

A Survey of Collaborative Information Seeking Practices of Academic Researchers

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ABSTRACT

Information seeking and management practices are an integral aspect of people's daily work. However, we still have little understanding of collaboration in the information seeking process. Through a survey of collaborative information seeking practices of academic researchers, we found that researchers reported that (1) the lack of expertise is the primary reason that they collaborate when seeking information; (2) traditional methods, including face-to-face, phone, and email are the preferred communication mediums for collaboration; and (3) collaborative information seeking activities are usually successful and more useful than individually seeking information. These results begin to highlight the important role that collaborative information seeking plays in daily work.

Categories and Subject Descriptors: H.3.3

Information search and retrieval

General Terms: Human Factors

Keywords: Collaborative Information Seeking, Group Work, Academic Researchers, Survey

1. INTRODUCTION

Information seeking and management practices are an integral aspect of people's daily work. In organizational work, information is vital for making decisions and coordinating activities. Therefore, organizations have developed a wide variety of processes and technologies to support their workers' information seeking activities. Much of this support has been for the *individual* information

seeker; in most organizations, information seeking has been traditionally viewed as an individual activity [1, 2].

Yet, collaboration is becoming an increasingly important component of work in organizations. Multidisciplinary teams are a common feature of modern organizations [3, 4]. To successfully accomplish their work, team members must collaborate with each other efficiently and effectively. One important aspect of the team's work is seeking information [5]. Yet, we have little understanding of collaborative information seeking practices [6, 7]. Therefore, to help team members work together effectively and to design information systems that support their work, we must understand the collaborative information seeking practices of team members.

To examine collaborative information seeking (CIS) practices, we conducted a survey of academic researchers in a small technology-focused research university. Researchers have traditionally collaborated with each other on research projects because of the often cross-disciplinary nature of the work. This collaboration has increased in recent years as information and communication technologies have improved. Although the survey asked a variety of questions, in this paper, we focus on three particular areas of interest:

- What triggers are most likely to lead to CIS activities?
- When engaging in CIS, what media or channel of communication is most likely used to collaborate?
- How successful are these CIS activities?

In a previous study, we identified three triggers that cause team members to collaborate when seeking information. These triggers are (1) lack of expertise (2) complex information need and (3) information not easily accessible [8]. In this study, we were interested in identifying which of these triggers researchers reported to be the most important reason for them to collaborate when seeking information. We also wanted to identify what were the primary mechanisms of collaboration (e.g., e-mail, face-to-face, etc.). We were also interested in determining the

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GROUP '05, November 6–9, 2005, Sanibel Island, Florida, USA.

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degree to which researchers found collaborative information seeking to be successful, particularly in comparison to individual information seeking.

2. COLLABORATIVE INFORMATION SEEKING

Although there is limited research on collaborative information seeking, researchers are beginning to explore this phenomena in various domains [9].

In a study of two design teams, Poltrock et al [10] found that each team had different communication and information seeking practices. Interestingly, they did not examine an individual's role in the information seeking process but rather how team members actively worked together to identify information needs. They argue that an understanding of collaborative information retrieval will allow for the informed design of technologies meant to support such work, and will also allow teams to work more effectively with these sources of information. In a study of information behavior in a hierarchical work environment – a military command and control environment – Sonnenwald and Pierce [11] described information seeking as a dynamic activity in which “individuals must work together to seek, synthesize and disseminate information.” They examined how team members maintained awareness of each other's information activities and how this awareness influenced their information sharing with each other. Finally, in a study of collaborative information seeking in the medical domain, Reddy and Dourish [12] argue that work rhythms play a role in healthcare providers' collaborative information seeking practices.

Although a few studies have examined collaborative information seeking in small group settings through ethnographic field studies, there have been, to the best of our knowledge, no studies that have used surveys to gather data on CIS from a larger population sample.

3. METHODS

3.1 Participants

Seventy researchers at a small a small technology-focused research university participated in this study. The majority were faculty researchers and a small percentage were graduate research assistants. Most participants were from science and technology disciplines.

3.2 Materials and Procedures

One-hundred and fifty potential participants were emailed a request to participate, which included an email link to an online survey. The response rate was 47%.

The survey included the following items:

1. What causes you to work together when looking for information?
 - (a) The information needed is complex.
 - (b) The information needed requires a different expertise.
 - (c) The information is not immediately accessible.

2. What medium are you most likely to use when collaborating with your teammates to look for information?
 - (a) Electronic forum; (b) Email; (c) Face-to-face; (d) Fax; (e) Instant message; (f) Telephone; (f) Web conferencing
3. When collaborating with teammates to look for information, we usually find the information for which the team is searching.
4. Participating in collaborative information seeking is easier than individual information seeking.
5. Participating in collaborative information seeking leads to more relevant information being found than when individually seeking information.
6. Participating in collaborative information seeking leads to information being found more quickly than when individually seeking information.

Participants responded to each phrase under item 1 and to items 3 – 6 on a scale ranging from 1 (strongly disagree) to 10 (strongly agree) and to item 2 on a scale ranging from 1 (not at all likely) to 10 (very likely). The survey also included free-text opportunities for the respondents to provide more information about their answers, if they chose to do so.

4. RESULTS & DISCUSSION

4.1 Triggers for Collaborative Information Seeking

In order to determine the triggers that are most likely to lead to collaborative information seeking, the responses to questionnaire items 1a, 1b, and 1c were considered. A one-way within-subjects analyses of variance (ANOVA) was computed with trigger serving as the independent variable with three levels (complexity, expertise, and accessibility) and rating as the dependent variable. This ANOVA was statistically significant $F(2, 132) = 16.878$ and $p < .001$. Bonferroni's post hoc tests indicated that expertise was rated significantly higher ($M = 8.17$) than both complexity ($M = 6.80$) and accessibility ($M = 6.73$), while complexity did not significantly differ from accessibility.

The findings indicate that academic researchers will most often collaborate because they find the information requires a different expertise than their own. Many academic research projects are multidisciplinary in nature and require particular knowledge that a researcher may not have. As one researcher stated, “The basic reason is that frequently a wide range of expertise is needed and no one person can possibly have all the skills needed to be successful.”

Although the complexity of the information need and accessibility of information could lead to collaboration, they are not viewed as strongly as expertise. In regards to information accessibility, one researcher points out, “information is usually accessible; however, someone else will likely understand it better.” For this researcher the difficulty was not in accessing the information but rather in understanding its relevance which may require different expertise.

During the CIS process, different researchers bring their own particular expertise and perspective to the team. When a researcher seeks information outside her domain of expertise, she will often turn to another researcher for help. These different expertises play an important role in the collaborative information seeking activities of the research team.

4.2 Communication Mediums for CIS Activities

In order to examine the relationship between communication mediums, and to reduce the number of variables for subsequent analysis, a principal component factor analyses with a Varimax rotation was computed on the responses to questionnaire item 2. A four factor solution was selected because all Eigen values were above 1, and a logical grouping of sources emerged. We labeled the first factor “*traditional*”, and it included: email, face-to-face, and telephone. We labeled the second factor “*web*” and it included: instant messenger, web conferencing, and web sites. The third and fourth factor each included one item, “*electronic forum*” and “*fax*”, and were, thus labeled accordingly. Factor scores were created by using the mean of all the items that loaded on a given factor, and these factor scores were used in subsequent analyses.

In order to identify the media that are most likely used for collaborate information seeking, a one-way within-subjects analyses of variance (ANOVA) was computed with medium factor scores serving as the independent variable with four levels (traditional, web, electronic forum and fax) and rating as the dependent variable. This ANOVA was statistically significant as $F(3, 195) = 84.709$ and $p < .001$. Bonferroni’s post hoc tests indicated that traditional media ($M = 8.10$) significantly outsourced all other types; both web media ($M = 3.64$) and electronic forum ($M = 4.58$) significantly outsourced fax ($M = 2.70$) but did not significantly differ one from the other.

Researchers preferred traditional media for their communication. Within this category, we included e-mail. Although e-mail may not seem to fit in the same category as face-to-face and telephone, it has become such a ubiquitous communication medium that respondents viewed it as being similar to face-to-face and the telephone. Furthermore, email has been in existence much longer than other types of electronic mediums such as web conferences. People are

more comfortable and experienced with email and personal conversations, whether these conversations are in person or on the phone. The other media were not as strongly embraced. For instance, we had anticipated that web-based media such as web-conferencing and instant messaging would have higher rating than it did. One possible explanation is “newness” of the technology. For instance, instant messenger tools are still relatively new and have not permeated to all groups and ages. Furthermore, some of the web-based media take time to set-up. Web conferences and web sites require time and effort unlike picking up the phone to talk to someone. Interestingly, although not included as a medium to rate, some participants added campus mail and “snail mail” as a medium for communication.

Whether collaborators are physically co-located or geographically dispersed, communication is an essential component of collaborative information seeking. The researchers orient towards the mediums that are familiar to them.

4.3 Success of Collaborative Information Seeking Activities

In order to address the question of whether collaborations are successful when engaging in CIS, a dichotomous variable was created for each success item (3 – 6), whereby a rating of 0 to 5 was considered “disagree”, and a rating of 6 to 10 was considered “agree”. We initially used a 10- point scale in order to be consistent with the rest of the survey questions. We then made the decision to reduce the scale to a dichotomous variable in order to evaluate this question with a test of statistical significance. Using this dichotomous variable, a chi-square analysis was performed on the frequencies for each success item. The results of these analyses as well as the mean rating for each item, with mean representing degree of agreement from 1 to 10 (10 representing “strongly agree”), is displayed in Table 1.

Table 1. Means and Chi-Square for Success Factors

Success Factor	Mean	Agreement		Chi-Square
		Agree	Disagree	
Usually find info	8.0152	64	2	$\chi^2 = 58.242, p < .001$
Easier than individual info seeking	7.1061	50	16	$\chi^2 = 17.515, p < .001$
Find more relevant info than individual info seeking	7.3788	55	11	$\chi^2 = 29.333, p < .001$
Quicker than individual info seeking	6.9394	48	10	$\chi^2 = 24.897, p < .001$

Success is often subjective and difficult to define, particularly with ill-defined tasks such as information seeking. Therefore, we asked four questions related to success to gain a better understanding of this important area. Most researchers agreed that when collaborating with colleagues to look for information, they usually found the needed information. They also thought that collaboratively seeking information was easier and lead to more relevant information than individually seeking information.

Collaborative information seeking allows researchers to rely on other colleagues for help and guidance; therefore, allowing them to focus on their own area of expertise. This could be one possible reason why researchers strongly believe that CIS allows them to quickly find more relevant information when compared to individual information seeking. At the same time, one researcher provided a note of caution stating that the success “depends on your team of seekers.” As in many collaborative activities, the success depends on how well the team of information seekers can work together when looking for information.

5. CONCLUSIONS

Collaborative information seeking is an important aspect of the work done by teams. The findings presented here raise issues that are important to consider when conceptualizing collaborative information seeking and how to best support this activity.

One important issue is how to support information seeking in geographically dispersed teams. Physical co-located team members can have face-to-face interaction. However, for “virtual” teams technical support becomes even more important because they do not have the advantages of the face-to-face interaction. This technical support could include features that allow individuals to exchange ideas, or share searches while collaboratively searching for information [9].

For the next stages of this study, we plan on conducting a field study of academic research teams to better understand the actual interaction of team members during the collaborative information seeking process.

6. ACKNOWLEDGMENTS

We would like to thank the anonymous participants who answered the survey. This research was supported in part by Missouri Research Board grant 1734.

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