A Framework for Studying Collaborative Information Evaluation

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ABSTRACT

In this paper, we claim that individuals involved in CIS may perceive that they would gain the benefits of collaboration most directly during the process of information evaluation because other members' evaluation, validation, and confirmation would add additional value to the information obtained. We propose a framework of collaborative information evaluation characterizing four different kinds of interaction: shared information evaluation, exchanged information evaluation, comparative information evaluation, and cooperative information evaluation. We then discuss future research directions investigating collaborative information evaluation in real work settings where information sharing, mediation, negotiation, evaluation, and acceptance among group members would be influenced by factors at multiple levels, including the nature of information goals, the characteristics of group members, and organizational context.

Keywords
Collaborative information seeking, collaborative information evaluation

INTRODUCTION
Unlike individual information seeking, collaborative information seeking (CIS) involves multiple parties who recognize the need for information seeking and the importance of information evaluation at different levels. While there is no single definition of CIS, researchers seem to agree on central concepts of CIS: collaboration and shared information need. That is, people work together to seek information and they have a shared information need (Poltrock et al., 2003; Reddy & Jansen, 2008). Shah (2012) stated that being democratic and inclusive are important principles for an effective collaboration. One assumption underlying conceptual foundations of CIS is that the entire process of information seeking is collaborative in the sense that individuals recognize a common information need and work together to resolve the need.

However, the contexts of CIS could be diverse. There might

be situations in which members of a group may not initially recognize the need to work collaboratively during the information seeking process. Therefore, they initiate a task individually, and later they realize that they need diverse expertise and a high level of knowledge from other members of their group to resolve the problem at hand. One might also imagine situations in which members of a group recognize the need for collaboration after they collect preliminary information and realize that they need to rely on other people's judgments of whether the information they gathered is valuable or at the very least good enough for them to use. Therefore, not all of CIS situations would be initiated with a shared information need and not all group members involve CIS at the same time. This calls for further investigations of diverse types of interactions between individuals in CIS.

Prior research work on CIS has identified what initiates CIS process and under what conditions CIS can be most effective. For instance, Hansen and Järvelin (2005) developed a conceptual framework for collaborative information retrieval (CIR) in the patent domain which describes "when, what, and how collaborative activities" (p. 1117) manifest in work performance. They also identified two categories of CIR activities in terms of document-related and human-related. Reddy and Jansen (2008) found four triggers of CIS such as complexity of information need, fragmented information resources, lack of domain expertise, and lack of immediately accessible information. Shah (2012) presented four conditions under which CIS would be most useful: common goal and/or mutual benefits, complex task, high benefits to overhead ratio, and insufficient knowledge or skills. Hyldegård (2006) discovered that a divergence in motivations and ambitions about CIS between group members had contributed to the negative feelings such as frustration and disappointment. What seems to be missing from previous CIS studies is an investigation about which phase of information seeking, such as starting from task initiation, topic selection, prefocus exploration, focus formulation, information collection, and search closure (Kuhlthau, 2004) people would find collaboration to be most effective.

We take the position that individuals are likely to bring others into the CIS process not only they recognize the shared information need but also they realize the desire of

evaluating the value of information collaboratively. In fact, we argue that individuals are likely to believe they would gain the most benefits out of collaboration during the process of information evaluation rather than in the phase of recognizing a shared information need. This is because while there is still high uncertainty of potential benefits of collaboration during the early phases of CIS, individuals may have clearer ideas about the nature of information seeking goals and intentions as they engage in information seeking actively, and it will help them to determine whether they need to work together to assess the value of information they obtained by bringing other members' knowledge, validation, and confirmation.

In this paper, collaborative information evaluation is defined as individuals' judgments of the value of certain information shared, negotiated, and changed through feedback, suggestions, and validations from other individuals as a result of interacting with them in the situations where they have common information problems to resolve. We argue that collaborative information evaluation could be a research agenda on its own right. This is because ultimately, the value of information must be assessed in terms of its relevance, value, and quality with respect to a particular task or situation, both of which normally involve others. Despite this, much of the literature of CIS focuses on identifying information needs collaboratively and coordinating information seeking activities rather than paying attention to the information evaluation during the CIS process.

The aim of this study is to better understand the characteristics of collaborative information evaluation by identifying different interaction types in CIS. Here, we propose a framework characterizing four different types of interactions that can contribute to the understanding of collaborative information evaluation.

INDIVIDUAL INFORMATION EVALUATION

Information evaluation is the most challenging task for most people (Rieh & Hillogoss, 2008). This assertion was later verified by Rieh, Kim, and Markey (2012) who investigated college students' search experience. Participants in their study reported that the evaluation of information was more difficult than choosing keywords to begin the search. Specifically, study participants responded that it was very difficult for them "to understand search results" and "to make decisions about the usefulness of information."

The evaluation of information by individuals has long been regarded as an important topic. Relevance has been a core notion determining the value of information. According to Saracevic (2007), there are roughly two distinct frameworks of relevance: user relevance and topical relevance. User relevance refers to a relation between information and the user's current state. Relevance is defined in relation to a user's particular situation, task, or problem. The more

pertinent the information is to a particular situation, task, or problem the more valuable the information is perceived to be to the individual. On the other hand, topical relevance denotes a relation between information and the topic or subject under consideration. If the information is about a particular topic that the individual is looking for, then the information would be perceived to be valuable for the individual. Saracevic summarizes the notion of relevance in information science with five manifestations: system or algorithmic relevance, topic or subject relevance, cognitive relevance or pertinence, situational relevance or utility and affective relevance. All of these multiple manifestations of relevance are based on individuals' information seeking and retrieval behavior.

FOUR TYPES OF COLLABORATIVE INFORMATION EVALUATION

Figure 1 presents four types of collaborative information evaluation which have characterized human-human or human-information interactions along two axes: information need axis and information evaluation axis. Information need axis illustrates individual information need and group-based information need while information evaluation axis shows individual information evaluation and group-based information evaluation.
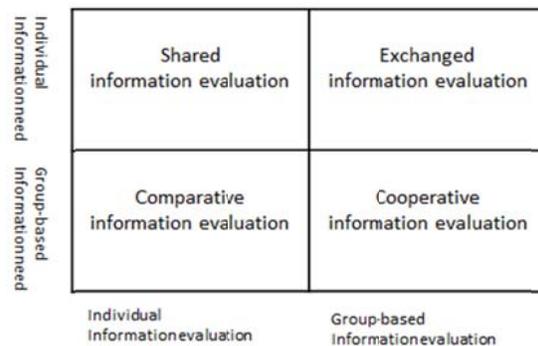

Figure 1: Types of collaborative information evaluation

Shared Information Evaluation

People often engage in the process of recognizing an information need, seeking information, and evaluating the value of information individually. Even when individuals complete the whole information seeking process themselves, the outcomes of their information seeking could be shared with other people. Therefore, when people make judgments about how useful information is to their information needs, the criteria used for evaluating information may not be entirely their own. They are likely to consider whether other people also would like it, or take into account whether other people also would find it to be useful or valuable. In other words, they use other people's evaluation criteria as a guide for their own evaluation and choices of information.

For instance, Rieh and Hilligoss (2008) found that college students' information evaluation was not entirely based on

their own judgments. When students worked on school homework, their judgments of information value were strongly influenced by professors' evaluation criteria. In their study, some students reported that they would not use certain types of Internet resources for their homework because they were "pretty nervous about just using the Internet because professors usually don't like it, and it's good to include some actual books" (p. 55). Here, their judgments are neither entirely based on their internal cognition nor based on the external situation at hand. Instead, students speculated about other people's judgments when evaluating information. Rieh and Hilligoss (2008) found other examples of this behavior including cases in which students bought gifts for other people or sought information on behalf of their dorm mates. In other words, when the use of information has consequences in other people's lives, students in their study considered the evaluation of others along with their own.

Exchanged Information Evaluation
It is quite common in both work and everyday life settings that people turn to their colleagues, friends, and family during the process of seeking information. Individuals have their own information need, and for some reasons they turn to other people for advice on where to start, how to find, what information can be useful. When another person provides information to an information seeker, he or she not only gives out a piece of information but also transfers his or her own judgments of the value and usefulness of information to a seeker. These two people are likely to discuss the value of information and exchange their opinions on the ways they evaluate the information. In other words, in this human-human interaction, each person's information evaluation is exchanged.

Yang and Rieh (2012) investigated the interactions between individuals during individuals' information seeking episodes in workplaces. They analyzed 450 diaries of advice-receiving and advice-seeking cases collected in the R&D department of a large company. They categorized colleagues' advice for information seekers into three main types: knowledge addition, value addition, and alternative suggestions. The "knowledge addition" advice type includes episodes related to pursuing background knowledge or sharing previous experience. The advice type of alternative suggestions includes referral to other documents or other people. Compared to other types of advice, "value addition" seems to rely on their colleagues' judgments of information value most directly as it includes episodes such as seeking ideas, opinions, suggestions, validation, or solutions.

Out of 272 advice-receiving diaries, 158 (58%) diaries were identified as value addition episodes. Participants reported that they were seeking ideas or opinions (N=72, 26.5%), suggestions (N=30, 11%), validation (N=20, 7.4%), or solution (N=36, 13.2%). The study also asked participants

to report up to five people they turned to for seeking advice on each task. Participants consulted more than two people to accomplish a task when seeking advice 27.6% of the time. Their results show that when participants were seeking "value addition" type of advice, they were more likely to consult multiple colleagues. The findings from Yang and Rieh's study suggest that (1) value addition is the most prevalent type of advice that workers pursue; (2) when workers seek advice for value addition they normally consult more than one person. These are the specific examples of how individuals exchange their evaluation of information value with their colleagues through group-based interactions.

Comparative Information Evaluation
When multiple individuals share the same information need, they are not always working together during information seeking. Often each person engages in individual information seeking process, and later people compare the outcomes of individual information seeking in order to verify, prioritize, and synthesize the information gathered through multiple episodes from multiple individuals. When they do, one of the primary tasks would be to compare what they selected as useful information and how they evaluated the value of information. For instance, participants of the BiblioBouts Project had the same group project for which they had to find information sources within undergraduate class environments. The task of the participants was to generate the top 10 best citations about a particular topic within the context of a group project (Markey, Leeder, & Rieh, 2012). Participating students first gathered documents they found from a variety of online resources. Then the entire class rated the relevance and credibility of each document. Students also provided their evaluation criteria behind their judgments. Although students engaged in information gathering individually, they evaluated the documents collaboratively by comparing the ratings of each source until they reach a consensus of what were the top 10 best citations for their group project. The students reacted positively to the collaborative evaluation process and felt more confident about the group's judgments. The students highlighted the feedback from others during the evaluation process as an enjoyable experience which allowed them to learn how other people made evaluations. The results of the BibliBouts project demonstrated a case of comparative information evaluation in learning environments.

Cooperative Information Evaluation
There are often situations in which people identify a common goal and involve in information seeking together to fulfill the goal "as part of explicit cooperation on a task" (Capra, Velasco-Martin, & Sams, 2010). According to Capra et al., "explicit cooperation" can take place work in various contexts such as work- and school-related group projects, even planning by families and groups of friends. People interact with other people intensively while

evaluating the value of information together as they share similar information goals and interests through cooperation.

Hertzum et al. (2002) observed 16 software engineering project meetings in which engineers shared information about the status of the project, coordinated activities, discussed problems and progress, made decisions, and reviewed and evaluated major project documents. They then analyzed 362 information seeking incidents to identify reasons for discussing, selecting, and referring to the information source. They found that 62% of the factors identified during the incidents were concerned quality of information sources and 14% were related to cost issues. Looking at quality-related factors closely, Hertzum et al. found that the assessment of an information source differ for people sources and document sources. When engineers assessed document sources they mentioned "appropriateness to task" and "up-to-dateness" most frequently during the meeting. For people sources, the two top factors were "appropriate organizational unit" and "appropriate project experience." Another important finding of their study is that CIS is not simply about providing information sources to other people. Their study demonstrated that the core part of CIS is cooperative information evaluation as group members "assist the information seeker in assessing the trustworthiness of other sources" (p. 596).

CONCLUSION

The future research directions of collaborative information seeking could be heading toward promoting and increasing collaborative efforts in the process of information evaluation. This topic has been understudied as most previous studies about evaluating the value of information were conducted in individual information behavior contexts. We are particularly concerned with collaborative information evaluation in work settings. In general, work is becoming increasingly more collaborative (Robert, 2013; Robert, Dennis & Hung, 2009). Specifically, workplaces are environments in which information seeking and evaluation tend to be mediated, shared, and negotiated most actively (Yang & Rieh, 2012). In addition, collaborative information evaluation in work settings is determined not only by individuals' knowledge, experience, and perceptions of task complexity but also by the nature of groups and organizational culture (Robert, Dennis, & Ahjua, 2008). For instance, at the group level, diversity of team members, leadership, size of a group, mutual long term goals could affect the ways individuals make judgments of information value. At the organizational level, the size, type and culture of an organization would influence the collaborative information evaluation process. As such we believe that workplaces offer one of the most interesting contexts to study collaborative information evaluation.

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