

Towards a Model of Collaborative Information Behavior

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ABSTRACT

The research area of *Collaborative Information Behavior* (CIB) has received increased interest in recent years. Various studies conducted within *organizational* as well as *non-organizational* settings have provided us with many key insights about CIB. However, the research area is still relatively young and is at a pre-paradigmatic stage. Although there are a growing number of CIB-related studies, we still do not have a canonical definition of CIB. The demarcations among Collaborative Information Behavior, Collaborative Information Seeking (CIS) and Collaborative Information Retrieval (CIR) are not very clear. Consequently, there are a variety of perspectives on CIB. In this paper, we discuss both the *Social* and *Technical* perspectives within CIB, and present a model illustrating the various activities that make up CIB. Finally, we discuss the potential usefulness of the model in bridging the gap between the social and technical streams of CIB research, and ask for suggestions concerning subsequent improvements that could be made to the model. The contribution of this position paper is in developing an early CIB model and in envisioning CIB as a set of activities that occurs across multiple phases.

Keywords

Collaborative Information Behavior, Collaborative Information Seeking, Models, Terminologies.

1. INTRODUCTION

There is a growing interest in the collaborative aspects of information seeking, searching, retrieval and use. This interest is partly reflected in the increasing number of research studies published and workshops conducted pertaining to this area of research [1-7]. However, researchers have used a wide variety of terms such as collaborative information seeking (CIS), collaborative information retrieval (CIR), collaborative web search, collaborative sensemaking and others to describe the activities in this area. There have been very few attempts in the past to synthesize these disparate, yet related concepts and their associated research findings. Consequently, there is a lack of conceptual clarity concerning these terms, leading to a tendency to use them interchangeably. As Olson et al. have stated [8], common vocabulary leads to a synthesis which is essential for cumulative theory building. Such a synthesis would not only help us better understand CIB, but also better translate research findings into workable design recommendations and technical solutions.

One of the reasons for this lack of conceptual clarity is the split between the *social* and *technical* streams of CIB research. Researchers in the *social* stream conduct detailed ethnographic

studies aimed at uncovering the everyday work practices associated with collaboration and information behavior. Researchers in the *technical* stream conduct user studies, build, deploy, and evaluate systems which are aimed at better supporting collaboration and information seeking activities. Though the findings from both these streams of research could potentially inform and benefit each other, we see little evidence of a cross-fertilization of ideas occurring between them.

In this paper, we attempt to bridge the gap between the *social* and *technical* streams of CIB research by putting forth a model of CIB that attempts to integrate the two streams. We do this by synthesizing the core concepts from both the *social* as well as *technical* perspectives on CIB. We also argue for using the term *Collaborative Information Behavior (CIB)* as an umbrella concept, encompassing the constitutive set of activities such as CIS, CIR, and collaborative sensemaking. Finally, we discuss about the potential usefulness of the model in bridging the gap between the social and technical streams of CIB research.

2. WHAT IS COLLABORATIVE INFORMATION BEHAVIOR?

In this section, we examine the question, “What is CIB and how is it different from other concepts such as CIS and CIR?” We present a working definition of CIB and an initial framework for conceptualizing the CIB research landscape.

2.1 A Working Definition of CIB

As noted by Vakkari, one of the striking features about studies related to information behavior is the use of core concepts without definitions [9]. Most of the community is in agreement that many of the concepts (*for e.g.*, information) are indeed quiet difficult to be bracketed into a single definition [10].

However, it would be helpful to specify the working definitions of core concepts because these definitions provide a frame of reference.

2.1.1 Individual vs. Collaborative Information Behavior

Wilson defined Information behavior as “the totality of human behavior in relation to sources and channels of information” [5] This includes both active as well as passive information seeking and information use. In general, ‘Information Behavior’ involves the generation, acquisition, use, and communication of information. However, this model has an underlying conceptualization that views information behavior primarily from an individual user’s perspective and as an intrinsically individual

activity, largely ignoring the collaborative aspects of work and organizing.

One of the first definitions dealing with the collaborative aspects of information behavior (specifically, information retrieval) was proposed by a team of researchers from the University of Washington. They defined Collaborative Information Retrieval as “activities that a group or team of people undertakes to identify and resolve a shared information need” [11]. Reddy and Jansen observed that there are two central concepts [6] within the above definition.

- **Collaboration** i.e. people working together to seek information.
- **Resolving an information need.**

Further, Foster defined the research area of Collaborative Information Seeking as “the study of the systems and practices that enable individuals to collaborate during the seeking, searching, and retrieval of information” [12]. However, Hertzum criticized Foster’s definition because it assigns *information sharing* a peripheral status and separates *acquisition* of information from the process of *being informed* by it [4]. Hertzum emphasized the central role of *information sharing* in CIS, and defined it as the “activities performed by actors to inform their collaborative work combined with the collaborative-grounding activities” [4] i.e. he conceptualized CIS as a combination of information sharing and collaborative grounding. Oftentimes, researchers use one definition in place of another and use the terminology interchangeably. For example, most studies tended to use the CIR definition put forth by Poltrock et. al [11] in the place of CIB.

In an attempt to integrate the various terminology associated with Collaborative Information Behavior, we put forth a working definition of CIB as the “totality of behavior exhibited when people work together to identify an information need, retrieve, seek and share information, evaluate, synthesize and make sense of the found information, and then utilize the found information.” However, this definition does not imply that *all* of the activities must be present for CIB to occur. Instead, the definition is aimed at highlighting the different activities that could occur as part of collaborative information behavior.

2.2 How is CIB different from Collaborative Information Seeking and Retrieval?

We envision CIB as an umbrella concept that encompasses other constitutive concepts such as CIS and CIR. We argue that the term ‘behavior’ best captures the overall dynamics which occur at the interplay of ‘collaboration’ and ‘information’, as opposed to other terminologies such as ‘*seeking*’, ‘*retrieval*’ and ‘*searching*’. Drawing upon Allport’s notion of a *structronomic conception of behavior* [14], we place emphasis on the notion of *collective structure* that is at the core of any collaborative activity. As Allport [14] stated,

“Wholenesses, or totalities, must be sought not in “things” or “agents,” for matter, as commonly conceived, does not provide a workable paradigm of wholeness....They lie, instead, in (completed or self-closed) structures of ongoing and events. Actually, we live in and through *structuring* at all levels” (p.17-18)

By focusing on the dynamics involved in how these collective structures emerge and unfold through repetitive cycles of

interlocked behaviors [15], we can gain a better understanding of various activities such as CIS, CIR, and collaborative sensemaking that happen at the interplay between ‘collaboration’ and ‘information’. Thereby, we argue for using the overarching term “Collaborative Information Behavior”.

2.3 Collaborative Information Behavior – An Initial Framework

Researchers have examined separately the constitutive concepts that make up the umbrella concept of CIB [6, 16-23]. Based on a review of the extant literature, we have conceptualized the CIB research landscape into two major streams – *social* and *technical* (see Figure 1). Some examples in the social stream include problem identification and collaborative sensemaking, collaborative information seeking (CIS), collaborative information searching & retrieval (CISR) and collaborative information use (CIU). Some examples in the technical stream include Collaborative Information Seeking, Searching & Retrieval, Collaborative Web Search & Collaborative Querying, and Collaborative Filtering.

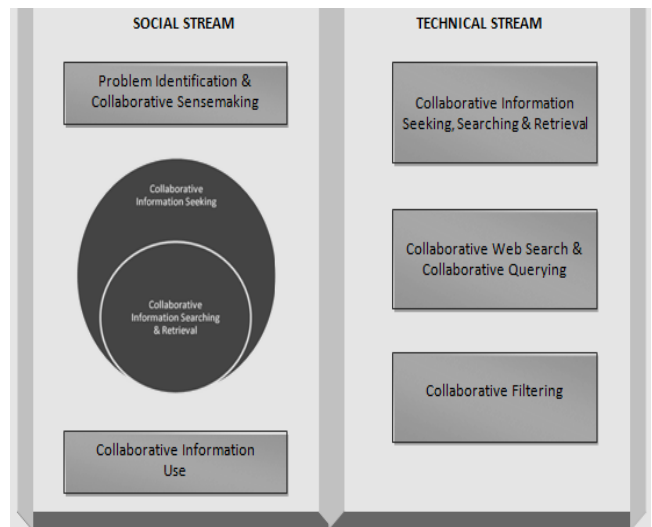


Figure 1. Examples of CIB research landscape

This framework provides an overview of the CIB research landscape, and highlights some of the concepts that underscore CIB.

3. A MODEL OF CIB

In an attempt to integrate the core findings of past CIB research, we have developed a model of CIB in organizations (See Figure 2). It is a *three phase model*. Certain activities are specific to certain phases, while other activities cut across all phases. This is a situated model embedded within the *organizational context*.

Although there are other models that look at the social aspects of information seeking and searching (for example, Evans & Chi’s model on ‘Social Search’ [30]), the focus of our model is to conceptualize the broad set of activities that could potentially occur within CIB.

3.1 Phase 1

Phase 1 starts with the *process* of problem identification - a process through which groups of people identify a problem and create a shared representation collaboratively to arrive at a shared understanding of the situation. Shared representation includes any

form of external representation, including conversations, verbal communication and representation via artifacts and more. This shared representation informs and refines the identified problem, which in turn elaborates and fine-tunes the representation. The

model shows that problem identification reciprocally shapes and gets shaped by the subsequent phase through the continuous process of moving from shared representation of the problem to the shared understanding of the situation

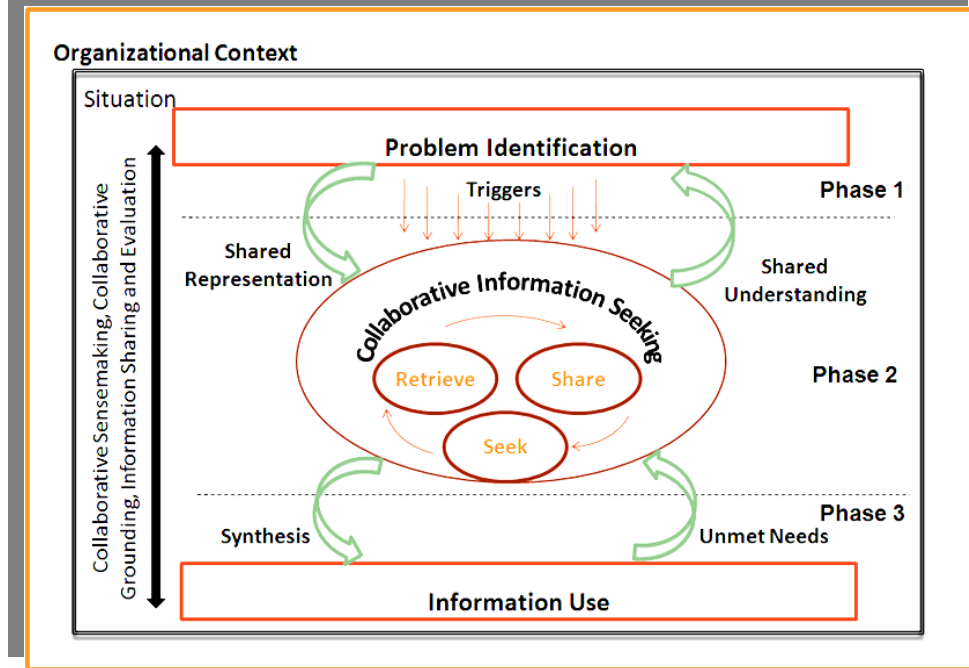


Figure 2. An Model of CIB

3.1.1 Triggers

Triggers play an important role because they act as critical transition points from Individual Information Behavior (IIB) to CIB. IIB has various triggers such as a gap between the context and a desired situation [24] or a lack of information, which prompt a set of activities [25]. However, CIB has more complex triggers that act as transition points from IIB. The four major triggers identified thus far include Complexity of information need, Fragmented information resources, Lack of domain expertise and Lack of immediately accessible information [6].

3.2 Phase 2

The second phase of activities within CIB gets triggered when the problem-in-context meets the set of characteristics listed above, and gives rise to **Collaborative Information Seeking (CIS)**. CIS is the *purposive* seeking of information by two or more individuals because of an information need in order to satisfy a shared goal. It may involve the use of a variety of systems, people and channels in order to address the information need. We conceptualize that CIS is comprised of other micro-level activities such as *retrieving* and *sharing*. These ‘micro-level’ behaviors are exhibited by two or more individuals interacting with one another and also with systems of all kinds. It consists of interactions with the system at different levels, including the cognitive and affective level as well as user-system interactions. The term ‘searching’ is used to denote both active and passive modes of acquiring information. As Reddy and Spence (2008) noted, this division of labor is common in CIS practice and is characterized by an iterative practice of searching-sharing-searching until the needed information is located [1].

3.3 Phase 3

Finally, information use consists of the physical, mental, and communicative acts involved in incorporating the information found into the group’s existing knowledge base in order to achieve common understanding. Examples of information use behavior include physical acts such as sharing artifacts, codified documents, or comparing and evaluating retrieved information with an existing knowledge base, etc. The output from the previous phase is collaboratively evaluated and synthesized, and if actionable, put to use. One could claim that information needs are met when the synthesized information that is put to use resolves the problem-in-context.

3.4 Activities that cut across all phases

3.4.1 Information Sharing and Evaluation

Throughout the entire process, there is continuous information sharing [26]. Evaluation occurs within each phase as well as between the phases. For example, in Phase 1, actors would collaboratively evaluate the identified problem before they move on to the next phase of CIS. Within the next phase, actors continually evaluate the retrieved and shared information, and later, collaboratively evaluate the information that is synthesized towards the end of the phase.

3.4.2 Collaborative Grounding

Sharing and evaluating information alone is not sufficient to accomplish various activities that constitute CIB. In addition to information sharing, collaborative grounding is also required. Hertzum construes collaborative grounding as “the active construction by actors of a shared understanding that assimilates and reflects available information” [4] (p.958). Collaborative Grounding requires that the meaning of shared informational

items be discussed, debated and resolved (at least at the local level). As Hertzum emphasized, through this view one could strike a balance between individual reductionism and group reductionism [4].

3.4.3 Collaborative Sensemaking

Collaborative sensemaking occurs when multiple actors with different perspectives about the world engage in the process of making sense of ‘messy’ information [20, 21]. Qu developed a framework called Sensemaking-Supporting Information Gathering System (SSIGS), which is an integrated workspace that supports information gathering and sensemaking [27]. The framework emphasizes the role of external representation in sensemaking. Later, Qu et al. put forth an enhanced framework for Collaborative Sensemaking, which moves from the emphasis on shared representation to shared understanding [28]. They argue that, in collaborative sensemaking the coupling of representation and understanding cannot be assumed. Convergent evidence shows us that collaborative sensemaking cuts across the activities within CIB.

4. DISCUSSION

Through this model, we attempt to synthesize extant literature and our empirical research to capture the various activities that are a part of both the *social* and *technical* streams of CIB research. Although both the social and the technical streams have provided significant insights about CIB, there seems to be some disconnect concerning how their findings could inform each other. We believe that both the technical and social perspectives should significantly inform each other, and we want to develop a model that would help in facilitating such a dialogue. Such a dialogue would not only help us better understand CIB, but also better translate research findings into workable design recommendations and technical solutions. Consequently, we would like feedback and suggestions from the workshop participants concerning

- Whether the model captures the findings from the two streams of CIB research.
- How this model could be improved and could be used by CIB researchers across both the technical and social streams.

5. AWKNOWLEGMENT

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