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## Case Study on social software in distributed working environments

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## Network of Excellence for Professional Learning



# PROLEARN

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## **Case Study on social software in distributed working environments**

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# 1 Executive Summary

This document outlines four different case studies on the use of Social Software in distributed working environments. While two case studies focus on the corporate world, two other case studies look at the use of Social Software in academic workplaces.

The concluding remarks identify some common benefits as well as issues with the use of Social Software and to derive some further research challenges from the different cases. The findings for future research need to be directed towards strategies for corporate learning and working environments to effectively integrate Social Software solutions for very specific needs in different institutional cultures. Therefore the continuation of social software applications in practice, including some other case studies from non-corporate or non-academic, will be essential for WP 15.

## 2 Introduction

This deliverable describes four different case studies on the use of Social Software in distributed working environments. Two case studies focus on the corporate world and two case studies look at the use of Social Software in academic workplaces.

The general objectives of the case studies can be summarised as following:

- to obtain rich descriptions of applications of social software in a variety of distributed working environments
- to provide evidence of (un)successful use of social software in distributed working environments
- to identify possible challenges for further developments in order to support the use of social software in distributed working processes

Apart from these general objectives each case study also has its own focus and addresses more specific questions regarding the use of Social Software, mainly related to knowledge building and knowledge sharing, social network building and informal learning processes.

Before going into the specific case studies we find it useful and important to dedicate a section on defining the common grounds regarding the concept of Social Software. Thus Section 3 will define the shared understanding of our research group regarding this term.

Section 4 will then give a short overview of current practices regarding Social Software in distributed working environments with a special focus on Social Software in the corporate world.

The following sections will be dealing with the different case studies in detail and finally we will give some concluding remarks trying to identify some common benefits and problems with the use of Social Software and to derive some further research challenges from the different cases.

### 3 What is Social Software

In order to discuss case studies on the use of Social Software in distributed working environments we find it necessary to elaborate on the understanding of this term and provide a definition that we share amongst our research community.

Whereas there is currently no official agreement on the definition of the term “Social Software” a number of approaches have come forward. Some people tend to list a number of software applications that fall according to their understanding under this term, e.g. e-mails, weblogs, wikis, chat rooms, etc. (Tscherteu, 2003) whereas others talk more about a philosophical approach that is included in the term “Social Software”.

Within the PROLEARN community we agree that Social Software concentrates on the link-up between social entities in digital social networks and their interaction (Wellman et al., 2002; Shirky, 2003; Bächle, 2006; Klamma et al., 2006). Whereas community information systems, which have been typically used for communities of practice (Wenger, 1998), support specific social entities they do not focus on the relationships among the entities as compared to Social Software. One of the main outcomes that Social Software supports is a digital social network.

Social software is changing the ways in which people communicate and cooperate. Physical location, temporal constraints, and face-to-face communication are becoming less important. The impact and the development wave of social software make significant sense to the society since the industrial revolution. It changes the way to make a deal, to travel, and especially to learn (Alexander, 2006).

Digital social networks are networks reflecting the social structures, while social structures are created by the usage of digital media. Hence, media and communities are equally involved. Social software is thus innovative as it bridges media and communities in a seamless way. The status quo of the Internet’s development trend is “Smarter, Simpler, Social”, which features social software (Bryant, 2003) and the Web 2.0 technologies (O’Reilly, 2005).

The terms Social Software and Web2.0 are often used together or even synonymously. Although we do not understand these terms as synonyms, they are closely related to each other. Basically the term Web2.0, which was coined by O’Reilly in 2003 and has since then been widely adopted, refers to a new way of how the World Wide Web is used. According to Tim O’Reilly (2006), *“Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform.”*

Generally speaking, Social Software employs Web 2.0 technologies. Users of social software often act on a global stage. Each weblog entry, each uploaded video, each shared bookmark can be viewed, commented, modified and re-distributed by every other user if published on the Internet. The complexity induced by this universe of possible interactions is threatening. It is far beyond the computational efforts of a single person.



Digital social networks are mainly realised by means of computer-mediated communication (CMC) (Licklider et al., 1968). While social interaction in professional communication was always there, the new is the persistence and global access to the social interaction followed by a cultural change of the Internet (Sixtus, 2005), due to the tremendous number of broadband access in western industrialized countries.

Moreover, every network supports certain types of media. They influence how the communication links between the members are created. For the purpose of the following case studies an important difference in the use of media has to be pointed out here. Since we are looking at the use of Social Software in working environments - often in private enterprise - the above-mentioned global access to the content and the social network is restricted and often only granted within the boundaries of the organisation, the Intranet. In the following chapter we will go into further detail on how social software is currently implemented in working environments.

Regarding social software in technology enhanced learning the potentials are still not exploited to its full extent. Companies as well as schools and universities are just starting to realise the potentials of social software for specific learning purposes. Dalsgaard argues that social software such as del.icio.us and Wikipedia are useful tools for personalised learning, together with the traditional learning management systems (LMS) (Dalsgaard, 2006). Social software is still often considered as an auxiliary tool for learning. However, a technology enhanced learning scenario for a scholar who uses just the social software tools can be well imagined. Research papers and books are searched on Google Scholar instead of in the libraries. Important research materials are managed at CiteULike ([www.citeulike.org](http://www.citeulike.org)), which is a social bookmarking system for research citations. Professional knowledge can be explored in weblogs as well as social bookmarking systems. Especially informal learning processes that usually take place in social networks can be supported by an internal “blogosphere” within a company. Wiki applications can support the internal knowledge management processes by providing updated information that is jointly published by a group of employees and supports a bottom-up approach. Papers writing can be cooperated in online cooperation-enabled text editors. Researchers are thinking of the solutions e.g. to cite an article which is not published in the journals or proceedings, but maybe in a personal weblog.

The case studies to be presented subsequently will show some of the attempts made so far to make use of social software for some of these scenarios.

## **4 How are social software applications currently used in distributed working environments**

Use of information and communication technology in organizations is self-evident these days. Several communication technologies, such as email and instant messaging have been used in organisations for over a decade already (Wellman & Hampton 1999). The novel tools in the field, social software technologies, have emerged to support knowledge and information sharing, and we can see a tremendous jump of the use and interest on them.

These new technologies and services benefit from the wisdom of crowds (Surowiecki, 2004), which simply means that the many can be smarter than the few. The role of users changes from passive consumers to active producers that generate content and form social networks. Some experts even speak about “collective intelligence” that is quicker, more up to date, deeper, and wider than the traditional models based on authorities and that derives from innovation mechanisms as differentiation and integration, competition and collaboration. This collective intelligence is “emergent” as a self-controlled network knowledge. As Tim O’Reilly says (Spiegel Special, 2007), the point is to make collective intelligence useful – it is not just about expression of opinions, but about distributed data development and real time intelligence.

If we focus now on the corporate world and their distributed working environments, let us consider how this collective intelligence can be supported by Social Software. As an example we would like to mention a tool for social bookmarking developed by IBM which is called “dogear” and has been implemented in the enterprise (Millen et al., 2005). Generally, applications for shared bookmarking have certain common features:

- individuals can create personal collections of bookmarks and share them with others,
- users can assign keywords or tags for each bookmark – it can belong to more than one category,
- social nature of their use – social browsing according to user names or tags.

Whereas social bookmarking has already been successfully used within the academic world for many years, the company was interested in whether large enterprises would also benefit from social bookmarking systems. As the authors of the experiment claim, it shows great potential for using the application to improve sharing, expertise location, and support of communities of interest within the enterprise.

### **4.1 Current Studies**

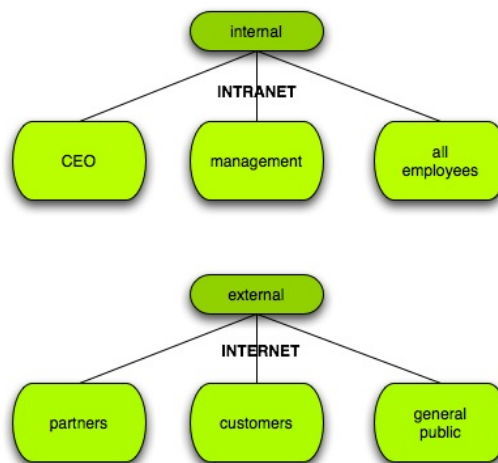
Academic research on the use of social software in organizations is still relatively rare. However, lots of organizations have adopted them; for instance, approximately 30 % of companies worldwide are already using or planning to use blogs and/or wikis at the moment (McKinsey 2007).

Although we have noticed an increasing interest of companies in Web2.0 and Social Software on a global scale, a recent study from the Gartner Group gives a warning that European enterprises are about to miss this global trend and lag behind the implementation of Social Software (Computerwoche 11.07.2006).

If we have a look at Australia, which is the continent with the highest Internet usage by its inhabitants (ITU, 2005) – more than 70% - we seem to spot a different trend. In March 2007 the Australian Flexible Learning Framework published a report on the use of social software for knowledge sharing and capability development in vocational education and training delivery (AFLF, 2007). Their research showed that social software is valuable in enhancing and enriching knowledge sharing, capability development and the teaching and learning experience. The successful use of social software relies on a spirit of openness and a willingness to share and collaborate as well as an enabling culture. Having an authentic need, being relevant to the context and appropriate for the client were the critical elements. The trends are indicating that social software will become ubiquitous largely because it is the technology already widely used by the 'Net Gen' – the new generation of workers and learners, which is a significant client group of the future. The use of social software in vocational education and training is in its early days of adoption, being trialled by the innovators and early adopters.

## 4.2 Typical Use Patterns

When talking about the current use of social software in companies we can generally distinguish between the following heavily simplified patterns of internal and external use:



**Fig.1 Use patterns of social software in enterprises**

Other authors such as Zerfaß (2005), who has been analysing weblogs as corporate communication channels, distinguishes between eight functions of corporate weblog (knowledge transfer blog, contract negotiation blog, CEO blog, public relations blog, product blog, service blog, customer relationship blog, and crisis blog). This distinction for one specific social software application would also fit into our scheme of internal and external use. We prefer to focus on this core distinction that relates to the actors (authors and audience) than to the content published via certain tools.

What we call “*Internal use*” here is often practiced for knowledge management purposes within an organisation. There is usually no public access provided as the content is only published and available on the Intranet, not on the Internet. Within the internal usage scenario we can distinguish between the use restricted to certain persons (e.g. the CEO) or to a group of people (e.g. the management team) or the whole staff members. In the case studies we will see all three types of use patterns covered.

On the other hand companies are using social software also more and more for *external purposes*. This is communication with external partners, customers, and the general public. In this way a company can receive a valuable feedback from external bodies. As an example of how an enterprise uses social software externally is Salesforce.com: they developed software that is now available for other developers who do adaptations and the company uses social software for transparent knowledge exchange between customers, external developers, who are also clients, and staff members. The whole business model has been adapted to this creation of collective intelligence amongst the different actors. With the right product and the right community service they have achieved great customer loyalty.

### **4.3 Outlook**

Web 2.0 and social software represent a strong wave that has the potential to change in a substantial way our society, politics, and economy. Those organizations that will not stick with the old models and will not fight against the new development, but that can recognize this new power and benefit out of it, can become successful in the future. A powerful new economic force in a world where the Internet allows almost unlimited choice was named as the theory of Long Tail (Anderson, 2006). Its author Chris Anderson has identified an important truth: the future does not lie in hits, but in what used to be regarded as misses – the long tail of the traditional demand curve. The result is a cultural richness when everybody everywhere can find something to his or her taste.

Since the use of social software in corporate environments is still rather young there is not much research work available yet on how social software has been implemented in enterprises yet. In the following case studies we will put our focus on what is called “internal use” in the above-mentioned scheme. We will not be analysing applications of social software for marketing, public relations, etc. purposes. Our focus will be on the “internal use” for the purpose of knowledge building and knowledge sharing and thus informal learning within distributed working environments. We will discuss cases in the corporate world, but also in academia. In the academic world social software seems to have been taken up and integrated into working processes earlier than in the private sector and may thus give us some indications for the further implementation in enterprises. Previous technologies such as text editors, e-mail or more recently instant messaging have gone through a similar adoption phase starting with students and academia, encountering first corporate suspicion and finally reaching growing acceptance in the workplaces of private enterprises (Lovejoy 2003, Perin 1991).

## 5 Case Studies

### 5.1 Case Study 1: Subsidiary of a global pharmaceutical company

#### 5.1.1 Introduction to the case study

The aim of this case study was to *study potential benefits of using social software in an organization and to identify key elements of a successful social software adoption process*. We try to have a closer look at the key factors of the introduction and use of social software in companies. The case study is based on research done for a Master's thesis (Ryypö 2007) on the same topic. One primary case and two supporting cases of introduction and testing of social software in companies are covered. In addition, a comparative analysis based on the primary and supportive cases is presented.

##### 5.1.1.1 Primary case: Introduction and testing of social software

In February 2006 an internal development project was started at a Finnish subsidiary of a global pharmaceutical company. The purpose of the internal development project was to explore new ways to improve information sharing within the company. The main focus was on developing individual employees' attitudes and behaviour in terms of acquiring, organizing and distributing information in the company. It was decided that social software would be tried out in the company as a sub-project of the internal development project. One of the focuses of the sub-project was to find out whether social software use should be promoted on a wider scale in the company in the future. The social software application introduced and tested was provided by an application service provider (ASP). The application they offered included blogs, wikis, discussion forums, aggregators, and some other functionalities.

The following principles and approaches in terms of introducing and testing the application were decided:

- One work area within the application was created in order to test blogging for enhancing communication and interaction within and between the management team and the project manager of the internal development project. The purpose was to advance the development project by giving the management team a chance to comment on the blog entries of the project manager and to promote idea exchange within the management team. The aim was also to help to document the project.
- A second work area was created for everyone involved in the project in order to test the social software application on a wider scale. The testing was done on a voluntary basis, i.e. only those employees who expressed their willingness to participate in the sub-project were involved. The purpose was to familiarize with social software and gain experience of using the application. The main focus was in the beginning on blogs although other functionalities of the application used we also introduced and available for use.

The introduction and testing began with a presentation at the end of May 2006. After the presentation seven people (two members of the management team and 5

product managers) expressed their willingness to take part in the testing of the social software application. It was acknowledged that both of the approaches meant extra work for the participating parties as no trade-offs between everyday activities and chores were made. For this group of volunteers a half-day workshop was arranged in mid-June 2006. The purpose of the workshop was to set-up, to demonstrate and to gain hands-on experience of using the application for blogging between the members of the project team. Hence, the main focus was on blog writing, reading, and commenting. However, the use of the aggregator was also demonstrated and tested. Wikis and forums were covered very shortly as well. The management team members were guided individually how to log in into application, read blog entries and comment on it. After holidays, in August, two more product managers joined in the testing of the social software application. Both were given hands-on instructions on the use of application. The testing phase of the social software application took place till the end of September 2006. At the end of the project an Internet survey was made.

### 5.1.1.2 Supporting cases: CEO blogs

The main purpose of the supporting cases was to get supporting data for the primary case. Furthermore, the supporting cases provided data of already implemented use of social software for business purposes in an organization. These supporting cases were CEO blogs open for all the employees of two big companies.

The first supporting case concerns a Finnish airline company in which the CEO of the company started writing an internal blog. The blog written by the CEO had been regarded as an interesting media for quite some time before its introduction at the company. Blogging was considered a well-known and interesting phenomenon, and it appeared to fit well in the existing interactive communication systems of the company. Hence, as a new CEO suggested starting to write a blog alongside with the beginning of his tenure in the beginning of the year 2006, a CEO blog was introduced. During the first two months of tenure (“trainee period”), the blog was written on a weekly basis. Later on, as the content of the blog postings concerned mostly events that had taken place in the company and its competitive environment, and was written on a monthly basis in intranet.

The second supporting case concerns a leading newspaper publisher in Finland. As in the first supporting case, the CEO blog was introduced in the beginning of the year 2006 and it coincided with the employment of a new CEO. The idea came from the new CEO who was aware of similar attempts being implemented elsewhere. Nevertheless, it took half a year of consideration and a testing phase with a small number of critical readers before the CEO decided to publish his blog to the whole organization. After the official launch the CEO blog was written on a regular basis (3-4 times a month). In the beginning, the postings were relatively short and the content focused on current events. Later on, the postings became longer and more story-like, focusing on the CEO’s personal viewpoints. Symbolically this was seen as an expression of the CEO’s willingness to be more approachable.

### 5.1.2 Objectives of the study

The main research question in this case study is: *What are key issues to consider if social software is to be successfully introduced and adopted in an established organization?*

The research question draws from the recognition that the number of established organizations adopting social software appears to increase rapidly. Therefore, some guidelines in terms of its introduction and adoption are needed.

### 5.1.3 Methodology

The research approach taken was exploratory case study with primary case and two supporting cases. The approach chosen allowed fieldwork to be undertaken prior to the final definition of study questions and the research to allow also intuitive paths.. A narrative strategy for description and analysis of process data was used, following the ideas described by Langley (1999).

In the primary case, an introduction and testing of a social software application in an organization was studied. This part of the research took place between April and September 2006. The supporting cases comprised two cases of blog usage in organizations. This part of the research took place in October 2006.

The primary research process undertaken had many elements of action research to realise it in terms of data collection and analysis. The researcher worked in the organization and with its members. In addition, the matter under research in the primary case was of genuine concern to the organization and there was intent by the organization members to take action based on the intervention. (e.g. Eden & Huxham 1997)

In order to provide a strong substantiation of constructs, several data collection methods were used. In the primary case the social software application introduced and tested provided many possibilities in terms of quantitative and qualitative data collection. All blog entries, and any comments to them, were monitored. In addition, any wiki pages and discussion forum posts created, posted, edited or deleted were tracked. In addition to the action research process, an Internet survey was carried out in the primary case among all involved. The questionnaire was sent to 15 people all of whom had participated in the project. Ten people answered it. It provided both quantitative and qualitative data on the use of the social software application. In the supporting cases, phone interview was the method used for data collection. Two phone interviews were carried out, one for each case. In addition, a serendipitous e-mail correspondence took place in the latter case. Hence, all data collected in the supporting cases was in qualitative form.

Analysis consisted of within-case analysis and a comparative analysis between the primary and supportive cases. The strategy chosen for analysis was narrative strategy which involved construction of a detailed story from the raw data. Furthermore, the strategy was deemed appropriate as its key anchor point is time and its focus is on contextual detail. (Langley 1999).

In within-case analysis the idea was to become intimately familiar with each case as a stand-alone entity. This type of approach allowed the unique patterns of each case to emerge before patterns across cases were generalized (Eisenhardt 1989). In practice this meant analyzing the user data of the social software application and the Internet survey used in the primary case as if trying to answer the research

questions. In a similar way, the phone interviews and the e-mail correspondence were analyzed in the supporting cases. The tactic chosen in comparative analysis was to select dimensions for which within-group similarities coupled with inter-group differences could be found (Eisenhardt 1989).

### **5.1.4 Analysis**

#### *5.1.4.1 Results of the primary case*

The introduction and testing of the social software application was not a success in terms of actual usage. After all, the actual usage of the blogs and wikis remained in this case very low. On the other hand, discussion forums of the application were a relatively popular media in both work areas even though they had not been introduced.

Even though awareness of and familiarity with the different tools utilized during the project increased, the tools were not seen as particularly useful in regard to present work of the respondents. Furthermore, the application itself was seen as difficult to use, logging into to it was extra work and required remembering yet another password, and it was seen as separate from the existing ICT tools used in the company. Nevertheless, 9 out of ten respondents of the final evaluation perceived social software to be positively significant in regard to the future activities at the company. In addition, the respondents had many views on why and how to promote its use in the organization. Many of these views related to concrete problems in terms of information sharing within the company. Therefore, as a result of the project, a recommendation to promote the use of social software in the organization in the future was given to the management team.

In sum, considering the challenges that had to be faced in the adoption and the increase in the level of familiarity in terms of social software, a lot was accomplished. This is especially true in terms of the internal development project, the purpose of which was to develop the attitudes and behavior of individual employees in regard to acquiring, organizing and distributing information within the company. Furthermore, the introduction and testing of social software gave new insights and ideas in terms of its applicability in the organization that had not been recognized earlier but were now considered worth pursuing on a wider scale.

#### *5.1.4.2 Results of the supporting cases*

Concerning the first supporting case, in the beginning, the main business application of the blog was to help the new CEO to communicate his first impression of the company and his vision for it to the employees. The CEO blog was seen as a part of internal communication system in the company. Its purpose was to support company strategy and increase the likelihood of successful communication on the CEO's part by adding another channel through which to communicate to the employees. In order to increase the likelihood of successful communication the blog postings were also published in the next monthly newsletter.

The interest towards and feedback of the CEO blog from the employees of the company since its introduction had been very positive. The informal and casual style of blog postings had not only made it easier for the CEO to express his feelings, but



had also made it more interesting reading for the employees than formal communication. It encouraged employees to interact and gave a unique possibility for them to comment on these postings of the CEO openly. For instance, after the first three postings approximately 200 feedback messages had been received. The employees had also understood the informal nature of the CEO blog, and hence had been more “forgiving” towards the content of it.

In the second supporting case blogging was seen to have many purposes in the organization. For one, it brought the new CEO as a person closer to the employees and made his way of thinking visible. Furthermore, it gave an opportunity to the CEO to interact with employees in a new way; people could ask questions (i.e. comment on the blog) on which the CEO could answer later in his blog. In other words, blog was seen as a “soft” media to communicate strategy and give appraisal to people. As it supported the existing communication systems in the company, it was also regarded as an addition to the leadership communication “toolbox”. Furthermore, the blog was seen as a leadership and management tool because it was believed to increase the level of trust in the management and enhance the development of organizational culture. The feedback on the CEO blog since its publication had mostly been very positive and spontaneous, although a few employees had expressed opposite viewpoints. Overall, blogging had been experienced as a good, quick, appropriately “soft”, interactive, and modern communication tool.

In both supporting cases, the CEO blog had been a success. However, in both cases no plans for a more widespread adoption of social software had been made.

#### 5.1.4.3 Comparative analysis of the primary and supportive cases

In the comparative analysis the above described cases were analysed for within-case similarities and inter-case differences in terms of five dimensions, which were derived from research questions and existing literature:

- business need/problem/challenge,
- social software (i.e. what it was),
- potential areas of applications in organization,
- implications of social software usage, and
- issues to consider in introduction and adoption.

The findings of the comparative analysis are summarized in the following table:

Table 1 - Results of the comparative analysis

	Primary case	Supporting cases
Business need/problem/challenge	Gain experience of social software Increase interaction between the project manager and the management team	Make the new CEO familiar Support existing communication strategy
Social software	Blogs (one-to-many), wikis (many-to-many), forums, aggregator	Blog (one-to-many), feedback channel via comment tool
Potential areas	Knowledge management	Interactive leadership and

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of application in organization	(documentation) Change management tool Informal learning, just-in-time learning	management communication tool Interactive feedback tool in communication strategy Informal learning, just-in-time learning
Implications of social software usage	Improved information sharing Increased openness Lowered change resistance	Increased openness and information sharing Flattened hierarchy
Issues to consider in introduction and adoption	Immediate business need Integration with existing IT systems and work routines Slow “ramp-up” and “backstaging” (e.g. supportive discourse) Critical user “mass”	Timing with other events (new CEO) “Acclimatization”/ testing phase Active use in the beginning

In the primary case the business need/problem/challenge was in nature additional to the existing business processes and work routines and more explorative for the possible future needs and challenges. The business need/problem/challenge that initiated the use of social software in the supportive cases was similar: the change of the company CEO in both organizations gave a good opportunity to introduce changes in the communication strategy.

In the primary case the locus of attention was on multiple users of both one-to-many (e.g. blogs) and many-to-many (e.g. wiki) forms of communication. In supporting cases the social software application used was a blog. In other words, the focus was on one person using a one-to-many form of communication, with the opportunity for readers to comment openly the postings.

When it comes to the potential areas of applications for social software and its implications in organizations, in the primary case the most potential areas of application relate to “knowledge management” (e.g. documentation) and change management. Thus, implications of the use of social software include improved information sharing, increased openness, and lowered resistance to change. In supportive cases, social software could be used to increase interaction between the management and the rest of the organization in change situation. Hence, it might help to flatten hierarchy and increase openness and information sharing in the organization. On the other hand, the use of social software may provide a forum for informal and just-in-time learning for both the management and employees.

### 5.1.5 Conclusions

Based on the case study, key issues to consider when introducing and adopting social software in an established organization are numerous. In terms of introducing and adopting social software in organizations, the primary case presented four issues to consider:

1. There must be an immediate business need which is tackled with social software.
2. The use of social software has to be integrated with the existing IT systems and work routines.

3. As novel concepts and applications are introduced, a slow “ramp-up” and “backstaging” are needed in order to make the new discourse (i.e. terms and concepts) familiar.
4. The number of users has to be high enough in order for the low proportion of active users (i.e. “content creators”) to succeed in sustaining a “critical mass”.

On top of this, supporting cases presented three additional issues to be considered:

1. An “acclimatisation”/testing phase before introducing and adopting social software on a wider scale can prove to be useful if there is uncertainty about its appropriateness for the situation.
2. Taking advantage of organizational changes that coincide with the introduction and adoption of social software, and linking them together, appears to give good leverage.
3. Likelihood of a successful introduction and adoption might increase if special attention is given to active use of the social software in its early days.

Most important of above-mentioned issues appears to be an immediate business need to which social software is applied.

From the theoretical perspective, the number of issues to consider in the introduction and adoption of social software appears overwhelming. Although there are numerous pitfalls and challenges to be aware of and many choices and success factors to consider on a detail level, the number of fundamental principles to bear in mind in terms of a successful introduction and adoption is still relatively small:

1. Social software has to be suitable for the task it is used for.
2. Social software has to fit and support the social context.
3. Immediate business problems through which teams can familiarize themselves with the concept of social software (i.e. change in attitude) and learn how to use the applications (i.e. change in behaviour) are crucial.
4. The change agent has to support the “public performance” of change but also focus on “backstage activity”.

In addition to above-mentioned issues, a key issue to consider in terms of introduction and adoption of social software relates to organization culture. After all, if the behaviour induced by the use of social software (e.g. openness and information sharing) is in conflict with the organization culture, it might turn out to be a potential hindrance to a successful introduction and adoption of social software. In a similar way, the bottom-up emergent dynamics of social software necessitates that trust and control are delegated to the users. However, it must also be ensured that access to confidential and financial information is restricted in order to avoid concerns about misuse, abuse, and reliability.

Ultimately, the key issue to consider when introducing and adopting social software in an established organization is the proposal and introduction of a supporting discourse through which transformation to new behaviours and routines is reinforced. There are two reasons for this: Firstly, discourse not only creates, sustains, and transforms the basic assumptions about organizing but also creates new areas of

application for social software in the organizations. Secondly, discourse upholds organizational metaphors which facilitate the creation and interpretation of social reality, and thus established behaviour in organizations.

## **5.2 Case Study 2: Siemens**

### **5.2.1 Introduction to the case**

The following case study describes the experiences of Siemens, one of the world's largest electrical engineering and electronics companies with headquarters in Berlin and Munich, Germany.

Since the end of June 2006 all employees in Siemens worldwide who have access to the company's Intranet have been offered the possibility to write, read and comment weblogs. This service is owned and sponsored by the central communication department while the centre for Knowledge Management of Siemens Corporate Technology is supporting this implementation by providing technical support and know-how regarding knowledge management aspects.

One of the reasons for introducing weblogs as a new means of corporate knowledge management has been the unsatisfactory experience with previous (often top-down) knowledge management solutions. On the one hand, the expected process integration into daily working practices has only taken place to a smaller degree than expected. On the other hand, implementations did not manage to transform the more abstract knowledge processes as postulated e.g. in Probst's model (Probst et al. 1998) into individual working routines and efficiency increasing tools.

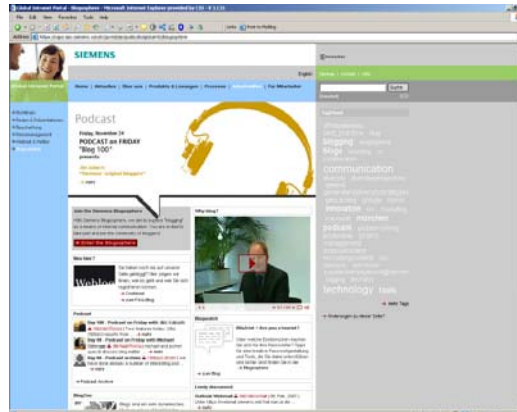
By offering weblogs as a bottom-up approach to corporate knowledge management employees shall be able to integrate the use of this simple tool into their daily practices according to their needs and experiences. This implementation represents an innovative step within this big enterprise as it offers more freedom and requires specific competencies from many players on an individual and organisational level. The company has committed to an open publication and networking space for its employees, which is guided by an internal blogging policy that refers mainly to ethical issues.

It should be mentioned that Siemens does not consider weblogs as the only solution for effective knowledge management. It is however an innovative approach complementing previous top-down methods and as we will see the first implementation phase already shows some rather promising results.

Generally speaking, weblog posts represent traces of the individual digitalised working process of an individual and as such an expression of specific topics the individual is concerned with. Anchoring these expressions in an individual episodic memory (Tulving 2002) as in the case of a weblog represents an enormous reduction of complexity for the individual compared to the distributed forms of content exchange as in the case of other systems such as discussion forums or community portals. For the author the retrieving is much easier while for the reader the understanding is supported by the relationship which each post has with its author

and is thus better contextualised. The technical support for establishing connections and creating networks is an additional reason for choosing weblogs over any other community tool.

The technical solution offers publishing and commenting functions for each employee. The main access point is via the Siemens Intranet Portal and authentication is possible via a Single-Sign-On service. Easy access and simple use were the main priorities when defining the specifications. The Siemens Blog-Homepage already includes a tag cloud that gives an overview of the most prominent topics covered in the Siemens Blogosphere.



**Pic.1 Siemens Blog-Homepage as entry point**

After the introduction in June 2006 a continuous adaptation of the application based on user feedback, which is communicated in an own group weblog, has been foreseen.

## **5.2.2 Objectives**

The objective of this case study is to observe the initial phase of the introduction of weblogs into a world-wide operating enterprise for knowledge management purposes. Our observations are concentrating on the specific use of weblogs, on network building, on knowledge sharing, knowledge exchange and knowledge building. Since the initial motivation behind the implementation of the Siemens Blogosphere has been triggered by an innovative approach towards knowledge management, we are also going to look for any success indicators in this respect.

Both the individual and the group level shall be observed. Especially for the individual level an objective of this case study is to identify any individual use of the weblog for personal learning process documentation.

## **5.2.3 Methodology**

The time period covered in this study is from the June 2006 (kick-off) to end of November 2006. It covers the very first months after the launching of the Siemens Blogosphere.

Data for this case study has been mainly gathered from anonymous user statistics and data extracted from the weblogs. Most of the data is concentrating on the

observation of the weblog use. Following an exploratory approach without any specific pre-defined theory the case study includes qualitative and quantitative data.

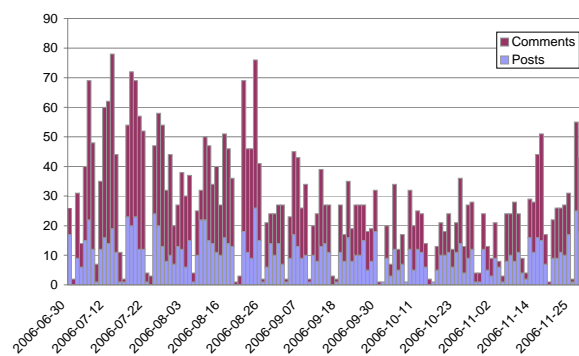
In addition to the data extracted from the system a few exploratory interviews with specific user were performed as well. The person performing these interviews is a staff member of Siemens and also the main responsible for the whole project.

## 5.2.4 Analysis

### 5.2.4.1 Statistical overview

First of all, we would like to give a short overview of some user statistics. Until the end of November 2006 the system counted 8879 registered users. The reach of people who have at least visited the platform is estimated to cover approximately 25.000 individuals. During that period (June 2006 – November 2006) 309 users created their personal weblogs and 38 group weblogs with more than one author were registered. In addition, an open weblog dealing with the system itself was created in order to collect suggestions for improvements and questions regarding the use of the system.

By the end of November 2006 the platform had registered 1464 posts and 2556 comments from 482 different authors. The following figure shows the distribution of the posts and comments over the time period.



**Fig.2 Number of posts/comments per day**

As expected, after the first months a small decline in comments can be noticed. However, the number of posts remains rather stable and even increases slightly towards the end of the period.

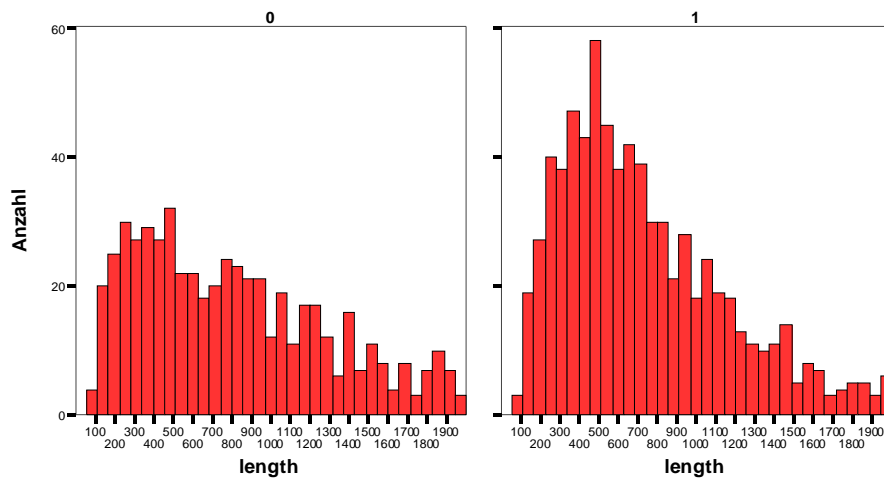
When comparing the distribution of posts and comments amongst the active users it becomes clear that it is a comparably small group of people who does most of the writing. An exponential increase as it has been observed for many Internet platforms (Sifry 2006) have not yet been noticed. We notice here some potential for improvement in attracting more active users.

### 5.2.4.2 Content

The average length of a post in the Siemens Blogosphere is 970 characters and a comment includes on an average 370 characters. Most of the entries (approx. 70%)

range between 100 and 1.100 characters following a typical power-law distribution (Cattuto 2006). This corresponds with the average length of weblogs published openly on the Internet as a study by Brown (2007), who looked at the top 100 Technorati Weblogs, shows.

Rearranging the type of posts we differentiate between posts that include a hyperlink and thus relates to additional sources of information and those posts that do not include any URL. The first type of posts we would like to call “Resource Posts” because they relate to additional resources and put the post into a broader context. It establishes a network of related resources of information. If we look at the length of the posts without an URL (0) and the resource posts (1) in the graph below it is interesting to notice that there is a peak at about 500 words for the resource posts.



**Fig.3: post's length without hyperlink (left) and with hyperlink (right)**

As previously stated the authors were given complete freedom in terms of content of their weblogs. The same applies for tagging. There was no terminological control (Hammond, et al. 2005) whatsoever regarding the tags that the authors were using for categorising their weblog entries. Although this fact was not explicitly featured during the launch of the system the weblog authors made quite extensive use of the tagging feature. Overall 1.150 different tags were used 3.224 times with an average of 2,3 tags per weblog post. The frequency scale of the different tags follows the typical power-law distribution or also called “long-tail” (Cattuto 2006) and has also been noticed for tagging in other social software applications (Barnett 2006) as we will see in one of the following case studies on the Nextspace (i.e. Section 5.3).

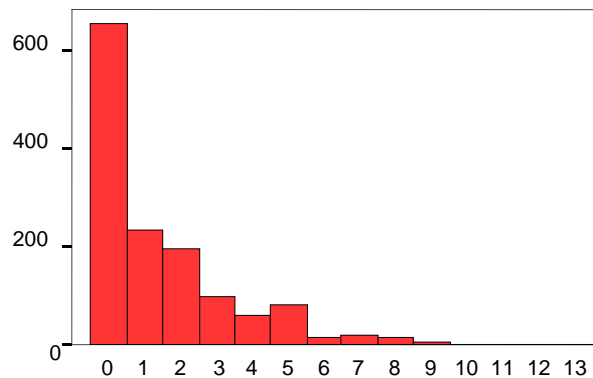
The most frequently used tags are related to the tool itself (e.g. blogs, web2.0, blogging, wiki, etc.). It shows that during the first phase many users were reflecting on the new system itself. Other frequently used tags include “innovation”, “communication” and “technology”. Although a deeper content analysis of the weblogs is still missing, it shows that at the beginning it was clearly technical innovations that attracted most authorship.

#### 5.2.4.3 Networking

One of the most important features for networking in the Blogosphere are comments. Whenever someone writes a comment attention is drawn to the content of the text

that is being commented and at the same time attention is also drawn to the author of the original text. A relationship between the author and the comment author as well as between the original post and comment is established. The contextualisation of this relationship is usually supported by hyperlinks.

In the Siemens Blogosphere almost two thirds of the texts are comments to other people's posts. During our period of observation 2.556 comments were made, ranging from 6 characters to 6.370 characters in length. The average text length was 370 characters. If we look at the frequency of comments per post it shows that 655 entries did not receive any comment, 233 entries received 1 comment, 195 entries received 2 comments, etc.



**Fig.4: frequency distribution of comments**

Overall we noticed a tendency that the number of comments depends on the topic and not so much on the length of a post.

As stated above commenting is especially important for social networking and needs to be followed on further if we want to find out more about learning in social networks.

First exploratory analysis of commenting practice reveal that there is strong commenting of bloggers from US sites in weblogs of German based bloggers. The top position is still held by comments of German based bloggers in German based Weblogs. There is lot of anecdotic evidence that within-country commenting also leads to new contacts. But since the information if commentator and blogger did know each other before engaging in blogging cannot be derived from system data final evidence would require complementing data from a survey, interviews etc. Nevertheless we have sufficient hints for national and international networking based on the use of the blogging platform.

#### 5.2.4.4 Blogging-Patterns

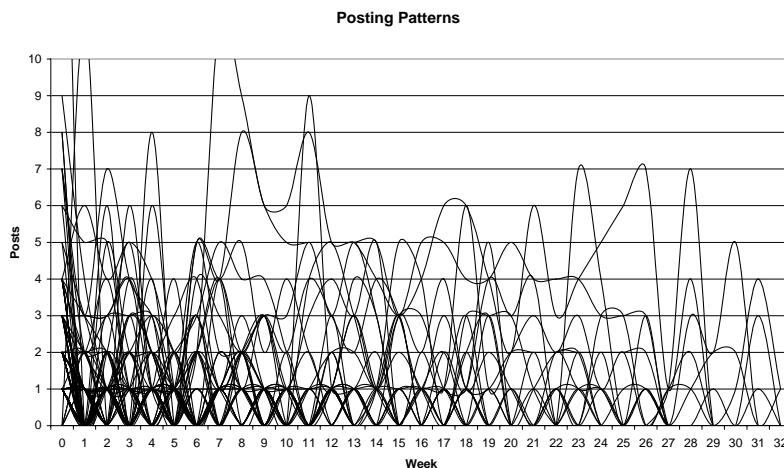
According to Technorati data, there are over 175,000 new blogs created every day on the World Wide Web<sup>1</sup> (including so called "spamblogs). About 55% of the weblogs that Technorati counts are considered active, which means that they have been updated at least once in the last 3 months. Of course this definition of an active blogs is incomplete without taking into account the regularity of posting over a longer period of time.

<sup>1</sup> <http://technorati.com/about/> latest visited on 29.06.2007



Only if a weblog has been active over a certain period of time experts speak about the survivability of weblog (Schmidt & Mayer 2006). We would like to stress here however that the period of analysis within this case study has been rather short with 8 months and the analysis should be repeated after a longer time period.

During the observed time span out of the 309 personal weblogs that were created 112 did not show any posts. This means that approx. one third of the employees who created a weblog for themselves did not activity make use of it. This percentage is similar to figures from the Internet (Krüger 2003).



**Fig.5: posting patterns in Siemens weblogs over time after blog creation**

Amongst the thirty most productive weblogs during the period of observation we counted 10 group weblogs (one third) with distributed authorship. If we look at the overall percentage of group weblogs amongst the total number of weblogs, which is 11%, we notice that group weblogs show a more stable blogging practice. This might be due to the fact that multi-authorship triggers more commitment by the individual author.

The posting patterns visualized in the figure above support these numbers. Only some bloggers transfer their personal experiment into a stable practice. The proportion of these employees of course varies depending on the definition of an “active” blog. Referring to the 3 months mentioned at Technorati we find update frequencies between 0.5 and 5 posts per week in a typical power-law distribution for blogs that showed any activity for longer than 12 weeks.

In 2003 Perseus found that blogs are updated much less often than generally thought. Only 2.6% of the 4.12 millions hosted blogs were updated at least once a week referring to definition of “active blogs” based on 2 months. Under comparable conditions this rate is 6% on the Siemens Blogosphere.

A percentage of active blogs between 15% and 20% - depending on the definition of “active” - seems to be state of the art for a voluntary offer of a new medium. This rate was confirmed by our statistics and numbers from IBM <sup>2</sup>, which are much higher in

<sup>2</sup> [http://www.cogneon.de/weblogs/bitkom\\_kem\\_08\\_02\\_2007](http://www.cogneon.de/weblogs/bitkom_kem_08_02_2007) retrieved 2007-02-13

absolute figures because their service exists since 2003 according to Jackson (2007).

### 5.2.4.5 *Knowledge-Patterns*

From a knowledge perspective we found at least five types of documented knowledge that can be linked to psychological theories of cognition. Many posts can be characterized as (simple) declarative knowledge pointing to interrelations between facts explicated in short checklists etc. Explanatory knowledge (Begründungswissen) articulated in arguments supporting opinions. Knowledge about resources that links to other chunks of information, mostly by using URLs. Procedural knowledge as found in simple tips and tricks for work related tool like MS outlook etc. Finally narrative knowledge as a rather rare category that can be related to posts that tell a personal (not privat!) story.

To date some blogs relate to workplace learning either by their authors being part of the internal training department or – which is even more important from a knowledge work perspective – by individual employees who deliberately choose to elicit their personal learning experiences and lessons learned. The example of an employee publishing his experiences with a certain CAD-Software from installation on is a very promising and lasting one for learning focused use scenarios.

### 5.2.4.6 *Concluding remarks*

The implementation of the Siemens Blogosphere represents an innovative approach towards knowledge management in this world-wide operating enterprise. Offering open publishing tools without any editorial control is a big step towards a dialogue-oriented communication culture.

The successful use of the platform gives an indication that weblogs are accepted as an additional working tool that offers employees the possibility of connecting globally around specific topics and of establishing social networks. It should also be stressed that the employees are using this service on a completely voluntary basis. With the growing use of the weblogs a successful indication is given that the blogging has been successfully integrated into individual working practices. Some posts and comments also explicitly mention this integration.

Regarding the motivation for the use of the weblog tool we have spotted different, mainly personally motivated, reasons. For some user the weblog support a reflection process and is used as a sort of “reflection” or “learning” diary while for some others the dialogue and the fast feedback that one receives via the comments is most important. Here again social networking and transparency plays an important role.

Some units within the organisation also make use of RSS feeds from specific topic-related weblogs and add thus more dynamic content to their websites. Some only subscribe to specific tags. Overall, the possibilities of linking, RSS feeds and comments create a new network of information resources that also relates to specific persons and contextualises the information in a new way. The growing number of specific topic related posts indicates also that employees better integrate weblogs into daily working practices than it has been the case with classical top-down knowledge management tools.

Although the Siemens Blogosphere is still very young, the first phase has given some positive results that shall lead towards a faster, more flexible, transparent and self-organised form of knowledge management.

### 5.3 Case Study 3: Nextspace in iCamp

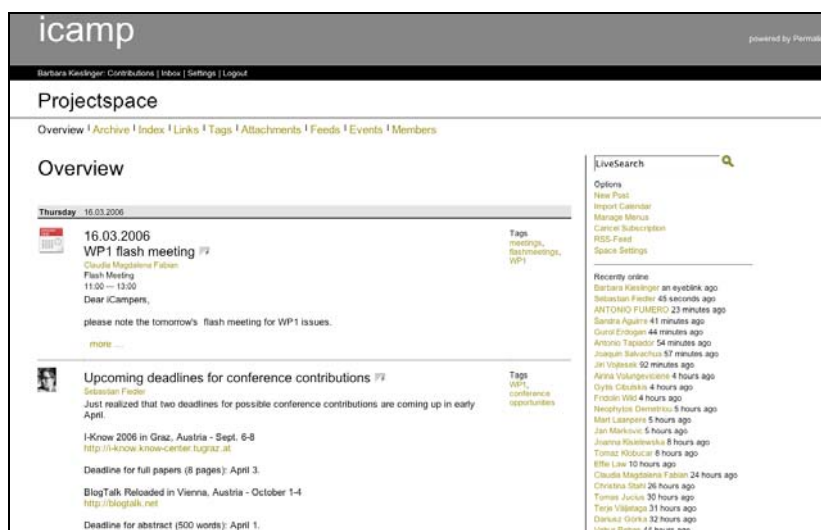
#### 5.3.1 Introduction to the case

iCamp (innovative, inclusive, interactive & intercultural learning campus) is a specific targeted research project under the sixth framework programme of the European Union. The project develops and evaluates targeted activity sets that make systematic use of interoperable, networked tools and services in order to support competence advancement in three areas of challenge: 1) self-directing and self-organising learning projects, 2) collaboration and 3) social networking. For more information on the specific project objectives, please see: [www.icamp.eu](http://www.icamp.eu)

The research team involved in this project consists of 10 partner organisations, which are geographically distributed across 9 European countries. Each of these organisations involves around 2-5 people in the project work. Research and development work are thus performed in a distributed way and have to be supported by ICT.

For the technologically mediated collaboration and communication of the team the project management decided to use a platform called Nextspace as the main vehicle. Nextspace is an innovative software for collaborative knowledge management that integrates various social software elements. The main features of the Nextspace are:

- Chronological content entries (similar to weblog)
- Multi-author posting and versioning (similar to wiki)
- Tagging
- Calendar
- Member overview
- RSS feeds



Pic.2 iCamp Nextspace Screenshot

This case study refers to the use of this software within the iCamp research community with a special focus on informal learning processes, knowledge exchange and social networking.

### 5.3.2 Objectives

Apart from the general research objectives of investigating how social software can be used in distributed working environments this case study focuses on the following research questions:

**General acceptance of the tool:** What is the general acceptance of the software itself and of the hierarchy-free and unstructured collaboration process that the Nextspace fosters?

**Collaboration process:** How is the collaboration process within the project community perceived? Has there been any perceived change in how the collaboration process is performed? Have there any perceived gains or disadvantages compared to previous practices?

**Communication process:** How is the communication process in the project community perceived? Has there been any perceived change in how the communication process is performed; Have there been any perceived gains or disadvantages compared to previous practices?

**Learning process:** How is the individual learning process perceived? Has the individual learning process been influenced positively or negatively by the use of the Nextspace? Have there been any perceived changes in the learning process? Has knowledge sharing and knowledge gain been facilitated by the use of Nextspace?

**Social behaviour:** Has there been any perceived influence by the use of the Nextspace on the social behaviour of oneself as well as of the other members of the team? Has there been any change in social behaviour?

### 5.3.3 Methodology

The time period for the data collection starts with the beginning of the project in Oct. 2005 until June 2006. This covers a time period of approx. 11½ year of the project, corresponding to the first half of the project duration.

Regarding the number of users on the Nextspace there has been some variation due to the fluctuation of staff members. From the very beginning each partner organisation had approximately 2-4 persons registered on the Nextspace. On June 1<sup>st</sup> 2007 we are now counting 55 members + 1 administrator out of which 13 members have not been active for the last 100 days and are thus either members who left the team or what we would call “silent followers”, who do not actively participate in the project work, but still have access to the Nextspace to follow the project development.

Out of this pool of iCamp team members five persons were selected for interviews. The selection of these persons is based on different interaction patterns that have been identified via quantitative data analysis from the usage data on the Nextspace. Via Social Network Analysis (SNA) we identified different interaction patterns and identified key persons who represent a certain interaction pattern (e.g. strong direct communication).

After the identification of these exemplary five representatives of Nextspace users seven interviews were conducted at two different points in time for qualitative data gathering. Three rather exploratory interviews were performed at the beginning of the project when the Nextspace had been in use only for a short time period and the second round of interviews were conducted after more than a year of using the Nextspace. Out of the five members two persons were interviewed twice. These had been the two most sceptical users and also as the less active ones regarding their interaction diagram. The structured interviews at the second point in time included two of the most active or “core users” of the Nextspace.

The following analysis is thus based on qualitative and quantitative methods used for data gathering, namely SNA and interviews.

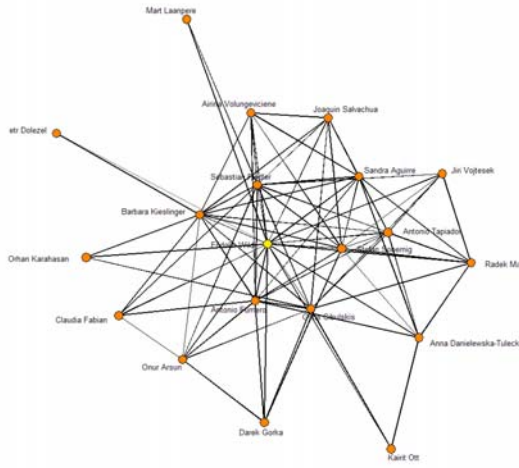
### **5.3.4 Analysis**

In this analysis we will discuss the data gathered in the interviews in combination with the results from the SNA and relate them to the above-defined research questioned.

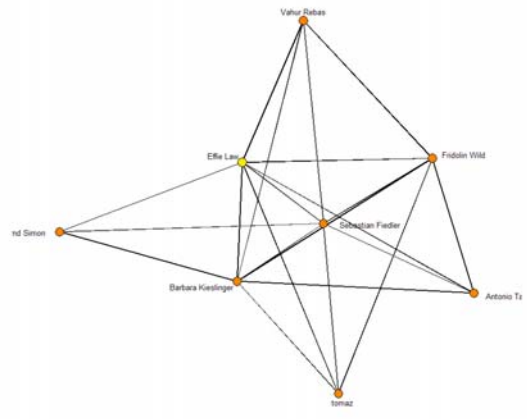
#### *5.3.4.1 Interaction patterns*

As mentioned above, SNA methods have been applied to identify certain interaction patterns amongst the members of the iCamp team. When looking at the egocentric networks of the individual members registered on Nextspace different interaction patterns can be perceived. On the one hand we can identify some very active members, for which we can detect frequent direct interaction with other members in both directions while on the other hand there are members with very little or even no interaction with other members. Amongst these two extremes there is a continuum of more or less active members. In the following we show ego-centred network (Wassermann 1994) of year 1 of the persons that have been interviewed for this case study. The personal network data indicating 1<sup>st</sup> order interaction (direct contacts) for each of them is different and the graphs show clearly that F. and S. are interacting much more in the Nextspace than e.g.E. ,T. or G.

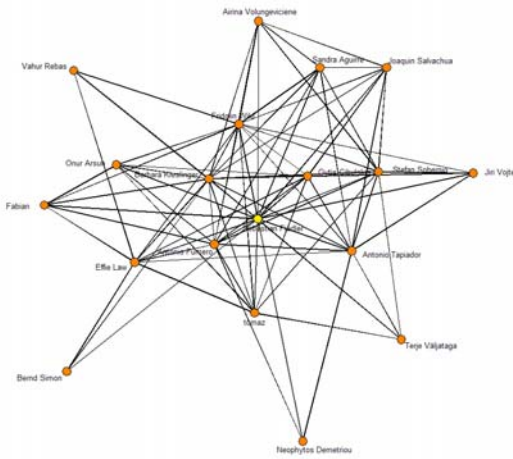
D15.2 – Case Study on social software in distributed working environments



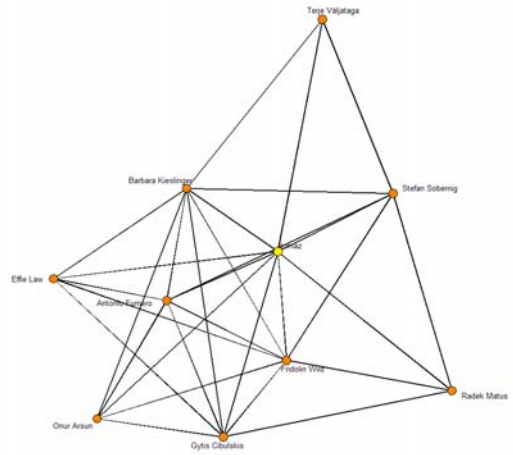
ego-centred network F.



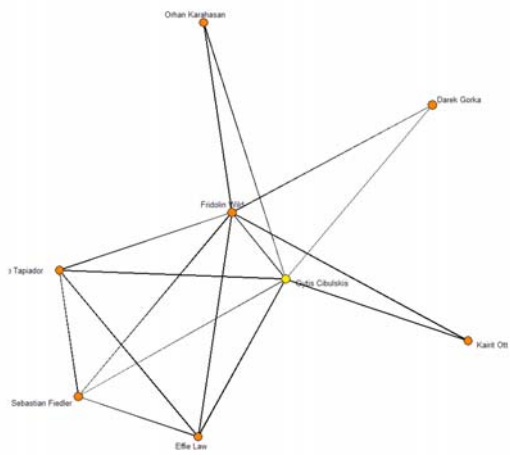
ego-centred network E.



ego-centred network S.



ego-centred network T.

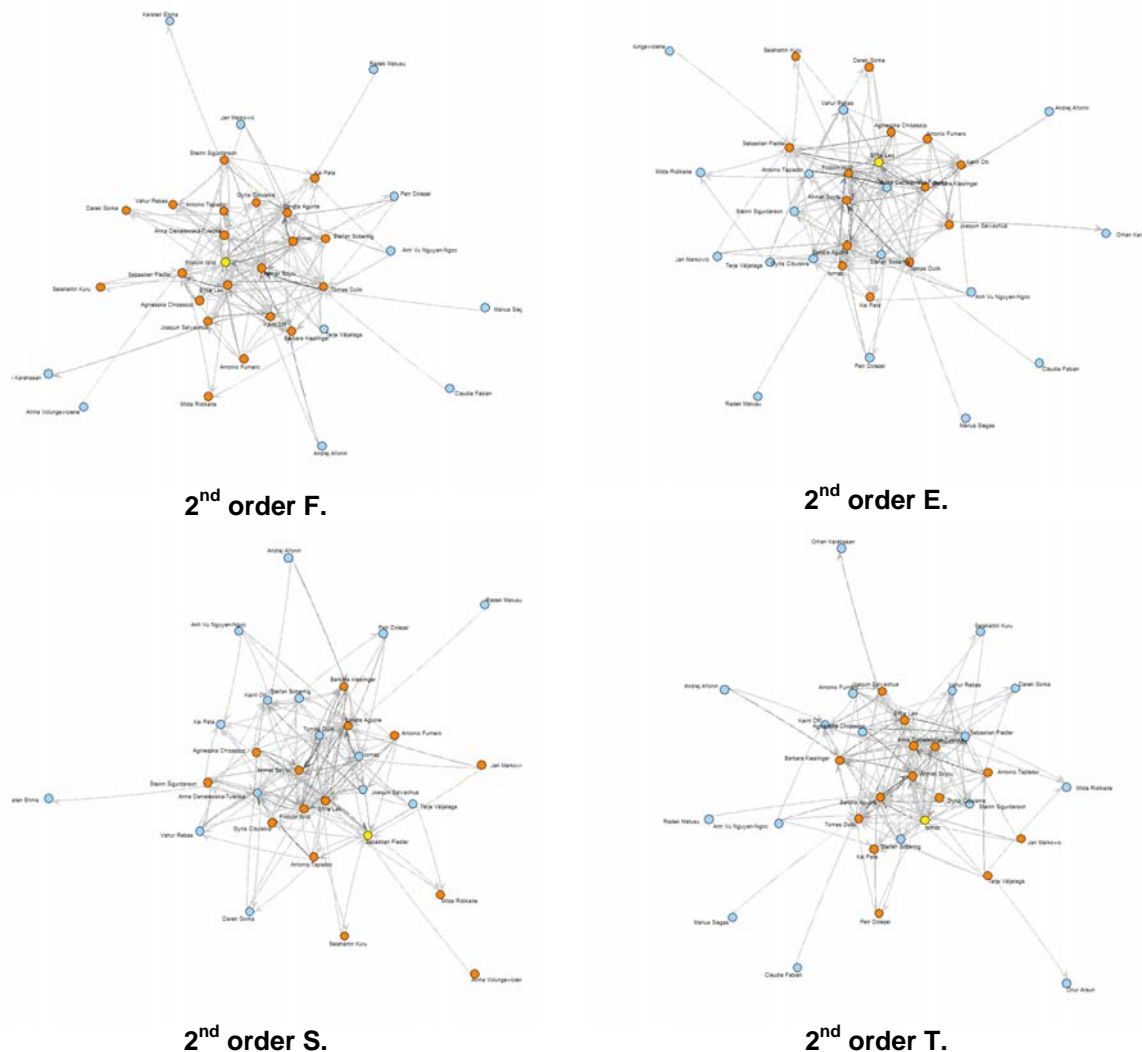


ego-centred network G.

Fig.6

If we have a look at the second order contacts of these persons less differences can be perceived in terms of network density and the network becomes sparser for all of the actors (see figure 7 below). This can be interpreted by the fact that overall we are dealing with a closed community of team members who generally interact heavily within the group in the beginning. With the time life of the project, the project partners direct their communication not to the entire group any longer as in the beginning of the project (only those messages which are relevant for all), thus dislocate their communication tool back to other channels (ie. emails) for messages only relevant for some of the involved partners.

The direct contacts are represented by the red dots, whereas the blue dots are indirect contacts.



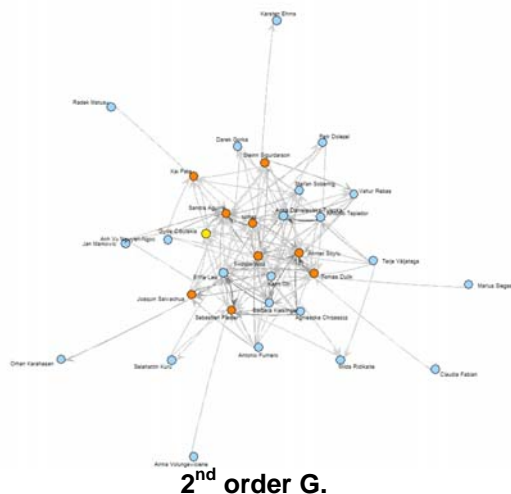


Fig. 7

#### 5.3.4.2 General acceptance of the tool

The general tenor regarding the acceptance of the Nextspace can be described as positive. Specific features could be improved and one bug was commented, but overall the use of the tool within the project has gained high acceptance.

Overall, there exists a general consensus amongst the interviewees regarding the usefulness of the Nextspace of project administration and coordination purposes. Especially the frequent coordination tasks can be handled conveniently via this tool. To-do-lists, meeting schedules, attendees lists, announcements, etc. are perceived as being more efficiently and effectively handled via Nextspace compared to previous workflows e.g. via e-mail.

One person, who also has a coordinating role in the consortium pointed out that the tool is not very convenient for controlling and monitoring purposes compared to more traditional project management tools. Another interviewee is missing some structuring elements such as folders. He pointed out some difficulties with adapting to the bottom-up folksonomy-based tag structures as the main elements for organising the content. This approach does not really fit with his personal working habits.

An important aspect addressed by all interviewees is the way in which the use of the Nextspace integrates with their personal working style. Here we can identify different attitudes towards the tools. One user e.g. has been working with social software applications for many years now and has constructed his personal workflow for using the Nextspace and has integrated it with his personal tools landscape. Three out of the five interviewees were exploring the potential of the features for adapting to the personal workflows. The other users seem more reluctant to explore the different possibilities that Nextspace offers for constructing different workflows and thus better integrating with the personal working habits.

Although the software provides various options in terms of use and integration with different workflows and other services (e.g. via RSS) it is mainly the users attitudes and some basic knowledge on the technical features of the tool that either supports



this integration or hinders it. In the iCamp community both cases have been identified.

### 5.3.4.3 Communication/Collaboration

As communication is normally part of any collaboration process and cannot be easily detached from it, we are treating the two aspects together. The Nextspace offers features for both activities. Weblog-like one-to-many communication structures as well as joint editing features similar to a wiki are core features of the tool.

The most important change that all interviewees noticed is the increased transparency compared to previous communication and collaboration in distributed working environments. Again, personal attitude and dispositions for open collaboration and communication play an important role here. Whereas some people favour complete openness and access for all to any discussion, comment and content and others are asking for restriction possibilities in order to make some comments only available to certain persons, but not to the whole group. Thus it is the personal preferences, attitudes, dispositions and working styles that determine how much transparency can be achieved.

Overall, an agreement seems to exist amongst the users that the system supports the emerging knowledge-pool or archive of the project work. Interestingly more communication regarding content related to special workpackages (WP) was taking place during the first project year compared to the second. The overall contribution of content has however not noticed any such decrease.

The following figures 8e.g. show the interaction related to a workpackage (WP) in year 1 and in year 2.

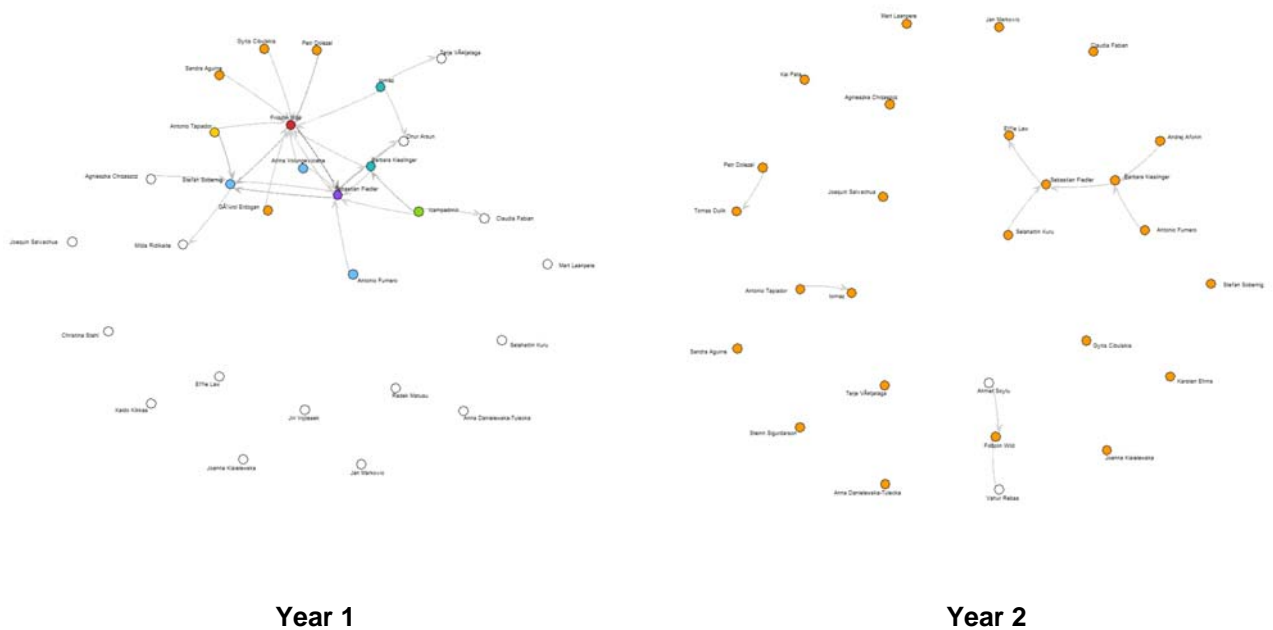


Fig. 8

A similar pattern can be identified for the communication related to any of the other WPs. One of the explanations for this is that in the second year the specific WP members started to use additional tools in smaller groups for specific WP collaboration and communication (e.g. Skype, etc.).

Generally the Nextspace has not been used extensively for collaboration on a bigger piece of work, such as a deliverable, or joint editing. According to interviewees the tool has proven to be more appropriate for communication than for strict collaboration in the sense of joint artefact production.

### *5.3.4.4 Individual learning process*

The individual perception on the support of the Nextspace for informal learning purposes cannot be easily derived, as many people do not reflect consciously on their learning process, especially not on informal learning processes. According to one user, who is very familiar with the tool, the Nextspace can be a good tool for supporting this reflection process. The system stores every comment, every interaction and makes the communication of the group transparent and provides a good archive for the project and for the involvement of each individual.

Another person explicitly points out that the Nextspace supports his learning process. He perceives the tool as an important information and knowledge pool that helps him generate new insights and ideas that are to a certain extent again fed into the system and might trigger something different for another user.

### *5.3.4.5 Social behaviour*

In terms of social behaviour various interview partners stressed the social engineering effect that the Nextspace is supporting. Various features add to this effect and facilitate the group building.

On the one hand the hierarchy free structure prompts the posting of not strictly project-related content, but also semi-private communication such as the birth of a child from one of the team members or the coordination of some extra (e.g. sports) activities of the project team before a project meeting. On the other hand, some specific features such as that online-presence status and the personal image of each team member supports the group identification and according to one interviewee also exerts some social pressure.

### *5.3.4.6 Concluding remarks*

Just as any other piece of software Nextspace is only a tool that can either support or hinder people in their collaboration, communication and social interaction and thus finally in their informal learning processes. It depends on the personal dispositions and attitude of the individual user towards the tool and the peers in how far the tool can support these processes. According to this case study the Nextspace has some specific affordances that may well support group communication, collaboration, knowledge sharing and social interaction for distributed working teams.

## **5.4 Case Study 4: Bibsonomy**

### **5.4.1 Introduction to the case**

The social bookmarking system BibSonomy is part of the wave of social software applications developed to enable the collaboration between distributed working environments. The system focuses on integrating features of bookmarking systems as well as team-oriented publication management. The social bookmarking capability allows for storing and sharing bookmarks, and providing entries with keywords (tags) to structure information and facilitate later retrieval. Besides the publishing of scientific paper metadata and descriptive keywords, the publication management component incorporates features such as the creation of bibliographies for publications or web sites, export facilities in 17 different output formats or automatic metadata extraction from websites [2, 3].

As the descriptive terms used to describe bookmarks or publications can be freely chosen, the assignment of tags from different users creates a spontaneous, uncontrolled vocabulary: a folksonomy. In BibSonomy, the folksonomy evolves from the participation of research groups, learning communities and individual users, organizing contents according to their information needs.

After about a year of operation, BibSonomy comprehends 1000 active users, 283.092 bookmarks, and 609.618 different tags. The system is designed to meet the specific needs and challenges of its target group: scholarly people world wide. In order to find out about its applicability and to identify possible challenges for further developments the BibSonomy team of the Knowledge and Data Engineering Group at the University of Kassel/Research Center L3S conducted a case study considering researchers and research communities as their unit of analysis.

The study started in the beginning of 2006 and terminated end of April 2006. In order to improve the reliability of this study, the case builds on multiple sources of evidence as proposed in [9].

1. Two research communities were selected, which committed to use BibSonomy to manage their project's references. Both groups are familiar with social software: the European Integrated Project "Nepomuk - the social semantic desktop" and the PROLEARN community. The participants of both projects were asked to anonymously fill out a questionnaire; additionally, usage statistics were drawn from the database to find out about the system's acceptance.
2. In the end of March 2007, BibSonomy was part of the CKC challenge in which social software applications were evaluated by researchers worldwide. The feedback given was analysed according to the objectives of this case study.
3. Finally, the University Library of Amsterdam conducted a user trial comparing BibSonomy with Cite-U-Like considering publication management. The documentation and feedback of the participants contribute to this case study.

The following section is organized as follows. The first sub-section defines the case study's objectives. The second sub-section outlines the applied methodology, and

the third sub-section analyses the results. Finally, a conclusion summarises the findings and proposes challenges for future research and development activities.

#### 5.4.2 Objectives

The case study underlying this section focuses on evaluating BibSonomy as a social bookmarking solution for the scientific community. Specific needs and behaviours regarding information retrieval and publication management of this group need to be analysed, and BibSonomy's strengths and weaknesses in responding to these particular requirements are assessed as well.

Three specific *research questions* can be derived from this general objective:

1. Identify individual benefits and expectations for using social bookmarking tools in a research environment.
2. Find out about a social bookmarking system's contribution to facilitating collaboration in scholarly groups regarding literature and reference management.
3. Explore BibSonomy's usability and applicability as a publication management tool for scientific authors and readers.

The next sub-section describes the approach chosen to study the three research questions.

#### 5.4.3 Methodology

The nature of the research questions called for a qualitative, exploratory study investigating experiences with collaborative publication management. Descriptive components are included to distinguish tendencies in attitudes. The study uses documentation, questionnaires and interviews as information sources.

Four representative groups from within the research community were selected to participate in the study:

- ***Nepomuk project:*** The European project aims to develop a comprehensive solution for “*extending the personal desktop into a collaboration environment which supports both the personal information management and the sharing and exchange across social and organizational relations*” [4]. The project, started in 2006, uses BibSonomy for organizing their publications. Special features such as the group functionality to share publication entries only within the project, the possibility to integrate BibSonomy into a project's web site [5] and the addition of group specific metadata was developed in conjunction with this project.
- ***ProLearn project:*** The 'Network of Excellence' under whose umbrella this case study was carried out, brings together people working on technology enhanced professional learning. The project uses BibSonomy for reporting its publications, but has not integrated the system into its active workflow (e.g. creating a tag cloud, connecting its web site and BibSonomy). The main reason why we asked for the participation of ProLearn members, was a

workshop on social software in March 2007 [7], in which people were introduced to the system.

Since both projects involve people across Europe, personal interviews and life observations were difficult to carry out. Consequently, we decided to distribute an online questionnaire which consisted of three parts:

- Demographic questions
- Questions about experiences with information retrieval and reference management
- Questions about system usage, perceived values and usability aspects.

A major risk to be controlled was the bias that people knew the research questions before responding to the questions. Thus, people were informed of the questionnaire via a short mail, explaining the basic settings of the case study without giving too many hints. The approach had the disadvantage that participants were not personally addressed.

A second risk was the fact, that the authors carrying out the case study were part of BibSonomy's development team. The development of the questionnaire therefore might have been biased towards a positive acknowledgement of the system. In order to receive neutral feedback, we decided to integrate the documentation of two external challenges in which BibSonomy was involved. The BibSonomy team contributed to these challenges by presenting the system, and providing help and guidance during the trials. The development of the survey, the formulations of questions as well as data collection were conducted externally. The two challenges are described as follows:

- **CKC Challenge:** The Collaborative Knowledge Construction Challenge [8] organized as a workshop in the scope of the WWW 2007, aimed to assess social knowledge creation tools combining the semantic web and web 2.0 branches. The challenge took place from April 16<sup>th</sup> to April 30<sup>th</sup> inviting participants to try and give comments on a variety of tools. Besides social bookmarking tools such as BibSonomy, collaborative ontology editing, visualization and development tools were taken into consideration. A specific help page [1] for CKC challengers was created which people could access. Participants were supposed to try the basic features as well as more advanced functionalities enabling semantic knowledge presentation. For instance, tags in BibSonomy can be marked as part of a hierarchy. Participants filled out a web questionnaire consisting of 10 open-ended questions.
- **University of Amsterdam Challenge:** The Library of the University of Amsterdam organized a user trial of academic social referencing software with members of the research group Systems- and Network Engineering of the University of Amsterdam [6]. Participants compared BibSonomy with Cite-U-Like in order to evaluate the potential value of social bookmarking applications for library services. An external company, Pleiade Management and Consultancy reported and analysed the feedback given by participants. The organizers led users to carry out several tasks with both systems. Participants

then filled out a questionnaire and log book to report on those tasks. Finally, an interview rounded up the assessment of social bookmarking systems.

#### 5.4.4 Analysis

Results are presented in three sub-chapters according to the different cases. Each of the analyses states sources, charts and comments to answer the three research questions.

##### 5.4.4.1 Results of the research projects

The response rate of the questionnaires was rather low. This may be due to several reasons: people were not offered incentives and were not addressed personally; furthermore, not all project members work with BibSonomy. As the structure and participants of both projects are similar, we decided to merge the results of the questionnaire in the analysis part. Overall, we had ten respondents, nine male and one female.

The analysis is grouped into three divisions: Questions considering experience and habits with search and reference management, questions and findings about the actual usage of BibSonomy and its value for users, and questions about the system's usability. The questionnaire can be found in the Appendix.

##### 5.4.4.1.1 Experience and habits

Experience and habits were studied by asking for search behaviour and reference tools used. Several statements were given which the participants could mark if they agreed with the statement.

As can be seen in figure 8, conferences and search engines play a major role in finding literature. Summing up statement 6 and 7 (“Other colleagues outside my project tell me.” and “Colleagues of my project tell me”) shows a strong influence by colleagues.

The most common reference management approach (see figure 9) is the local storage and classification of literature in folders and sub-folders. Local (browser) and global (social bookmarking systems) are equally interesting for reference management. Several participants indicated that they use other tools, unfortunately a specification of the other approach was not given.

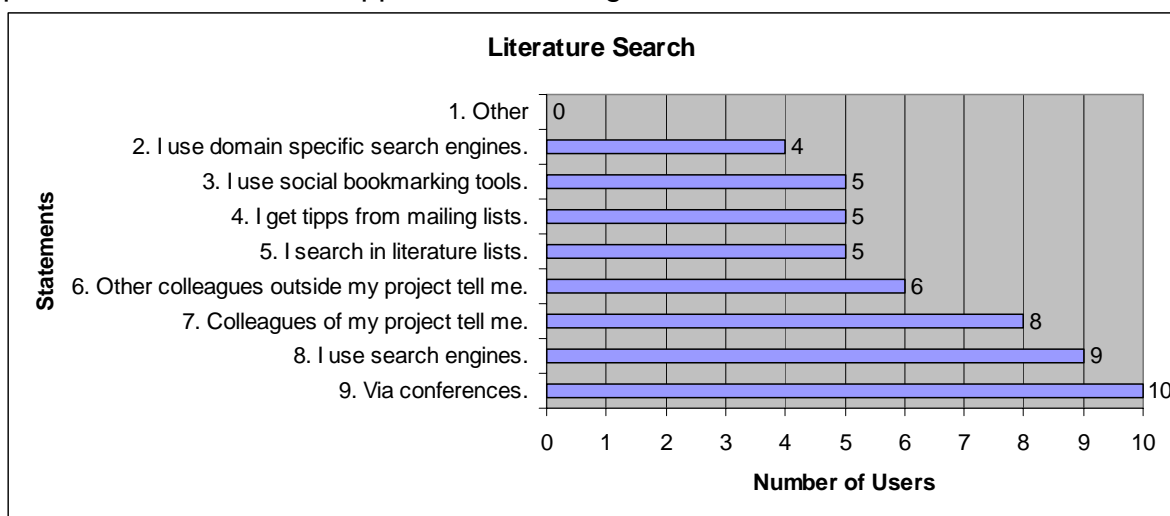


Figure 8: Literature Search and Reference Management

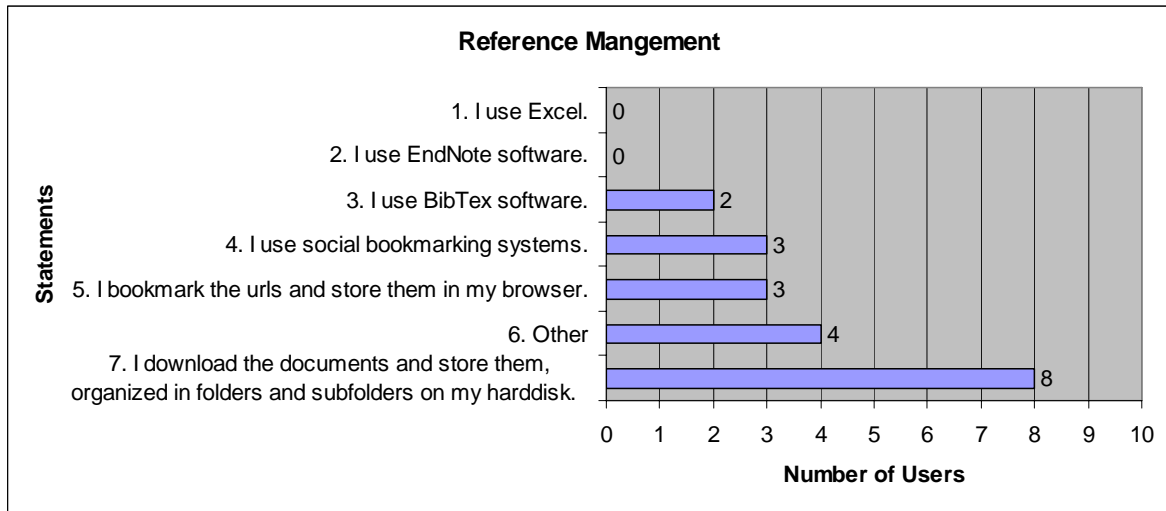


Figure 9: Reference Management Tools

Being asked to which extent they are influenced by others in their literature and document search, most participants agree or strongly agree with this statement (see figure 2, statement 1). They are interested in their colleague's literature findings (statement 4), but not all agree to read the colleague's comments added to literature (statement 2). In the contrary to the hypothesis that people prefer to keep their thoughts about literature in private, people do not mind sharing their literature classification (statement 3).

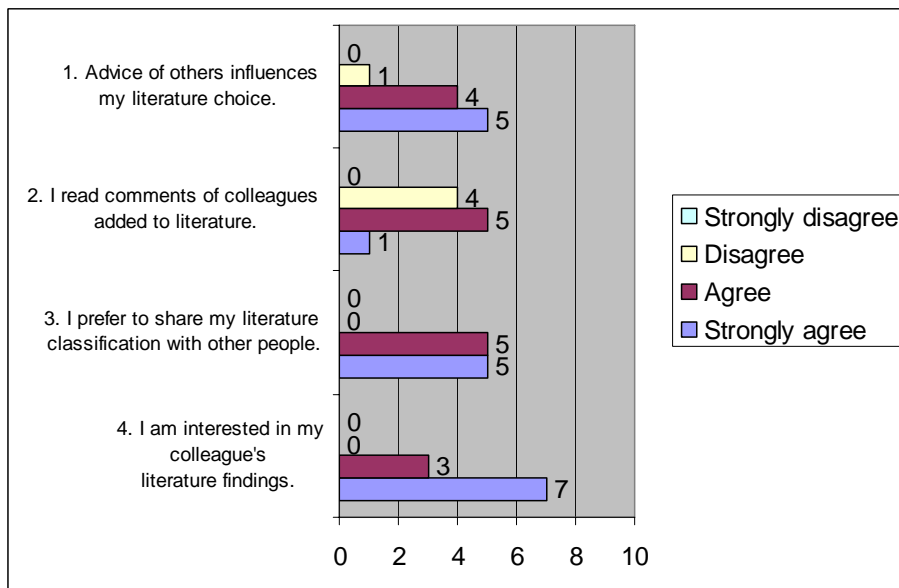


Figure 10: Collaboration in Nepomuk and ProLearn

#### 5.4.4.1.2 Usage and benefits of social bookmarking

Basic usage statistics can be seen in the following table:

Project	# Group Members	# Group Posts	# Group Bookmarks	# Group Publications	# Project Bookmarks	# Project Publications	# Group Tags
Nepomuk	28	6886	3355	3531			3631

<i>Project</i>	<i># Group Members</i>	<i># Group Posts</i>	<i># Group Bookmarks</i>	<i># Group Publications</i>	<i># Project Bookmarks</i>	<i># Project Publications</i>	<i># Group Tags</i>
					4	59	
<b>ProLearn</b>	2	395	4	391	4	391	77

Table 1: Usage Statistics

We distinguish two different group statistics: “*Group Bookmarks*” and “*Group Publications*” count all bookmarks and publications (whether or not they are directly related to the project) contributed by members of the ProLearn and Nepomuk group. “*Project bookmarks*” and “*Project Publications*” are those entries that represent the project itself (e.g. publications from project members).

Nepomuk is the more active project sharing both bookmarks and publications. ProLearn focuses on representing its publications, not being an active participant in collecting bookmarks or using publication reference features. This may be due to the fact that, within ProLearn, project related publications are reported in Excel sheets and are then entered into BibSonomy centrally by only few project coordinators, whereas in Nepomuk, reporting is done directly within BibSonomy by active project members. The ProLearn decision to organize the reporting centrally was probably influenced by the fact that the project had already started, and people were used to reporting in Excel sheets.

The fact that not all of the questionnaire's respondents actually use a social bookmarking system is also shown in figure 8, where only five respondents include social bookmarking tools in their literature search and only 3 use such a tool for reference management.

#### 5.4.4.1.3 Usability of BibSonomy

The usability of BibSonomy was explored in two ways: on the one hand, participants had to indicate to which extent they agree with different usability statements, on the other hand, participants were allowed to comment on features they liked/disliked in BibSonomy.

While people find it easy navigating through menus, the complexity of the system seems to be a major problem. Half of the participants state that new features are not easy to find, and that they do not believe learning all that the software can do.



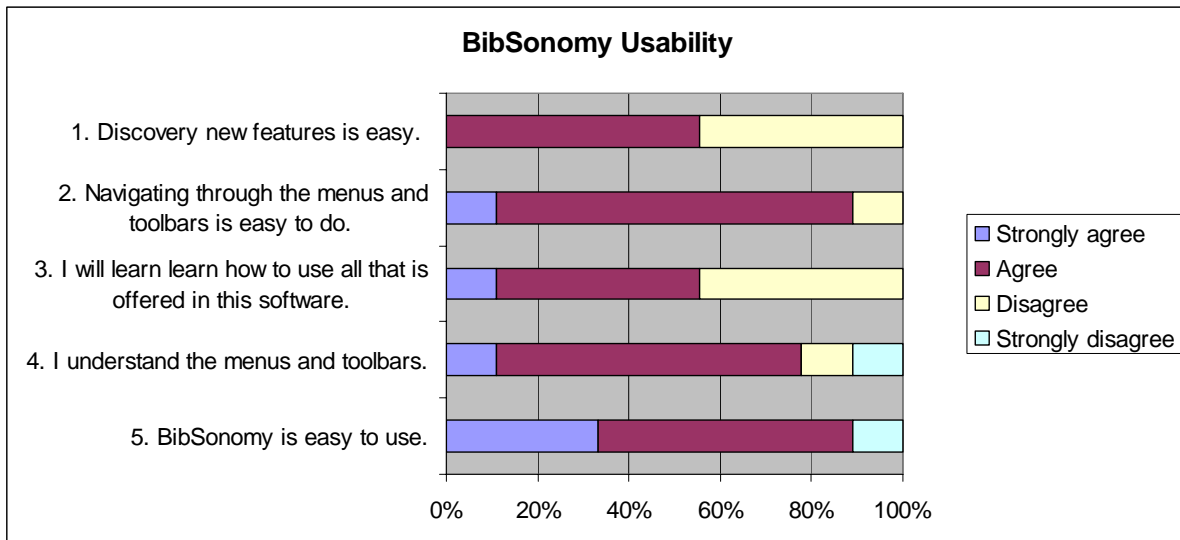


Figure 11: BibSonomy Usability

Answers given when asked to comment on what people disliked encourage the assumption that BibSonomy is perceived as being too complex.

What particular aspects of BibSonomy do you dislike?
<i>Too much information on pages; difficulties in finding information as a whole.</i>
<i>The menu bars are too crowded.</i>
<i>The usability of the interface.</i>
<i>Add FOAF support to enable me to connect to my friends without entering them!</i>

Table 2: Suggestions for improving BibSonomy

Positive acknowledge was given regarding the handling and extracting of BibTex entries for publication management. 80 % agreed that managing reference tasks is easy. The exporting and importing functionality as well as the extraction of BibTex from web pages was mentioned.

What particular aspects of BibSonomy do you like?
<i>that people help each other.</i>
<i>the idea, the gui looks ok. The URLs are REST, they look good.</i>
<i>exporting/importing bibtex</i>
<i>extraction of bibtex from web pages (acm...)</i>

#### 5.4.4.2 Results of the CKC Challenge

Eight people world-wide responded to the challenge. Out of the ten given questions we selected the most representative responses as a data source for our research questions.

##### 5.4.4.2.1 Experience and habits

To find out about people’s benefits, people could state if they would use the tool for regular activities.

Do you think you will use the tool in some of your regular activities? If yes, what for?
---

If no, is there something that tool developers can change to make it more likely that you will use the tool?	
1	yes for bookmarking.
2	<i>I already knew this tool and used it sometime. so...yes i think it is a great tool for storing paper i want to read but it needs a critical mass of users yet.</i>
3	<i>Yes, I think as a researcher, I really need an online storage (even if shared to some extent) of resources (link, publications). Moreover, the ability to export the references in various formats is quite nice, I can link my publication page to bibsonomy and update it dinamically and have it linked to others (related) collections automatically.</i>
4	<i>1. Yes I shall use together with Web research tools and other social bookmarking tools. 2. I use Firefox and i created a list of tabs with more 5 different social bookmarking tools. I use them for search. Other search is in blogs.</i>
5	<i>Possibly. It is easy to use and convenient. It will be useful for posting bookmarks online while away from home.</i>
6	<i>Yes, for storing my bibliography</i>
7	<i>No, I won't use Bibsonomy, but I will continue using Connotea, CiteULike, and Zotero with my EndNote.</i>

Figure 12: Value of a social bookmarking system

Most participants can think of using a social bookmarking tool in their daily work. Referring to BibSonomy, one mentions a missing critical mass as a criterion for not using this tool. One person prefers other existing systems. One suggests the combination of different bookmarking tools to improve information retrieval. Beside bookmarking features, most participants positively mention reference management features such as storing and creating bibliographies and exporting to different (formatting and reference) languages as a reason to use a social bookmarking tool.

#### 5.4.4.2.2 Collaboration

The group evaluated collaboration with others very differently. One participant entirely refuses social bookmarking as a collaborative knowledge creation tool in international environments: *“There was no ‘sonomy’ to the ‘bib’. Mob logic and mad conflation of languages and ideas are worse than ignorance and noise, they’re anti-knowledge.”* Other participants acknowledged the information sharing capabilities when being asked what they liked about the tool: *“the chance to have my own private personal space together with the opportunity to share the information I want with the community”*. *“I shall be glad to collaborate in future as I am collecting a lot of new information, analyzing it and using in different projects and eLearning.”* Two participants suggested improving the collaboration facility: *“Adding users to groups could be automated to shorten waiting time.”* *“A page showing my groups could be useful”*.

#### 5.4.4.2.3 Usability of BibSonomy

Several questions asked for specific information about the system BibSonomy considering usability aspects. The most representative questions and the corresponding feedback are given in table 4 and table 5. The frequent mentioning of relations comes from the fact that many participants of the challenge studied the tag hierarchy in detail to compare it with the ontology tools of the challenge.

What did you like about this tool?
------------------------------------

1	1)making relation between tags. 2)making group 3)bibtex 4)importing bookmarks fom del.icio.us 5)exporting bookmarks to xml and RDF 6)exporting bibtex to XML, RDF, HTML, ... . 7)"pick" ing in bibtex
2	the easiness for annotating web resources and publications. the chance to have my own private personal space together with the opportunity to share the information i want with the community
3	It allows to categorize both links and publications using social tagging in an homogeneous way. Plus, the way to provide relations is quite an appealing feature.
4	Very easy saving selected snippet and information source when using postBookmark, easy adding tags that can be selected and from recommended list. Very usefull feature - easy creation of tags binary relations.
5	The challenge page explained everything in a simple easy-to-understand manner. The "postBookmark" and "postPublication" buttons that you could bookmark was a very nice touch and made the whole process of adding bookmarks and posting publications very convenient.
6	Easiness of use, intuitive and simple interface
7	Provided utility like CiteULike, and provided import/export features for use in my EndNote.

**Table 4: CKC Challengers: what they liked**

<b>What do you think needs to be improved?</b>	
1	the mechanism for adding bookmark. like what is in del.icio.us if it has a firefox extension.
2	the automatic annotation of publications from different digital libraries (sometime it does not work) the difference between a tag and a concept is not clear in the tool when you insert a relation the name of the concepts have to be without spaces... if they are concept and not tags i think you should let a concept name composed by more than one word.
3	The presentation layer. The user is immediatly prompted with a list of resources, maybe a visual clustering with some criteria could help in improving the usability. It is not so clear the added features of having groups and friends (I couldn't use it extensively).
4	Relations editing. It's quite confusing to see all the relations listed with no structure.
5	I have tried about 10 social bookmarking tools and they all lack one feature - saving not only information source (URL) but a few snippets from the one information source. These snippets will have the same URL but different tags and different comments. As social bookmarking tools lack this feature I must use other tools, e.g. Web research tool <a href="http://www.macropool.com/en/index.html">http://www.macropool.com/en/index.html</a> (German tool) and Net Snippets (Israel) <a href="http://www.netsnippets.com">www.netsnippets.com</a> but in March 2007 they stopped and now they propose to use <a href="http://www.esnips.com/download/">http://www.esnips.com/download/</a> . Second, it would be useful to visualize tags cloud as a network that will be created using binary relations between tags. Third, to implement an advanced search (using Boolean operators). Fourth, to think about integration social bookmarking, Web research and ontology tools. Fifth, to think about using semantic tripples instead of simple tags.
6	Adding users to groups could be automated to shorten waiting time. You are notified in some way if something you posted was edited by another user.
7	Relations - engine for building tags hierarchy

**Table 5: CKC Challengers: what they disliked**

#### 5.4.4.3 Results of the Amsterdam Librarian Trial

The Library of the University of Amsterdam wanted to explore (dis-)advantages of social academic referencing tools. Statements and comments regarding the three research questions are selected from their final report [6]. Overall, the report indicates that there is a need for organising and sharing literature references and that

social bookmarking tools have the potential to fulfil this need. During the trial, the Amsterdam group switched to Cite-U-Like, another social publication sharing system, as it was perceived as being more user-friendly. Nevertheless, the trial participants also reported positive feedback and constructive suggestions to BibSonomy.

### 5.4.4.3.1 Experience and habits

One focus of the trial was to identify the value of such tools to the academic community. Two questions from this section give results for our first research question.

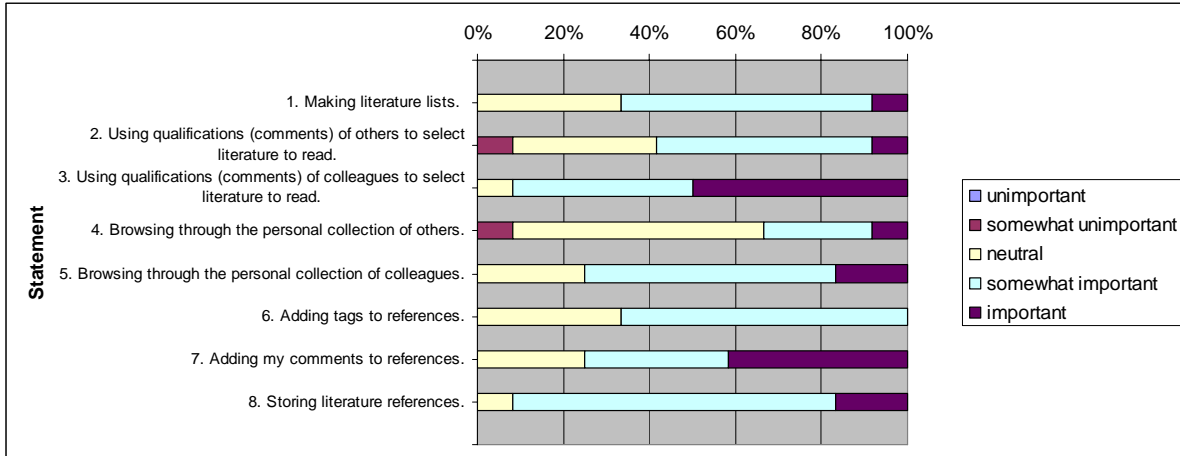


Figure 13: Expectations from the librarian trial

Most people value “storing literature references” and “using comments of colleagues for literature retrieval” as the most important features of social bookmarking tools (combining “somewhat important” and “important” marks). Considering only important features, colleague’s qualifications and the adding of comments to references is estimated most important. Some perceive collaboration of others as not important (statement 2 and 4 have a “somewhat unimportant” component), while none of the participants perceived advice from colleagues as unimportant (statement 3 and statement 5).

Figure 13 evaluates expectations of participants regarding the management of literature. Better management of literature references as such was perceived as important. Combining the important/somewhat important scale, participants mostly wish to improve collaboration with colleagues for a better retrieval of literature.

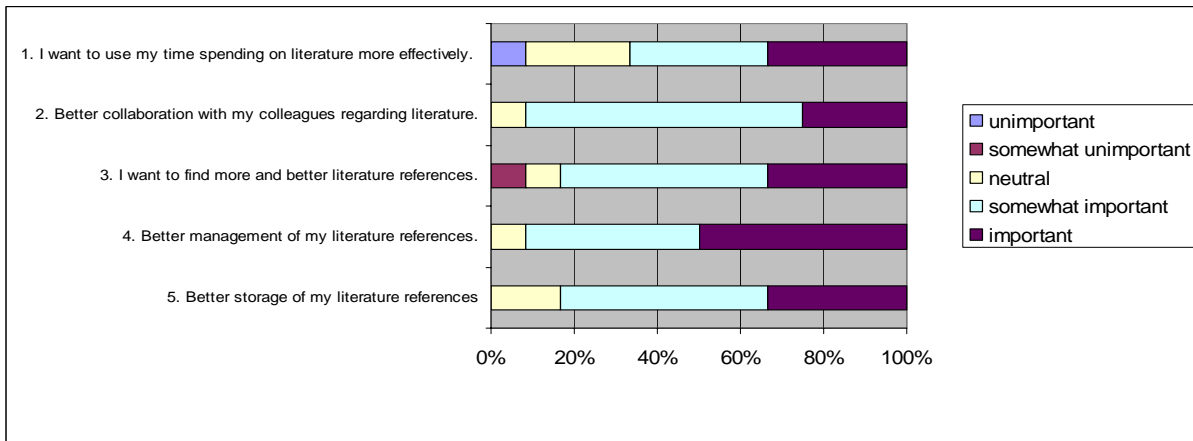


Figure 14: Social bookmarking value

#### 5.4.4.3.2 Collaboration

In an interview after the user trial, several respondents mentioned that the usage of such systems supports collaboration in an academic environment. *“I think it will also be very useful for our PhD students. I have advised my PhD students to use it. They have to read a lot of articles and in this way they preserve their reading better and make the results of their reading also accessible for the other members of the group.”* Another respondent selected BibSonomy as his social bookmarking system *“because the collaborative functionality was better developed”*. However, he states that he switched to Cite-U-Like since the latter appeared to be more user-friendly. The same respondent emphasized the importance of colleagues’ and external literature lists.

#### 5.4.4.3.3 Usability of BibSonomy

Usability aspects of BibSonomy were commented in the logbooks. One participant stated late response times: *“I really do hope that they will find a way to enter things more quickly, because this might get annoying fairly quickly.”* The interface was also commented: *“Not totally at easy with the interface, though”*. Another positively marked the ACM extraction capability: *“It is very easy to look up the reference list of an article in ACM. They try to make references into hyperlinks when possible. This results in a very fast process where you can look up an article, its references and add it to your literature list in very few clicks”*.

#### 5.4.5 Conclusion

This case study explored social bookmarking systems, especially BibSonomy, as collaborative knowledge creation tools in a scholarly, distributed environment. The specific characteristics of the unit of study, academics and research groups, led to specific expectations towards social reference sharing. These expectations were identified and together with benefits listed.

Four different groups were taken into consideration: two projects using BibSonomy as their reference management tool, academics from the University of Amsterdam and participants from the CKC challenge. While the first two groups were questioned from the authors of this study, the latter ones were external challenges exploring the value of social bookmarking and collaborative knowledge creation tools. The main data source consisted of online questionnaires which participants worldwide could fill out. The Amsterdam Librarian study also involved discussions and log files.

The results of the different cases lead to the following conclusions:

- Evaluating the experiences and expectations with social bookmarking tools.

Social bookmarking for information retrieval complements traditional methods such as using search engines or conferences. As the spread of information via colleagues (e.g. advice, comments, suggestions from the research group) plays an important role, the sharing and collaboration components in social bookmarking respond to the specific demands of the research community. However, a critical mass should be offered. This hypothesis is supported by a further experiment during the time of the case study: BibSonomy was introduced to a group of law students which did not accept the system due to the lack of law content available.

Traditional methods (or no methods at all) are still in favor when people describe their reference management techniques. However, the import/export facilities, the easiness to proceed with BibTex entries and manage one's publications were positively acknowledged – making literature management in the web an alternative for people not having a developed literature management method yet or for people who want to collaborate and share publication metadata but keep working with their tool in use, such as EndNote.

(2) Analyzing collaboration behavior

Researchers are aware of each other and their ideas. Several participants pointed out that they broaden their literature knowledge with the advice of others and that collaboration is the main motivation for using social bookmarking tools.

Feedback from ProLearn's and Nepomuk's usage of BibSonomy shows that the acceptance of social bookmarking as a collaboration component for distributed projects depends on the integration of the system into the project's reference management tasks and workflows. While Nepomuk uses BibSonomy not only to store references, but also integrates the publication management facility on the web site and allows people sharing project specific metadata information, the ProLearn decision to report publications centrally, does not motivate people to get to know the system and use it for their project related work.

(3) Finding out about BibSonomy's usability.

Offering literature management capabilities as well as bookmarking services, BibSonomy covers a broad range of services for the research community. Positively mentioned were the variety of features the system offers, and the facility to integrate it with other publication management tools. This also makes BibSonomy a tool for both, "expert" users, building hierarchical relations with tags, using multiple functionalities and being part of the semantic community and "mainstream" users looking for a simple system to manage and share information.

The different user perspectives within this community implicates two major further development paths:

Facilitate interaction with the system: a concise interface, clearly arranged navigation features and personalized result lists shown to individuals might be a first step to improve the system's usability and make it understandable to a broader range of users.

Improve specific features: integrate a relations editor and more structuring facilities within the tag cloud, facilitate the creation and maintenance of groups, improve search within the system.

Research is already under way to enhance BibSonomy: support for users to find new and particularly relevant content, new ways to provide better service for communities of practice and the development of semantics. In further studies we hope to deepen

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our knowledge of a researcher's search and publication management behavior to further enhance collaboration efforts in distributed environments.

## 6 Conclusions

Social Software applications gain increasingly importance in the corporate learning environment. According to some studies, 30% of organizations are already using or planning to use blogs and/or wikis at the moment (McKinsey 2007). Although we have noticed an increasing interest of companies in Web2.0 and Social Software on a global scale, a recent study from the Gartner Group gives a warning that European enterprises are about to miss this global trend and lag behind the implementation of Social Software (Computerwoche 11.07.2006).

The discussed case studies demonstrate that the Web 2.0 and social software represent a strong wave that has the potential to change in a substantial way our society, politics, and economy. The use of social software in corporate environments is still rather young and connected with a change in processes and working environment for the purpose of knowledge building and knowledge sharing and thus informal learning within distributed working environments.

Although all displayed case studies differ highly in application scenarios and first conclusions on impact, they demonstrate very high potential for the change of communication and collaboration processes. But as any other piece of software, the scenarios have also demonstrated that all the listed tools are only an instrument that can either support or hinder people in their collaboration, communication and social interaction and thus finally in their informal learning processes. It depends on the personal dispositions and attitude of the individual user towards the tool and the peers in how far the tool can support these processes. For some user the tools support a reflection process and are used as a sort of “reflection” or “learning” diary while for some others the dialogue and the fast feedback that one receives via the comments is most important. Others use the Social Software tools for storing, sharing and linking with others. Hence, one important finding of the case studies underpins the bottom up approach by outlining the high dependency of individuals, their motivation, attitude and personal dispositions with the output of very different and diverse usage scenarios in corporate environments.

Although social software emphasize the importance of each individual as single contributor the real value of these contributions lie in the communication and collaboration with others. A common finding of the case studies is the high potentiality of social software in supporting group communication, collaboration, knowledge sharing and social interaction for distributed working teams. First implementation evaluations show some positive results that shall lead towards a faster, more flexible, transparent and self-organised form of knowledge management and networking. Overall, social software creates – provided an ideal setting for the implementation is enabled - a new network of information resources that also relates to specific persons and contextualises the information in a new way. Two of the described case studies have demonstrated a growing number of specific topic related posts which indicate that employees better integrate weblogs into daily working practices than it has been the case with classical top-down knowledge management tools. In this respect a major finding of this report relates to the need of a critical mass of users and the integration within existing IT systems. Also a clear and



immediate (business) need supports the integration of Social Software. In addition these results raise the question on how corporate management can find structures to support bottom up knowledge management tools. Still, from all these very ambitious and successful implementations a key issue relates to the organizational culture. After all, if the behaviour induced by the use of social software (e.g. openness and information sharing) is in conflict with the organization culture, it might turn out to be a potential hindrance to a successful introduction and adoption of social software. In a similar way, the bottom-up emergent dynamics of social software necessitates that trust and control are delegated to the users. However, it must also be ensured that access to confidential and financial information is restricted in order to avoid concerns about misuse, abuse, and reliability. Ultimately, the key issue for companies is to understand if the employees' needs are covered by the Social Software solution and if the solution is in line with the organizational culture and the attitude of the employees.

Consequently, the different findings implicate that future research need to focus on different objectives.

The success of Social Software applications depend on the personal dispositions and attitude of individuals. Therefore major a research need is identified in the motivational dynamics of corporate Bloggers and Web2.0 users. The research towards the individual motivation could give clear indication on how to reach the necessary critical mass of users in order to implement successfully Social Software systems within companies.

Web2.0 applications foster a different way to communicate and collaborate than we have observed from LMS. Consequently companies supporting the (internal) knowledge exchange between employees with Social Software have to face a critical change. So far there has not been any evident research on how these changes influence business processes. Through the changed bottom up and networked communication structures communication processes are changed as well. Future research need to be directed towards strategies for corporate learning and working environments to effectively integrate Social Software solutions for very specific needs in different institutional cultures.

The findings of the case studies as well as the further research needs will drive the future work of WP 15. The final deliverable of WP15 will include additional conclusions and will contribute to a holistic picture of Social Software application in corporate environments.

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Appendix

## Appendix A: Questionnaire for Bibsonomy Study

5. In what age group are you?
  5. 19 and under
  6. 20-29
  7. 30-39
  8. 40-49
  9. 50-59
  10. 60+
- Please select your gender. (male/female)
- What is your main activity in the project?
  - Administrative Assistant
  - Professor
  - Researcher
  - Technical expert
  - Student
  - Ph.D. Student
  - Administrator
  - Manager
  - Other
- How do you find new literature?
  - I use domain specific search engines.
  - Colleagues of my project tell me.
  - Other colleagues outside my project tell me.
  - Via conferences.
  - I search in literature lists.
  - I use search engines.
  - I get tips from mailing lists.
  - I use social bookmarking tools.
  - Other
- Which methods do you have for storing and managing references?
  - I download the documents and store them, organized in folders and subfolders on my hard disk.
  - I use BibTeX software.
  - I use EndNote software.
  - I bookmark the URLs and store them in my browser.
  - I use social bookmarking systems.
  - I use Excel.
  - Other.
- Please indicate the extent to which you agree or disagree with the following statements.  
--> (Strongly agree, Agree, Disagree, Strongly Disagree)
  - I am interested in my colleague's literature findings.
  - I prefer not to share my literature classification with other people.
  - I spend a lot of time searching for literature alone.
  - I do not read comments of colleagues added to literature.
  - Advice of others influences my literature choice.

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- Do you use social bookmarking tools other than BibSonomy? (yes, no)
  
- How often did you carry out the following activities?  
--> (never, 1-10 times, more than 10 times)
  - Browsing through the collections of my colleagues.
  - Adding tags to references.
  - Adding comments to references.
  - Adding tags to bookmarks.
  - Exporting literature references with BibTeX.
  - Adding private comments to my postings.
  - Exporting with EndNote.
  - Copying entries from other colleagues.
  - Browsing the publication list of my project.
  - Exporting with RSS.
  - Looking up my references.
  - Creating literature lists for a publication.
  - Browsing the general tag cloud to find bookmarks.
  - Browsing my projects's tag cloud to find information.
  - Reading comments that others of the team made to a publication.
  - Using relations to better classify my tags.
  - Reading the blog to find out about news.
  - Reading the help pages to get more information.
  
- Please indicate the extend to which you agree or disagree with the following statements:  
--> (Strongly agree, Agree, Disagree, Strongly Disagree)
  - I found a certain literature reference of interest to me by browsing the reference of my colleagues.
  - We published a paper using BibSonomy for creating the reference list.
  - I never found interesting bookmarks by browsing the tag cloud.
  - Due to my personal classification I can refind my bookmarks quickly.
  - When I followed the link to other users sharing my entries I found people of similar interests.
  - I find the keywords in the tag cloud of my project appropriate for the classification of our literature.
  - I improved the metadata for my references by looking up other reference entries for the same publication.
  - When other people copy one of my bookmarks I am not encouraged to participate more.
  - I find the automatic extraction of references by scrapers not very convenient.
  
- Please indicate the extend to which you agree or disagree with the following statements:  
--> (Strongly agree, Agree, Disagree, Strongly Disagree)
  - BibSonomy is easy to use.
  - I understand of the menus and toolbars.
  - I will not be able to learn how to use all that is offered in this software.
  - Navigating through the menus and toolbars is easy to do.
  - I can easily navigate to the bookmarks I am searching for.
  - I often have to re-read the help pages to work with BibSonomy.
  - I do not mind that others can see my bookmarks.
  - This software is not flexible.

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- Finding the options that I want in the menus and toolbars is easy.
- I often use the private posting functionality.
- Discovering new features is easy.
- I get my reference managing tasks done easily.
- I am afraid that my personal information is being used by unknown people.