

Designing Social Navigation for a Virtual Community of Practice

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Abstract. Social navigation in a community of practice (CoP) is an approach of locating information through increased social awareness. Designing support for social navigation requires precise knowledge about the users' needs and wishes so as to meet user participatory design methodology. User requirement definition on social navigation is, however, difficult to elicit. On the one hand, without the context of the CoP, it is hard to collect the user requirements on navigation, especially when the concept of virtual community is new to the target user group. On the other hand, to set up such a virtual community, preliminary studies on social navigation is however necessary. This paper presents the experiences how we dealt with such a chicken and egg problem. Different approaches were used: performing a theoretical study, administering an online questionnaire, observing on an existing virtual society, analyzing similar systems, prototyping, and conducting an expert walk-through.

1 Introduction

In companies people meet during lunch and coffee breaks. They talk to each other thereby sharing their knowledge, experience and expertise. They are informally bound by what they do together and thus they form an implicit (*physical*) community of practice (CoP) [1]. The proliferation of advanced information and communication technology (ICT) and internet has enabled the emergence of *virtual* CoPs. Generally, in communities-no matter physical or virtual-people pay a lot of attention to the behavior of others when they navigate in the space. Social navigation is a way to navigate, mainly considering people, their actions, and the traces left by these actions. It helps not only to locate information quicker, but through the increased social awareness it is also motivating people to interact with and learn from each other, especially in distributed communities [1, 2].

Career switchers in Dutch primary and secondary schools are identified to form such a distributed community. Career switchers are new teachers, but not yet qualified. To become a credentialed teacher, career switchers have to follow a career switcher alternative route in a formal teacher licensure program (i.e., a career switcher program) at a teacher educational institution. Yet, most of the learning is done at the workplace requiring the school to take responsibility for organizing in-house support for the career switcher. There are not so many career switchers in each individual school, but they are spread all over the Netherlands.

An online virtual community can help them to form a society and to learn from each other. Hence, we started a project, aiming at such an online virtual community for these new teachers, believing that social navigation through increased social awareness would enhance their learning experience.

This paper presents the lessons learned from this project. Early in the project, a literature study made clear that the user requirements definition from this study alone is incomplete unless we put it in a bigger context such as actually using a CoP. After administering an online questionnaire on our target user group, we found that these users were not only unaware of the concept of social navigation but also of the concept of a CoP. It was difficult to collect the real needs from them. In order to find more requirements from the users' perspective, a similar user group from an ongoing virtual community was observed. This observation generated supplemental user requirements for both virtual space and social navigation. To get an idea about possible information structures and social navigation approaches, three other virtual community systems – wikis, blogs and newsgroups – were analyzed and compared. Specifically, a wiki-like system was mocked up and walked through by experts. The final user requirements combined the results from all these studies. At the end of this paper we present some parts of the final prototype, roughly to show how these requirements could be reflected and satisfied at the user interface level. The paper concludes with a discussion.

1.1 Communities of Practice

CoPs are informal learning environments and have already existed in workplace settings for centuries [1]. CoPs involve members who are geographically close to each other and share the same surroundings. The use of ICT and internet, however, has enabled the emergence of virtual CoPs. These virtual CoPs connect the geographically dispersed members who are participating in the same set of activities as members of physical CoPs but-at the same time-are taking advantage of the time-space independency by using asynchronous synchronous communication tools. In a CoP, management and participation are important.

Appropriate management can seed and nurture the communities of practice [3], by for example providing experts to support distributing quality information, and providing moderators to respond timely to participants-a quick response tells participants that there is always somebody care for them. Participation in most communities of practice is voluntary. Therefore it is essential to build up membership and trust [4]. There are two aspects influencing the participation:

1. *Individual Benefits.* A CoP thrives because participation has benefits to its members [2]. A CoP's life is determined by the value it provides [5].
2. *Social Aspects.* If the users perceive the CoP as a social space, they will be more motivated to participate. There are there main factors that may influence this perception. (a) Social awareness makes people feel that the space is alive and, hence, more inviting [6]. (b) Social interaction helps people to build trust and relationships among them and hence makes the virtual community more inviting to participate. (c) Social navigation may also help to locate information quicker and have a better overview of the space [7].

1.2 Social Navigation

Social navigation is the “navigation towards a cluster of people or navigation because other people have looked at something” [8]. Social navigation means that, when navigating, people are guided and informed by others and their actions. Social navigation is very common in real environments because people typically pay a lot of attention to the behavior of others and are influenced by their activities.

Social navigation can be *direct* or *indirect* [9]. In direct social navigation, people directly give advices and guide each other, synchronously or asynchronously. In indirect social navigation, people use navigation cues to be aware of other people’s actions or the traces of these actions.

Social navigation can also be *intended* or *unintended* [10]. In the physical world, an example of intended social navigation would be people explicitly recommend someone a place to visit, where an unintended example would be footprints on the snow that people might follow. In a virtual CoP, the system may support social navigation in many different ways, for example, by providing information of interaction history, making explicit recommendations, and supporting synchronous communication.

Social navigation depends very much on the information structure of the community [11]. A virtual CoP can be formed with different communication tools, such as bulletin boards, chat rooms, and email lists. These tools determines which social navigation approaches can be used. The activities that people are performing or have performed are the basic sources for indirect social navigation.

Based on these understandings, we could not simply peel social navigation from a certain virtual CoP. Instead, an integrated approach should be used and the social navigation requirements had to be defined in the context of a given virtual community. But first of all, we needed to have a closer look at our target user group.

2 Target User Group

In order to know our users better, we developed a questionnaire [12]. Since the users were spread all over the Netherlands and hard to reach, we launched the questionnaire online. Thirteen responded.

They were new teachers from Dutch primary and secondary schools and they wanted to make teaching a career. They aged between 20 and 35. Although they had required domain specific background, such as mathematics and physics, they were different from other teachers because they were not yet qualified. The reason of involve them in teaching was the shortage of teachers in the Netherlands. Most of them did not have any teaching experience.

They used computers about 2 hours a day at school or at home. They often used Microsoft Word for writing and Microsoft Outlook for emailing. Only few of them also had some experience with online forums and instant messaging. Their computer skills and the usage were found to be very limited. During the working days at the primary or secondary school, they consult other qualified

teachers. They had to go to training centers one or two days a week, where they exchanged information with other teachers and consulted their mentors. They also communicated with each other over the phone and sometimes using email.

In the questionnaire, we also provided a list of possible benefits that a virtual CoP might offer and let the participants decide whether these benefits were important. The following benefits were thought important by most of the participants: 1. providing efficient idea exchange; 2. providing high quality content; 3. helping for problem solving; 4. helping people do their jobs; 5. developing individual skills; 6. providing access to experts. The following items were considered less important by most of the participants: 1. motivating people to learn; 2. providing challenges and opportunities; 3. developing professional relationship.

The validity of user requirement gathered from the online survey was low. The main reason was that the target user group was new to the concept of the virtual CoP. It was found to be difficult for them to imagine something they had never experienced. We could hardly collect any requirements on social navigation either. We could, for instance, have let them practice an online system. However, most of them hesitated to try anything new due to their limited computer and internet knowledge. To compensate, we turned our eyes on an ongoing virtual CoP to observe and study an experienced yet similar user group.

3 Teacher Focus

Since our target user group was not experienced with the idea of virtual communities of practice, we decided to have a closer look at a similar user group of an ongoing online CoP called “Teacher Focus” (teacherfocus.com). They had similar profile not only because both were teachers, but Teacher Focus also tried to involve new teachers in a dedicated space. By November 20, 2005, they had 3897 registered users and 20774 posted articles. This enabled us to observe a much bigger group of users, on their behaviors and the content of the postings.

Forums were the major parts of the service, in which New Teacher’s Place was the most popular forum. The users of this forum have the similar user profile to our target users. The forum had the same goal with our future system – for new teachers to look for help and advices, and to share their teaching experiences.

We decided to analyze the users who posted to this forum during May 2002 and May 2003. The reason for choosing this period was that it was the most active period. Most of the users posted more than one post. The rate of reply (84%) during this period was higher than average (75%). There were 55 users posted 82 articles. 10% of the articles were posted by moderators and the administrator. 80% of the posts were questions. 84% of the posts had replies and there were 187 replies in total, in which 60% were replied by the moderators. 60% of the question posts got no reply. There were about 4000 views in total. During this one year period, 80% of users posted just once or twice, only 10% of the users posted more than ten times. In general, comparing to the average of all other forums, users in this forum were much more active, especially in asking questions and joining in discussions. Social navigation cues used were:

1. *Interaction history.* Thread lists showed the author of the original post, number of the replies and views, creation date of the first post, and the latest reply as well as the author of the latest reply.
2. *Intended social navigation.* In the forums, people posted questions to ask for help. Often, people redirected the discussion to another forum, thread or post with a link, which was a typical kind of intended but indirect social navigation.

Other observation results were: 1. Most of new teachers came to the forums for solving their problems and looking for help. Before any new teachers started to contribute, they had to be convinced that this was the right place to do so. So the further system should not start from an empty skeleton. 2. Experts and experienced teachers should stay in the community to provide well organized and useful information, solving problems and sharing practical experience, so that the new teachers could benefit more than only new teachers involved. 3. As the new teachers participated, they started to develop their own personal contacts with people in the virtual CoP. People tended to have private person to person conversations. Teacher focus did not provide private spaces for such person to person conversations. 4. The social navigation cues found in Teacher Focus should be kept for our purpose, such as number of the replies, number of the hits, the time and the author of the first and the last post. Intended social navigation should be encouraged in the future system. 5. People also would like to know and to follow what their friends were doing. A list of online friends and their current activities would have increased the feeling of social involvement.

Besides the observation, we also sent our online questionnaire to selected Teacher Focus users. 20 replies collected. Analysis showed they had indeed similar profile, however the selection of wanted benefits differed. The 3 excluded benefits by our target user group (see section 2) were included by Teacher Focus users. Our target users could not foresee these features without actually experiencing a virtual CoP such as the Teacher Focus users did, which explained why these important benefits were not “wanted” by our target user group.

4 Virtual CoP Systems

We investigated other three virtual CoPs:

Wikis. A wiki is a group of Web pages that allows users to add content, as on an Internet forum, but also permits others (often completely unrestricted) to edit the content; a wiki is to support collaborative writing and to open discussions. The original wiki has mainly two social navigation tools: one is “Recent Changes” which aggregates the most recently changed pages; another is “View other Revisions” which preserve the different versions of the pages. People can trace the history of the pages.

Blogs. A weblog, or simply a blog, is a web site which contains periodic, reverse chronologically ordered posts on a common web page. Two features which are

common to blogging are “blogrolls” and “commenting” or “feedback”. A blogroll is a list of other blogs, with which a blogger creates a context for his blog. This is a typical cue of intended social navigation. Blogs also often allows users to post their own comments on an article.

Newsgroups. A newsgroup is a repository for messages posted from many users at different locations. It is completely decentralized by categories, then interest groups, then a specific topic or subject area. Newsgroups can also be considered as the virtual place where people exchange ideas, discuss, communicate and even make friends [13]. A typical social navigation cue in newsgroups is the Frequently Asked Questions (FAQ).

Wikis provide information resources in a more collaborative and structured way. The open way of page creation and editing may also provide challenges and opportunities for the users to contribute. Newsgroups allow open discussions and the users often post their questions and ask for help. It has a larger coverage of the experts that are willing to answer these questions. Comparing to wikis, It is harder to find information in newsgroups. Reading a blog can also help to solve problems if the blog is about a particular topic, provided that people know where to find such a blog at the first place.

It seemed that there were more social navigation approaches in wikis and newsgroups than in blogs. The wikis appeared closer to what we wanted, providing with some additional features, for example, the commenting mechanism from the blogs and asynchronous communication from the newsgroups, would also make our target system richer.

5 Mockup and Feedback

Since wikis were closer to what we wanted, we decided to mock up a wiki, integrated with the user requirements found and the features we thought could be helpful. We presented this prototype to a committee for expert walk-through. The committee consisted of a educationist from the project owner, a professor from the field of communities of practice, and three trainers from teacher training centers. Most of them knew the target user group very well, so the feedback from them should be valuable for our target user group. Social navigation approaches included in the first prototype (Fig. 1) were : 1. Page rating: popularity of a page, including the traffic and the freshness. 2. Recent changes: a summery of recent changes on the content. 3. Online users: a list of online users with their information. 4. Who is with me: who else was reading the same page and their personal information if available. 5. My pages: a list of the pages that was created or edited by current user, with their popularity and freshness. 6. History: A list of different versions of the current page with version numbers, editors and their personal information if available. 7. Online chatting: users could chat with others in a public chatting room about the page that they are reading together, and start a private conversation in a separated private room.

This mockup prototype was walked through together with the committee. Feedbacks were for example: 1. Comments should be at multiple levels, associated

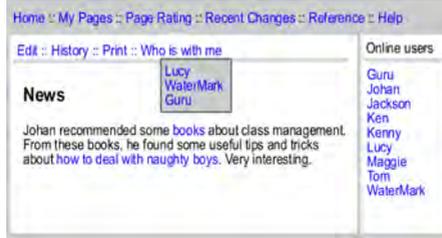


Fig. 1. “Who is with me” in a wiki mockup

with not only an article, but also a part of the article, for example a sentence or a paragraph. 2. “Who is with me” should be more direct. The users should be able to see who are on the same page immediately without any clicking. 3. Social navigation should not be only at the top level, but also in a local context. More social navigation cues should be available at the level of internal pages, such as users on the same page, experts good at the topic, and comments and questions about this page. The system should also show the users that were close, for example, the users who were in the same category, and the users who were reading a page that this page had a link to or was linked from.

We tried to collect more feedback from the expert walk-through by presenting improved versions according to the feedback from the previous round. This process was iterated for several round until the experts were satisfied.

6 Final Requirements

The final requirements contained 60 categorized items, including the benefits that should be provided by the CoP, the ways to achieve these benefits, the information structure of the content and the social navigation approaches. Detailed requirements are listed in [12]. Here we list few requirements on the information structure and social navigation. As the basic structure, the target system should include at least the following four components:

Pages. Pages are the basic components as those in wikis. People should be free to create and modify the pages and hence every page may have many versions. The content structure should be maintained by the users themselves.

Inline Comments. The system should support commenting in the lines of the internal pages, on an internal page as whole, or a part of the content. With inline comments the amount of the version history can be reduced to a minimum, otherwise the history version list might become too long to be useful.

Discussions. Discussions are comments on the content at the page level, but also engage the uses into asynchronous discussion. The discussion on a page should be organized into topics and replies as it is done in the newsgroups. This is also where a user can ask questions.

Chat Rooms. Every page should be associated with a chat room, where the users may join to talk about the page as the topic. There should also be rooms which are not associated, where the user may decide the topics.

Social navigation should be organized according to the activities around the basic structure components. Around pages, the social navigation cues can be the number of visits, recent changes, page ratings, “who is with me”, and the pages most of others visited before and after this page. Around inline comments, the cues can be recent commented pages and number of the comments. Around discussions, the cues can be recent discussed pages, numbers of topics, answered and unanswered question, and recent questions. Around chat rooms, the cues can be most active rooms, and numbers of the users in a chat room etc. The users often like to follow certain people with whom they share common concerns and interests. The contributions from these people could be more useful than those from others, and should be implemented as social navigation cues as well.

7 Final Prototype

In this section we show some parts of the final prototype and give some examples how the requirements can be satisfied at a user interface level. The social navigation approaches are mainly the history and read-wear information of a page. There are mainly two considerations when we decide which cues should be used: 1. Many kinds of read-wear information give different social navigation cues. These cues can be represented with small icons so that we can show as many as possible. However, too many icons in the text will decrease the readability. 2. Many social navigation cues can be shown as a list in a separated page or as a pull down menu. But as mentioned in the feedback from the expert walk-through, the social navigation cues should be available as direct as possible. These two considerations seem contradictory. We have to either trade the readability for the space to show more cues, or vice visa. We cannot overcome this problem unless we try to optimize the tradeoff – a typical challenge in design.

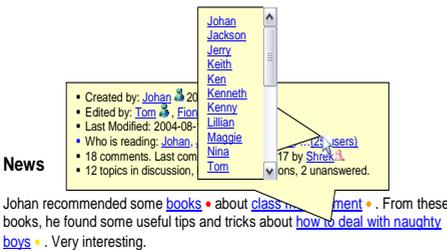
In a page, we decided to only present the local social cues that are most often used directly along with the links to the page. The rest of the cues about the linked page will be shown in callout windows. Callout windows are the windows that pop up when the mouse cursor hovers over the link. The same strategy will be used for the links in a callout window. That means extra social navigation cues will be available only when the user needs it. The use of “Hovering for a callout window” instead of “clicking for a popup window” requires less mouse clicks and hence less user effort for social navigation.

Most of the global social navigation cues require a list, often a long list, to present. Direct listing together with an internal page would squeeze the space for reading and editing. So we decide to use links or buttons for activating the lists. Briefs of global lists are shown whenever is possible and details can be available in callout windows when the user moves the cursor over a brief. Clicking on the brief activates the page showing relevant list with all details.

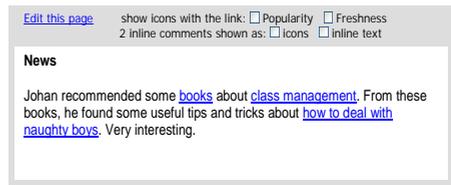
Social Navigation Cues Inside a Page. As said, in order to ensure the readability, we only want to show the icons of the most often used social cues inside a page for social navigation. We do not know yet which social cues are the most often used ones. This needs a design process to make the choice, or we may leave this to the users – they decide which cue icons should be shown along with links according to their personal preference. As an example, we assume that the popularity is a right choice. In fig. 2(a) different colored dots indicate the different level of popularity of the linked page. Red dots appear “hot” and indicate the very popular pages. The color turns orange, and then yellow when there is less traffic to the page. Once the mouse cursor is over the link, a callout window shows additional social cues. When the user moves the cursor away from the link the callout window disappears immediately.

Too many overlapped or nested callouts might also cause usability problems. We have to find proper tradeoff between the direct shown social cues and the callouts. We may leave this to the user; the user decides which ones should be shown inline with the page, to what extent they should be shown, or not to show them at all to gain maximum readability. In fig. 2(b), the user decides not to show any of the social cues and leave all of them to callout windows.

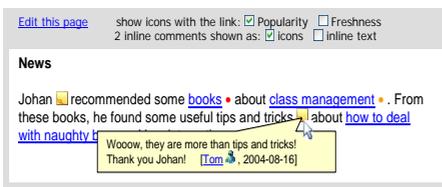
When there are any inline comments, the user may decide to show them as icons and use callout windows to show the details (fig. 2(c)), or to expand all the comments as in line text if the user does not mind readability (fig. 2(d)), or to show none of them. As we can see from these figures, there is always a tradeoff between the amount of the social navigation cues direct shown in the page and the readability of a page. This holds not only for the cues inside a page, but also for the cues of a page, and the global social navigation cues as well.



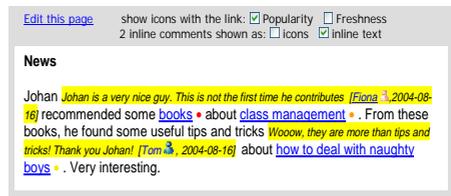
(a) Hovering for callout windows



(b) No inline social navigation cues



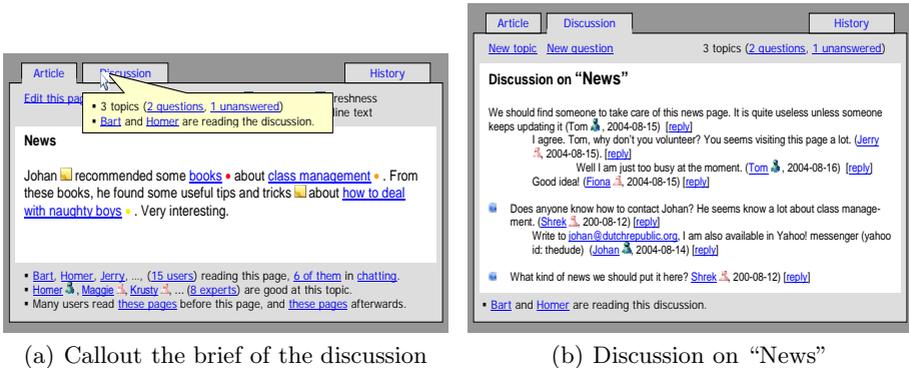
(c) Comments as icons



(d) Comments as inline text

Fig. 2. Social navigation cues in a page

Social Navigation Cues of a Page. From the data structure point of view, a page is an article associated with 3 other elements: the discussion on the article, the revision history and an online chat room. We may leave the online chatting function to another dedicated system, for example, an IRC (Internet Relay Chatting) service. We associate the page with a unique chat room from the service, for instance, “PageTitle@OurSystem.com”, so that we may leave out the complexity of the chatting service and only provide a link to this chat room in the page. Now that the chat room is left out, we only need to take care of the discussion and the history. We organize them into tabbed sub pages (fig. 3).



(a) Callout the brief of the discussion

(b) Discussion on “News”

Fig. 3. Social navigation cues of a page

We show the brief of the social navigation cues about the current page at the bottom. When the article is long and requires scrolling, we suggest keeping the brief always visible so that the social navigation cues can be reached at the first glance or within one click.

In fig. 3(a), a callout window shows the brief of the discussion. The user may click on the tab titles to enable the tabbed element. In fig. 3(b), the Discussion tab is enabled. The user may click on “New topic” to start a new thread, or on “New question” to start the new thread with a question. On the top it also shows a brief of the discussion: The number of topics, questions and those remain unanswered. At the bottom it shows the social navigation cues. There are not so many so we list all of them: Bart and Homer are reading this discussion.

As shown in fig. 3(b), the discussion is organized in a typical newsgroup manner: topics are sorted according to the date, and replies are nested into a tree like structure. The operations on the topics and replies are almost the same as those in the newsgroups. We expect this will bring some of the advantages from the newsgroups into our wiki-like design.

Global Social Navigation Cues. We show global social navigation cues on the top of every page together with other navigation tools (fig. 4). The designers may decide whether to put it on top or at the left or right side. But no matter



Fig. 4. Global social navigation cues

where to put them, there are always more navigation means than the global navigation panel can display. As many web designers do, we use nested popup menus and callout windows to save the space.

We need a line to show a short sentence about how many users are online. Moving the mouse over the number of the online users will pop up a callout window showing a list of all online users. When the cursor is over “these pages”, another callout window shows a list of the pages being read by the online users, sorted by the number of the users on each page.

When the cursor hovers over “Page Lists”, a menu pops up shows multiple ways of page listing. When the cursor is over “Questions”, we show a list of the unanswered questions collected from all the discussions in a callout window, sorted by the date. Again, there may be more questions than we can show in a callout window. To counter this problem, we may use a scroll bar, or list only part of them and present a link to all of them.

Although many requirements are covered in the prototype presented here, we do not try to present a complete design and cover all the user requirements, instead, we take some of them as examples. We did not cover other navigation means, for example, content structure based navigation – how to categorized the content, and how to present and navigate these categories.

8 Conclusion

The aim of the project was to define the user requirements of social navigation in a CoP. It was quite clear, but challenges appeared during the project: at the beginning, we did not have an idea what our target system – the CoP would look like. Without a given navigation space, there was no way to find out how to navigate it. The concept of virtual communities of practice was new to our target user group. Most of them did not have any experience with any kind of virtual communities of practice. It was hard for end users to imagine what they wanted and how they would like to do it in a never experienced virtual space, although everybody had social navigation experience in real environments.

We managed the challenges by introducing different approaches step by step, from theoretical studies, online questionnaires, observations on an existing virtual society, analysis on similar systems, to prototyping and expert walk-through. During this process, we always first looked at the CoP, and then tried to find out which social navigation approaches were available, and which ones could be used in our future system.

Currently these requirements together with the final prototype are taken into account for implementation. We are confident that the requirements and the design reflect enough the real user needs, in terms of social navigation for the new teachers to get into the world of virtual community of practice.

References

1. Wenger, E.: Communities of practice learning as a social system. *System Thinker* **9**(5) (1998)
2. Wenger, E., McDermott, R., Snyder, W.: *Cultivating Communities of Practice*. 1st edition edn. Harvard Business School Press (2002)
3. Wenger, E.: *Communities of practice: Learning, Meaning, and Identity*. Cambridge University Press (1998)
4. Kimble, C., Hildreth, P., Wright, P. In: *Communities of practice: Going Virtual*. Idea Group Inc. (2001) 220–234
5. Allen, S., Ure, D., Evans, S.: *Virtual Communities of Practice as Learning Networks*. Instructional Psychology and Technology Program, Brigham Young University (2003)
6. Dieberger, A., Dourish, P., Hook, K., Resnick, P., Wexelblat, A.: Social navigation: techniques for building more usable systems. *interactions* **7**(6) (2000) 36–45
7. Lonnqvist, P., Dieberger, A., Hook, K., Dahlback, N.: Usability studies of a socially enhanced web server. In: *CHI 2000 Workshop on Social Navigation*. (2000)
8. Dourish, P., Chalmers, M.: Running out of space: Models of information navigation. In Cockton, G., Draper, S.W., Weir, G.R.S., eds.: *People and computer IX, Proceedings of HCI'94*, Cambridge University Press (1994)
9. Dieberger, A., Hook, K., Svensson, M., Lonnqvist, P.: Social navigation research agenda. In: *CHI '01 extended abstracts on Human factors in computing systems*, ACM Press (2001) 107–108
10. Forsberg, M.: *A Collaborative Building for Pharmaceutical Use*. Master thesis, Linköping Institute of Technology (1998)
11. Robins, J.: Affording a place: the role of persistent structures in social navigation. *Information Research* **7**(3) (2002)
12. Xu, W.: Requirement definition of social navigation in a virtual community of practice. Thesis for professional doctorate in engineering, Eindhoven University of Technology (2004)
13. Roberts, T.: Are newsgroups virtual communities? In: *the SIGCHI conference on Human factors in computing systems*, ACM Press/Addison-Wesley Publishing Co. (1998) 360–367