Collaborative information behaviour:
a case study of two research groups

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SUMMARY

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The aim of the licentiate thesis is to examine researchers' information practices in research groups. The researchers were involved with study communication and media related issues within Social Sciences and Humanities Faculties. The theoretical framework of the study comprises the new holistic models of information seeking (for example: Meho and Tibbo, 2003; Seldén, 1999) and the collective aspects of information behaviour (Prekop, 2002 ; Talja, 2002; Talja and Hansen, 2006).

The research questions are: 1. How do scholars seek information in research groups? 2 What kind of collaborative information behaviour occurs in the research groups? The research data was gathered by interviews and observations. Three meetings of a research group at the University of Tampere were observed during the autumn of 2004. The group members and the group leader of the research group were interviewed in the spring of 2005. The research group members and the group leader of a research group at the University of Jyväskylä were interviewed in the autumn of 2005. Altogether, two research group leaders and eight researchers were interviewed.

The significance of the research group for information seeking is more important in close-knit research groups than in rather loose research groups. The significance of the research group for information seeking can be at least threefold. First, research group members can inform the group about relevant information resources and potential library or other information services. Second, the research group can to some extent compensate for the information seeking systems of libraries by distributing material and information resources. Third, information seeking can be carried out in collaboration in research groups.

The significance of the research group was found to be most important in informing about new information services and marketing library systems. Recommendations from colleagues were often needed to mobilize researchers into using new library services. The significance of colleagues in informing about library services is in line with earlier studies. The present study showed that sometimes information from colleagues was regarded as more important than information distributed directly by the local library.

A culture of information sharing, including mutual trust, seemed mainly to be reflected in collaboration and collaborative information seeking in the research groups studied. The timing of the onset of individual research seemed to be related to the information sharing culture and social networks in research groups. The simultaneous onset of the research work by group members seemed to promote the growth of unbiased collaboration, also in information seeking.

Keywords: Information seeking, Collaboration, Research groups, Libraries

Acknowledgements

1. INTRODUCTION

1.1 Background

During the more than ten years that I have worked as an information specialist in Nordicom in the Department of Journalism and Mass Communication at the University of Tampere, I have been interested in the information seeking behaviour of researchers. I have noticed that libraries and databases seem to play a relatively marginal role in researchers' information seeking. Of course, there is much variation. Some of the younger researchers seem to be aware of many new library services, while some researchers have a rather mechanical and narrow image of what libraries have to offer.

Information seeking practices of researchers is a well-studied area, but most information seeking studies have focused on "the information man", that is, on the individual as seeker and user of information (Talja, 2002). Attempts have been made to characterize academic information seekers by their properties or traits (for example: Heinström, 2002; Lönnqvist, 2003).

In the sociology of science, science is seen as a social system. Scientific collaboration and social networks are seen as an important part of the information environment in all disciplines. It can be argued that new electronic communication tools have made scientific work more and more social. (Forsman, 2005; Meadows, 1998, 37.)

"Researchers do not behave as information specialists wish them to behave", Forsman (2005, 36) characterized the situation. Researchers can build their own information collections and use them as their primary information resources. There may also be conceptual and terminological problems between researchers and library systems. Furthermore, information resources offered by libraries are often planned and collected without researchers having any possibility to influence the contents or the structure. Such reasons make researchers rely more on their personal connections and networks.

In general, the collective aspects of information behaviour have been little studied. Collaborative information seeking and use is a rather new approach under development in information studies. (Talja, 2002, 143-145.) Academic work often involves collaborative aspects that should be better understood in libraries and in information services. Research groups, previously most typically

found in natural sciences, have become more common in "softer" sciences, such as humanities and social sciences. Research group settings can give an appropriate context to the study of the information practices of researchers.

My aim in this study is to examine the information behaviour of researchers by focusing on the collective aspects of information behaviour. I want to know in what kind of information environment researchers, especially young researchers, live today and what kind of a relationship they have towards library services.

The potential readers of this research might be, in the first place, information specialists and librarians working in university libraries. My target is to write a thesis that is usable for the design of library services for doctoral students within humanities and social sciences. I hope that the thesis benefits from my long experience as an information specialist within journalism and mass communication.

One of the targets of my study is to develop my own professional practices and update my knowledge on information seeking. I also want to better understand what researchers think about information seeking in the era of electronic information, when information specialists actually meet the people to whom they offer services and information tools less frequently than before.

1.2 Research questions

My aim is to study researchers' information practices in the situation of a research group. The concept of situation is used here as defined by Sonnenwald (1999b; See, p. 12-13 in this study). The study is domain-specific in the sense that it concerns non-natural sciences. The researchers observed and interviewed for my thesis study communication and media related issues. The analytic framework of the study includes the following elements:

- the new, more holistic models of information seeking (for example: Meho and Tibbo, 2003; Seldén, 1999) and
- the collective aspects of information behaviour (Prekop, 2002 ; Talja, 2002; Talja and Hansen, 2006).

My research questions can be formulated like this:

 1.) How do scholars seek information in the situation of a research group?
 2.) What kind of collaborative information behaviour occurs in research groups?

My original motivation can be recognized in the first question: a deep interest in how researchers seek information, formally or informally. I also want to explore how libraries facilitate research carried out in the situation of a research group. What is the role of different information seeking tools and materials for researchers? Can research groups replace library services? The situation of a research group makes the study more focused. Individual information seeking may be touched on as well, but the main focus is on the role of a research group.

 The second question concentrates on collaborative information behaviour discovered in research groups. My hypothesis is that some collaboration and information sharing takes place, but I intend to explore how and to what extent. Here I also ask what factors seem to influence collaboration and information sharing. What promotes collaboration, and what restrains collaboration?

The aim of the research questions is to obtain information on how information specialists and librarians can better support information seeking and collaboration done in research groups. How can information services and libraries pay more attention to the fact that researchers work more and more in groups?

After the introduction including central concepts, the present research report continues with the theoretical section (chapter 2.) where collaboration and information seeking models are introduced. In the analytical framework (chapter 3.), I try to sum up the collaborative aspects of the different models. The research is based on qualitative analysis that is described together with the data in chapter 4. The results are introduced and discussed in chapter 5. In the last chapter I summarize the results and evaluate the present study. Finally, I try to give examples of potential future research objects.

1.3 Central concepts

My study belongs to the field of information studies, and more specifically to the field of information seeking research, although it also intersects with research on scientific communication.

Information could be argued to be the first concept that should be defined. Information is a difficult concept. For instance, Case (2002, 63) argues "in favour of treating information as a primitive concept that is so basic to human understanding that it does not require a tight definition". In the same book he, however, chooses the following definition of information: "Information is any difference that makes a difference" (ibid., 40). Originally, this definition was introduced by Gregory Bateson (1972, 453).

The difficulty of defining the basic concepts in information science is noticed by Vakkari (1997, 460). He argues that one of the striking features in many information studies is the use of central concepts without definitions. In his view this might imply that most of the research community takes the meaning of the basic concepts, such as information, as given. This sounds paradoxical because "most of the community agrees that their meaning is quite vague".

There are several additional assumptions that could be considered when talking about the concept of information. First, does information, in order to be information, have to reduce uncertainty about something? Second, utility: must information always be useful? Third, must information always take some physical form such as a book? Furthermore, it is possible to make assumptions connected to information as structure and information as process, as well as to the intentionality of information, and to the truth of information. (Case, 2002, 50.)

For this study, the preliminary definition of information is taken from Machlup (1983, 644) who says that information is acquired by transfer, while knowledge is more like a state. Thus, knowledge can be said to be information that has been sifted, organized, and understood by a human being.

Information behaviour consists of active information seeking, as well as unintentional or passive behaviours, such as encountering information accidentally. Information behaviour also includes purposive behaviours that do not involve seeking, such as active avoidance of information. (Case, 2002, 6-7.) Thus, information seeking can be defined as purposive activity, whereas information behaviour also includes passive information seeking and information exposure, as well as active information avoiding.

Information seeking is a broader concept than information retrieval, as described in the nested model of information behaviour by T. D. Wilson (1999). Originally, Wilson did not talk about information retrieval but 'information searching'. I chose to use the term 'information retrieval' in

accordance with Ingwersen and Järvelin (2006, 198). The central idea behind Wilson's model is that information retrieval is always found in the context of information seeking processes which, again, constitute one part of information behaviour processes.
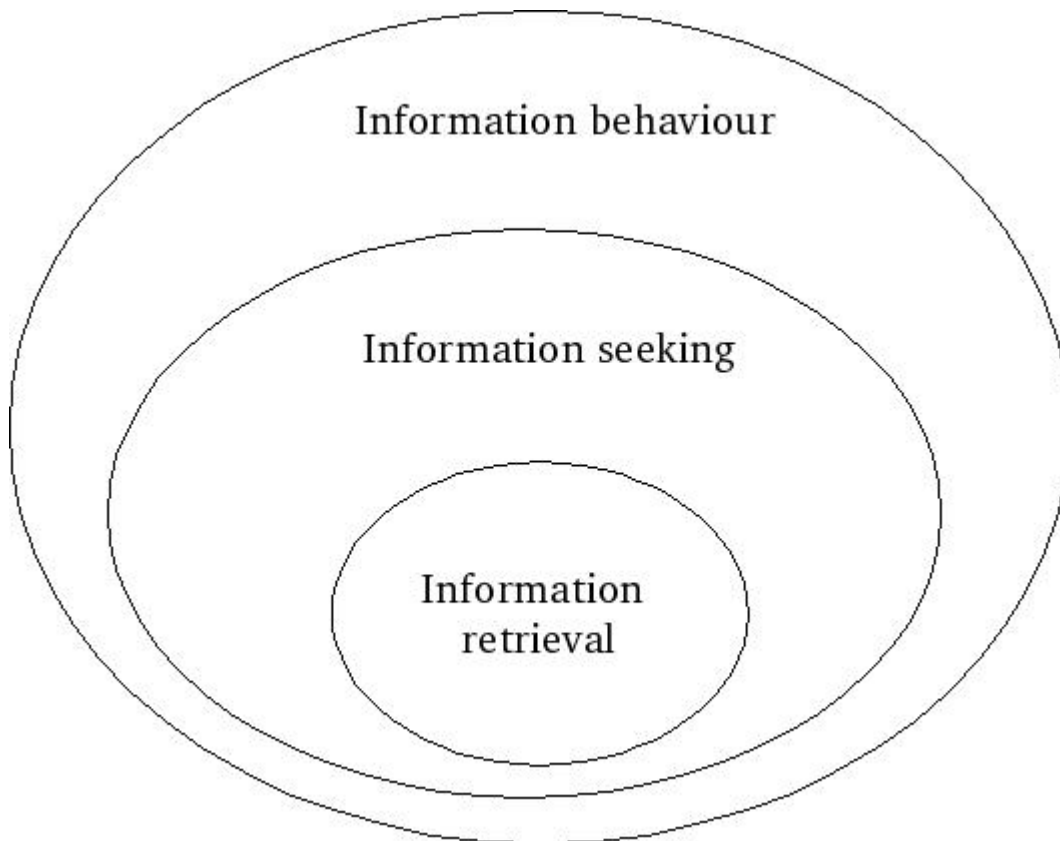
Figure 1. The nested model of information behaviour. (Ingwersen and Järvelin, 2005, 198 [adapted from T. D. Wilson 1999].)

The nested model of information behaviour (Figure 1) demonstrates the relationships between information retrieval, information seeking and information behaviour extremely well. My study is located within the large frames of information behaviour. Researchers do not only actively seek for information: they often find information accidentally, or sometimes even try to avoid it when too much information is available (Case, 2002, 75-76).

Hara et al. (2003, 953) studied collaboration in research settings, and they defined collaboration as "working together for a common goal and sharing of knowledge".

Collaboration and information behaviour can be combined into a concept of collaborative

information behaviour, or we can talk about collaborative information seeking if we need a narrower concept. Collaborative information behaviour, as described by Talja and Hansen (2006, 114), ranges from "sharing accidentally encountered information to collaborative query formulation, database searching, information filtering, interpretation, and synthesis." Collaborative information behaviour thus includes both ad hoc sharing of information and planned division of labour.

Some more concepts need to be examined as well. The concept of context (See Figure 2) is often used in information studies, but seldom defined. Sonnenwald (1999b, 178-179) suggests that context is "the circumstances in which a particular event or situation occurs". In her view, examples of contexts include working life, family, citizenship, university, or school.

Each of these contexts has boundaries and privileges as gained by participants. There must be some shared understanding about the context. Defining different contexts is a complicated task because contexts are not discrete. For example, a faculty member may also be a teacher and an administrator. An outsider cannot easily determine when a faculty member is acting in the context of teaching, or in the context of administration (ibid., 178-179).
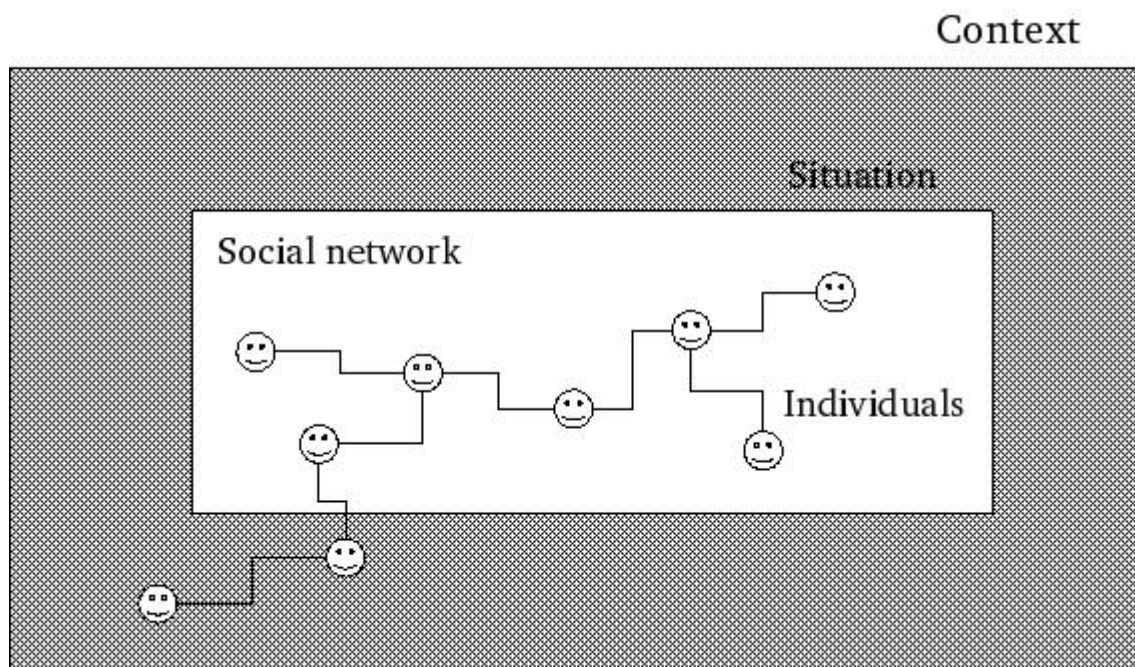
Figure 2. Context, situation and social networks. (Sonnenwald, 1999b.)

In my study the larger context is the university. The information behaviour that I studied occurs within the university context. Situations arise from contexts. Sonnenwald (ibid., 179-180) mentions two typical situations within the context of academic life: teaching a course and attending a meeting. I suggest that research group activities can also constitute a situation. I study collaborative information seeking that takes place in a research group situation. Sonnenwald (Figure 2) demonstrates well how individuals are located within a context and a situation. All the individuals can be located in the same context, but they do not, however, participate in the same situation, for example in a research group. Through social networks individuals can be connected to each other despite their different situations.

2. COLLABORATION AND INFORMATION SEEKING

2.1 Collaboration in research settings

Collaboration is a mounting trend in all research, even at universities and even in non-natural sciences, such as social sciences and humanities. As Finholt (2002, 73) noted: "The science is an inherently collaborative enterprise." This trend can be seen at least when measured in terms of the number of authors of articles and other publications. Collaboration is increasing, and that appears to be independent of discipline or research field. Multiple authorship has become more and more common also in non-natural sciences, as shown in an analysis of authorship in social sciences (Endersby, 1996).

In the world of scientific research, cooperation and collaboration have become much more common than individual research and investigation, as Cronin (2004) argued. This is mostly true for the natural and life sciences, but also for the social sciences, and even, to some extent, the humanities. Co-authorship is not the only sign of collaboration, Cronin noted, and added that not all forms of collaboration result in formal recognition. In an examination of the para-textual elements of scholarly publications, such as bibliographies and acknowledgements in particular, a far broader picture of collaboration could be discovered.

2.1.1 Collaboratories

The Internet has created new possibilities for collaboration and communication between scientists. An example of an Internet-mediated facility is a collaboratory, a laboratory without walls. The term 'collaboratory' is a hybrid of collaborate and laboratory. In scientific collaboration, physical proximity has had a direct effect on the quality and frequency of collaboration. Collaboratories are virtual places, where researchers can perform their research without regard to physical location, "interacting with colleagues, accessing instrumentation, sharing data and computational resources, accessing information in digital libraries" (Finholt, 2002, 77). A collaboratory is more than a group-ware programme. The collaboratory concept includes the use of distributed, media-rich networks to link people to people, people to facilities, and people to information (ibid., 73-80).

Collaboratory projects used to suffer from low participation. For instance, Worm Community System (1990-1996) was a disappointment according to Finholt (ibid., 82-83). A key factor in the non-use in this case might have been that the target audience of biologists had to master a relatively complex system installation within alien computing environments (such as Unix), when most of them were Macintosh users.

There also appears to be a general view that all kinds of computer-supported groupware systems often fail to improve information sharing and decision-making in groups. Social factors may play an important role in these failures, as Choo et al. (2000, 92-93) noticed. For instance, a groupware may require some people to do additional work for others, and they may not be the ones who derive the most benefit from the use of the groupware. The groupware programmes may also have been considered as a threat to existing social structures. The most recent studies adopt a more hopeful view on the success of groupware programmes because people are becoming more and more sophisticated users of ICT, and groupware technologies have become easier to maintain and use (Wittenbaum et al., 2004, 294-295).

The Upper Atmospheric Research Collaboratory (1992-1999) was a better experience: the collaboratory provided real-time control over remote instruments for space physicists. UARC was intended to support communication between geographically distributed colleagues and also to provide access to archived data (Finholt, 2002, 84-85). The key finding of the study was that the collaboratory expanded the pool of participants in data gathering sessions, as compared with traditional sessions, although the additional participants tended to remain relatively passive. This meant that more participants had an opportunity to watch and collaborate for educational purposes, in much the same way novice workers were doing in 'communities of practice' in shared physical settings, as Lave and Wenger (1991) have described.

While novice scientists were given more opportunities to learn and experience social networks, for senior scientists collaboratories sometimes offered more effort than benefit. There was one case in particular when sessions became places for newcomers to bombard the senior researchers with questions and demands. There was even some fear that collaboratories might become a home for scientists who are marginalized in their more traditional scientific communities. (Finholt, 2002, 99-100.)

Finholt (ibid., 94) summarised the lessons drawn so far from collaboratories: they have changed the number and type of participants in scientific work. Sometimes the use of collaboratory tools reduced the time required to carry out a certain procedure, instrumentation was also often used more effectively. However, it was less evident whether collaboratories had qualitatively changed scientific work.

Because the collaboratories examined in Finholt's review were all in natural sciences, their results cannot directly be applied to social sciences and humanities. A real-time use of instrumentation is not a relevant issue in most social sciences. However, some results may be relevant to academic research in general. Finholt found that in the virtual context, scientists must be more explicit about information that is normally tacit, when scientists are co-located. This means more work, particularly for the leaders of the collaboratories.. For some tasks co-location is still essential: face-to-face contact is most critical in starting a scientific relationship. Success seems to require a positive orientation towards collaboration, but a key factor is also the presence of sufficient technology infrastructure, and the availability of local technology expertise. However, the use of collaboratories will augment, not replace, proximity as a tool for scientific collaboration. (Finholt, 2002, 96-97, 99.)

2.1.2 Multi-disciplinary collaboration

Hara et al. (2003, 952-965) reported on a research project concerning collaboration among a group of scientists, who were members of a newly formed distributed, multi-disciplinary academic research centre which was organized into multi-disciplinary research groups. Each group had from 14 to 34 members, including faculty, postdoctoral research fellows, and students. The data for this project included interviews with some members of the centre, observations of videoconferences and meetings, and a socio-metric survey.

"Scientific research is not purely rational, but is influenced by social factors", which requires a demand to "explore the social dimension of scientific work in order to identify factors, that facilitate or impede collaboration", Hara et al. (2003, 952) argued. They defined collaboration as "working together for a common goal and sharing of knowledge" (ibid., 953), and that
> "collaboration is neither easily achieved nor guaranteed to succeed even though the nature of
> scientific work requires working together for a common goal and sharing of knowledge.

Sharing knowledge, resources and responsibility involves building social capital and taking risks and trusting others, which can be difficult to do when careers, reputations or other valued assets are at stake."

Sonnenwald (1995) introduced the concept of 'contested collaboration' to characterize the complexity of collaboration. The concept was also useful in the project of Hara et al.:

"Different patterns of work activities, expectations, personal beliefs, specialized language and individual goals make it difficult for participants to collaborate. -- These differences can cause team members to contest or challenge one another's contributions, although they may also enrich collaboration" (Hara et al., 2003, 953).

Sonnenwald's (1995, 872) concept of 'contested collaboration' was developed for describing inter-group communication in information system design. Participants in information system design had to work together despite their personal views, goals and ambitions. A promotion might be a designer's personal goal, but the success of a common project can bring fame to the whole group, not only to a single designer.

The same kind of patterns consisting of unique work experiences, personal beliefs and individual goals occur in academic settings as well. The situation of younger researchers may be very similar to that of Sonnenwald's system designers: researchers are supposed to collaborate in research groups, but at the same time they are compelled to compete with each other for scholarships.

Byrne (2001) explored collaboration and knowledge sharing in private companies associated with the so-called new deal of employment. In his view, companies increasingly like to describe themselves as knowledge companies, while employees are encouraged by the new deal culture to hold back their specialist knowledge and thus retain their employability value. Byrne argues that employees are likely to be more loyal to themselves than to the firm they are working for. (Byrne, 2001, 44-50.)

The circumstances described by Byrne resemble that of contested collaboration. What is valid in private companies might not be entirely valid at universities. However, among younger university researchers there exists a culture, which is to some extent similar to that of the new deal. It consists of long working hours, added responsibility, a broader range of skills, and tolerance of change and ambiguity described as features of the new deal (ibid., 47). On the other hand, universities offer

researchers neither as high a salary as private companies do (the new deal), nor security of employment (the old deal). At universities, researchers are also used to information sharing in the form of conference papers, lectures, and published articles. Academic information culture is more open than information culture in private companies.

Sonnenwald (1995, 872 discussed unique 'life-worlds' or domains or perspectives. 'Life-world' as used here is a term meaning "reality that is lived, experienced, endured". Participants had to explore each other's life-worlds and specialized knowledge so that they could work together. This might diminish contest in the work process.

The research of Hara et al. (2003, 955) focused on a multi-disciplinary research centre located at four universities. The centre had developed web-pages that provided information about the staff and the centre's goals, objectives and the organizational structure. The web-pages also provided links to related research. E-mail lists had been created to make it easy to send an e-mail to everyone in the centre. The directors of the centre enthusiastically encouraged collaboration among centre members. One of the results of Hara et al. (ibid., 957) was that for students and postdoctoral researchers collaboration with scientists is one indication of acceptance, and in this sense a rite of passage. Undergraduate students and new graduate students were seldom viewed as potential collaborators and had a limited exposure and participation in collaborative research. Students and even postdoctoral researchers worked for scientists, but not with them, Hara et al. noticed.

This process of gradually learning how to become a scientist can be explained in terms of 'the communities of practice' concept. Lave and Wenger (1991) originally created the term to describe work communities. Those, who are new to a profession, learn their ways by participating in the activities of a professional community. They gradually learn how to become full members of the community. The first and second year graduate students are novices in the community of scientists. These new researchers learn their profession through exercises, observations and conversations with senior researchers and their advisors. (Hara et al, 2003, 957.)

For postdoctoral researchers collaboration was more established, but they still had much to learn to become full members of the scientific community by attending scientific conferences, having discussions with senior researchers and supervising undergraduate students (ibid., 957-958).

Two kinds of collaboration occurred among graduate students and their advisors: collaboration with students and collaboration through students. Collaboration with students included advising, mentoring and providing information. This kind of collaboration means that "your paper is signed by two, three people", as one of the informants characterized the situation. Collaboration through students becomes possible with the student who bridges the work of two professors or other senior researchers. (ibid., 958.)

Interestingly, both Finholt and Hara et al. argue in favour of differences in collaboration for senior and novice researchers. However, both of them seem to emphasise that collaboration and establishing of social networks are extremely important for young researchers at the beginning of their careers.

The typology of collaboration created originally by Sonnenwald (1999a), later adapted by Hara et al. (2003, 958; Figure 3), views how collaboration is a continuum from complementary collaboration to integrative collaboration. In the case of complementary collaboration, some kind of division of a project occurs. When collaboration can be characterized as integrative, a fully integrated and shared project takes place.
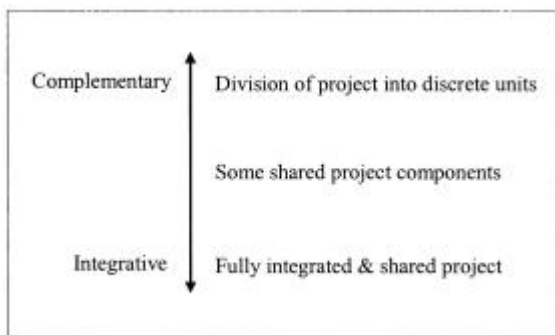
Wiley Periodicals, Inc.

Figure 3. Typology of collaboration. (Hara et al., 2003, 958 [adapted from Sonnenwald, 1999a].)

Much of the collaboration Hara et al. (ibid., 959) found fell into the category of complementary collaboration. Researchers could work on the same project, but they did not work closely with each other. Each researcher was responsible for his or her part of the research.

Complementary collaboration can also be sequential, in which case a researcher can continue only after receiving certain data from a co-researcher. Integrative collaboration requires individuals to

work closely together all through the project in order to develop ideas and challenge each other's ideas, while respecting and trusting each other on both a personal and professional level. (ibid., 959.)

What makes collaboration successful? Hara et al. (ibid., 959-963) found several factors, of which compatibility was one of the most important. Complementary collaboration required personal compatibility with respect to work style, writing style, and work priority. Fully integrative collaboration required even more: compatibility in approach to science and compatibility of personality. This often included personal friendship and trust that comes with friendship.

Passive collaboration could occur as well, i.e. willingness to help and waiting to be asked for help. Physical closeness belonged, in particular, to integrative collaboration: ”Our offices were next to each other... we worked very closely, ... we have grown as scientists together”, one faculty member described a co-researcher. In this case the following aspects were included as well: complementary expertise, appreciation of each other's work, access, accompanied by personal friendship. The metaphor ”collaboration is like a marriage” was used by several informants. The metaphor includes trust, good communication, friendship, and mutual effort. (ibid., 960-961.)

The factor of work connections included work interests and work expertise. Complementary expertise could be successfully connected to common interests: “a very good match of interests” resulted in good collaboration. One researcher could provide a learning experience for the other. Credit was not a problem with different expertises when it was clear to readers how the research tasks were divided. (ibid., 961-962.)

The factor of incentives influenced as well: external incentives, such as funding, prestige and publications, were more often connected to complimentary collaboration, while internal incentives, such as personal motivation and personal growth, were generally connected to integrative collaboration. (ibid., 962.)

Socio-technical infrastructure was the last factor found. Integrative collaboration meant unlimited access to collaborators. Geographical proximity has traditionally facilitated awareness of each other's research. Communication tools, such as videoconferences, e-mail and telephone, may help to compensate for the lack of physical proximity. (ibid., 963.)

Hara et al. (ibid., 963-964; See Figure 4.) suggested that there is an interaction between these factors and types of collaboration. In some cases the factors facilitate collaboration, in other cases they act as barriers. Hara et al. recommended further studies, because collaboration and the use of technologies differ in different disciplines.
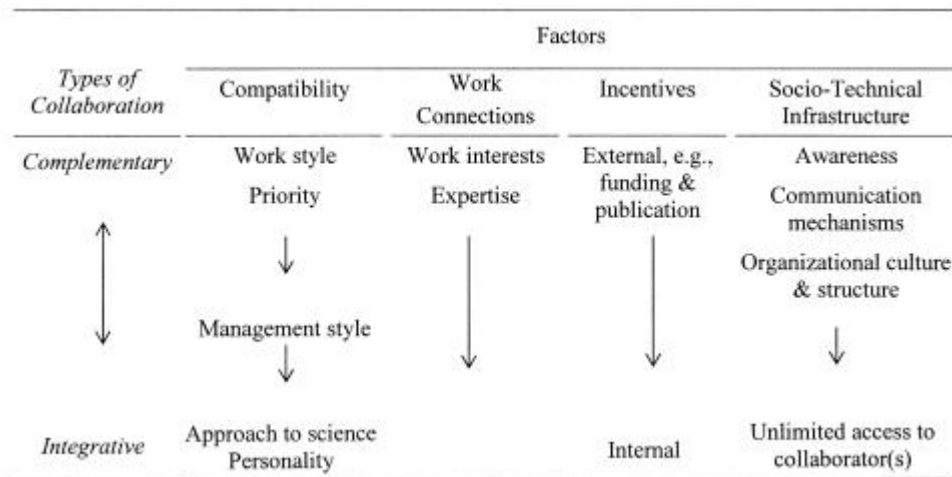
Figure 4. Factors influencing the different types of collaboration. (Hara et al., 2003, 959.)

2.1.3   Summary of collaboration research in academic settings

All in all, collaboration has been studied mostly in natural sciences. Hence, the examples provided by Finholt and Hara et al. are not exceptions. It is also important to keep in mind that collaboration is a far broader concept than information seeking or information behaviour. The aim of this study is to only consider collaborative information behaviour, not all kinds of scientific collaboration.

However, the studies of Finholt and Hara et al. have some very useful approaches. One of them is the typology developed by Hara et al. that shows how collaboration is a continuum from complementary collaboration to integrative collaboration. Factors influencing collaboration, such as compatibility, incentives, and socio-technical infrastructure, can also be applied to this study.

Sonnenwald's concept of 'contested collaboration' is also useful for academic settings where contest occurs especially between younger researchers. Contest might be one of the barriers to successful collaboration.

2.2 Information seeking research

Case (2002, xv) estimated in 2001 that information behaviour literature consisted of more than ten thousand titles. Of course, the figure covered all kinds of research from information needs to information use and information avoiding, as well as literature from many academic disciplines.

Investigations into scientists' and engineers' information seeking dominated until the mid-1980s. Since then information seeking researchers have moved to less studied groups, such as social scientists, humanists, and others, as well as to non-occupational information seeking. One trend has been "a move away from quantitative measures of large numbers of scientists and toward more naturalistic observations of information seeking behaviours." (Case, 2002, 234.)

The study of occupational information seeking has produced several models that describe the stages of information seeking. The contextual, dynamic nature of information seeking has been emphasised in the models produced during the past twenty years. The latest models represent a potential shift from linear stage models to cyclical process models. (Lindström, 2005, 2.)

Three of the models are examined here more closely: Ellis (1989; 1993) studied social scientists, Meho and Tibbo (2003) revised Ellis's model and Foster (2004) studied interdisciplinary researchers. Additionally, Seldén's (1999) study on scholars' information seeking skills and social capital is looked at.

2.2.1 Ellis's model of the information seeking patterns of social scientists

In the 1980s Ellis considered that it was necessary to obtain "micro-level information about the activities and perceptions of the academic social scientists." He decided to interview social scientists at the University of Sheffield in the United Kingdom. His sample of 48 scholars consisted

of psychologists, educationalists, economists, sociologists, historians, geographers and political scientists. Ellis used informal semi-structured interviews. (Ellis, 1989, 172-174.)

The huge amount of data was analysed using a grounded theory approach. In the end, six major categories seemed to cover the characteristics of the information seeking patterns satisfactorily: 1.) starting, 2.) chaining, 3.) browsing, 4.) differentiating, 5.) monitoring, and 6.) extracting. (ibid., 174.)

1.) Starting referred to the activities of the information seekers meeting a non-familiar research topic or area. Information seekers tried to identify a key paper to start with or seek out people who know something about the area. Reviews and review articles were heavily used at this stage, because they provide a context for understanding phenomena under examination. Libraries, library catalogues, bibliographies and databases were consulted as well. Students or novice researchers could often be particularly dependent on supervisors et al., when starting new research. (ibid., 179-181.)

2.) Chaining could take two forms: backward chaining or forward chaining. Backward chaining meant following up references cited in the publication consulted. Forward chaining meant identifying citations to the publication consulted. Forward chaining required the use of citation databases and skills to use them. Backward chaining was a typical feature of social scientists, and some of them mentioned it as their principal way of gathering material. (ibid., 182-184.)

3.) Browsing was defined as semi-directed or semi-structured searching: scanning recently published journals or tables of contents publications, examining book acquisition lists of libraries or publishers' advertisements, and sometimes even browsing along the shelves in libraries or in bookstores. Browsing served the purpose of familiarising a researcher with the sources available. Sometimes browsing was related to differentiation when a researcher tried to identify the differences between the sources. Differentiation was, however, characterized as a separate feature of information seeking. (ibid., 187-188.)

4.) Differentiating belonged to a researcher's tacit knowledge. When a researcher was familiar with the research area, he or she was able to discriminate between sources. This filtering of material has become more and more relevant in the era of information overflow. The criteria which seemed to be most significant for differentiating were: the topic of study, the approach or perspective chosen, and

the quality, level or type of treatment. The most obvious form of differentiating was, of course, the topic, but differences between various approaches or paradigms were meaningful as well. The perceived quality or prestige of journals made a difference. In most disciplines there seemed to be well-defined author and journal hierarchies. The level of the treatment of the topic was a criterion: the material might be inappropriate because it was too general or too technical. (ibid., 190-192.)

5.) Monitoring developments in a field of study and keeping up-to-date was an important part of the information seeking activities of many researchers, Ellis (ibid., 194) discovered. The principal ways of monitoring were through informal contacts, but also through journals and through different catalogues or research directories. Ellis (ibid., 195) also mentioned some kind of alerting systems used by some social scientists.

6.) Extracting referred to the activity of "going through a particular source selectively identifying relevant material from that source" (ibid., 198). The source might be a journal article or a journal issue or conference proceedings or other key source. The identification of a useful information source was a crucial point of information seeking. There was a close relationship between monitoring and extracting. Monitoring could be complemented by extracting.

Later Ellis, when he studied the information seeking patterns of physicists and chemists, added two more features to the features of information seeking: 7.) verifying and 8.) ending. Verifying referred to checking the accuracy of information. Ending may be defined as tying up loose ends through a final search. Verifying was mentioned by a majority of chemists, while ending seemed to be a fairly minor category. All in all, this study revealed a surprising degree of similarity between the information seeking patterns of physicists, chemists, and social scientists. (Ellis, Cox and Hall, 1993, 358, 364-366.)

Wilson (1999, 254-255; See also Figure 5 on the next page.) suggested that, although information patterns characterized by Ellis did not necessarily follow in a specific sequence, some features were more dependent on each other than others. According to Wilson, "extracting is not an information behaviour of the same kind as browsing, or chaining, or monitoring, -- and that differentiating is also a different kind of behaviour." Wilson characterized the features as follows: browsing, chaining, and monitoring were search procedures, while differentiating was a filtering process, and extracting was an action performed on the information sources. Thus, according to Wilson, there were possibilities to a cyclical process of information seeking in the beginning of information

seeking behaviour, but some features like differentiating, extracting, verifying, and ending must follow in a specific sequence.
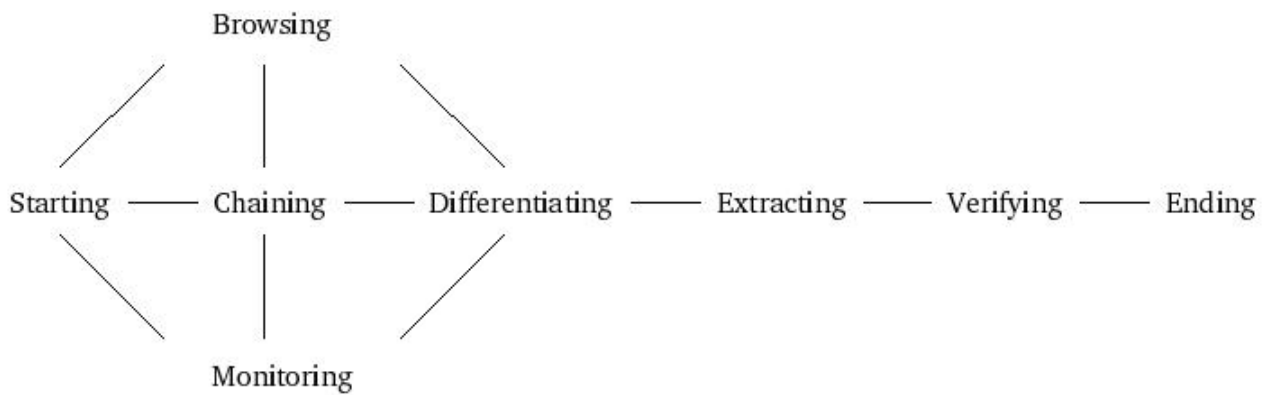
Figure 5. A stage process version of Ellis's behavioural framework. (Wilson, 1999, 255.)

2.2.2 Meho and Tibbo: Ellis's study revisited

Ten years later, Meho and Tibbo found Ellis's study still significant, because it was based on empirical qualitative research and had a major impact on information seeking research. However, no attempts had been made to replicate the study. Meho and Tibbo intended to update Ellis's study on social scientists to the era of the World Wide Web. Information technology had developed dramatically since the late 1980s, when Ellis carried out his study. Ellis's study was also based on a sample drawn from a single university in the United Kingdom. Meho and Tibbo chose a international research area: stateless nations,[1] and they chose to explore scholars from different countries and from different social science disciplines. (Meho and Tibbo, 2003, 571.)

Meho and Tibbo conducted structured and semi-structured interviews through e-mail. They chose the sample of social scientists through searches in international bibliographic databases. Finally, they got 139 potential participants to the study. They decided to interview nine of them face-to-face, and 130 were sent invitations to participate in an e-mail interview. The final number of scholars who participated in e-mail interviews was 60, and five scholars were interviewed face-to-face.

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1 Stateless nations is defined by Meho and Tibbo (2003, 571) as "those regionally concentrated people that have lost their autonomy before and after World War I, but still preserve their cultural distinctiveness and want to re-establish a politically separate existence". An example of those people are the Kurds.

31 % of all participants were from the United States, 10 % from the United Kingdom, 7 % from Canada and the rest of the participants were from Australia, the Netherlands, Sweden, Germany, Turkey, Bangladesh, Finland, Israel and the Republic of Ireland. (ibid., 572-575.)

Meho and Tibbo (ibid., 578) found that scholars studying stateless nations relied more on "their personal collections, fieldwork, other libraries, and archives than their own university library collection." Grey literature and archival material were important to them, as well as contacts and acquisitions through friends and colleagues. Their own university libraries could offer them essential material for general background, and material for theoretical and comparative purposes. To obtain the rest of the material, they had to search special libraries and collections, well-funded research libraries and national libraries. Online material and the use of e-mail helped them a lot.

Although the study confirmed Ellis's model, Meho and Tibbo found that a fuller description of the information-seeking process of social scientists should include four additional features besides those identified in Ellis's (1989) original study. Those new features were: 1.) accessing, 2.) networking, 3.) verifying, and 4.) information managing.

1.) The issue of access was regularly brought up by participants in Meho's and Tibbo's (2003, 581, 583) research, because a great deal of information was identified through bibliographic databases, personal contacts, publisher's catalogues or backward and forward chaining. Maybe the topic of stateless nations was particularly vulnerable in this sense and caused the problems with access to researchers, as one of the participants characterized the situation: "It is still very difficult to get into Indian archives without a lot of persuasion, administration and bureaucracy. This is fundamentally a political and financial question that I cannot solve." However, all problems with access could not be caused by the topic. Similar problems could have; in particular those involved in interdisciplinary research or in understudied research topics.

The same political and sensitive nature of the research topic affected 3.) the issue of verifying. Many participants wrote about disinformation, lack of reliability and accuracy that they had encountered especially among the materials produced by ethnic and governmental organizations, as well as among materials published on the Internet. Participants had to verify the information by asking colleagues, government officials, and members of stateless nations. They also tended to gather material from different sources and compare the findings. (ibid., 582.)

The category of verifying was not identified in Ellis's original study (1989), but when Ellis, Cox and Hall (1993) studied chemists, the issue of verifying emerged. Similar activities, however, were mentioned by some social scientists, but they were in a minority, and these patterns were subsumed under chaining (Ellis, Cox and Hall, 1993, 364). Meho and Tibbo (2003, 584) emphasised that Ellis's study on social scientists was conducted before the existence of the Web. The Internet might have raised the issue of verifying among social scientists, too.

2.) Networking was characterized as an important feature of the researchers' information seeking. Networking included communicating and maintaining a close relationship with friends, colleagues, and intellectuals working on similar topics, as well as members of ethnic organizations, government officials, and booksellers. Researchers who were networking with each other shared all kinds of information and materials. The Internet had significantly encouraged and facilitated their sharing. (Meho and Tibbo, 2003, 582.)

The participants in Meho's and Tibbo's research often referred to their own collections as a primary information source. Therefore the need and importance of filing, archiving, and organizing the information was brought up repeatedly. Meho and Tibbo (ibid., 582) characterized this feature as 4.) information management.

On the ground of the features found already by Ellis (1989) and the features found by Meho and Tibbo themselves, Meho and Tibbo suggested a new model of information-seeking behaviour. (Figure 6.) The features starting, chaining, browsing, differentiating, monitoring, extracting, accessing, networking, verifying, and information management were not characterized as entirely sequential. In general, according to Meho and Tibbo (2003, 584), the information seeking activities of academic social scientists could be divided into four main interrelated stages: searching, accessing, processing, and ending.

Starting, Chaining, Browsing, Monitoring,
Differentiating, Extracting, Networking

Searching

New Information Needs

Direct Sources   Indirect Sources

No

Chaining, Extracting, Differentiating,
Verifying, Information-Managing,
Synthesizing, Analyzing, Writing

Processing ← Yes ← **Accessing** — Decision-Making

Ending
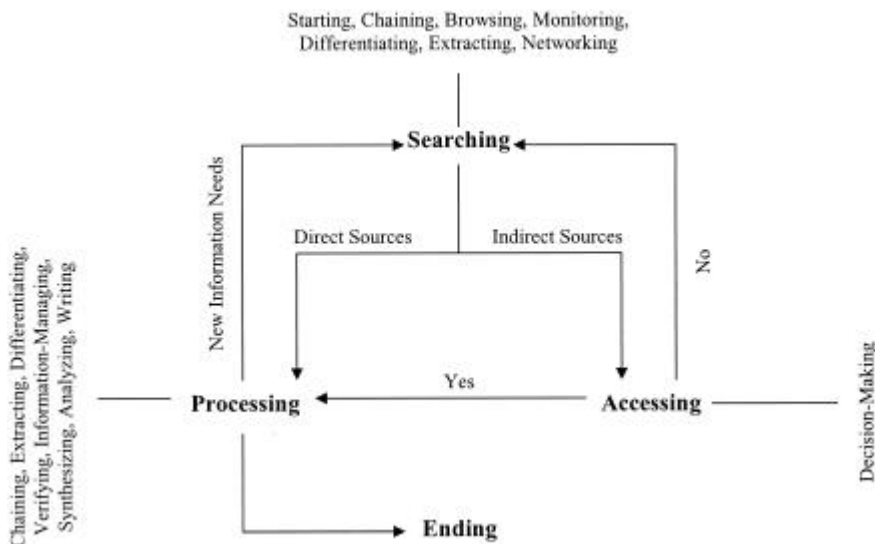
Figure 6. Stages in the information-seeking behaviour of academic social scientists. (Meho and Tibbo, 2003, 584.)

As shown in Figure 6. at each of the first three stages (searching, accessing, and processing) a number of activities could occur. During the search stage, researchers might use starting, chaining, browsing, monitoring, differentiating, extracting, and networking activities. During the accessing stage, researchers could make a decision whether to proceed to the processing stage or return to the searching stage. This decision was likely to be based on the success or failure in obtaining needed material and gaining access to various information sources. During the processing stage, researchers might use chaining, extracting, differentiating, verifying, information-management, synthesizing, analyzing, and writing activities. (Meho and Tibbo, 2003, 584-585.) These last three activities (synthesizing, analyzing, and writing activities) did not belong to actual information seeking behaviour, but they were mentioned here obviously because they were so essential to a researcher's work.

Meho and Tibbo (ibid., 585) described their model as a research cycle. When research started at the searching stage, it could be continued to the accessing stage or to the processing stage, or to both. This depended on the types of information used: indirect or non-full-text sources, or direct or full-text sources. When full-text sources were available, a researcher might skip the accessing stage and go directly to the processing stage. Moreover, when access to information was not possible, researchers could try to use alternative sources. This could mean searching for new information and

returning to the searching stage. During the processing stage, new questions might arise, which could require the return to the searching stage.

Meho's and Tibbo's information seeking model has been found to be interesting (for example, Haasio and Savolainen, 2004, 83; Lindström, 2005). It has been appreciated mostly because of its cyclical and dynamic nature. More empirical research has, however, been suggested to confirm the stages described in the model. Lindström (2005, 6) speculated over Meho's and Tibbo's issue of access which he found interesting, but problematic. He wondered if accessing included only accessing formal sources through different facilities or technologies. Social institutions and communities might build up barriers to access, or support access as well. Therefore he argued that Meho and Tibbo had a rather traditional and technology-oriented view on access. He also paid attention to how small role contextual factors seemed to play in Meho's and Tibbo's model. According to Lindström (ibid., 10), Meho and Tibbo did not really examine how much researchers' position and skills affect information seeking.

2.2.3 Foster's nonlinear model of information seeking

When Meho and Tibbo still talked more about stages than cycles, Foster (2004) created a real cyclical model of information seeking. He advocated a new nonlinear, contextual model of information seeking.[2]

Foster's data collection was based on in-depth semi-structured interviews of 45 academics. The population from which the sample was drawn consisted of all academic and postgraduate researchers at the University of Sheffield, in the United Kingdom. A subpopulation of interdisciplinary researchers was chosen as a specific group from which a sample of 45 academics was drawn. The data were analysed using the naturalistic inquiry and the constant comparison method. Coding took place in multiple sessions. (Foster, 2004, 229-230.)

In the initial analysis, the following core processes were identified: opening, orientation and consolidation (Figure 7). The concept of opening resembled the feature of starting found by Ellis (1989) and confirmed by Meho and Tibbo (2003). In Foster's model, opening included a number of

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[2] However, Foster was not the first to discover a nonlinear information seeking model. Paisley emphasised nonlinear information seeking as early as in the 1960s. (See, for instance, Haasio and Savolainen, 2004, 49-50).

potential activities. Each of the activities interacted with the other opening activities and the other core processes.
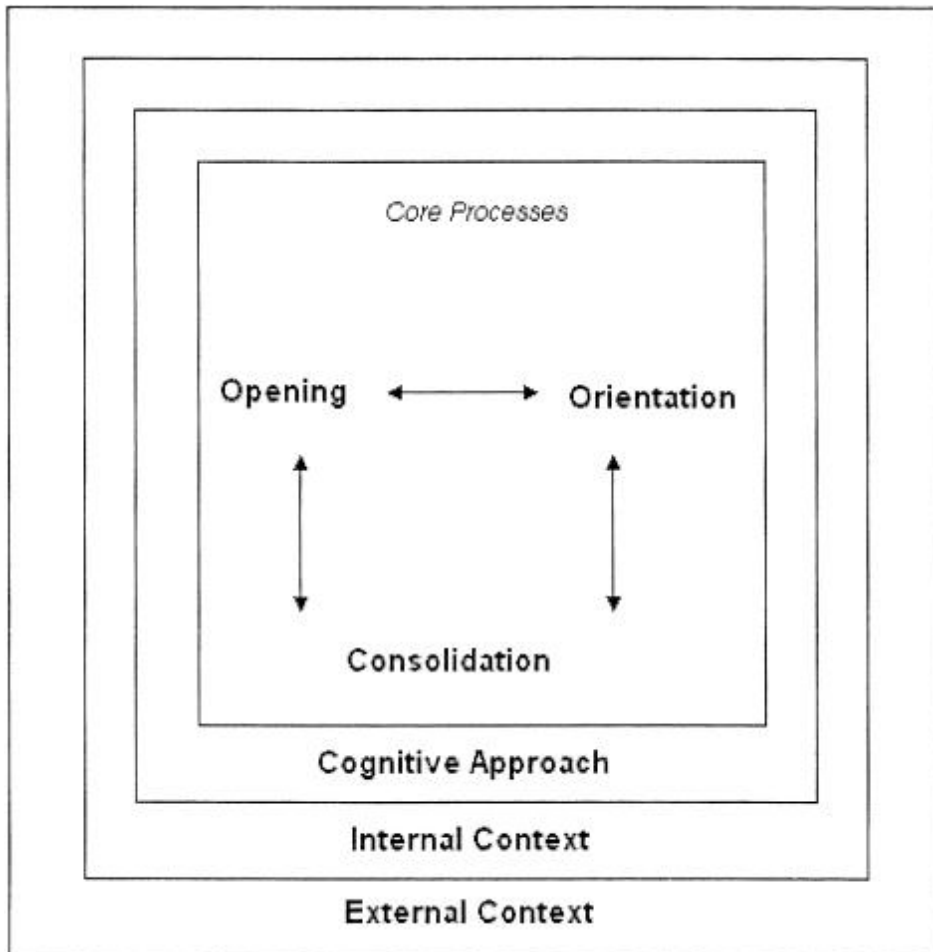
Figure 7. Nonlinear model of information-seeking behaviour (Foster, 2004, 232)

Opening included the following activities (Foster, 2004, 233-234):

1.) Breadth exploration was defined as a conscious expansion of searching, "a kind of splatter gun approach".

2.) Eclecticism was defined as accepting, gathering, and storing information from as many channels as possible and from both passive and active sources, sometimes over long periods, in order to reveal new ideas and concepts.

3.) Networking appeared as a main activity of interdisciplinary researchers interviewed in this study. It was operated through conferences, social gatherings, colleagues, and the Internet, including e-mail. Networking helped to cope with limited resources such as time and access, and to cope with information overflow.

4.) Keyword search was conducted as well, but it was sometimes ineffective during opening, when terminology was not yet appropriate.

5.) Browsing was found to be a key process.

6.) Monitoring was found to have a similar meaning to that used by Ellis (1989). Ease of access played an important role, together with reliance on Internet sources, current periodicals and publishers' catalogues.

7.) The activity of chaining was strongly identified, as also found by Ellis (1989).

8.) Serendipity was identified as a valued part of information seeking. It was closely associated with eclecticism, browsing, and networking.

Foster affiliated networking mainly to opening procedures in information seeking. This kind of activity could also be included in orientation or consolidation, and this is what collaborative information seeking studies suggest. For instance, Talja (2002, 158) maintains that "scholars' social networks are the place where information is sought, interpreted, used and created."

The other interesting feature in Foster's opening procedure is serendipity. Some kinds of coincidences are probable when scholars seek information. How much these findings and information paths are really accidentally found, and how much is some kind of tacit knowledge, could be argued. Erdelez (1997) calls these serendipities 'information encountering'. People often find information when they are not seeking it, and are not involved in looking for certain information that they happen to find. Erdelez (ibid., 417), writes that many people experience information encountering, but some are more likely to encounter information by coincidence than others. Erdelez calls them 'super-encounterers', people who very often experience information encountering, and who rely on it as an integral part of their information behaviour.

Orientation focused on identification and in which direction to look. The strategies found in the opening process feed results into the orientation process, but opening could lead to consolidation as well.   (See Figure 7)

Orientation included the following activities:

1.) Problem definition was found to be a primary component, defining the focus and boundaries of the information problem. Problem definition was a continuous process lasting up to the closure of information seeking.

2.) Picture building meant mapping out concepts and interactions in the mind, and on paper.

3.) Reviewing was found to be the use of existing knowledge, accessing and reading a personal collection, identifying "where I am now" and "which gaps need filling next".

4.) Identifying suitable keywords was relevant again.

5.) Identifying the shape of existing research included identifying key names, key articles and latest opinions in discipline. Relevant criteria were required for selecting sources. (Foster, 2004, 234.)

Consolidation was found to be less likely at the first stage in information seeking, although the features of consolidation could be recognized in every interaction from the first idea to the final product. Judging and deciding, whether further information seeking was necessary, was the main content of this process.

Consolidation included the following activities:

1.) Knowing enough was identified as questioning whether sufficient material for the present situation had been acquired.

2.) Refining was closely connected with knowing enough. Refining meant selecting a narrower focus.

3.) Sifting was a process of selecting and pruning.

4.) Incorporation meant assembling the material into relevant connections.

5.) Verifying was a less common aspect of interdisciplinary researchers. It tended to be confined to the accuracy of quotations and references.

6.) Finishing could consist of diverse activities like browsing, networking, and keyword searching. This process was described as "sweeping up the loose ends". (ibid., 234.)

The core processes of information seeking, opening, orientation, and consolidation occurred in the frame of three approaches or contexts. (Figure 7)

The outermost frame constituted the external context. The major external factors were categorized as social and organizational factors, time, the project, navigation issues, and access to sources. The

social networking aspect was found to be one of the most important. It had a major influence on access to sources and information sharing. The surrounding organizational climate, varying from a positive encouraging climate to a restrictive negative culture, affected funding and access to resources such as journals. (ibid., 232.)

The internal context consisted of aspects like feelings and thoughts, coherence, and knowledge and understanding. Internal influences were unique to each information seeker's own profile. Cognitive approach was related to the mode of thinking observed in participants, their willingness to identify and use information. A flexible and adaptable approach emphasised the mental agility and willingness to adapt to different information cultures. Openness of approach meant that all sources and ideas were welcome until proven otherwise. Nomadic thought went further in the direction of openness: it favoured remote and untraditional sources and materials. The holistic approach was important in incorporating concepts from diverse research areas. (ibid., 232)

Foster's (ibid., 235) model offers "a complex multilayered tool to explain and further explore interdisciplinary information behaviour." It is an alternative to the model of sequential stages such as Ellis's model (1989) and also to some extent Meho's and Tibbo's model (2003). It rejects a problem-solving framework suggested, for instance, by Wilson (1999). "Instead the results explicitly point to problem definition and, more widely, information seeking behaviour to be cumulative, reiterative, holistic, and context-bound", as Foster (ibid., 235) put it.

Lindström (2005, 10), who compared Meho's and Tibbo's model to Foster's model, favoured Foster's model to some extent because of its contextuality. However, he recommended further examination of the relationships between core processes and contexts. Besides using sources and channels of information, information seekers could also affect sources and channels, and create new sources. Foster had not taken into account that kind of interaction in his model.

 2.2.4   Seldén: Social capital and information seeking in academic settings

The Swedish information scholar Seldén (1999) studied the information practices of academic researchers from the perspective of social and symbolic capital. He adopted the concepts of social and symbolic capital from Bourdieu and applied them in information studies in a unique way. However, in the beginning Seldén was most inspired by grounded theory and action research.

He considered first that American sociologists of knowledge, such as Merton, could constitute the background for his study, but finally, he preferred Bourdieu as more relational, reflective, and generative.

Seldén's data consisted of interviews with young and more established researchers in the field of business administration (Swedish: företagsekonomi), as well as participation in seminars with doctoral students. He also collected some texts from students. His first phase of data collection (in 1990) was still inspired by readings in grounded theory and action research. He interviewed both experienced researchers and newcomers, as well as two librarians; with a total amount of 24 informants. He also observed one seminar. The second period of 1992-1993 was planned as the main study. He had already by then decided to follow a longitudinal design of study, and had found Bourdieu. The same group of 10 doctoral students were interviewed continually during the period. Observations and interventions were carried out, and texts were collected from the students. (Seldén, 1999, 126-129, 139-142.)

Seldén developed a concept of 'information seeking capital' from Bourdieu's conceptions of symbolic and social capital. Information seeking capital is a part of more general academic capital. Seldén elaborated on information seeking capital by dividing it into two types: 'the information seeking capital of symbolic kind' and 'the information seeking capital of social kind'. The information seeking capital of symbolic kind was related to the skills of formally oriented information seeking. This meant, for example, skills and resources to navigate on the Internet or use library services. The information seeking capital of social kind, on the other hand, was related to socially oriented information seeking, that is, researchers' opportunities to use social networks to gather information and share questions and thoughts. (Seldén, 1999, 95; Savolainen, 1999, 11.)

Seldén (ibid., 253-257) argues that the field of information seeking capital of social kind was dominated by established scholars, for example, professors. They had usually reached the stage where they hardly needed to search for information, but information was offered to them through their social networks, more or less without their own efforts.

This brings to mind the example of an engineering professor of forty, interviewed by Star et al. (2003, 241), who told:

> "I know practically everybody. -- I am also on the editorial board of a number of journals. -- And I go to meetings, to quite a few. -- This is where I meet my colleagues, and we talk. I

probably am almost never in the situation where I am having to do a search in an area where I do not know anything about the field."

Another professor (ibid., 245) told:

"How do you find information or references? -- Often a paper comes across my desk. It is an archaeological dig here. -- Simply because I will review articles or journal submissions, and something seems interesting, and I will file it. Or something seems interesting in one of the publications I subscribe to."

Star et al. (ibid., 245) described this system as if the scholars used to walk into a library or another information system and be able to put their fingers on the right resources. They seemed to sit at the metaphorical centre of the social web. The system was quite transparent for these scholars. The cases were good examples of 'invisible college' functioning, as Price (1961) argued and Crane (1972) consolidated. Erdelez (1997, 417) calls this kind of people 'super-encounterers', because information encountering is an important element in their information seeking behaviour.

Professors might, however, have their own kind of information problems. They could suffer from information overload (Savolainen, 1999, 13), or they might be too dependent on their social networks and miss relevant information because it did not come through their ordinary channels (Star et al., 2003, 247).

For new researchers this system of social capital meant, according to Seldén (1999, 254), a struggle to obtain more information seeking capital of social kind. Sometimes they could compensate a lack of information seeking capital of social kind by formal information seeking skills.

Sometimes young researchers might feel information seeking systems are "confusing, chaotic, and unusable". They struggle to follow given directions and still fail to find anything useful. Much of the professional socialization in academic settings concerns moving from this lost state into the state of obviousness or naturalness, as Star et al. (2003, 245) put it.

Information seeking capital of symbolic kind was dominated by librarians, Seldén (1999, 254) argued. Librarians were the real masters of information systems. Their duty, of course, was to distribute this knowledge further, but perhaps they did not always succeed very well. As an established researcher interviewed by Selden (ibid., 166) put it:

"Bibliotekarier har alltid för mig varit ganska träiga typer, som i och för sig har varit ganska snälla och vänliga, men egentligen aldrig kunnat hjälpa mig. De har ställt konstiga frågor och jag har aldrig riktigt fattat vad de har velat. Nånstans har vi väl gått vid sidan av varann..."

The major categories of information seeking include, as stated by Seldén (ibid., 290), for example reading, browsing, publishing, participation in conferences, organizing conferences, receiving information from colleagues, and receiving information from libraries. Interestingly, Seldén emphasised the importance of conferences.

The role of conferences has not been recognized in information studies very often, although the significance of the conferences might be crucial for both the symbolic and social kind of information seeking capital. When scientific communication has been studied, conferences have been more in focus (See, for instance, Meadows 1998, 137-139.).

However, Seldén[3] never tried to approach information seeking from the perspective of groups; or for example, from the perspective of social classes, although for Bourdieu, social classes were important as bearers of habitus (Seldén, 1999, 80).

Seldén could use the ideas of Bourdieu to look more deeply at the cultural and social embeddedness of information seeking practices. Seldén had chosen a context which made the picture of academic information seeking richer and more clarified. His longitudinal design of study succeeded, and most of the research goals were reached. (Savolainen, 1999, 17-18.)

2.2.5 Summary of information seeking research in academic settings

The models of Ellis, Meho and Tibbo, and Foster, together, give a comprehensive picture of the information seeking behaviour of individuals in academic settings. For the purposes of collaboration and working in groups, their examinations, however, do not seem to be sufficient. Ellis (1989, 179-181) mentioned informal sources et al., especially in connection with starting the information seeking. Meho and Tibbo (2003, 582) emphasised the feature of networking which they located at the stage of searching. Unfortunately, they did not elaborate more on this feature, or any

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3 Seldén (1999, 80) wrote: "Emellertid vill jag påminna om att jag inte studerar grupper, utan att det är individer, som jag har samarbetat med."

other features, in different situations or contexts. Foster (2004) took up the issue of social and organizational factors in an external context. He did not, however, specify more closely the relationships between information core processes and external context. His model is in this sense very general. He also mentioned networking as an important feature of information seeking, but only in the opening procedure. Networking or collaboration was not identified in other stages of information seeking in Foster's model.

As the purpose of the study is to explore the information seeking behaviour of researchers in collaborative settings, these models do not constitute a sufficient background for the study. They do not adequately consider collective and collaborative features in information seeking. Some of the features offered by the models might, however, be useful in this study. This could concern, in particular, the cases of access and networking, highlighted by both Meho and Tibbo and Foster.

Seldén used Bourdieu's concepts of social and cultural capital in academic settings in a very interesting way. He managed to reveal a richer picture of the contexts where academic researchers struggle in information seeking practices. The connection between academic career and experience and information seeking capital was a result of longitudinal research work.

In spite of Seldén's interdisciplinary approach, his study does not give here a theoretical framework to build upon. Seldén himself wanted to make it clear that he studied individuals' information seeking, not groups, neither groups as social classes nor groups as research groups. However, Seldén's notion that scientific conferences have a special significance in information seeking strengthens the foci of this study.

2.3 Collaborative information seeking

2.3.1 Prekop's qualitative study of collaborative information seeking

Prekop was among the first information scholars who challenged the information seeking models from the collaborative point of view. Prekop found various models too individualistic. He wanted to study the collaborative dimensions of information seeking. (Prekop, 2002, 533.)

Studies on collaborative information seeking had been carried out before Prekop, but most of them were initial and exploratory, and often located within the computer-supported collaborative work (CSCW) domain. (For example, Twidale and Nichols, 1998; cited by Prekop, 2002, 533.) Prekop presented a qualitative information behaviour study performed in a military working group. This working group conducted a large and complex review work in the course of three years. All kinds of information collection and analysis were conducted in the working group.

Prekop (2002, 534) collected two types of data from the working group: the minutes of the working group's meetings, and semi-structured interviews with some of the working group members. The working group had 40 meetings over three years. All the meetings were recorded. A total of 28 active members were involved, and 5 of them were selected for interview.

Prekop decided to use grounded theory approach for the analysis of the data. The meeting minutes were coded and categorized. The initial collection of categories was used as the starting point for the second stage of data collection and analysis. During the second stage, the first round of interviews was undertaken. The interviews gave a deeper explanation of many of the codes uncovered in the minute data. Finally, during the third stage, the last interviews were conducted. (ibid., 534-535.)

Three components were identified in collaborative information seeking: 1.) information seeking roles, 2.) information seeking patterns and 3.) the context in which the roles and patterns were performed. (See Figure 8 on the next page.)
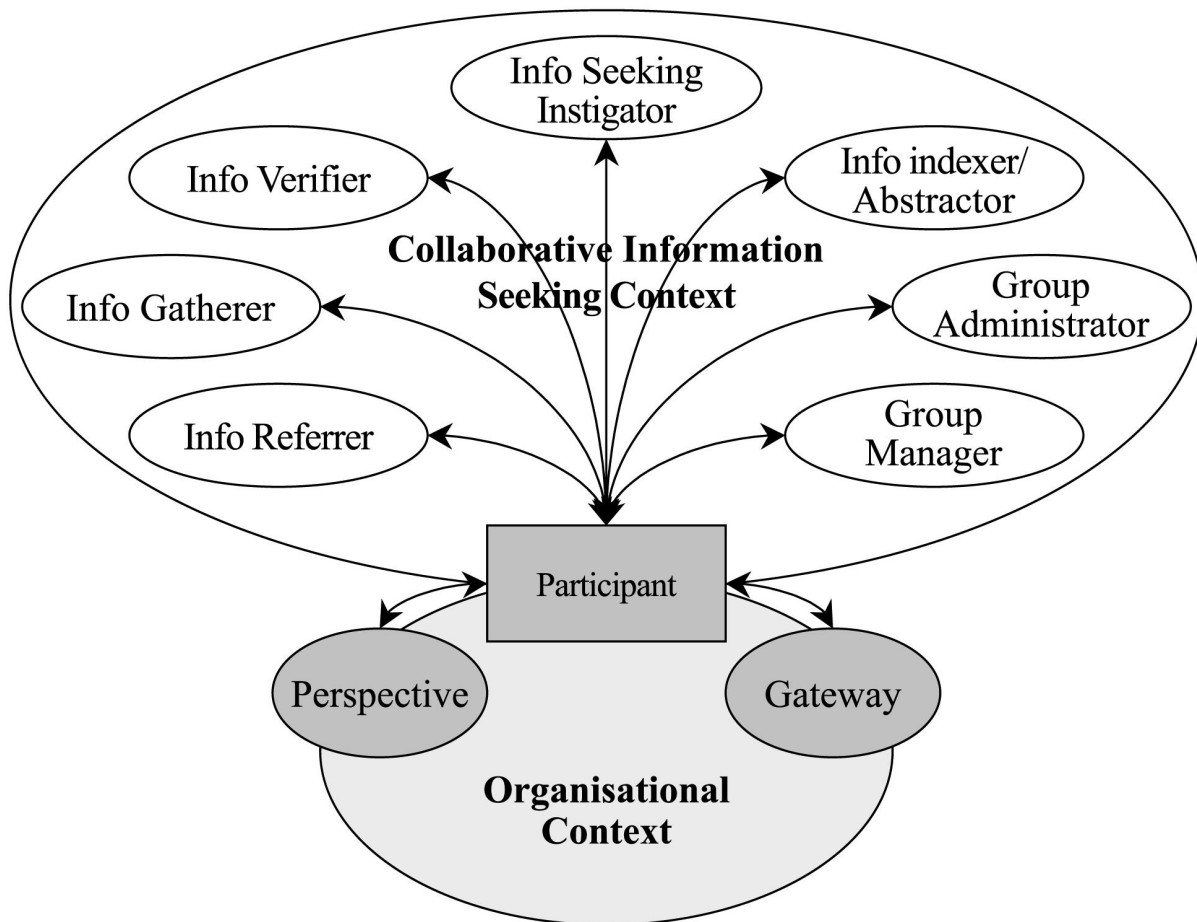
Figure 8. Model of collaborative information seeking. (Prekop, 2002, 536.)

Collaborative information seeking context covers what is collectively known, as well as the history of the working group, and the group's norms, social rules and social structure. It is within this context that the collaborative information seeking practices take place and the group members enacted the various collaborative information seeking roles. (ibid., 536.)

The second context, the organizational context, is where the group members come from. They all have their specialist information and background, as well as their perspectives and gateways. The gateway acts as a way of "accessing both formal and informal information within the organizational context." The gateway has a twofold meaning, that

> "the participants not only represent their organizational context within the collaborative information seeking context, but also represent the collaborative information seeking context back to their organizational context." (ibid., 537.)

The most interesting part of Prekop's results seems to be the collaborative information seeking roles performed in the working group. The roles were surprisingly analogous to many of the information seeking behaviours developed by Ellis (1989) and later consolidated by Meho and Tibbo (2003), although in the working group a division of labour in information seeking occurred, and information seeking tasks were distributed to all of the group members. Information seeking roles were both formally assigned and informally adopted. Group members also enacted several roles, and several members might enact the same role. (Prekop, 2002, 535, 538.)

The following roles were identified by Prekop (ibid., 538-543; See also Figure 8):
1.) Information gatherer
The main task of the information gatherer was to find and gather specific information. People, who volunteered to become information gatherers, tended to feel that the information that needed to be gathered matched their information gateway and perspective. The actual information gathering occurred within the participant's organizational context. Quite often, the information request was passed to a subordinate (Prekop's study took place in a military environment.) or to an information professional. The information gatherer's role was not passed forward: the original information gatherer bore the responsibility for the task.
2.) Information referrer
The information referrer worked, more or less consciously, in cooperation with the information gatherers. The information gatherers used to advertise openly what they were after, and the information referrers directed the required pieces of information to them.
3.) Information verifier
The information verifier validated the gathered information. This is often an implicit part of information seeking, analogous to, for example, the model of Meho and Tibbo (2003). Verification tended to focus on several factors, such as the accuracy and the completeness of the information, and the quality and utility of the information.
4.) Information seeking instigator
The information seeking instigator directed participants to gather specific information and initiated the information seeking. The task began by identifying the information need, and then continued by setting in place an information seeking activity to satisfy this need. During the seeking, the information seeking instigator monitored the activities and took action if needed. All information seeking instigators found that they built up trust and understanding between themselves and particular information gatherers.
5.) Information indexer/abstracter

The information indexer acted like a reference librarian or archivist by providing summaries and information tools within their organizational context. These summaries and information tools were used by information gatherers and information instigators.

6.) Group administrator

The group administrator was responsible for providing administrative support to the working group, and responsible for organizing the information that resulted from information seeking. This person was also responsible for many formal and informal parts of the work in the working group. She or he kept the minutes of the meetings, catalogued and organized the information gained, scheduled the meetings, and distributed collected information.

7.) Group manager

The group manager "kept the group working": she or he resolved conflicts, guided the direction of the work, monitored the progress, and kept people feeling they belonged to the group.

Prekop (2002, 543-545) identified some patterns of interaction between the roles within the contexts. He mentioned information seeking by recommendation, direct questioning, and advertising information paths. Patterns were identified late in the analysis phase of the data, and all the data did not facilitate the identification of all patterns. Prekop referred to future research which could be able to validate more patterns. Because the existing patterns seem to be rather vague at this stage, they will not be emphasised here either. Information seeking by recommendation is tightly tied to the information referrer's role, and his or her cooperation with information instigators and information gatherers. The pattern of direct questioning was the ordinary case, when information was asked for and transferred, and, finally, the information task was fulfilled. The pattern of advertising information paths was about providing potential paths by which to seek information; in most cases information gatherers and information indexers/abstracters could be involved.

2.3.2 Talja's study of information sharing in academic communities

Talja has applied collaborative information behaviour theories in academic settings. According to Talja and Hansen (2006), collaborative information behaviour ranges from accidental information sharing to intentional collaborative work on databases and search formulations, information filtering, and information synthesis. Talja and Hansen define collaborative information seeking and retrieval as "active and explicit seeking and retrieval of information for solving a specific task", whereas

information sharing is defined by them more broadly: " Information sharing incorporates both active and explicit and less goal oriented and implicit information exchanges."

Talja and Hansen (2006) emphasise that collaborative information behaviour research is not so much interested in collaboration itself, such as the dynamics of group work or human relations in the processes of collaboration. Collaborative information behaviour research instead "looks at collaboration in the processes of information seeking, retrieval, filtering and synthesis".

Talja (2002) studied scholars' information sharing practices as a part of a larger project that focused on scholars' use of electronic resources. Four disciplines were chosen as the objects of study: nursing science, history, literature and cultural studies, and ecological environmental science. 44 interviewees were chosen from four departments of two Finnish universities and semi-structured interviews were conducted. Among the interviewees there were research leaders, researchers and doctoral students.

Following the model of Erdelez (1997), Talja developed a classification for the types and levels of information sharing. Erdelez had characterized information encounters as super-encounterers, encounterers, occasional encounterers, and non-encounterers. Rather than categorizing individual scholars, for instance, as super-sharers, Talja wanted to view sharing and non-sharing more as social and cultural phenomena. Sharing and non-sharing is affected primarily by cultural factors, such as working climate or departmental resources, rather than other factors, such as individual's attributes or information seeking styles.

Her empirical findings gave basis to the following classification of the types of information sharing (Talja, 2002, 149):

- Strategic sharing: information sharing as a conscious strategy of maximizing efficiency in a research group.
- Paradigmatic sharing: information sharing as a means of establishing a new and distinguishable research approach or area within a discipline or across disciplines.
- Directive sharing: information sharing between teachers and students (two-way).
- Social sharing: information sharing as a relationship and community-building activity.

The category of non-sharing is missing here. It is present, however, in the other classification more directly adapted from Erdelez (1997). This classification describes the amount of information sharing:

- Super-sharing takes place in longitudinal close research projects in which information sharing has been adopted as a conscious productive strategy. All types of information sharing take place in these projects.
- Sharers work together in temporary writing or conference projects or more loose research groups. The group may have a common interest in making sense of a new research problem or research area. All types of information sharing take place in such groups.
- Occasional sharing takes place between colleagues who do not share the same research interest or subject, or between teachers and students. The forms of sharing may be limited to, for instance, sharing of relevant documents or ways of finding relevant documents.
- Non-sharing may be mostly combined with the research projects that are so unique that no one in the work community shares the same research interest.

One of the major results found by Talja (ibid., 155) is that, even if scholars seem to conduct their research independently and alone, scholars' social networks are in fact the place where information is sought, interpreted, used and created. This is in line with Haythornthwaite's and Wellman's (1998, 1102) research results in which they argue that scholars' information behaviour is affected more by the kinds of social networks in which they are involved than by their individual attitudes and attributes.

Furthermore, Cronin (2004, 557-558) reported that in the end of the 1990's, 99 % of chemistry articles and 71 % of psychology articles were co-authored, but only 4 % of philosophy articles. Cronin argued that philosophers may not collaborate using formal structures: their collaboration can sometimes be measured only with difficulty. However, 94 % of philosophy articles included an acknowledgement, and the majority of these acknowledgements recognized others' intellectual contributions.

Talja and Hansen (2006, 123) also characterized the object of collaboration or sharing related to information seeking and retrieval in the following manner:
- sharing the same need for information

- sharing search strategies
- sharing search results
- sharing retrieved information objects
- further processing of the retrieved information objects: interpretation, filtering, synthesis
- archiving potentially useful information into group repositories

As Talja (2002) noticed, scholars may also share information about non-relevant documents or their contents. This could be useful as well, because colleagues can thus avoid wasting their time in reading unimportant articles.

Above all, scholars' information seeking is often embedded in work practices. Usually scholars, who seek documents, at the same time retrieve them, access them, evaluate them and extract relevant information from them. (Talja and Hansen, 2006.)

2.3.3   Summary of the collaborative information seeking research

Prekop's study in a very formal working group context revealed the different roles performed in collaborative information seeking. He also found some traces of patterns existing in a working group. Although the information behaviour roles found by Prekop are individual, they are interestingly building up a picture of collaborative information seeking in a group context. Prekop also emphasised the organizational context where collaborative information seeking occurred.

Talja explored collaborative information behaviour found in different academic disciplines. Her classifications have not been tested, but they seem to constitute a useable addition to information seeking studies.

3. ANALYTICAL FRAMEWORK

The analytical framework adopted here consists of elements from information seeking models and classifications described in the theory chapter (2.). Scholars' information seeking is a well-studied research area in information studies. However, in most studies, such as in Ellis', Meho's and Tibbo's, Foster's, and Seldén's, information seeking has mainly been analyzed as private labour. Recently,

many researchers have stressed the importance of research on collaborative information seeking. Hara et al. described collaboration in a broader sense in a university environment. Prekop studied information sharing in a working group context in a military environment. Talja did the same in academic settings and together with Hansen explored the theoretical basis for the studies of information sharing and collaboration.

The basis of the analysis starts from Talja's (2002, 149) classifications of information sharing. I want to study what kind of information sharers my informants are, and above all, what kind of information sharing culture dominates in their research communities. My analysis also benefits from Prekop's (2002, 536) collaborative information seeking roles. I am, however, more interested in scholars' cultural and social conditions related to their collaboration and information seeking than their individual attitudes and working styles. This could make the application of Prekop's study, to some extent, difficult.

My analysis benefits as well from the typology of collaboration taken from Hara, Solomon, Kim and Sonnenwald (2003, 958). Hara et al. described collaboration among scientists. Their focus was not especially on information behaviour or information seeking. However, their typology adds an analytic dimension into my study.

Meho and Tibbo (2003, 582-584) found networking and access to be important features in scholars' information seeking. Compared to Ellis's original model which they revisited, this was a new observation. In this study Meho's and Tibbo's perceptions related to networking and access are considered. Foster (2004) also paid attention to networking as a part of his model. He included networking in the opening activities in his information seeking model. Networking was operated through, for instance, conferences, colleagues, Internet and e-mail. I try to take into consideration Foster's results related to networking.

4. METHODS AND DATA

Qualitative methods were a natural choice for studying scholars' information seeking practices. When one is studying the behaviour of people, why not let them describe for themselves what they do. Non-scheduled or focused interviews (in Finnish: 'teemahaastattelu') give an interviewee a good possibility to talk about his or her research practices (Eskola and Suoranta, 2000, 85). Besides conducting interviews, non-participant observation to gather background material and to get in deeper in the practices of a research group was also undertaken. This kind of research approach resembles that of ethnography. Ginman (1990, 35-36) noticed that in information studies interviews and observations have been applied successfully. In her view, observation can well be used in research aiming at the studies of information flows, or at the analysis of the impact of information behaviour, while interviews can be used for exploring the reasons and motives of people.

A research group conducting social science research on media-related issues at the University of Tampere was chosen for this study. The research group was led by a professor, and there were five more researchers involved in the project. Four of them were doctoral students, and one of them did her master's thesis and, at the same time, worked as a secretary of the project. Their research data were collected in 2002-2003. The current phase of the project started in 2003 with the finance of the Academy of Finland. This research group will be referred to later as group A. (See also Group descriptions in Table 1)

I started my data gathering by conducting observations in the autumn of 2004. I visited three meetings of the research group in Tampere. Meanwhile, the group members also met elsewhere as a group and individually. I visited the meetings on the 8th of September, the 21st of October, and the 29th of November. I recorded the meetings and got altogether six and a half hours of tape recordings. I decided to transcribe the recordings, but only partially. The researchers discussed information seeking only occasionally, but it was interesting to learn about their research concepts and strategies.

As Cooper et al. (2004, 1) noted, participant and non-participant observation is used in information seeking studies, often in working life settings, and is sometimes associated with action research. Cooper et al. reported on lessons from two observation studies: non-participant observation of hospital pharmacists, and participant observation of old people living in their own homes. They argued that "observation techniques seem to offer a more objective and direct view of information

behaviour". However, in both studies, the observation was complemented by survey data and interviews.

A theme, that emerged from both studies reported by Cooper et al. (ibid., 6-13), was trust. Building up trust was especially challenging in the project with old people. Trust was much easier to establish in a hospital environment where the researcher worked as a member of library staff. Both the researcher and the pharmacists felt collegiality as information professionals. The pharmacists understood that the researcher would observe in order to obtain a better understanding of their information behaviour. The pharmacists "shared common interests and concerns (with the researcher) in information handling and information provision".

My situation resembled that of the hospital settings with the researcher as a hospital librarian. I worked as an information specialist at the University of Tampere, in the Department of Journalism and Mass Communication in the Unit of Nordic Information Centre, Nordicom. However, this was probably not a well-known fact among the researchers I observed. They may have felt more collegiality with me as a researcher gathering material for her thesis. Anyhow, trust was not a problematic issue. I visited their group meeting for the first time briefly in the spring of 2004 and introduced my research plan including observations. After the meeting I received a message that the research group unanimously approved my intention of observations.

After the period of observation, I did a pilot interview to test my interview guide. The interview guide was non-scheduled, in other words, semi-structured. The discussion topics were defined, but the order of questions was not. (Interview guides are enclosed in the Appendix 1.) The interviewer takes care that all the topics are discussed, but interviews may differ from each other very much (Eskola and Suoranta, 2000, 86).

I interviewed the five group members and the group leader individually in May 2005. Because of the earlier observation period, it was easy to contact the researchers and ask them to be interviewed. I used the non-scheduled interview guide, but the questions for the group leader differed partially from the questions for the group members. Each interview lasted from 30 to 50 minutes. The interviews were recorded and transcribed. Two recordings failed because of the problems with the digital tape recorder. I noticed the problem already in the beginning of the interviews, and took as precise notes as I could.

To receive more data and to be able to compare results, I decided to interview members of another research group at another university. A research group from the University of Jyväskylä from the humanities faculty volunteered. They studied mental violence in communication relationships. The research group consisted of a research leader (senior researcher) and three researchers (doctoral students). Later I will call this research group, group B. (See also Table 1) The research project of group B had started in the autumn of 2004. I interviewed the researchers during the September and October of 2005. The interviews lasted on average an hour. They were recorded and transcribed without problems.

	The research group A	The research group B
Location	University of Tampere	University of Jyväskylä
Faculty	Social science	Humanities
Subject	Media and children	Mental violence and communication
Start	2002-2003	2004
Group members	5 researchers and a group leader - 4 doctoral students - 1 undergraduate student (= secretary of the group)	3 researchers and a group leader - all researchers were doctoral students
Observation	Three meetings during the autumn of 2004	-
Interviews	During May of 2005	During September/October of 2005

Table 1. The description of the research groups A and B.

Besides ordinary interview questions, my interviews also consisted of discussions over a recent literature list of an interviewee. The presence of literature references was aimed to make the discussion of information seeking concrete and connected to real-life incidents. At the end of interviews, I used to go through a certain checklist of information seeking tools and facilities. Usually I did not mention any database names, but I used to ask if informants already knew the new information seeking portal Nelli that was launched in the beginning of 2005. (All the questions and the checklist are enclosed in Appendix 1.)

Silverman (2005, 48) raised an important methodological issue about how far it is appropriate to think that people in fact mean what they say in research interviews. People might talk very differently to each other, to colleagues, or to a researcher. Silverman asks: "Whether interview responses are to be treated as giving direct access to experience or as actively constructed narratives." He answered that "both positions are entirely legitimate but the position you take need to be justified and explained".

From the very beginning, I decided to treat interviews as "giving direct access" to the experiences of my informants. I did not want to explore indirect meanings, or to carry out a discourse analysis on the informants' discussions about information seeking. Of course, I understood that the informants might have described their information seeking differently in other circumstances, or to another interviewer. However, I trust that their accounts were as near to reality as it is possible to get through single interviews. My task was to compare the interviews, pick up similarities and differences, and pay attention to all peculiar incidents, as well as to all typical incidents.

Silverman (2005, 210-220) described several paths to validity. According to Silverman, "validity is another word for truth", that is, "the extent to which an account accurately represents the social phenomena to which it refers". Triangulation is often offered as a solution to the challenge of validity. Triangulation requires using different approaches, data, or methods to secure validity. In my study, I used both observations and interviews to obtain a clearer view of the phenomena. However, as Silverman argued, triangulation is not enough to ensure validity. Eskola and Suoranta (2000, 70-71) also expressed doubts about the advantages of triangulation. It is often too expensive and time-consuming to use many methods and data sets. Science philosophically, different methods could be incompatible, Eskola and Suoranta argued as well.

Instead of triangulation, Silverman (2005, 210-220) suggested in qualitative studies, for example, comparative method, deviant-case analysis, and the use of appropriate tabulations. Comparisons can be conducted between different data sets, or inside a data set. Earlier studies can be used for comparison as well. Because my empirical data was rather small, I attempted to compare my results to earlier studies and surveys, and furthermore to make comparisons inside my own data.

The deviant-case analysis means that in qualitative studies all facts must support the claim before it is valid. If deviant-cases occur, the circumstances must be analysed and the case explained before the claim can be stated to be valid. (Silverman, 2005, 210-220.)

Using appropriate tabulations means, according to Silverman, that counting and tabulations are meaningful even in qualitative research. Eskola and Suoranta (2000, 164) also discussed the opportunities of quantitative analysis related to qualitative data. Tabulations can mean presenting results in a more systematic manner. This can be useful in research reports that are full of text.

Ginman (1990, 36-37, 39) emphasised strongly that the interpretation of collected data in qualitative research should be based on theory. Otherwise the anecdote danger is obvious. She argued that the analysis of qualitative interview data is challenging, even if the researcher knows the theory basis thoroughly. There is a great risk that a research report resembles a journalistic text more than a research report. Ginman also recommended the use of quantitative methods whenever possible since this facilitates the process of interpretation related to qualitative data.

	Amount of recordings	Level of analysis	Tabulations	Figures
Observation (Group A)	6 and a half hours	Background information. Partially analysed.	-	-
Interviews (Groups A and B)	6 hours and 10 min. + 2 written interviews	All analysed.	Amount of the references to the own research group (Tables 3 and 4, p. 54-55.)	Direction of the references to the own group (or to other close advisers) (Figures 9 and 10, p. 61, 63.)

Table 2. The research data.

As this table of the research data shows, I tried to follow the recommendation of tabulations. I counted the number of times the informants mentioned their own research group in a positive manner. These references are collected in tables 3 and 4. I also gathered the references to persons who have supported the informants in information seeking or in related matters. These connections are presented in Figures 9 and 10.

Reliability according to Silverman (2005, 210, 220-224) refers to "the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions." Silverman gives two ways of strengthening the reliability of field data: field note conventions, and inter-code agreement. This also means some sort of direct access to raw data. He emphasises that "for reliability to be calculated, it is incumbent on the scientific investigators to document their procedure and to demonstrate that categories have been used consistently" (Silverman, 2005, 224).

I started my analysis by categorizing the data, both interviews and also, partially, observations. At the first stage, I used four candidate categories and some subcategories. The categories consisted of 1.) the significance of the research group, 2.) information sharing and non-sharing, 3.) conferences and seminars, and 4.) the significance of the library. The library category was divided into subcategories of communication, education, and keywords. In the communication sub-category, two recent incidents were examined.

The choice of initial categories seemed to work rather well. In the later stages, I revised the division of the categories only slightly. Information sharing and non-sharing were discussed separately. The model of collaboration by Hara et al. (2003) needed deeper examination that required a chapter.

Journals emerged from the interviews and from earlier research so frequently that they required a chapter under the main category of the library. In fact, I did not intend to explore library services as much as I later did.

The data analysis was conducted without the aid of any computer-based programmes. The amount of data was reasonable for manual examination. There were 10 interviews altogether, lasting from 30 minutes to an hour. Of two of the interviews, I only had notes, because recording failed. Observations lasted six and a half hours altogether, but they were transcribed only partially. Furthermore, the categories of the examination developed quite spontaneously. My long experience as an information specialist among researchers in the university environment may have been of some help.

Reliability was ensured by putting the instances to the same category in all cases (=the degree of consistency). The data is preserved digitalized as sound files and as transcribed text files. Observation field notes helped in the analysis of the data from group A.

An ethical question arose in the process of analysing and writing: can the informants be recognized? Universities in Finland are so small that the researchers may easily identify each other within disciplines and even across disciplines. The topics discussed were not delicate in the sense of intimacy; however, the informants told their personal, positive and negative experiences in confidence. Therefore, an effort was made to preserve the anonymity of informants.

Instead of letters, Kuula (2006, 215) recommends the use of pseudonyms for informants. Among my informants, there were so few males that the use of pseudonyms could have revealed the identity of the male informants. I did not either want to mix up the sexes and call the males by female names, or vice versa. The name carries an image of the person, an image about his or her age, or ethnicity, or gender. Therefore I chose the neutral way to use letters and numbers: groups A and B, researchers 1, 2 and so on. This also made it easy to recognize at once which group the informant who was cited came from.[4]

Because disciplines were considered relevant for the analysis, information about the backgrounds of the groups was not concealed. This may enable persons familiar with the universities of Tampere or Jyväskylä to identify the groups. The identifiability of single informants was, however, made as difficult as possible, for the reason mentioned above.

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[4] For example, Seija Ridell in her doctoral dissertation also used letters and numbers for her informants. Unfortunately, she did not explain the choice of letters and numbers (Ridell 1998, 168). She had 15 discussion groups and 45 informants in them altogether. The systematic manner of letters and numbers must have helped her to keep material in order.

5. RESULTS

5.1 Significance of the research group for information seeking

Almost all the researchers interviewed spoke warmly of the role of the research group in information seeking and sharing. The leaders of the research groups especially emphasised the significance of collaboration and cooperation, as one of them put it: "Information sharing is the very meaning of a research group."

Information seeking can be seen as a social event, as recent studies in information studies have also noticed. Ginman (2003, 60-61) elaborated on the social capital and the group as an information processor. She argues that the group is a social system which acquires, analyses, processes, stores and uses information in the same way as an individual. This new approach focuses on the processes in the group instead of the structure of the group.

Hyldegård (2006, 294-295) carried out a qualitative longitudinal case study on information seeking in a group of students, and she also noticed that variables embedded in social activities seemed to affect the outcome of the process. She tested Kuhlthau's Information Search Process (ISP) model in a group-based setting, and noticed different intra-group preferences that seemed to affect the motivation and ambitions of the group. Because her focus was more on individual students' information seeking behaviour, her results only slightly touched on collaboration and groups.

Meanwhile, Reijonen (2005) specifically studied interdisciplinary research groups and their information seeking strategies and collaboration. She explored the research groups comparing their strategies to the collaboration typology of Hara et al. (2003, 958). She also applied theories of interdisciplinary information strategies. Reijonen (2005, 111) discovered both complementary and integrative collaboration take place in research groups. The main strategies for information seeking were negotiation with experts, modelling, learning together, and integration through a group leader.

In this study, when researchers were asked directly about the significance of their research group for information seeking, the group members described the meaning as, "we change materials and talk a lot" (Researcher B1); "the importance is great, but it could be greater" (Researcher A2); "yes, I

have got hints..." (Researcher A3); "many good ideas and hints that I have received through the group" (Researcher B3).

When information seeking was discussed in detail, sometimes the significance of the researchers' own research groups appeared spontaneously.

Q: "How did you first find those English terms? I mean, you need to know which English keywords to use in Ebsco."
A: "---I remember we once had a meeting with our research group and we discussed English terms in communication science."
Q: "It was your ordinary meeting?"
A: "Yes, I still have the paper on which I scribbled English terms in the margin."
(Researcher B1)

The significance of researchers' own research group came through rather equally in two research groups, when I counted how many times researchers mentioned their research group in a positive manner. All these instances were connected more or less to information seeking. Researchers from Group A mentioned their group 10 times, and researchers from Group B mentioned their group 12 times. (Tables 3 and 4.)

Group A	The own group was mentioned:
Researcher 2	3 times
Researcher 3	4 times
Researcher 4	3 times
Researcher 5	- times
Total	**10 times**

Table 3. Own research group mentioned in the interviews: Group A.
(One of the interviews is excluded because the interview was not comparable. The interview was not recorded.)

Group B	The own group was mentioned:
Researcher 1	4 times
Researcher 2	5 times
Researcher 3	3 times
Total	**12 times**

Table 4. Own research group mentioned in the interviews: Group B.

There was, however, an exception to the rule that all the group members of the research groups gave at least some positive feedback of the research group's role in information seeking.

Q: "What kind of role would you give to your own research group and its leader in information seeking?"
A: "It does not play any role, it hasn't affected at all. If somebody suggests something, I have already found that earlier by myself. If you have poor abilities in information seeking, you could certainly benefit from the project, but I cannot remember I have benefited a single time..."

--- Later in the interview
Q: "Are you saying, it is a lonely job this information seeking?"
A: "Well, it belongs to this work. It is not so social, neither information seeking nor anything else, it doesn't occur in a group..."
(Researcher A5)

This exception does not seem to fit the picture. An explanation could be the interviewee's location. This researcher worked and lived far away from the home university, whereas almost all the other group members lived in the same town where the university and their department were located. However, in the same research group A, there was also another group member who lived and worked far away from the university. She seemed to be rather pleased with research group A and its role in information seeking. Furthermore, in research group B, there was a group member who lived and worked in the capital, while two other group members as well as the group leader lived near the university, and worked in the department. However, this separate group member said that research group B had generally worked quite well. As for information seeking, he said that "the significance

of the research group would be stronger, if I sat there along the same corridor... but maybe I can say, I have found real gems through the research group."

Timing could be a better explanation for the situation than location. The researcher, who was not satisfied with the support in information seeking from research group A, had to start the research project first, before the other group members joined the group. This researcher struggled alone for a year or more before the other group members started. Then her own research was in a different phase compared to the others, and the researcher could not benefit from the research group so much. Her unfavourable location made the situation even more complicated.

Widén-Wulff and Davenport (2005, 43) emphasised that information sharing requires two elements, timing and availability. In this case, timing did not succeed.

Seldén (1999, 123) talks similarly about information seeking as a phenomenon connected to time. Information seeking is a process in which the context plays a major role. Timing is a part of the context in the deepest sense.

5.2 Integrative or complementary collaboration in information seeking?

Hara et al. (2003, 959) formed a useful typology for collaboration in scientific work. Their typology shows how collaboration is a continuum from complementary collaboration to integrative collaboration. They also suggested several factors influencing the different types of collaboration (ibid., 959; See also Figure 4, p. 21). According to Hara et al., complementary collaboration takes place when researchers work in the same project but do not work closely with each other. Complementary collaboration may be sequential as well. Integrative collaboration means a fully integrated project.

When collaboration is a continuum from complementary collaboration to integrative collaboration, it means that few projects are located at the far ends of the continuum. Some kind of collaboration occurs in almost all projects, while few projects are totally integrated. This applies to the two research groups I studied.

Observation data is available only from group A. The three meetings observed were different in nature. Meeting 1 (8.9.2004) dealt mostly with research plans and timetables, meeting 2 (21.10.2004) dealt with basic concepts and theoretical approaches, and meeting 3 (29.11.2004) concerned the financing of the project and individual scholarships applied for and granted. The members of the research group also had some minor meetings between these meetings, but they were not included in the observation, and most of the researchers met each other separately quite often, except the researchers who were located in other towns. The observations are only a sample from all the group meetings.

Research group A had common survey data and common interview data, but all the researchers wrote their individual theses. The theses included articles or conference papers that were written jointly. Many of the researchers intended to write a doctoral thesis consisting of articles.

Meeting 2 lasted almost five hours (including a lunch break). It was a very intensive meeting starting with a researcher describing his experiences in a conference in Switzerland. Then the meeting continued with a discussion about the main theorists in the research field and the definition of some basic concepts. The leader of the research group talked most, but also the researcher who was somewhat more experienced than others talked a lot and other researchers asked questions directed at that researcher. The theorists and other scholars mentioned were, for instance, John Bowlby (several times), Anthony Giddens (several times), Giuliano Bonoli, D. W. Winnicott, Susan Goldberg, Joanne Cantor, and Patti Valkenburg. Altogether 19 scholars were mentioned and in some cases extensively discussed. The concepts discussed were, for instance, fragmentation and individualization. Altogether the research group talked about ten concepts in this meeting. Almost all the concepts were also mentioned in English, as the social science literature nowadays is published mostly in English.

In addition to theory and concepts, talk in the meeting 2 covered the group's research practices and publishing practices. The scientific journal system was discussed, including citation index and peer review systems.

Meeting 2 may be very typical of a research group working in academic settings. However, its intensity and effectiveness were impressing. Many of the scholar names talked about in the meeting, were later found in the literature lists shown to me in connection with the interviews. For example, Joanne Cantor was one of the names found in almost all researchers' literature lists.

Hara et al. (2003, 959) connected factors, such as work style, incentives, and socio-technical infrastructure, to the type of collaboration. In research group A work style was fairly independent. Researchers used to characterize themselves as detached or self-reliant, but when articles were written jointly, collaborative information seeking occurred. That kind of case came up in the interviews with researchers A4 and A5 who were co-writing an article for a yearbook and helped each other in finding relevant literature.

The independent work style, complemented with some collaboration in common writing projects, leads to the conclusion that the type of collaboration in group A is complementary. This kind of characterization is apparent also in the statement: "The importance (of the research group) is great, but it could be greater" (A2).

Hara et al. (ibid., 959) included external incentives in the factors that influence the type of collaboration. In research group A all members received or had received some funding directly from the project. All researchers also benefit from the prestige gained through the co-authored articles and conference papers. The data gathered for the project was also available for all the researchers. These kinds of incentives strengthened the motivation to collaborate.

Socio-technical infrastructure was the last factor found by Hara et al. (ibid., 959). Geographical proximity facilitates awareness of each other's research and potential collaboration. This kind of proximity was not possible in research group A, although three of the researchers were working in the same department. Communication tools, such as e-mail and telephone, helped to maintain contact and send materials between group members. The project also had a homepage on the Internet, but it was mainly aimed at an interested audience.

The leader of group B assured me they did a lot of collaboration, also in information seeking. All the researchers in group B studied the same phenomenon but in different contexts. This made it easy to identify literature that did not fit into a researcher's own focus, but could be ideal for a co-researcher. Also in the conferences, literature was gathered and later distributed to all members of the research groups.

The research group leader in group B characterized the experiences like this:

Q: "Have you noticed (collaboration), or have you even consciously shared duties in information seeking or otherwise? Or have you noticed somebody has taken that kind of role?"
A: "We have agreed it explicitly that we inform each other. It is some kind of principal decision. Everyone benefits, if somebody finds something that someone else can use. We even share ideas, and theories, and research methods, we have offered them to each other because we think if this doesn't suit me, it might suit somebody else. We share knowledge we have received through reading."
(Leader, B)

Research group B was smaller than group A, consisting of only three researchers and the leader. Only one of the researchers worked outside the home university. This made the research group more coherent. Despite the shared topic, researchers did not share the same research data. The project offered them some funding and a common theoretical approach and general support. The research group had the same communication facilities as group A: e-mail, telephone and a homepage on the Internet. Some articles and conference papers were already written together. All members of the research group had once attended an international scientific conference together.

Work style in research group B was independent, just like group A, but maybe because of the smallness and relative coherence of the group, they shared information more often than researchers in group A. Although they did not have the shared data, they had almost similar external incentives as group A. They also had co-authored papers and received some funding from the project.

Generally, group B seemed to collaborate more than group A. This concerned especially the group members working in the same department. They had group meetings every other week, while the separate group member could join the meetings four or five times a year. At least all the members in group B with one voice emphasised the benefits of group work. The researchers also had shared information about information tools, such as an alert system. One of the researchers had introduced an alert system in the group, and all had begun to use it. Furthermore, researchers in group B discussed terms and concepts in the same way as group A.

Integrative collaboration, according to Hara et al. (ibid., 959-963) means compatibility, not only in terms of work style, writing style or work priority, but also compatibility in approach to science and compatibility of personalities. This often includes a longer personal history together and trust that comes with that kind of history. Group B is committed to integrative collaboration. As they will

learn to know each other and each other's work even better than now, they have full possibilities to exploit the collaboration more and more. One of the researchers expressed it like this:

Q: "How do you experience information seeking in your group, how do you collaborate?"
A: "So?"
Q: "I mean sharing information and discussing information seeking..."
A: "I have experienced it very meaningful. We work a lot together and we know well each other's research subjects. When we search for ourselves, and encounter an article useful for somebody else, we certainly take a print or send a link or something. I have received many good ideas and hints. --- Coming from the own research group, the hints are more relevant and precise. They don't give hints about basic things any more. They already know your approach."
(Researcher B3)

5.3 Information sharing in research groups

Social networks influence who has access to information or technologies. An individual requires a social and media environment that enables and supports effective use of information. (Haythornthwaite and Wellman, 1998, 1102.)

The research group members can also use each other as repositories of information, based on earlier perceptions of expertise. This hypothesis is based on trans-active memory theory, created by Wenger (1987) and applied in the information retrieval of working teams by Contractor et al. (2004). What this means in practice is that it is important to know who knows. This kind of collective memory and division of work helps groups to manage information overflow. (For further reading on trans-active memory theory, see also: Huotari, Hurme and Valkonen, 2005, 112.)

A research group offers many opportunities for communication and information sharing. To what extent are opportunities in fact used? The following figures describe help, sharing and support in research groups A and B. Support means here either scientific support (ideas, relevant documents or discussions) or support with technology (infrastructure). In the studies reported by Finholt (2002, 73-80), computing problems partly caused failures related to collaboratories. On one hand collaboration needs a functional technological infrastructure, on the other hand these problems can be solved through social networks and collaboration.
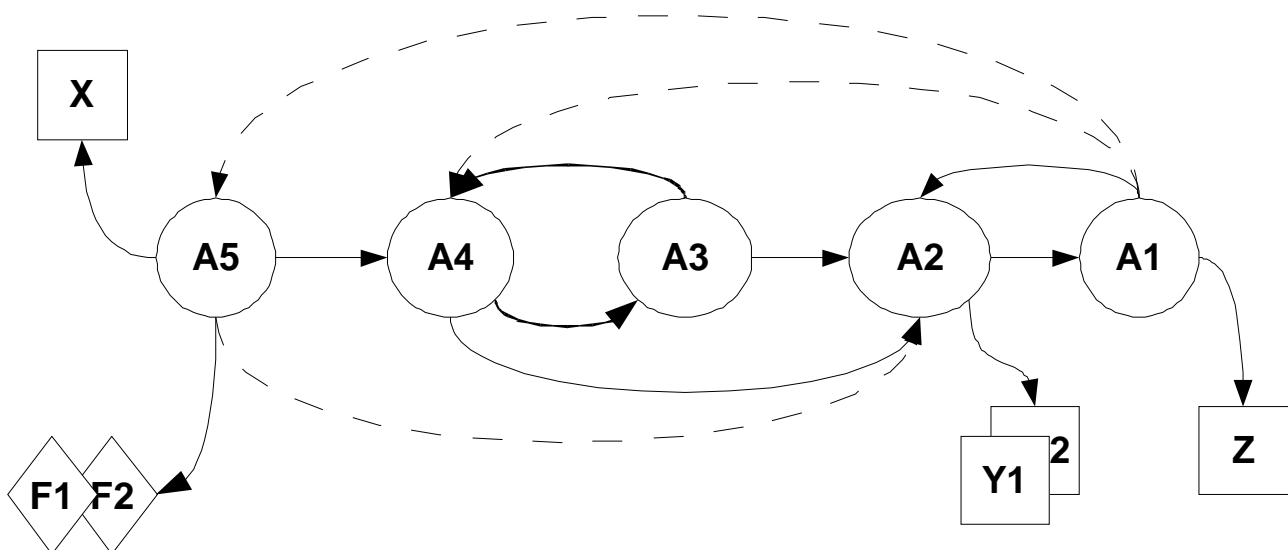
Figure 9. Sharing and support in research group A.[5]

A1-A5 = Researchers

X, Y, Z = Other colleagues in the department or nearby

F1-F2= Family members

Two of the researchers (A4 and A3) were room-mates at the same time as the interviews were conducted, and information sharing between them was naturally intensive. One of the researchers (A2) was mentioned by all the others, whereas this person mentioned only one of the other group members. The central position of this researcher could be explained by the social capital the researcher had gained through earlier studies: the researcher was a couple of years older than the others and had participated in quite a few projects in the department.

Besides own research group members, colleagues from the researchers' own departments or from other departments were mentioned as valuable sources of scientific support. The researchers A1, A2 and A5 mentioned contacts outside the research group. These contacts were mostly inside the context of the university. Researcher A5, who worked separately, also mentioned some family members as sources of PC advice. Researcher A5 emphasised contacts outside the university context. These outside contacts were important for the researcher's work, therefore they are

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5 Figures 9 and 10: Sharing means here that a researcher mentioned this colleague as the one he or she had benefited from, or as a person she or he would ask for help in information seeking. An arrow is coming from the person who mentioned the colleague, and is targeted on the person who had been the source of help. The leaders of the groups were not included in these figures.

included here. If the researcher's own research group cannot offer enough support, other social networks can compensate for it. Sonnenwald (1999b; See also Figure 2, p 12.) noted that social networks are a part of (university) context, too.

Researcher A5 wanted to stress that the research group had not supported her information seeking at all. However, researcher A5 had in fact also collaborated with one of the group members (Researcher A4) recently, when they co-authored an article.

Prekop (2002, 543-545) described some preliminary patterns of interactions between the roles of collaborative information seeking. One of the patterns was called "advertising information paths". The main elements of the pattern were that a participant advertised his or her information gateways and abilities to provide information on a specific topic, then he or she was used as an information gatherer or an information indexer. The pattern resembles the position of researcher A2 in group A. The researcher was known as an experienced information seeker and therefore the researcher was repeatedly used as an information gatherer or a consultant.
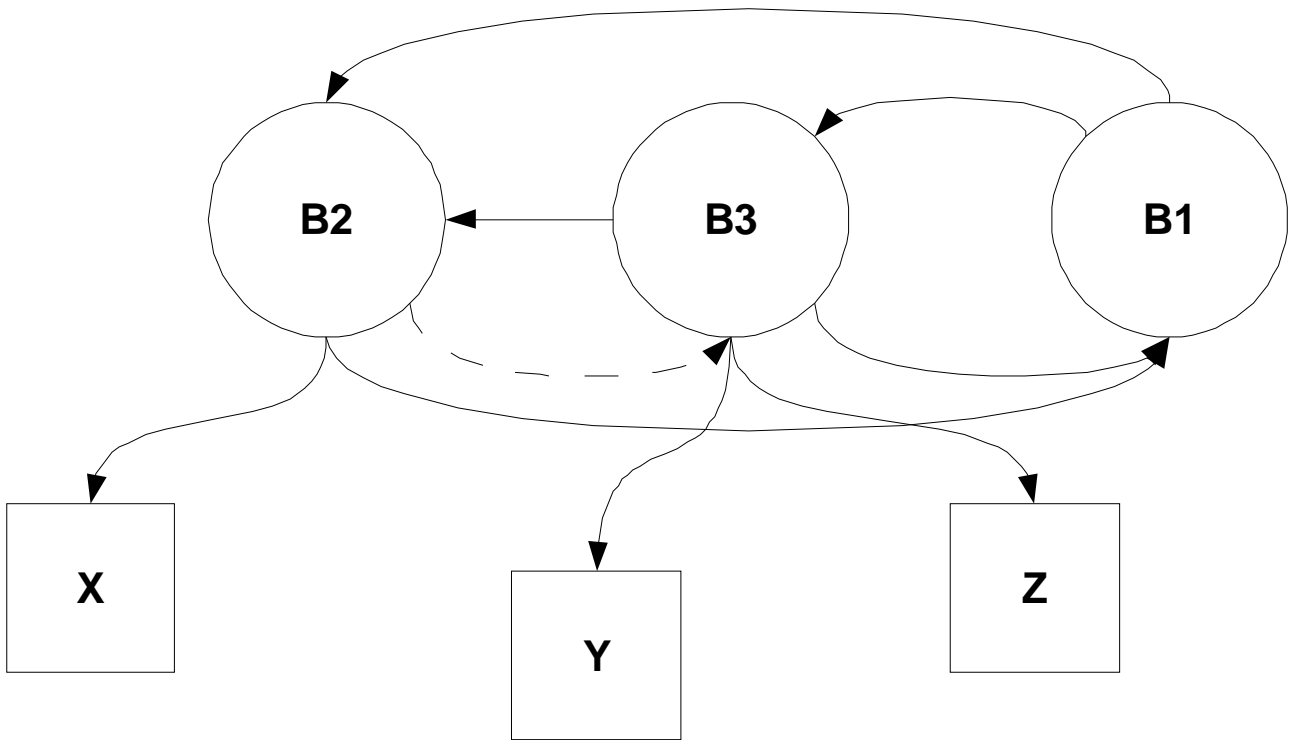
Figure 10. Sharing and support in research group B.

B1-B3= Researchers

X, Y, Z = Other colleagues in the department or nearby

Sharing in research group B was more evenly distributed than in group A, as can be seen in the arrows in Figure 10. The group members mentioned everybody else by name as potential sources of scientific support. Many kinds of collaboration had already occurred between the group members. Sharing was again most intensive between the two researchers working in the same room in the department.

It may be difficult to develop a working culture that values and encourages information sharing. One of the researchers (A2) referred to that by saying that the role of one's own research group is important for information seeking, but it could be much more important. "We have no real culture for information sharing", the researcher argued, and continued that, "information could be shared more frequently, why not on a daily basis".

Davenport (2002, 193-194) recommended investing in social interaction when information sharing is targeted. She listed four major features:

- clear rules on the operation

- shared language

- social events

- collocation of staff.

In groups A and B, collocation was a valid problem to be discussed. Collocation did not concern all group members, and it, together with some timing problems, might have caused some trouble in group A.

Choo et al. (2000, 27) noticed the problems in information sharing, too:

"Some of the best information sources are one's colleagues in the same organization. Ironically, as organizations become more information-intensive, the more problematic it has become to encourage members to share their information freely. Organizations have to work at creating and sustaining affective systems and cultural climates which promote the sharing of information and knowledge."

Collaboration in information seeking among the members of a group can result in the monitoring of large areas as, Sandstrom (1994) notes when presenting her model of information foraging. For example, group members can exchange information at a central place. This can mean the Intranet or a similar kind of technological solution. This can help a group to optimize their information seeking and, finally, possibly promote their interaction. Information filing and managing might be done at a central place using the Intranet or other protected information systems. These kinds of solutions were not used in the groups I explored.

It is often supposed that computer-supported groupware systems often fail to improve information sharing and decision-making in groups, as already discussed in connection of collaboratories. A groupware requires some people to do additional work for others, and they may not be the ones who derive the most benefit from the use of the groupware. New technology may also pose threats to existing social structures. (Choo et al., 2000, 92-93.)

These effects of groupware systems were, however, observed in studies in the 1990s, and may not exist any more. People are becoming more and more sophisticated users of ICT, and groupware technologies have become easier to maintain and use. (Wittenbaum et al., 2004, 294-295.)

For example, an exploratory research on collaborative information seeking suggested a more supportive environment within a working group, including new elements, such as weekly short meetings to discuss issues related to information seeking, an electronic communication system, or a database of information strategies (Fidel et al., 2000, 244-245).

Reijonen (2005, 86) discovered that in an interdisciplinary research group one of the researchers edited an on-line news bulletin where the researcher gathered recent literature references and other information. New literature was also registered into an on-line database available for all group members. In another interdisciplinary research project studied by Reijonen (ibid., 99), researchers built up an on-line data archive that was also meant for the use of future research.

Some kind of electronic archives might have helped information gathering and delivering in groups A and B, too. This opportunity was not discussed in the interviews.

5.3.1 Types of information sharing

Talja (2002) has studied information sharing in academic communities. She classified the types of information sharing to the following categories: strategic sharing, paradigmatic sharing, directive sharing, and social sharing.

In group A, I recognized three of these types: strategic, directive, and social sharing. The leader of the group emphasised the role of information sharing as a conscious strategy. She noted that some information tasks had been given to certain group members, for example one of the researchers had a task to inform others about potential conferences abroad. Furthermore, group A employed a part-time secretary, one of the researchers, who helped, in particular, the professor in information seeking, and informed the other group members of current issues. This work belongs to strategic sharing of information.

Directive sharing occurred in group A between the professor and group members, because four of the group members were doctoral students doing their dissertations in the project, and one was an undergraduate student doing a master's thesis in the project. Directive sharing occurred sometimes in both ways, especially as regards the more experienced researcher. Social information sharing occurred in group A, at least between some group members. Social information sharing was easiest and most regular between those two group members who shared a working room. E-mail was used for information sharing, both for strategic and social information sharing. Besides the secretary, who had a duty to inform others, two other group members were mentioned as being regular sharers through e-mail. One of them was the researcher, who had been given the task following conference information, the other researcher, who used e-mail most frequently, was the one who lived furthest away from the others.

When talking about the differences in information sharing, one of the researchers (A4) explained the situation by the financing of the studies. According to the researcher, those group members, who were financially dependent on the project, felt more obliged to inform others actively, while those who were financed by personal scholarships felt less obliged to inform others and be active information sharers.

In group B, I also recognized mainly three types of information sharing: strategic information sharing, directive information sharing, and social information sharing. The leader of group B said that the principle of information sharing had been expressed explicitly in group meetings. The principle had been obeyed in many kinds of situations, for example, when attending conferences, the group members used to gather material for themselves as well as absent group members. Directive information sharing occurred in group B through the supervision of the dissertation theses. The leader of group B supervised the group members' doctoral dissertations. Two-way directive sharing was not observed in this research group. The young researchers were not able to share much of their information with the research leader. Social sharing occurred in a rather unbiased way, but naturally the group members, who were sitting in the same working room, shared information between each other most regularly.

Information sharers can be characterized as super-sharers, sharers, occasional sharers, or non-sharers, according to the extent in which they engage in information sharing (Talja, 2002). Although my aim is not to study individual information seeking habits, there were some recognizable features in the information sharing cultures of the research groups.

The researchers in group A seemed to be sharers or occasional sharers. They used to share information openly, particularly when they were co-authoring articles or conference papers. The researchers in group B seemed to be sharers or super-sharers. All types of information sharing took place in the group. The members shared information in all kinds of situations, not only when they worked closely together on an article or a conference paper.

Prekop's (2002) study on collaborative information seeking identified various roles performed in a working group. He also took into account the organizational context where the group members came from. Despite the aims of Prekop's study, its results seem to be easier to apply in individuals' information seeking than in collaborative information seeking. Unfortunately, Prekop did not develop his patterns of collaborative information seeking further. Probably the patterns can be used and applied in the studies of collaborative information seeking more easily.

5.3.2 Non-sharing of information

It is not self-evident that information will always be shared when it is available and needed by others. I asked the interviewees what is their view if non-sharing of information occurs in research communities. Their general view was that it happens, but mostly non-deliberately, because of time and work pressures, or because the need just goes unnoticed.

The researchers had not encountered purposive non-sharing of information in their own research communities. On the contrary, one of them told how they share even the methods of data collection in their research group (Researcher B1). Furthermore, when they write articles together, references and ideas will be shared automatically (Researcher A3). Inside a research group it would be difficult to hide information, even if a researcher wished to do that. Non-sharing was not apparent in the research groups studied here.

The research communities confront rivalry to an increasing degree. This can be an obstacle to information sharing. The researchers noticed the possible situations in which non-sharing can be easier than sharing, when I asked if they have encountered non-sharing of information:

Q: "Are there situations in which information is not shared in the research community?"

A: "Yes, I think so. Or at least, I would do so, if I had awfully good information and I would like to be sure it will be published somewhere. (Speaking ironically.) Or it will be raised up just at the right time. I could keep it for myself, and even not tell my nearest people. Particularly if it could promote my career." (Researcher B2)

Also in group A the problem was recognized:

Q: "Can you say, to what kind of situations this (non-sharing) may be connected?"
A: "They can be so different. Some situations could be connected to people's own personal history, if they have met with injustice and therefore they are very sensitive. And some people just don't notice. They don't notice." (Researcher A2)

The issue of trust emerged in this last quotation. Information sharing occurs when people trust each other. If trust is damaged somehow, it is difficult to share information. The significance of trust is a topic that deserves to be studied extensively in information seeking (Marsh and Dibben, 2003, 465-498).

Interestingly, according to Talja (2002), non-sharing is mostly combined with research projects so unique that a researcher cannot share information with others, or a researcher cannot benefit from others. Talja argues that usually in the academic research community non-sharing does not refer to a condition when researchers hold back relevant information because of fears, or because of lack of social capital or social networks. She argues that instead non-sharing occurs when the research community cannot provide relevant information for one of its members, and he or she must struggle alone.

According to my interviews, the situation may not be quite as simple as Talja maintains. My informants found it totally evident that some kind of non-sharing occurs, although perhaps rather seldom. According to the informants, non-sharing mostly occurs non-deliberately. A lack of information sharing culture might be the most important factor.

Byrne (2001, 44-50) found difficulties in knowledge sharing in private companies to be associated with the so-called new deal of employment. According to him, employees were encouraged by the new deal culture to hold back their specialist knowledge and thus retain their employability value. Sonnenwald (1995) also found collaboration complicated when she studied inter-group communication in information system design. She called the phenomenon contested collaboration. Academic information culture is more open than information cultures in private companies. Information is shared through lectures and conference papers even before it is published through

other channels. In my study I did not find any specific signals of contest. However, Byrne's and Sonnenwald's arguments might be worth exploring in academic environments, too.

5. 4 Role of conferences and seminars in information seeking

Conferences and seminars are mostly seen as places for social meetings and scientific publishing. Researchers gather together to talk and get to know each other. It should also be taken into account that new results are first published in conferences before they come to light in periodicals and monographs. For both young and more established researchers, conferences and seminars can play a significant role in information seeking as well.

Established researchers often attend conferences regularly to meet colleagues and to collect new ideas. At the same time, they submit papers there and receive feedback for their research. Many established researchers also participate in the organizing of conferences.

"Where the discipline is going can be seen in conferences and the most recent issues of journals", one department member argued in the focus group interviews at the Oxford University. (Robb and Janes, 2003.)

For younger researchers, conferences are even more important places for building up their own networks, publishing research, and seeking information.

Also in library and information studies, conferences are well known for their information capacity, although their meaning has not been intensively studied recently (Seldén, 1999, 232-233). The functions of conferences are both active and passive. The established researchers mingle in 'invisible colleges'[6] and meet their academic friends ad colleagues. For those who are only building up their academic networks, conferences offer various opportunities. The presentation of a paper may draw attention to the author and help her or him into academic networks. This is why junior researchers are sent out to participate in pertinent conferences. Timing is a crucial point for succeeding. The research context and theoretical approaches have an effect as well.

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6   The concept established by Price (1961), and made famous by Crane (1972). See also p. 31 in my study.

One researcher from group A participated in the conference of European Research Network in Vocational Education and Training (ECER) in 2004 and presented a paper there, but the researcher was not very pleased with the experience. In the group meeting the researcher reported that:

"There were actually not any interesting issues from my point of view... it was educationalists' conference... it was an interesting experience, but I would not like to go alone anymore. It would be more interesting to attend a psychology conference, for example." (Observation, 21.10.2004)

The researcher gave two reasons for her less pleasant conference experience: the social reason and the context reason. Attending an international conference for the first time could have been a more satisfactory experience with colleagues. The choice of a conference had perhaps gone wrong, too. As a social-psychologist, she felt that pedagogical approaches were not very relevant.

All the group members and the group leader of group B participated in the conference of National Communication Association (NCA) in 2004 in the USA. They presented papers there individually in different working groups and a panel together with their American research partners. The group leader of group B emphasised the meaning of National Communication Association: "For us, speech communication scholars, the most important forum is the annual conference of National Communication Association... we try to go there regularly."

All the group members of group B mentioned this NCA conference, but not with special enthusiasm. Comments were such as: "You always promote your own study somehow, when you write a paper for a conference. Plus you can hear different viewpoints there and meet researchers." (Researcher B2); or : "There are not many people in the USA who study this topic at the moment so it (the conference) was not very meaningful. I experienced nothing agitating. The most important breakthroughs have happened in the discussions between the supervisor and myself." (Researcher B3). All the researchers appreciated the contact with American colleagues, however, and especially the panel they had there with them.

Although the group members of group B did not emphasise the significance of the NCA conference, participation may have had useful consequences later. The same can be said about the researcher from group A, who attended the educational conference. The conference experience could give ideas after a longer period, too. At least, it is easier for her to attend conference next time when she is already familiar with the procedures.

Large international conferences may not be the best places to start with. Researchers from group B previously had useful experiences from national or Nordic conferences. The timing had been right and the topic as well.

Q: "What kind of a conference or a seminar was it there on the Åland Islands?"
A: "It was, er..., there were people working in the field, there were work psychologists, nurses, and researchers, most from psychology. Some psychiatrists and doctors were there as well. I was the only communication scientist. It was very multidisciplinary. It was also a very pragmatic conference. Not so much about ongoing research, but it was more like examining this phenomenon and how to tackle the problem from very practical points of view. I got very much information that I needed then when I did my master's thesis. I have often thought the master's thesis had been much more incomplete without this conference. I got so much information about field work there."
(Researcher B3)

This researcher also said that a Norwegian psychologist, one of the most prominent researchers of mental violence and harassment in the work-place, participated in this conference on the Åland Islands. The researcher had the possibility to discuss with the Norwegian scholar and received a list of literature and other material from him.

Another researcher from group B (Researcher B1) told that she participated in the national conference of narrative researchers in Oulu. It was a useful conference for her. She had already learnt about narrative research in connection with adult pedagogy, and this conference made her even more convinced about this approach. For example, she decided there to join the mailing list of Finnish narrative researchers. Through this mailing list, she has received some interesting hints, even hints of research literature.

Another useful conference for researcher B1 was the school harassment conference in 2003 in Stockholm. The timing was good, as she was writing her master's thesis at that time.

Q: "It was an important conference for you (the Stockholm conference)?"
A: (laughing) "In fact, talking about information seeking, it was an awfully important conference. This Peter (pointing a name in the literature reference list) was there. And S. introduced his research, too." (Researcher B1)

In the end of the interview this researcher (B1) once more returned to the matter of conferences and seminars, and admitted that she had not realised how important they could be in the sense of information seeking.

The significance of conferences has not been questioned in information studies. However, their role in information seeking has not been explored much. Meadows (1998, 137-139) examined conferences as part of scientific communication. According to him, junior researchers were likely to gain most from attending conferences. They got there up-to-date research information, completed not too long before the conference. The common information provided was also "know-how" or stimulating ideas. Meadows argued, however, that a major problem with many conferences was the great amount of sessions and lectures that could cause information overload.

Looking at conferences from the point of collaborative information seeking, their meaning could be two-sided. Attending conferences together as a whole group may make interaction and communication better in a research group. Also attending conferences individually can be meaningful for the whole research group through ideas and material gained from a conference. Two researchers together might be an ideal combination of collaboration and independence. My interviewees emphasised the meaning of national and Nordic conferences in the beginning of the research career. The choice of a conference seems to be crucial, as well as timing.

5.5 Libraries facilitating information seeking and information sharing in research groups

Academic libraries as information facilitators for research and teaching have, in general, been studied a lot. Some of these studies are reported by IFLA (International Federation for Library Associations) in its conference proceedings (www.ifla.org).

For example, Robb and Janes reported in 2003 in the IFLA conference in Berlin about their study of the research support needs of Oxford University's social scientists. The study consisted of focus group sessions with academics, followed by a web-based survey e-mailed to the members of six social science departments. The scholars were asked among other things about their use of journal literature and their use of monographs, and about how they trace journal articles relevant to their work. In general, the majority of social scientists used journals heavily, although some differences existed between departments. Economists were more likely than scholars of any other discipline to regard journals as their primary source of information. On the other hand, in sociology, monographs were still often regarded as essential resources. Interestingly, the use of citations in articles was the most popular method of tracing relevant reading. 92 % of the 144 researchers that responded to this question used this method. 58 % asked their colleagues to recommend them relevant articles, and in

addition, 19 % also picked up useful references through their roles as editors and peer reviewers in scientific journals. Over half (51 %) of the researchers mentioned library databases and e-journals. Databases and e-journals were third in popularity after journal citations et al..

Meho and Tibbo (2003, 582) found networking to be an important feature of researchers' information seeking. The study of Robb and Janes confirms that characterisation. Colleagues and social networks were in their study on the second place after citations in scholars' information seeking. Foster (2004) also had networking as a part of his information seeking model. Foster located networking in the feature of opening. Foster (ibid., 233), argues networking was the main activity of interdisciplinary researchers.

Researchers often retrieve and exchange information without the aid of a library. This is good to keep in mind, as Robb and Janes (2003) reminded in their conference paper. However, sometimes researchers, without recognising it, in fact use the services facilitated by a library. This is sometimes the case in the use of e-journals ordered and paid for by a library. Many users of electronic journals do not even understand that their local library is playing a major role both in negotiating and paying for licences (Lynch, 2003, 205).

Talja (2002, 156) found that scholars did not often collaborate with librarians in information seeking. The scholars argued that there was no lack of information resources. Finding relevant documents was not a problem for them; the problem was deciding which documents were the most relevant. That is why scholars preferred to collaborate with colleagues, for instance through mailing lists, as some humanities scholars described. The scholars interviewed by Talja considered that they had no need for the kind of general and technical searching skills librarians possessed.

Sometimes, digital libraries offered by commercial enterprises substitute library databases. Lynch (2003, 203-204) characterized American scholars' information seeking behaviour: "People tend to use the local catalogue, along with a handful of mega-catalogues such as the Library of Congress catalogue, or the University of California's Melvyl. -- Or they also use Amazon.com, which is an effective digital library for book selection and acquisition. -- Amazon is much more effective than many current library online catalogues. Amazon has made a great effort to include enriched data such as book covers, tables of contents, and reviews that help users."

Two of my informants said they had bought themselves some basic books for their study. One of them mentioned Amazon as a place to buy relevant scientific literature. The Internet and credit cards have made book acquisition from abroad easy for everyone. Because of purely economic reasons, most researchers must rely on libraries as their main information channel. None of my informants was willing to use much of their own money for the acquisition of research literature. To what extent researchers use Amazon as a place in which to seek for information, without any intention to acquire books through it, is unclear.

The research projects had some funds for the acquisition of literature. These acquisitions took place mainly through library systems, but books remained in the possession of the project or the department.

In general, my informants connected information seeking and libraries quite naturally. For example, one of the researchers said in reply, when the topic of information searching came up for the first time in the interview:

Q: "What is your first thought when you hear the word information seeking?"
A: "My first thought is a computer and library databases. Online catalogues. And Nelli, the new system I have started to use recently, and Ebsco of course." (Researcher B2)

National or local library databases were mentioned several times in my interviews: Jykdok (three times), Arto (three times) and Helka (once). "Library databases" were mentioned in general, without naming any, frequently. An interesting detail was that researchers from Tampere never mentioned their university library's database Tamcat by name, but several researchers from Jyväskylä used the name Jykdok, instead of speaking of "the library database".

In fact, researchers from the University of Jyväskylä seemed to be quite happy with their library services, and some even praised them, and they were aware of the newest library services, too, whereas misunderstandings and ignorance concerning library services could be noticed among researchers from the University of Tampere. The reasons for these kinds of differences are worth a closer study. Any definite conclusions should not be drawn from this data, because the focus of the study was information sharing and collaboration within research groups, not the use of local library services. It is not possible to say whether the structure and information culture of the research group affected the informants' attitudes towards library services, or whether the researchers from the University of Jyväskylä were so loyal to their university that they refrained from criticizing it.

After all, the researchers from Tampere also seemed to use library services regularly and they were, in general, satisfied with their information seeking skills and the library resources. – The attitudes towards library services in the groups are discussed in detail later. (In chapters 5.5.1-5.5.4)

5.5.1 Electronic and printed journals

Because journals are such important sources for researchers, their use has been studied a lot, in particularly recently, when electronic journal systems have enhanced opportunities for obtaining more detailed statistics on journal use. Younger researchers especially, such as doctoral students, are eager users of electronic journals. (Vakkari, M., 2006, 39.)

Törmä studied FinElib[7] use through a web-based survey questionnaire in 2002, and found that the most active users were researchers from the natural sciences. The questionnaire was located on FinElib's own site. Thus, the sample consisted of self-selected volunteers, and may be therefore biased towards the most active users of digital libraries. However, 63 % of the natural scientists, who answered the FinElib survey, described how that they had used FinElib resources daily or several times a week. 34 % of humanists and 35 % of social scientists told that they had used FinElib daily or several times a week. (FinElib; Törmä and Vakkari, P., 2004.)

At first, the differences between disciplines seem to be prominent, but Törmä and Vakkari emphasise that social scientists and humanists who considered FinElib resources as useful and usable, did in fact use FinElib as much as natural scientists. When FinElib had a good reputation in a research community, it was frequently used. Thus, Törmä and Vakkari argue that the atmosphere towards digital library services varies between research communities, not so much between disciplines. The results show that the services of FinElib were most frequently used when both the atmosphere in a research community was in favour of its services, and material was found usable. Furthermore, in the research communities with high or rather high use of FinElib, 26-27 % of researchers had first heard about FinElib from colleagues. Colleagues could effectively market digital library services. (Törmä and Vakkari, P., 2004.)

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[7] FinElib, The National Electronic Library, a programme launched by the Ministry of Education, aims to support research and teaching in Finland. The National Electronic Library collects electronic materials, improves information retrieval from the information network and provides common access to information in electronic form.

Törmä's and Vakkari's results were in line with a British study (Bonthron et al., 2003) where the findings confirmed that the working environment of researchers provided clues for the use and non-use of electronic journals. Disciplinary differences were, however, still apparent in the use of electronic journals.

The fact that information culture and atmosphere as regards digital libraries affects the use of e-journals was also apparent in my study. When the information culture emphasises independence and information sharing as not very spontaneous, new information tools and services are seldom discussed, and that affects the use of information services. This kind of information culture was observed in research group A.

I interviewed researchers in 2005, almost three years after the FinElib survey was performed. Almost all of my informants mentioned spontaneously that they use journal databases licensed through FinElib. One of the informants even mentioned the FinElib consortium by name. The FinElib databases mentioned were Ebsco (five times), Science Direct (four times) and Sage Collections (once).

Talja (2006) presented new FinElib statistics and survey results in the FinElib seminar in the spring of 2006. The new FinElib statistics (Talja 2006; See also Vakkari, P. and Talja 2006)) show that almost 40 % of humanities scholars used the FinElib resources daily or several times a week, and 47 % of social scientists used the FinElib daily or several times a week, while 50-70 % of the scholars in natural sciences and economics used the FinElib daily or several times a week.

According to Talja (ibid.), 58 % of the respondents used only or mainly electronic journals as information sources. Results also revealed that the researchers working in a close-knit research group seemed to use electronic literature more than researchers working in a loose research group, or independently. Furthermore, interdisciplinary researchers used electronic literature more than others. The differences between disciplines in the use of electronic literature had decreased.

Differences in the amount of electronic journal use between the research groups in my study cannot be examined, while the groups are rather small, making quantitative comparisons of that kind insignificant. The FinElib resources were, nevertheless, mentioned many times in both groups.

Pasanen (2006) studied the use of electronic journals among doctoral students at Helsinki University of Technology. She was interested in whether there was any brand value aspect between young researchers and the electronic information services offered by the library. The results of the study demonstrated that the brand value, i.e. the effect of the brand name, could be positively affected over time. However, the effect was the combination of the authority of the library websites, together with colleagues as an important source of initial information about the electronic scholarly information services.

It was interesting to discover that two of the researchers from the University of Tampere spoke about a special e-mail offer from Sage to search their journal databases for free within a time frame. At the same time, the Sage full-text databases were in ordinary use throughout Tampere University Library. Through the database, all the journals of Sage were usable for free all the time. This Sage offer was also discussed in a meeting of research group A (Observation 8.9.2004).[8] The e-mail offer was forwarded inside the university to several e-mail lists of researchers.[9] Apparently, information coming from colleagues and other researchers was considered much more relevant than information coming from the library, or the information from the local library had not reached all researchers. It is also possible that the branded value of the well-known publisher Sage had an impact on these social scientists used to reading Sage's books and journals (Compare: Pasanen, 2006). Of course, this kind of offer was relevant for those researchers who were not able to use the library facilities on the campus regularly. At the University of Tampere remote use of electronic journals and databases became possible in November 2004. During the first few months, the marketing of the new opportunity was rather moderate and probably did not reach all the potential users.

Naturally, my informants used the open Internet for many kinds of purposes. The issue of scientific journals on the open Internet, so-called Open Access -journals, did not emerge in any interviews.

The issue of access was brought up by Meho and Tibbo (2003, 581-584), and they made accessing one of the main stages in their model of information seeking. While bibliographic databases were the main tool for scientists for identifying new literature, the issue of access was very crucial.

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8   I checked the launch of Sage Full-Text Collections in the Tampere University Library from Aniita Ahlholm-Kannisto (E-mail 5.7.2006). Sage's databases were launched in the beginning of 2004.
9   .In my job as an information specialist at the University of Tampere I discovered that researchers distributed the Sage offer through e-mail lists.

Nowadays, full-text information is increasingly available for researchers. However, access can still be a problem in information seeking. Access is often related to the topic of research. For example, the topic of the researchers studied by Meho and Tibbo was stateless nations. This topic was interdisciplinary and difficult in the sense of information seeking. Also understudied subjects could be difficult when there is very little literature to be obtained. According to Foster (2004, 233-234), networking helped researchers to cope with limited resources, such as time and access, or also with the problem of information overflow.

My informants were rather satisfied with the access of literature. Several of them mentioned, however, that they were not able, or willing to pay for access to information. They had encountered situations where a journal article or a conference paper was liable to a charge.

In one case, there was talk about the topic of the research as an aspect of access.
Q: "How often do you encounter the situation that you can not get access into an article or something like that?"
A: "It happens, but not so often. I guess that to X (a colleague) it happens more often. My topic is rather well represented in our library. Topics, such as working culture or aggression, are not so well represented." (Researcher, B1)

The location at the different university to other group members could be used as an advantage sometimes, as mentioned by a researcher in group A. The researcher asked other group members to retrieve an article that was not available at her nearest university.

The participants of the research conducted by Meho and Tibbo (2003, 582) often talked about their own collections as the primary information source. This made Meho and Tibbo create a new feature in their model of information seeking, a feature called information managing. It included filing, archiving, and organizing information. This is, naturally, daily work for all researchers to some extent, but it seems to be more important to some of them. To one of my informants this kind of activity was typical. The researcher introduced me to a huge amount of folders containing printed articles. All e-library services were available to the researcher, but the researcher was convinced that the own collection was necessary.

All my informants reported that printed journals still had some relevance to their studies. This fact was also verified in the study on the use of printed journals conducted in the Tampere University Library in 2004 and in 2005. Although printed journals located in the main library were used rather

infrequently, and the use was concentrated on few journal titles in 2005, the amount of those titles that were used over 20 times within the research frame of four months was 89. 26 % of the use focused on the journal issues that were more than 10 years old. (Iivonen and Bourramman, 2005.)

Drexel University's library in the USA started to migrate to an electronic journal collection in 2002. After migration an analysis of impacts was conducted, and it was found, in particular, that doctoral students relied on library-provided electronic journals. About 77 % of their library-provided reading was in electronic format, and about 63 % of their all reading was in electronic format. (King and Montgomery, 2002.)

In a comparative analysis carried out in the USA, about 40 % of scientific reading was from electronic journals in the sample universities (Drexel, Pittsburgh, Tennessee) in 2000-2003. Scientists clearly preferred electronic journals more than humanists and social scientists. Scholars, especially faculties in the USA, often subscribe to printed journals through membership of scientific societies. Without these subscriptions, the use of e-journals in the USA could be even stronger. (King et al, 2003.)

My informants mentioned some subscriptions, but those were to national scientific journals, such as Sosiologia. When printed journals were referred to, some of the researchers also mentioned professional journals, such as Opettaja or even newspapers, such as Helsingin Sanomat. This kind of media exposure could be important when material for a study was gathered, or as background information about the phenomenon in focus.

In general, my informants told me that they used printed journals less and less. This situation has changed considerably during the past few years. Researchers referred to convenience and even laziness as an explanation to why they favoured electronic library services and particularly e-journals.

The development of electronic journals has been fairly rapid in Finland. In the study conducted in 2000 by Talja and Maula (2003, 679-681), many non-users of e-journals were found among a sample population of scholars. Most of the non-users were humanities scholars conducting, for instance, history research or research on cultural studies. The non-use by historians was related to lack of retrospective material in electronic journal databases. Instead of e-journals, many humanities scholars had found Amazon.com as a relevant information source. Talja and Maula (ibid., 685) also

argued that electronic journals were more extensively used by those using direct searches as their dominant method of information seeking. Humanities scholars were likely to prefer browsing or chaining in their information seeking.

In my study, all the informants used e-journals, as well as printed journals. Also monographs were relevant, especially as sources of methodology and theoretical approaches. In the beginning of the research projects, directed searching seemed to be the most frequently used method, but later browsing and chaining were used, too. The researchers described the progress in information seeking by saying that "I seek more focused now..", or "I know some names", or "It was a joy when I discovered that this Buckingham was an authority...".

The significance of a research group can be relevant in finding key authors and in authorising findings made independently. In both groups there seemed to be those kinds of discussions. Interestingly, Talja (2006) argued that the meaning of browsing et al. as means of information seeking had decreased in favour of directed searching with search terms. My study does not support this result, but my sample is rather small compared to the large survey data exploited by Talja.

5.5.2 Learning about new information seeking services

Törmä and Vakkari (2004) found that colleagues played a major role in marketing new library services and facilities. The atmosphere towards digital library services varied between research communities, and digital libraries were used most where the atmosphere was in favour of these kinds of facilities. Research groups could constitute a research community inside the department. How do research groups adopt new library services? How do they learn of new library facilities? I present two cases here.

The first case is Nelli. During my data collection period, Finnish university libraries started to use a new information seeking portal called Nelli. Nelli, National Electronic Library Interface, is a national library portal that can be used to search a multitude of different resources. Nelli has been in production use at several Finnish universities since January 2005. The Tampere University Library launched the use of Nelli in March 2005. The official opening ceremonies took place on the 8th of March in 2005. The Jyväskylä University Library launched the use of Nelli at the end of January 2005. (Partanen, 2005; Järvinen, 2006.)

When I asked my informants about the use of Nelli, interesting aspects arose from the research groups. None of the members of research group A from Tampere had used Nelli. Two of them seemed to know what it was about. Nelli was quite a new service at the time of the interviews in May 2005. However, none of the researchers had tried it or looked at it.

Interviews in Jyväskylä took place in September 2005. All members of research group B mentioned Nelli spontaneously without me asking about it in particular. They told me they used it a great deal, although they had noticed a few shortcomings too, for example the slowness of the search through Nelli.

Q: "Is Ebsco still the most important database for you or have you found something else?"
A: "Honestly, I don't know how this Nelli works, but I have used it a lot."
(Researcher B1)

The leader of the research group had already used Nelli:

Q: "Have you some favourite sites there on the Internet? Where would you go now if you were supposed to search for something?"
A: "Now I would go to Nelli, it is here at the University of Jyväskylä, they all have this kind of names, I think this is called Nelli. It was introduced in the last spring or in early autumn, it is a new search programme, and you can choose the disciplines you are most interested in. Because we have such a multidisciplinary research topic, we have to find literature from psychological journals and educational journals and sociological journals and communication journals, and even medicine journals and law journals. We have so large area that we choose almost every discipline. We benefit a lot from this kind of extensive search programmes."
(Leader B)

There was a difference between research groups A and B as regards the Nelli portal. The researchers from group A hardly knew the Nelli portal and none of them had used it. The researchers in group B used the Nelli portal and said they had learnt of Nelli through the library's information on the Internet and from the e-mails sent by the library. They had not participated in any user education, despite some slight efforts. However, they considered that they could use the Nelli portal relatively smoothly. One of them had recognized the increasing usability of new library services and mentioned Nelli in this connection.

The timing of the interviews could be the major explanation of why the researchers from group A (from the University of Tampere) did not know much about the Nelli portal, and the researchers from group B (the University of Jyväskylä) had already used it and even considered it as their main site to go to for information seeking. The researchers from group A were also active information

seekers. Maybe they were so satisfied with their own information paths and skills that they did not need any new services, or their research projects were in such a phase that information seeking did not take place on a daily basis.

The study in the Helsinki University Library, carried out in November 2005, revealed that the Nelli portal had not been able to establish its position as researchers' main information seeking tool. However, researchers and doctoral students used Nelli more than undergraduate students at the University of Helsinki. (Vakkari, M., 2006, 59).

The role of the university library and its information policy could be taken into account. A Quality of the Services Survey conducted in the Tampere University Library in 2005 gave the result that almost 75 % of the clients were satisfied with the informing of the library (Ahtola and Partanen, 2006). However, the clients answering these kinds of surveys are mostly those who are active and skilful users of the services. Those who attend the library occasionally and know hardly any services beyond text books, seldom answer the surveys. Lack of information related to services was also raised as a challenge in the Tampere University Library and, for example, the renewal of the library home pages on the Internet was going on (ibid., 2006).

According to Pasanen (2006, 58), web-based sources seemed to be the most important sources of initial information about library services at the Helsinki University of Technology. Library web-sites, other web-sites, and search engines were mentioned in the answers of 58 % of the informants as being the most important information sources. Personal connections, such as colleagues, professors, and library staff added up to 28 % of the answers.

The second case is alert systems. Alert systems mean ongoing monitoring: a user can automatically be notified that a new journal issue is published, or that an article which includes certain keywords appears. A user needs only to subscribe to an alert in a database or on a publisher's homepage. References or tables of contents come automatically to a subscriber's e-mail. Most databases include alert opportunity; also most international academic journal publishers offer alert systems.

Talja and Maula (2002, 44) noticed that the researchers mainly did not use alert services in Finland in 2000, except for some environmentalists who used publishers' tables of contents alerts. However, some kind of alert systems were mentioned much earlier by informants in the study of Ellis (1989,

195). In the new FinElib survey (Talja, 2006) it was found that alert services were used the most in close-knit research groups in natural sciences.

Among my informants, there was again a division between the two research groups. None of the researchers from research group A used alert services, while all members of research group B used alert services. This was, however, mainly due to one of the researchers in group B who had found alert services in the Science Direct database and introduced this opportunity to other researchers in the group. As far as I understood, Science Direct was the only database in which they used alerts.

Research group B was fortunate enough to have a member who seemed to be a typical vanguard of new technology. Moreover, this researcher was also a (super-)sharer who wanted to share new information with colleagues. Prekop (2002, 545) found a pattern of advertising information paths in his study of collaborative information seeking. This activity might comply with the pattern.

These cases emerged spontaneously during the interviews. The Nelli portal had been recently launched in the university libraries, hence it was natural that the topic was discussed. Alert systems were chosen as an example of new opportunities, especially suitable for doctoral students and other researchers working for longer periods on a research topic.

The role of the research groups could be discussed, because there seemed to be relevant differences in these two cases. The information culture of the research groups could be considered as an explanation for the differences. Information sharing seemed to be more natural and unbiased in research group B, even if information sharing to some extent occurred in both research groups. (See Figures 9 and 10, p. 61 and 63.)

Timing is an explanation already suggested, and it is certainly related to the case of Nelli portal. The case of alert systems could be seen as an example of serendipity. Serendipities are a recognized part of information behaviour: they are not as accidental as they seem to be (Case, 2002, 84). Erdelez (1997) characterized the same phenomenon as information encountering. It is a typical feature of information seeking behaviour of more experienced information users, such as senior researchers, and also typical of those information users who prefer browsing and experimenting. Foster (2004, 233-234) found serendipity as a valued part of information seeking. According to him, serendipity was closely associated with browsing and networking. (For further reading about browsing and serendipity, see also: Ellis, 1993, 480; Meho and Tibbo, 2003, 580.)

One should bear in mind that, in addition to direct searching, information seekers could also be encouraged to browse and monitor in databases and on information portals. This is how they can learn about new information facilities and possibly encounter relevant information sources, too.

5.5.3 Information seeking education for researchers

Courses in information seeking and library skills have been incorporated into undergraduate curricula in higher education in Finland during the past few years. These skills have mainly been taught by library and information professionals. (Kautto and Talja, 2006, forthcoming.)

Most of my informants recalled that they had participated in the courses of library skills during their first years at university. Since they started to write their doctoral theses, they had not participated in any courses in library skills. An exception was a researcher who had participated in a course in information seeking in a role of a lecturer with his undergraduate students. Usually, the researchers reported, they did not have time to participate in library education. They argued as well that new programmes had good instructions and were possible to learn by using the method of trial and error.

Q: "Have you participated in courses in information seeking? You seem to know a lot about information seeking."
A: "Well, in the beginning of studies, I participated in a course that was targeted at communication students, but since then no. I am ready to learn new things and like to use computer. In my opinion, I can also adopt new things quite quickly. When I said that I hadn't used the folder services or similar things, I meant more like it is about motivation, I don't think it is about skills."
(Researcher B3)

Also other researchers from group B seemed to be rather satisfied with their information seeking skills. They expressed it as follows: "no big worries", "they (sources) are so easily on the net", and "I trust myself".

The users of the Tampere University Library seemed to be in general very independent and self-confident as regards their information seeking skills, as seen in the Quality of the Services Survey in 2005. The users of the library valued independent initiatives more highly than information seeking education or counselling services on the Internet. However, most users who attended information seeking education arranged by the library regarded it as useful or very useful. (Ahtola and Toivonen, 2006.)

A national study in American college and university libraries was in line with the study in the Tampere Univesity Library: a need for training and for assistance in finding information was not strongly expressed. The picture was, however, mixed because undergraduate students especially seemed to prefer asking library staff, but at the same time they expressed even less need for assistance than other informants in the study. (Marcum and George, 2003.)

Some of the researchers among my interviewees expressed, however, a slight concern that they might not be able to use the library systems efficiently enough and that there might be options and applications they did not know.

Q: "Have you wished to have education about some specific areas (in information seeking)?"
A: "Yes, I suppose. Certainly you could benefit from education. I feel unsure all the time, if I know enough, if I have found enough. But I cannot name any specific area."
(Researcher B1)

The same kind of experience had the leader of group B:

Q: "What about for example this Nelli? How did you learn to use it?"
A: "It was merely by trial and error...".
Q: "You found it by yourself?"
A: "The university informed through email that they had launched this new system, and then I decided to try it. Education was arranged, too, but I couldn't include it in my schedules. And then I trusted that I can learn it. I feel, however, all the time, that you don't master these new tools well enough. I feel that also when I use Nelli. Probably, I use only a very small part of it. And this concerns all the library services, I suppose. I don't use them efficiently. It is because of this lack of time, you don't have time to educate yourself in these things."
(Leader B)

Information seeking education arranged by libraries sometimes fails because of a lack of participants, especially when education is optional. Compulsory information seeking courses do not fit into the education of graduate students. In doctoral education however, alternative courses in information seeking could be scheduled. This could make information seeking skills a more visible part of a researchers' "know-how", while at present everybody has to acquire these skills more or less alone.

Collaboration could be exploited as well. In either of the research groups A or B, no initiatives were launched for collaboration in the education of information seeking. Probably, both research groups could have afforded information seeking courses designed for them. Or they could have sent one of

the researchers for education, and he or she could have told the others about new services and facilities. This kind of division of labour was settled in other matters, such as informing about coming conferences or new literature, as both group leaders reported.

5.5.4 Challenges in information seeking: finding keywords and search terms

The most crucial aspect of information seeking seemed to be the finding of keywords and search terms. Vakkari and Talja (2006) found on the basis of the FinElib survey that keyword searching was clearly the most used access method in all disciplines compared to browsing, chaining, or the use of social networks. This holds true especially for younger researchers and active users of digital libraries.

Almost all the informants talked about terms. In the beginning of the research project, search terms might have been too general or too broad, but gradually the right keywords were found.

Q: "You said it (information seeking) was not so easy in the beginning. How has your information behaviour changed since?"
A: "Not generally so much, but in the beginning you just sought and sought, but now I already know where I go and what I should do. And if I don't find, I know where to go next. First it was more like seeking everywhere, now I know where I seek for what. And with what kind of search terms. And sometimes I even know some specific names."
-- (later)
Q: "How do you now experience information seeking, what is the most problematic thing?"
A: "I don't know if you can say there is anything problematic, but I could have better knowledge on search terms, what keywords to use. I have tried all these ordinary ones, but maybe there are some (keywords) I haven't discovered. You cannot ever know what the name of the book is where they discuss children's television viewing. The topic is maybe not in the title of the book. The name of a book or an article doesn't tell everything."
Q: "Do you think your keywords are too broad?"
A: "In the beginning they were. I have learned, however, to use them little better. I cannot say I have big troubles (in information seeking)."
(Researcher, A3)

According to Foster (2004, 233-234), at the opening stage of information seeking, keyword searching might be ineffective when terminology is not yet appropriate. This is the phase where the own research group or fellow doctoral students could play a significant role in finding the right keywords.

Q: "How have your information seeking skills changed during the past few years? For example, how did you seek for information while you did your first seminar paper, and how are you seeking now?
A: "Then I couldn't do much more than put some search terms into Ebsco or somewhere. Or into Jykdok. Now I can seek much more focused for something specific. All kinds of screening is gone. I seek precisely for specific publications, or journals, or authors. I seek more specifically, I think. Perhaps more broadly, too."
Q: "How did you first find those English terms? I mean, you need to know what English keywords to use in Ebsco."
A: "Yes, I remember, there was this problem of which theoretical approach and like that. ... I remember we once had a meeting with our research group and we discussed English terms in communication science."
Q: "It was your ordinary meeting?"
A: "Yes, I still have the paper on which I scribbled English terms in the margin."
(Researcher B1)

And an example of the help of the fellow doctoral students:

Q: "Did you get any help with this matter of terminology?"
A: "When I did my master's thesis, I learnt the basic terms, but later other doctoral students, while reading articles and encountering some concepts, they gave tips (about search terms)."
(Researcher B3)

The collaborative information behaviour also occurred in research group A (Observation 21.10.2004), when the research group discussed concepts and central theorists related to their topics, 19 names of the central authors and 10 concepts were mentioned. Names and concepts were added to the discussion mostly by the leader of the group, but also the researchers participated by asking questions and making comments.

In the libraries, the problem of finding the right keywords or search terms for the search queries is often left to supervisors and teachers. Librarians think that suggesting keywords demands so deep an expertise in the subject that they do not want to take responsibility. However, the whole system of keywords and thesauri may be unclear for (doctoral) students, and there librarians can help students forward. My informants did not mention having received that kind of help from librarians.

Moreover, many librarians and information specialists are intermediaries, who use thesauri to describe publications in their own collections or databases. In spite of their limited knowledge of the field, they must choose the keywords describing the collections. This experience might help them to consult information seekers to find relevant keywords in the library (See also: Meadows, 1998, 207.)

The scholars interviewed by Talja (2002, 57) expressed, sometimes, their trust of a particular librarian, but in those cases, it was the librarian's scientific training that "qualified" him or her for setting keywords. Apart from that, the scholars who were interviewed did not collaborate much with librarians.

One of my informants had studied information science as a secondary subject. Also to her the choice of search terms was the crucial point.

Q: "What is most problematic for you in information seeking?"
A: "While you must handle search terms, it is sometimes difficult to find right search terms for a topic. If you then don't get much search results, you wonder, if the search terms were the right ones. It is related to search terms (potential problems), but they are not big troubles. I have managed pretty well."
(A4)

Directed searching with keywords is not suitable for all kinds of information seeking. For example, Talja and Maula (2003, 687-686) concluded in their study that keyword searching was more suitable for topical searches, not for searches where paradigmatic relevance was the primary relevance. Library-provided electronic services are mostly intended for directed searching, although browsing of tables of contents is also possible.

The open Internet could be a better source for seeking theoretical approaches or methodological aspects, in other words when a topic is not so important as research methods and research approach. The choice of search terms concerns also searchers on the open Internet. In addition, colleagues and scholarly networks are essential when theoretical approaches are sought and evaluated.

Q: "How much do you use other tools there (on the Internet), such as Google?
A: "I use Google regularly, sure. And usually, I have found Finnish doctoral dissertations using Google. Quite amazing! But in most cases then, I have started searching using my methods as a starting point. I consider who has done narrative research and I decide to look for what is the situation in Finland. By using Google I can quickly check that. And the same thing I have done with some concepts, such as Goffman's concept, faces. I have checked who has written about it. I may have found two or three researches using that approach. Then I could have looked at what other sources they have and how they have constructed their research."
(Researcher B1)

The only informant (when the leaders of the groups are excluded) who did not talk about search terms was the one with the most scientific experience. The researcher (A2) talked about his own paths on the Internet and about informal gatherings and networks as typical information seeking

places. This is in line with earlier research (for example Seldén, 1999, or Taylor, 1991) which indicate that more experienced researchers use formal information facilities rather little, since they rely more on their personal connections and personal files, which requires, according to Seldén (1999), that they have social capital helping their information seeking. These kinds of comments were also reported in the article by Star et al. (2003, 241, 245) as they cited professors interviewed about their information behaviour. Star et al. (ibid., 247) pointed out that absolute reliance on personal knowledge webs may become researchers' weakness, too.

6. DISCUSSSION

6.1 Results in brief

My first research question was the following*: how do scholars seek information in a situation of a research group?*

The significance of research groups for information seeking is more important in close-knit research groups than in rather loose research groups. This observation by Talja (2006) seemed to be relevant in my study, too. The structure of research group A seemed to be not so close-knit, and the group members were quite independent information seekers, whereas the structure of research group B seemed to be rather close-knit, and the research group members emphasised that they benefited from the group in many ways.

Generally, the meaning of the research group in information seeking could be at least threefold. First, the research group members could inform the group about relevant information resources and potential library or other information services. This kind of activity was found in research group B, for instance, when a researcher informed the other group members about alert systems. Informing took place also in research group A, but less frequently.

Second, the research group could to some extent compensate for the information seeking systems of library by distributing materials and information resources. This kind of activity was found in my study, too, but not to a large degree. Photocopies and monographs were circulated in both research groups, but in the majority of cases publications originated from the local library. The research groups operated as evaluators of the material in the sense also found by Talja (2002, 156).

Third, information seeking could be carried out jointly by the members of research groups. This kind of activity requires very close collaboration. It was found in these research groups only occasionally when common research tasks were carried out, for instance, a conference paper or an article was co-authored. Rather than in primary information seeking, the research groups helped the group members in choosing relevant search terms and keywords. These matters were discussed in both research groups, and these discussions seemed to be important for almost all the group members, as one of the major worries in information seeking was the choice of search terms.

The role of research groups was found to be important in marketing and informing about library systems. However, sometimes the information from colleagues was regarded as more important than information distributed directly by the local library. The case of Sage e-journals was interesting in this sense. Researchers at the University of Tampere did not recognize that they had full access to Sage journals through their library at the same time when they forwarded Sage's advertisements about temporary free use of Sage's journals.

However, the information efforts of a library could also prove quite successful, as verified at the University of Jyväskylä where, according to my interviews, the launch of the Nelli portal in 2005 succeeded.

Conferences and seminars were found to be important in researchers' information seeking. Except for Seldén (1999) and Meadows (1998), the role of conferences in information seeking has not been emphasised, and actually even Meadows talked more about scientific communication in general, not about information seeking in particular. The researchers in group B attended several meaningful conferences and seminars, some of which were national and some Nordic. The results of the conferences were also captured in the reference lists of the group members' publications. Several new author names originated from the conferences. The choice of a relevant conference was discussed in the interviews, as well as the importance of right timing.

My second research question was the following: *What kind of collaborative information behaviour occurs in research groups?*

The research groups studied were located in a university context. However, they were located at different universities in Finland and represented different disciplines. Research group A was located at the University of Tampere in the social science faculty, research group B at the University of Jyväskylä in the humanities faculty.

Generally, collaborative information behaviour and information sharing occurred in both research groups, but there were gradations in intensity. In research group A from Tampere, there seemed to occur occasional sharing dependent on work tasks. For instance, when a conference paper was written jointly, quite intensive information sharing and collaborative information seeking occurred. Between common work tasks information sharing was on a lower level and collaborative

information seeking occurred infrequently. One of the research group members felt she had not derived any benefit from the research group. Generally, collaboration in information seeking seemed to be mainly complementary in nature. The research group members struggled to reach for their individual targets and to proceed in their own projects.

In research group B from Jyväskylä, a more unbiased information sharing culture seemed to prevail. The research group members collaborated more regularly. All group members valued each other in information sharing and collaboration. The information sharing varied from ordinary to very intensive, depending on work tasks and timetables. Collaboration in information seeking seemed to be more than complementary, but not yet integrative. Hara et al. talked about continuum from complementary collaboration to integrative collaboration. According to them, integrative collaboration included compatibility in approach to science and compatibility of personality. Trust was needed for integrative collaboration and often required personal friendship or at least a longer personal history together. Research group B seemed to have more options for integrative collaboration than research group A.

The reasons for more collaborative information culture in research group B could be discussed more closely. Research groups A and B seemed to be rather similar at first glance. Group A was only slightly bigger, having five members compared to three members in group B. Collocation had not succeeded in either research group: in research group A, there were two group members who did not work in the same town; in research group B, one of the group members was located in a different town. The research groups had the same communication tools available. E-mail and telephone were used most. Intranet or groupware programmes were not used in either research group. Face-to-face meetings with all the group members present were used regularly in both groups. Conferences and seminars were attended with equal regularity from both research groups. All members of group A had the same research data available, whereas the group members in group B had to collect their own research data.

Factors mentioned by Hara et al., such as incentives and socio-technical infrastructure, did not appear to influence collaborative information seeking and information sharing in the research groups studied. Management style in the groups was not, however, studied, and the influence of management could not therefore be evaluated here. Hara et al. did not discuss timing, but other information studies have discussed the meaning of timing in common projects (for instance, Widén-Wulff and Davenport, 2005). Research group A started to work gradually, one group member after

another. The first group member had worked more than a year before the others started, and the rest of the group members did not start at the same time either. This had to be a great challenge for the constructing of information culture. It is evident that information sharing does not occur easily in that kind of information culture.

In research group B the group members had been more equal in the timing of the onset of the research group. They all had started more or less simultaneously. Furthermore, they knew each other from the earlier study group when they had written their masters' theses. Time is, in fact, mentioned by Hara et al. (2003, 964) in the conclusion in the connection of trust and integrative collaboration. In research group B trust had time to grow in interpersonal connections.

The non-sharing of information was discussed in the interviews as well. It was not an unfamiliar phenomenon to the informants, although they had not encountered it themselves. They argued that most non-sharing occurred unintentionally because of time pressures. However, some congruence between the so-called new deal of work in private sector and research work in the context of university can be noticed. Byrne (2001) argued that the new deal of work could cause non-sharing of information when employees want to keep their special knowledge in their own possession in order to maintain their value in the employment market. Short research projects at universities can cause same kind of situations in which loyalty to the employer and co-researchers is less beneficial than reaching individual targets. The existence of this kind of congruence is, however, very unclear and needs to be studied more extensively in other academic settings.

6.2 Evaluation of the research

My study was based on interviews and observations in the university context, more closely in the situation of two research groups. Interviews and observations proved to be good methods for acquiring information from academic researchers. The participants were open for questions and willing to be observed, as well. Trust was not a problem with them. A survey-based study could not have reached the kind of signals reached through this study. Interviews and observations were very fruitful and interesting. It is another question whether a survey, beside interviews and observations, would have yielded a more solid picture of the phenomena. It was not possible to carry out a survey because of limited research resources and time, and lack of the survey data was to some degree compensated for information from other studies. In fact, researchers' information seeking and

especially the use of e-journals have been studied a lot recently. The FinElib consortium has been an object of several studies, the most relevant of them also cited here (Törmä and Vakkari, P., 2004; Vakkari, P. and Talja, 2006); also many other relevant information seeking studies, in which statistical information was available were reviewed.

The analysis of the data was a real challenge as often is the case in qualitative studies. Silverman (2005) emphasised the comparison of the results. I compared the results between research groups A and B, and it proved to be fruitful. However, there were several potential occasions for too easy conclusions. I decided to interpret the data always for the best of the informants, hence aiming to avoid, for instance, drawing easy conclusions on the information seeking skills of the informants. All the researchers were skilful and hardworking information seekers using their own seeking style and information channels that were sometimes not the ones I myself would have chosen. As Forsman (2005, 36) put it: researchers do not behave as librarians want them to do. Information seeking paths prepared for them by librarians and information specialists may not be rational from their point of view.

Silverman (2005) also emphasised comprehensive data treatment that succeeded quite well in my study, except for some problems caused by the recording of the interviews. The two interviews that were only written down were not complete and detailed enough in order to have been used in all tabulations.

Tabulations and figures were useful. They formed a solid ground for the analysis that was otherwise very much based on quotations from the interviews. For instance, Table 3 confirmed the occurrence of an interesting deviant case that was then analysed and interpreted in more detail.

Regarding the reliability of my study, to some extent I was able to rely on my intuition and work experience as an information specialist in an academic context. The categories of my analysis appeared rather spontaneously, and the procedure is difficult to document. Some of the categories were already set to constitute the main topics in my interviews, such as the role of the research group, but some categories emerged from interviews, such as the category of keywords and search terms.

Ethical issues prevented me from giving a more detailed description of the research groups and the group members. The individual group members had to remain unidentified. For instance, the sex of

the researchers was not mentioned in connection with the quotations, because there were only a few male informants. They would have been identified too easily. I also avoided describing more closely the research topics of the informants, because the researchers can be quite easily identified with their topics. Since the focus of the study was on collaboration and on the situation of research groups, it was not necessary to be more precise in the characterization of the informants.

There is always room for some self-criticism. The data collected seemed to be adequate, but would more data have made the analysis more solid? Should the other research group have been observed as well? However, I am quite satisfied with the data and the analysis, including the choice of the research groups studied. Two different universities proved to be a good choice, too.

My aim was not to study so much the use of library services and individual information seeking but, perhaps due to the checklist of the interview guide, informants talked rather more about tools they had used and their relationship toward library services. I could have been stricter during the interviews and limited the discussion to the collaboration and the role of the research group.

6.3 Future directions

Collaborative information seeking is a rather new issue in information studies. Internationally, there is not much research done, as Talja and Hansen (2006) noted, in Finland even less. This study is one of the first contributions, in addition to the studies of Talja (2002), and Talja and Hansen (2006) and Reijonen (2005). More context-bound studies in collaborative information seeking are needed and the issue of information retrieval and information systems could be included more strongly as well. This is in line with the recent argument by Ingwersen and Järvelin (2005) that there is a pressing need for the integration of information seeking and retrieval in context.

Collaborative information seeking should also be studied through quantitative methods complemented with qualitative research. University libraries in Finland could perhaps invest more in comprehensive studies in information seeking and the use of (electronic) collections. University libraries have explored the use of journals and other collections and the attitudes of users (for instance: Iivonen and Bourramman, 2005; Vakkari, M., 2006), but more in-depth studies are needed, because the information about services does not always reach clients optimally.

Besides basic research in collaborative information seeking, future studies could be focused on trust in research communities and trust between librarians and researchers. Also the management style of research groups could be examined more closely, as well as the impact of management style on information culture in research groups. Furthermore, the influence of the disciplines or sub-domains in collaborative information seeking could be studied in more depth.

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FIGURES AND TABLES

Figures

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SVENSK SAMMANFATTNING

Eija Poteri: Samarbetande informationsbeteende: en studie av två forskningsgrupper. Åbo Akademi, 2007. Licentiatavhandling i informationsförvaltning.

Avsikten med föreliggande licentiatavhandling är att undersöka forskares informationspraktik i forskningsgrupper. Forskarna som studerades verkade inom samhällsvetenskaper och humaniora och forskade i medierelaterade ämnen. Den teoretiska referensramen i avhandlingen består av nya, holistiska modeller för informationssökning (till exempel: Meho och Tibbo, 2003; Seldén, 1999) och studier i samarbetande aspekter på informationsbeteende (Prekop, 2002; Talja, 2002; Talja och Hansen, 2006).

Forskningsfrågorna är: 1. Hur söker forskare information i forskningsgrupper? 2. Vad slags samarbetande informationsbeteende finns i forskningsgrupper? Materialet till avhandlingen insamlades via intervjuer och observationer. Tre möten i en forskningsgrupp observerades i Tammerfors universitet under hösten 2004. Gruppmedlemmar och gruppledaren intervjuades under våren 2005. Gruppmedlemmar och en gruppledare från en forskningsgrupp i Jyväskylä universitet intervjuades under hösten 2005. Allt som allt intervjuades två forskningsgruppledare och åtta forskare.

Forskningsgruppens betydelse för informationssökning är viktigare i närstående forskningsgrupper än i rätt så spridda forskningsgrupper. Betydelsen kan vara av minst tre slag. För det första kan gruppmedlemmar lättare informera varandra om relevanta informationsresurser och bibliotekstjänster. För det andra kan forskningsgruppen i vissa avseenden ersätta de formella informationstjänsterna med att distribuera litteratur och informationsresurser. För det tredje kan informationssökning utövas i samarbete i forskningsgruppen.

Forskningsgruppens betydelse var störst i informering och markadsföring av nya tjänster. För att mobilisera forskare att använda nya bibliotekstjänster behövs ofta rekommendationer från kolleger. Kollegernas betydelse i marknadsföringen av nya informationstjänster har framkommit redan tidigare i litteraturen. Denna studie visar att man ofta förhåller sig mera seriös till information som erhållits via kolleger än till information som kommer från t.ex. biblioteket.

En forskningskultur som innehåller informationsdelning samt ömsesidig tillit inverkade mest på samarbetet och på den samarbetande informationssökningen i dessa forskningsgrupper. Den gemensamma timingen i början verkade vara mycket viktig för informationsdelningen och de sociala nätverken i gruppen. Den inverkade också på samarbete och informationssökning.

Nyckelord: Informationssökning, Samarbete, Forskningsgrupper, Bibliotek

APPENDIX 1

Interview guide for the members of the research groups

1. Background information
- Age
- When graduated and what was the subject of the master's thesis
- Secondary subjects included in the degree
- Theory orientation

2. General about information seeking
- Do you seek information by yourself, or do you prefer to use the services of information specialists?
- In which phase of the research did you mostly seek information?
- How do you in general seek information for research purposes? Has your information seeking behaviour changed during the past few years? Have you participated in information seeking education?

3. The role of the research group and other colleagues
- What kind of role do your own research group and the research group leader have in information seeking? Has somebody in the research group a special role in information seeking? How much of your research literature have you found through the research group?
- Have you participated in other scientific networks than your own research group? What has been their significance for information seeking?
- What has been the role of conferences and seminars in information seeking?
- Do you discuss information seeking with your colleagues? With whom?
- Do you think there occurs non-sharing of information in research communities?

4. Information seeking experiences, feelings towards information seeking
- What is most challenging in information seeking? What is easy and enjoyable?

5. The interviewee was asked to bring along a recent article of her or his own, or a conference paper that includes a reference list
- How have you found the literature cited in your paper?
- What are the most central information sources in the paper and how would you describe the information in them (for instance: methodological, empirical, theoretical)?
- How have you found these most central information sources?
- How have you found the rest of the literature, and how would you describe that literature?

Interview guide for the leaders of the research groups

1. Talk about the interviewee's "scientific biography"

2. How have you started to explore this subject of the research group? What is your own theory orientation? Have you other research projects going on?

3. How has this research group been constructed? How have these people come in the group? How has this subject been chosen?

4. What are your scientific connections and networks? Where do you meet colleagues? (for instance: e-mail lists)

5. Information seeking in general
- What do you do when you need new literature? Where do you go?
- How do you follow journals in your research field and other literature?
- Has your information seeking behaviour changed during the past few years? Have you participated in information seeking education?
- How have you experienced information seeking?
- Have you encountered non-sharing of information? Do you think non-sharing occurs in research communities?

6. What is the role of conferences and seminars in information seeking?

7. The own research group
- What is the role of information seeking in the research group? How much do you share information? Who are sharers? What is your own role in the group in the sense of information seeking? Have you assigned special tasks to some members in the research group?

The checklist of information seeking

The interviewees were asked about the following issues, if they had not come up spontaneously during the interview.

1. Formal information resources
- databases
- search engines
- printed bibliographies

2. Browsing
- printed journals
- e-journals
- databases
- web-sites
- library collections
- portals (for instance: Nelli)

3. Systematic following of new information, how
(for instance: alert systems)

4. The significance of colleagues
- the members of the own research group
- other researchers in the department
- other researchers, where
- staff of libraries, information services or archives

5. The significance of scientific communication in general
- conferences
- e-mail lists
- web-sites of departments or scholars