKASI R (1995) Perspective making and perspective taking in communities of knowing. *Organization Science* **6**(4), 350–372.
- BOUTELLIER R, GASSMAN O, MACHO H and ROUX M (1998) Management of dispersed product development teams: the role of information technologies. *R&D Management* **28**(1), 13–25.
- CABRERA EF and CABRERA A (2002) Knowledge sharing dilemmas. *Organization Studies* **23**(5), 687–710.
- CIBORRA C and PATRIOTTA G (1998) Groupware and teamwork in R and D: limits to learning and innovation. *R&D Management* **28**(1), 43–52.
- CONNOLLY T and THORN B (1990) Discretionary databases: theory, data and implications. In *Organizations and Communication Technology* (FULK J and STEINFELD C, Eds), pp 219–233, Sage, Newbury Park.
- CONSTANT D, KIESLER S and SPROULL L (1994) What's mine is ours, or is it? A study of attitudes about information sharing. *Information Systems Research* **5**(4), 400–421.
- CONSTANT D, SPROULL L and KIESLER S (1996) The kindness of strangers: the usefulness of electronic weak ties for technical advice. *Organization Science* **7**(2), 119–135.
- COOK S and BROWN J (1999) Bridging epistemologies: the generative dance between organizational knowledge and organizational knowing. *Organization Science* **10**(4), 381–400.
- DAFERMOS G (2003) Blogging the market. How weblogs are turning corporate machines into real conversations. Working paper, Massachusetts Institute of Technology, Cambridge, MA.
- DAFT RL, LENGEL R and TREVINO LK (1987) Message equivocality, media selection, and manager performance: implications for information systems. *MIS Quarterly* **11**(3), 335–366.
- DAVENPORT TH (1997) *Information Ecology*. Oxford University Press, Oxford.
- DAVENPORT TH, ECCLES RE and PRUSAK L (1992) Information politics. *Sloan Management Review* **34**(1), 53–65.
- DAVENPORT TH and PRUSAK L (1998) *Working Knowledge. How Organizations Manage What They Know*. Harvard Business School Press, Boston.
- DECI EL (1975) *Intrinsic Motivation*. Plenum, New York.
- DECI EL and RYAN RM (1985) *Intrinsic Motivation and Self-Determination in Human Behaviour*. Plenum, New York.
- DIESING P (1972) *Patterns of Discovery in the Social Sciences*. Aldine, Chicago.
- EISENHARDT KM (1989) Building theories from case study research. *Academy of Management Review* **14**(4), 532–550.
- EKEH PP (1974) *Social Exchange Theory – The Two Traditions*. Harvard University Press, Boston, MA.
- FULK J and DeSANCTIS G (1995) Electronic communication and changing organizational forms. *Organization Science* **6**(4), 337–349.
- GARTON LE and WELLMAN B (1993) Social impacts of electronic mail in organizations: a review of the research literature. [WWW document] <https://tspace.library.utoronto.ca/bitstream/1807/368/1/KMDI-HP-93-13.pdf> (accessed 29 November 2006).
- GERARDI S (2000) Practice-based theorizing on learning and knowing in the organization. *Organization* **7**(2), 211–223.
- GERARDI S (2003) Knowing as desiring: mythic knowledge and the knowledge journey in communities of practitioners. *Journal of Workplace Learning* **15**(7–8), 352–358.
- GERARDI S and NICOLINI D (2000) To transfer is to transform: the circulation of safety knowledge. *Organization* **7**(2), 329–348.
- GLASER BG and STRAUSS AL (1967) *The Discovery of Grounded Theory. Strategies for Qualitative Research*. Aldine Atherton, Chicago.
- GOODHUE DL and THOMPSON RL (1995) Task-technology fit and individual performance. *MIS Quarterly* **19**(2), 213–236.
- GOULDNER AW (1960) The norm of reciprocity: a preliminary statement. *American Sociological Review* **25**(2), 161–178.
- GRANOVETTER MS (1973) Strength of weak ties. *American Journal of Sociology* **78**(6), 1360–1380.

- GRANT RM (1996) Prospering in dynamically-competitive environments: organizational capability as knowledge integration. *Organization Science* 7(4), 375–387.
- HAMERI AP and NIHTILAE J (1997) Distributed new product development project based on internet and world-wide web: a case study. *Journal of Product Innovation Management* 14(2), 77–87.
- HANSEN MT, NOHRIA N and TIERNEY T (1999) What's your strategy for managing knowledge? *Harvard Business Review* 77(2), 106–116.
- HERRING SC, SCHEIDT LA, WRIGHT E and BONUS S (2005) Weblogs as a bridging genre. *Information Technology & People* 18(2), 142–171.
- HERTEL G, NIEDNER S and HERRMANN S (2003) Motivation of software developers in open source projects: an internet-based survey of contributors to the Linux kernel. *Research Policy* 32(7), 1159–1177.
- HILTZ SR and TUROFF M (1978) *The Network Nation – Human Communication via Computer*. MIT Press, Cambridge, MA.
- JARVENPAA SL and STAPLES SD (2000) The use of collaborative electronic media for information sharing: an exploratory study of determinants. *Journal of Strategic Information Systems* 9(1), 129–154.
- JIAN G and JEFFRES LW (2006) 'Understanding employees' willingness to contribute to shared electronic databases. *Communication Research* 33(4), 242–261.
- JONES SG (1995) Understanding community in the information age. In *CyberSociety: Computer-Mediated Communication and Community* (JONES SG, Ed), pp 10–35, Sage, Thousand Oaks.
- KAISER S, MUELLER-SEITZ G, LOPES MP and PINA E CUNHA M (2007) Weblog-technology as a trigger to elicit passion for knowledge. *Organization* 14(3), 391–412.
- KIMBALL L and RHEINGOLD H (2000) How online social networks benefit organizations. [WWW document] <http://www.rheingold.com/Associates/index.html> (accessed 20 March 2008).
- KOLLOCK P (1999) The economics of online cooperation: gifts and public goods in the cyberspace. In *Communities in Cyberspace* (SMITH M and KOLLOCK P, Eds), pp 220–242, Routledge, London.
- KRAEMER KL, DANZIGER JN, DUNKLE DE and KING JL (1993) The usefulness of computer-based information to public managers. *MIS Quarterly* 17(2), 129–148.
- LAKHANI KR and VON HIPPEL E (2003) How open source software works: free user to user assistance. *Research Policy* 32(6), 923–943.
- LAKHANI KR and WOLF RG (2005) Why hackers do what they do: understanding motivation and effort in free/open source software projects. In *Perspectives on Free and Open Source Software* (FELLER J, FITZGERALD B, HISSAM SA and LAKHANI KR, Eds), pp 3–22, MIT Press, Cambridge, MA.
- LAVE J and WENGER E (1991) *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press, Cambridge.
- LERNER J and TIROLE J (2001) The open source movement: key research questions. *European Economic Review* 45(4–6), 819–826.
- LERNER J and TIROLE J (2002) Some simple economics of open source. *Journal of Industrial Economics* 50(2), 197–234.
- LINCOLN Y and GUBA E (1985) *Naturalistic Inquiry*. Sage, Beverly Hills.
- MACKAY W (1988) Diversity in the use of electronic mail: a preliminary inquiry. *ACM Transactions on Office Information Systems* 6(4), 380–397.
- MALHOTRA A, MAJCHRZAK A, CARMAN R and LOTT V (2001) Radical innovation without collocation: a case study at Boeing-Rocketdyne. *MIS Quarterly* 25(2), 229–249.
- MARKUS LM and KEIL M (1994) If we build it they will come: designing information systems that users want to use. *Sloan Management Review* 35(4), 11–25.
- MCDERMOTT R (1999) Why information technology inspired but cannot deliver knowledge management. *California Management Review* 41(4), 103–117.
- MCCLURE WASKO M and FARAJ S (2000) It is what one does: why people participate and help others in electronic communities of practice. *Journal of Strategic Information Systems* 9(2–3), 155–173.
- MCCLURE WASKO M and FARAJ S (2005) Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS Quarterly* 29(1), 35–57.
- MICROSOFT (2005) Most valuable professional – letter from Lori, Sean and Anthony. [WWW document] <http://mvp.support.microsoft.com/MVPINTRO> (accessed 09 May 2005).
- NONAKA I (1994) A dynamic theory of organizational knowledge creation. *Organization Science* 5(1), 14–37.
- OJALA M (2005) Blogging – for knowledge sharing, management and dissemination. *Business Information Review* 22(4), 269–276.
- O'MAHONY S (2003) Guarding the commons: how community managed software projects protect their work. *Research Policy* 32(7), 1179–1198.
- ORAVEC J (2004) The transparent knowledge worker: weblogs and reputation mechanisms in KM systems. *International Journal of Technology Management* 28(7–8), 767–775.
- RAUB S and VON WITTICH D (2004) Implementing knowledge management: three strategies for effective CKOs. *European Management Journal* 22(6), 714–724.
- RHEINGOLD H (1993) *The Virtual Community: Homesteading on the Electronic Frontier*. Addison-Wesley Publishing Company, New York.
- SONG M, BERENDS H, VAN DER BIJ H and WEGGEMAN M (2007) The effect of IT and co-location on knowledge dissemination. *Journal of Product Innovation Management* (24), 52–68.
- SPENDER J-C (1996) Making knowledge the basis of dynamic theory of the firm. *Strategic Management Journal* 17(winter special issue), 45–62.
- SPOULL LS and KIESLER S (1998) *Connections: New Ways of Working in the Networked Organization*. Massachusetts Institute of Technology, Cambridge, MA.
- STRAUB D and KARAHANNA E (1998) Knowledge worker communications and recipient availability: toward a task closure explanation of media choice. *Organization Science* 9(2), 160–175.
- STRAUSS A (1987) *Qualitative Analysis for Social Scientists*. Cambridge University Press, Cambridge.
- TAYLOR SJ and BOGDAN R (1984) *Introduction to Qualitative Research Methods*. Wiley, New York.
- THOMKE S (2006) Capturing the real value of innovation tools. *Sloan Management Review* 47(2), 24–32.
- VAN LANGE PA, LIEBRAND WB, MESSICK DM and WILKE HA (1992) Introduction and literature review. In *Social Dilemmas – Theoretical Issues and Research Findings* (LIEBRAND WB, MESSICK DM and WILKE HA, Eds), pp 3–28, Pergamon Press, New York.
- VENKATESH V, MORRIS MG, DAVIS GB and DAVIS FD (2003) User acceptance of information technology: toward a unified view. *MIS Quarterly* 27(3), 425–478.
- VON KROGH G, SPAETH S and LAKHANI KR (2003) Community, joining, and specialization in open source software innovation: a case study. *Research Policy* 32(7), 1217–1241.
- WEBER S (2004) *The Success of Open Source*. Harvard University Press, Cambridge, MA.
- WEENIG MW and MIDDEN CJ (1991) Communication network influences on information diffusion and persuasion. *Journal of Personality and Social Psychology* 61(5), 734–742.
- WELLMAN B and GULIA M (1999) Virtual communities as communities – net surfers don't ride alone. In *Communities in Cyberspace* (SMITH MA and KOLLOCK P, Eds), pp 169–193, Routledge, London.
- WELLMAN B, SALAFF J, DIMITROVA D, GARTON L, GULIA M and HAYTHORNTHWAITE C (1996) Computer networks as social networks: collaborative work, telework, and virtual community. *Annual Review of Sociology* 22(1), 213–238.
- WELLMAN B, QUAN-HAASE A, WITTE J and HAMPTON K (2001) Does the Internet increase, decrease, or supplement social capital? *American Behavioral Scientist* 45(3), 436–455.
- WELLMAN B and WORTLEY S (1990) Different strokes from different folks: community ties and social support. *American Journal of Sociology* 96(3), 558–588.
- YIN RK (1989) *Case Study Research: Design and Methods*. Sage, Newbury Park.
- ZEITLYN D (2003) Gift economies in the development of open source software: anthropological reflections. *Research Policy* 32(7), 1287–1291.