

Information Source and its Relationship with the Context of Information Seeking Behavior

Naresh Kumar Agarwal

Simmons College, Graduate School of Library and Information Science

300 The Fenway,

Boston MA 02115 +1 (617) 521 2836

agarwal@simmons.edu

ABSTRACT

Past studies on a person's choice of information sources have shown mixed results because of a lack of understanding of the 'context' surrounding information seeking that impacts a person's choice of an information source. The Contextual Identity Framework combines three conflicting views of context to try and define its boundaries in information behavior. However, it is not clear in which of these three views of context would 'information source' fit. Would it be part of the shared context or contextual stereotype or both? Also, prior studies have often muddled the distinction between sources and channels, and between sources and source types. They have not been comprehensive in classifying types of information sources, especially with the advent of new media. To help address these gaps, this theoretical study proposes: 1) a classification of information source types; 2) a workflow of interaction among different possible elements of context; and 3) the placement of information source within the context of information seeking behavior as defined by the Contextual Identity Framework. The frameworks should help us better understand information sources in relationship to the context of information seeking behavior, and help lend greater rigor to empirical studies relating to a person's choice of information sources. It would also benefit designers of search systems paving the way for the possible information seeking systems that take the context of search into consideration.

Categories and Subject Descriptors

H.1.2 [Models and Principles]: User/Machine Systems – *human factors, human information processing*; H.3.3 [Information Storage and Retrieval]: Information Search and Retrieval – *search process, selection process*; H.3.7 [Information Storage and Retrieval]: Digital Libraries – *user issues*

General Terms

Human Factors, Theory.

Keywords

Context; Information Source; Classification; Boundary; Contextual Identity Framework; Information Seeking Behavior.

1. INTRODUCTION

An information source can be defined as a carrier of information (e.g. a person, a book, a search engine, etc.). Different research

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

iConference 2011, February 8-11, 2011, Seattle, WA, USA
Copyright © 2011 ACM 978-1-4503-0121-3/11/02...\$10.00

questions have been investigated with regard to a person's choice of information sources when faced with a need for information [1]. E.g. What is the nature of the information seeking process? What affects the amount of information seeking? How does a seeker choose an information source or where does a person go for information and how does a person choose an information source when faced with an information-seeking task or need for information? Answering all these questions effectively require understanding the 'context' surrounding information seeking that impacts a person's favorable rating and subsequent choice of an information source. However, despite the seemingly widespread and growing attention to the notion of 'context' in information seeking, the concept remains ill-defined and inconsistently applied. Brenda Dervin [2] describes it as an 'unruly beast' difficult to tame methodologically. There isn't any success in defining: What context really means? What are the boundaries of context? What constitutes the 'core' (main factors that lead to information seeking behavior) and what constitutes the 'surrounding' circumstances (or context)? Where do we draw the line between this core and the context? Or does this context subsume the core? [3]

To help towards delineating the boundary of context, Agarwal, Xu and Poo [3] proposed a contextual identity framework that combines the three ideologically divergent schools of thought on context – 1) those that think context is subjective and resides in the mind of the seeker (personal context or 'my' context); 2) those that think context is made up of shared norms and social influences (shared context or 'our' context); and 3) those that think context is objective and made up of the factors and environment that surround the seeker (context stereotype or 'his/her/their' context. [3] highlights the futility of trying to define context using any one view. It contends that it is only when we take all the 3 views of context into consideration that we are able to adequately define, understand and study context.

Dourish [39] looked at context as used in the Human-Computer Interaction and design fields that go by names such as ubiquitous computing, context-aware computing, pervasive computing, embodied interaction, etc. (p.19). His discussion on the incompatibilities between the positivist engineering tradition and the phenomenological social tradition and the 4 assumptions he talks about (see [39], p. 21-22) can be mapped to context stereotype and personal context [3] respectively. Relating to ethnomethodology and the concept of ordinariness in conversation analysis, [39] arrives at an interactional view of context where he concludes that "context is managed moment by moment, achieved by those carrying out some activity together, and relative to that activity and to the forms of action and engagement that it entails" (p.25). This is in tune with the call for recognizing the interaction between the three views of context put forth by [3].

A question then arises as to in which of these three views of

context [3] would an information source fit. Would it be part of the shared context or contextual stereotype? Does it depend on factors of ‘sharedness’ such as familiarity, ease of use or previous working relationship? Also, information source itself needs to be understood better. Is there a difference between channel and source? Is there a difference between source and source type? How can information sources be classified such that they comprehensively account for variables type of new media and information sources?

Thus, the objective of this theoretical study is three-fold:

- 1) To understand the nature of information sources and to propose a way of classifying information source types
- 2) To demonstrate the workflow of interaction among different possible elements of context
- 3) To place information source within the ‘context’ of information seeking behavior as defined by the Contextual Identity Framework

Such an exploration could be a starting point for a deeper understanding into the nature of information sources and their relationship with context i.e. their placement within the larger scheme of context, so that we can better answer the questions related to a person’s choice or use of information source when faced with a task that requires looking for information. This is especially important with regard to the conflicting findings of past studies e.g. studies that showed a person chooses information sources based on the quality of sources versus those that showed a person chooses sources based on the accessibility of the source with not much regard for quality [1]. The classification of sources would be useful in developing studies relating to the choice/use/preference of information sources by a person looking for information when faced with an information-seeking task.

The effort is also important because researchers in the recent past have been struggling to define the elements/variables that would make up context. E.g. Nick Belkin asks in his panel at the First International Symposium on Information Interaction in Context, ‘What aspects of your concept of context are *essential*, *important*, *interesting* and *unnecessary* for understanding and supporting human interaction with information?’ [4].

The rest of the paper is organized as follows. In Section 2, we review past literature and discuss the distinction between system-centered and person-centered research, as well as context and the contextual identity framework. In Section 3, we look at information source in detail, including its nature and classification. In Section 4, we discuss the placement of information sources within the Contextual Identity Framework. We conclude the paper in Section 5 and briefly outline directions for future research.

2. LITERATURE REVIEW

2.1 System-centered versus person-centered studies in Information Seeking and Retrieval

Since time immemorial, human beings have been looking for information – sometimes to satisfy one’s curiosity and most of the times, to fill an information gap in our heads (as per Dervin [5]’s sense-making theory) when carrying out a given task.

What was done during most of the twentieth century was what is called *system-oriented research* [6] – studies on information channels and systems, libraries, mass media, institutionally sponsored evaluations of library use, selective dissemination of

information (SDI) programs, information retrieval systems, interface designs, information campaigns, advertising effectiveness, etc. [7]. Here, information sources and how they were used were studied, rather than the individual users, their needs (as they saw them), where they went for information and what kind of results they expected [7].

In the 1970s, the emphasis shifted away from the structured information system and towards the person as a searcher, creator, and user of information – making way for terms such as ‘information seeking’ and ‘sense making’ [7]. ‘Studies have moved from an orientation that is primarily system-centered...to an orientation that is also user-centered’ [8]. Thus, the increasing focus on person-centered research has given impetus to understand the *context* of information seeking behavior, getting us to think whether the current information retrieval systems suffice or do we need to start thinking more in terms of information seeking systems that also take a person’s search context into account. E.g. a search for apple on the Google search engine returns most of the links on the first page related to Apple computers, where as the seeker could very well be an apple farmer interested in the produce of the fruit.

2.2 The ‘Context’ of Information Seeking Behavior

A *context* is typically seen as ‘that which surrounds, and gives meaning to, something else’ [9]. In information seeking behavior, different researchers have tried to view it in different ways such as setting, environment, information world/life-world, information ground, etc. [10] [3]. However, the concept remains problematic. [10][3] highlight its contending definitions.

This interest in context is exemplified by the holding of conferences such as the biennial Information Seeking in Context (ISIC) conference – with the 8th conference to be held in Spain this year (September 2010). The person-centered focus is exemplified by these words on the conference website: “the unifying characteristic, which we see as essential in developing a program is the relationship between the needs or requirements of the information user, the means for the satisfaction of those needs and the uses to which those means are put in practice organizations or disciplines. Thus, papers that deal solely with technological aspects of system design, for example, will not be appropriate for the conference.” [11]. Another conference incorporating context is the Information Interaction in Context Symposium (IIIX 2010 was held recently in New Jersey). This conference seeks to combine the person-centered research (behavior track) with system-centered research (system track) and the interaction between the two (interaction track) [12]. Apart from these, ACM SIGIR incorporated a workshop on Information Retrieval in Context (IRiX) in 2004 and 2005. The HARD track of the TREC conference also seeks to achieve high accuracy information retrieval by capturing more information about the search context. Exemplifying the importance of context, in this iConference 2011 in Seattle, one of the five cross-cutting themes is ‘context’. [13][14] have also called for IR research to incorporate more context. ‘The underlying hypothesis (and belief) is that by taking account of context, the next generation of retrieval engines dependent on models of context can be created, designed and developed delivering performance exceeding that of out-of-context engines’ [15]. Cool [16] attributes this to the thinking that ‘in order to better understand information-seeking behavior (ISB) and information retrieval (IR) interaction, greater attention needs

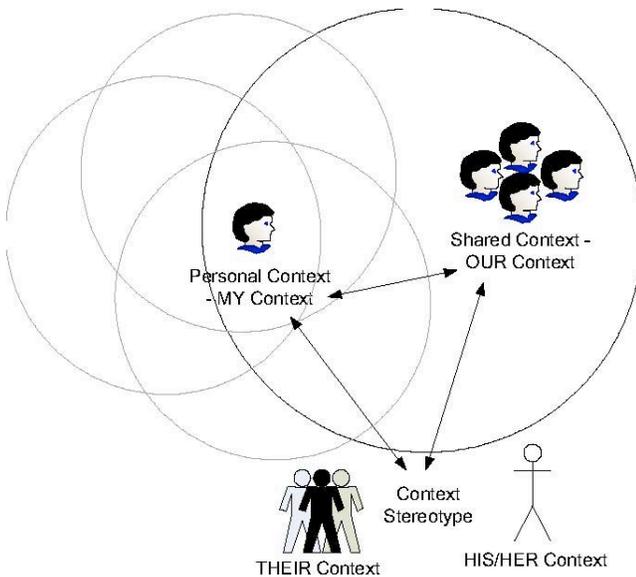
to be directed to the information spaces within which these activities are embedded' (p.5).

However, despite the seemingly widespread and growing attention, the concept remains ill-defined and inconsistently applied [16]. Most literature on information needs, seeking and use fails to address the problem of context theoretically [2][10][3]. There isn't any success in defining what context really means (see [10] for contending definitions) and what its boundaries are.

2.3 The Contextual Identity Framework

To help towards delineating the boundaries of context through a Contextual Identity Framework, Agarwal *et al.* [3] proposed the *Contextual Identity Framework*, where they applied the sociological notions of identity, personal identity, social identity and stereotype. The framework has 3 components: 1) Personal Context or 'my' context, 2) Shared Context or 'our' context, and 3) Context Stereotype or 'his/her/their' context.

Figure 1. The Contextual Identity Framework [3]



As per the Personal Context, everything, including the factors external to the searcher (which is largely seen as constituting 'context') is seen from the affective, psychological or cognitive viewpoint of the searcher. The influence of this context is not the way it exists external to the searcher, but rather in the way it is constructed in the mind of the individual. Thus, from the viewpoint of the Personal Context or 'My' context, everything is subjective i.e. everything is the way the searcher/actor sees it (if I am the actor/searcher, everything is the way I see it or think of it). Nothing is external or objective here. [3]

Shared context (our context) is defined as the common view of context shared by a group of people that are connected by a common identity e.g. people of a certain demographic group, people of a certain profession, those working for a certain company or organization, etc.

The view of context as 'a setting' or 'an environment' (and one that has been criticized by researchers adopting the person-centric view of information seeking), is what [3] labels 'Context Stereotype'. "Thus, while all context is subjective and dynamic and can be bounded only insofar as it exists in the mind of

particular searcher at a particular point in time, researchers and designers of information systems for search can, nevertheless attempt to objectify this subjective context (the process of stereotyping). This attempt is crucial because it paves the path for designing search systems that could be applicable in various settings such as organizations, home environment, etc." [3] Thus, this is the context surrounding a person B, as seen from the eyes of a person A. As opposed to 'my' or 'our' context, this is 'his', 'her' or 'their' context. Thus, this view appears more objective than 'my' (personal) or 'our' (shared) context, which are largely subjective in nature.

Through this framework, [3] highlight the futility of trying to define context using any one view. It is only when we take all the 3 views of context into consideration that we are able to adequately define, understand and study context.

A question then arises as to in which of these three views of context would an information source fit. Would it be part of the shared context or contextual stereotype? Does it depend on factors of 'sharedness' such as familiarity, ease of use or previous working relationship?

However, before we go on to that, let us look at information sources in greater detail.

3. INFORMATION SOURCE

[17] defines *information source* (e.g. a person, a book, a search engine, etc.) as a repository that can provide knowledge or information. [1] defines sources as carriers of information, a definition implicitly assumed in past studies [18][19][20][21].

Impersonal sources increasingly have systemic/technology components (e.g. search engines, digital libraries, etc.). These might consist of systemic and interactive features and information objects. Here, Information Objects deal with knowledge representation, thesaural nets and full contents/structures. Interfaces have functions with interactive features. The information technology (IT) components consist of retrieval engines, database architecture, indexing algorithms and computational logics [13].

3.1 The confusion: Channel versus Source

While *source* and *channel* are often 'bundled' with past studies using both terms synonymously [22][23][24][25], Xu *et al.* [1] differentiate between an information source, information content and a channel. The same content or information can be available from multiple sources, and a specific source can provide different types of information. One source can also be better in providing one type of content compared to another type. Thus, channel, as per [1], is better understood as the mode-of-communication in the way content is delivered from source to receiver e.g. face-to-face, phone, email, etc. (as discussed in the media richness theory [26]). [27] look at the concepts of uncertainty (absence of information) and equivocality (multiple interpretations of available information) and posit that 'uncertainty affects *what* information is sought (source selection) and equivocality affects *how* that information is sought (media [or channel] selection)' (p.300).

3.2 Past classification of types of information sources

Sources can be categorized as:

- 1) *[Inter]personal* or relational (e.g. [30]) or human i.e. colleagues, friends, supervisor, internal and external experts, etc. The term ‘personal’ signifies ownership. Since we can rarely *own* human information sources, the term ‘*interpersonal* sources’ is more appropriate and has been used in this paper.
- 2) *Impersonal* or non-relational (e.g. [30]) or non-human (documents, manuals, journals, books, libraries, electronic repositories, digital libraries, Google search, etc.).

A recent study [27] has also classified sources as relational (interpersonal) and non-relational (impersonal) and studied their determinants. Past studies have consistently shown that people (following Zipf [31]’s principle of least effort) prefer interpersonal sources over impersonal sources (e.g. [32]).

Table 1. Classification of Information Sources

[28]			Classification as per [29][19][1]
Source	Interaction features	Considerations for usage	
Search engines	Anonymou s	Quality control through linking process	External Impersonal
Professional website	Anonymou s	Established practice; Helpful in directed search	External Impersonal
Listserver	One-to-one; Asynchronou s	Fact answers because of large n; Prestige versus embarrassment	External Impersonal
E-mail	One-to-one; Asynchronou s	Pre-existing relationship important; Easy to evade	Internal/ External Impersonal
Print publications	Anonymou s	Peer-reviewed; Relatively hard to search	External Impersonal
Phone	One-on-one; Synchronou s	Pre-existing relationship important; Relatively easy to evade	Internal/ External Impersonal
Face-to-face	One-on-one; Synchronou s	Pre-existing relationship important; Relatively easy to evade	Internal/ External Impersonal

Knowledge could also reside within an organization (internal) or outside its boundaries (external). [29][19][1] classify information sources into *internal [inter]personal*, *external [inter]personal*, *internal impersonal* and *external impersonal*. However, there are other classifications as well. [33] distinguishes between dyadic information sourcing (dialogue between one seeker and one source), published information sourcing (one published source

read by many seekers) and group information sourcing (many sources exchanging information with many seekers). [28] include a table (p.12245) classifying information sources. I add a column to it (see Table 1) to include the classification by [29][19][1]. [34], an exploratory study, found that differences in antecedents of interpersonal (relational) and impersonal (non-relational) source use exist. However, it also found that knowledge bases appear to behave as personal sources.

3.3 Proposed classification of source types

As information technology has blurred the line between interpersonal and impersonal sources ([34]), I propose classifying sources into five types which also takes the channel or mode of communication into account. This is because when choosing an information source, a seeker/actor may not adequately distinguish between a channel and a source. Here, three dimensions of classification of information sources/channels have been used 1) interpersonal-impersonal 2) physical-electronic 3) synchronous-asynchronous, where the first two relate more to the source, while synchronous-asynchronous relates to the channel of communication, and applies only to interpersonal sources. Table 2 lists the proposed classification of source/channel types.

Table 2. Proposed classification of Source/Channel Types

SNo	Source/Channel Type	Description
1.	Face-toface	Meeting a person face to face (people, colleagues, friends)
2.	Phone / Online Chat	Calling a person using landline/mobile or reaching out to a person through online voice/video/chat/instant messaging (Skype, Yahoo/MSN messenger, Google talk, Facebook chat, etc.)
3.	Email / Online Forums	Reaching out to a person through email, messaging in social networking websites (Facebook, Friendster, Orkut, etc.) or through online forums/blogs (posting queries in specialized forums) or Twitter.
4.	Book / Manual	Physically accessing books (from the library, company, etc.), magazines, hard copies of manuals, reports, journal/conference proceedings, printouts, etc.
5.	Online Information	Electronic/online sources of information such as web search engines (Google, Bing, Yahoo, etc.), online knowledge bases, professional websites (company websites, Wikipedia, etc.), electronic/soft copies of journals/conference proceedings/books/manuals/reports, finding answers in pre-posted entries in forums/blogs, etc.

Figure 2 shows the five chosen source/channel types classified as per the dimensions of interpersonal-impersonal, physical-electronic and synchronous-asynchronous. Face-to-face is classified as interpersonal-physical-synchronous. An interpersonal-physical-asynchronous dimension (i.e. where a person is present but does not respond to a query immediately) doesn’t make sense in general day-to-day settings and has been excluded. However, this dimension is possible in certain rare cases e.g. when a celebrity is present on stage and invites questions from the audience to be written on chits of paper and

passed on to him/her. The celebrity then chooses a few chits and then responds to those questions during this talk. This could be considered an asynchronous form of answering questions even when the person answering is present physically. But as opposed to 'face-to-face', here, the person (interpersonal source) is 'on stage'. Snail mail or a letter sent through the postal system might also be considered an example of the interpersonal-physical-asynchronous dimension

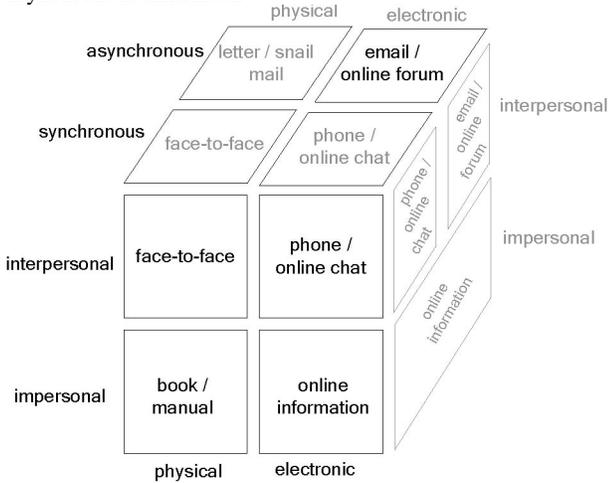


Figure 2. Classification of source/channel types along dimensions

Phone and online chat have been clubbed together as a channel type because they fall under the same dimension of interpersonal-electronic-synchronous. When you ask a query to a person over the phone or chat, you can expect an instant reply. In both the cases, the person is not physically present before you. Phone has been classified as an electronic channel because of the prevalence of digital and Voice-over-IP phones and voice chats using Skype, Google Talk, etc.

Table 3 shows a simplified view of source/channel types along dimensions.

Table 3. Simplified view of source/channel types along dimensions

		Interpersonal	Impersonal
Physical	Synchronous	Face-to-face	Book / Manual
	Asynchronous	Letter / snail mail	
Electronic	Synchronous	Phone / online chat	Online Information
	Asynchronous	Email / online forum	

Both email and online forums provide asynchronous channels of communication to the information seeker where a user has to post a query and wait for a response. A query sent in the form of a SMS (short message service) using a mobile phone also uses an asynchronous channel of communication. They are thus classified under the dimension interpersonal-electronic-asynchronous. For impersonal sources, the classification of synchronous and asynchronous channels of communication doesn't really make sense. There is no easy answer to whether you get an immediate response from a book or not. For online sources, a query using a search engine may be considered to be synchronous (there is an immediate response) but it depends on the speed of the internet

connection, as well as the search engine under use. For other forms of online information e.g. an e-book, a digital repository, website, etc., we cannot easily answer whether they give an immediate response (synchronous) upon querying or not. I, therefore, classify impersonal sources in the physical-electronic dimension only. Thus, books and manuals are classified as impersonal-physical, while any type of online source of information is classified as impersonal-electronic.

More confusion: Source versus Source Type. It is important to distinguish between source (or channel) types and sources (or channels). Some past studies in source usage have muddled this distinction e.g. a recent study [27] asks for survey responses like "The information I get from [information source] is clear in meaning" (p.331), where 'information source' could be one of these eight – printed media, static internet, dynamic internet, knowledge bases, supervisor, department coworkers, other coworkers and others outside the organization. However, all these are 'types of information sources' and not 'information sources'. When a survey respondent answers a question, s/he doesn't know e.g. which printed media is being spoken about. A specific book that the person read (a particular information source) might be clear in meaning but another book s/he borrowed from a friend (another 'information source', but same 'type of information source') may not be clear in meaning. Thus, while the responses may apply to different types of sources, they do not apply to different sources as [27] concludes.

In any survey study, this problem can easily be resolved by asking the respondent to think of a *typical* source of information for each of the 5 types of sources/channels. E.g. a person could be asked to think of a typical source of information for each of the following types of sources:

_____ (MyFace2FaceSource) The person with whom I would typically (or could) discuss the problem face to face e.g. Mr A

_____ (MyPhone/ChatSource) The person with whom I would typically (or could) discuss the problem on the phone or online chat e.g. Miss B (or Mr A on phone)

_____ (MyEmail/ForumSource) Typical person to email or post online queries about the problem e.g. Mr C (or Mr A on email), or Mr D in an online forum

_____ (MyBookManual) Typical book, manual or report to help in the problem e.g. Book-A

_____ (MyOnlineInfoSource) Typical online or electronic information source to help in the problem e.g. Google, company digital library, intranet, etc.

After having looked at information sources and the possible ways in which they could be classified for research studies, let us look at where information sources would fit within the boundaries of context. I will use the contextual identity framework by [3] for this placement.

4. PLACEMENT OF SOURCE WITHIN THE CONTEXTUAL IDENTITY FRAMEWORK

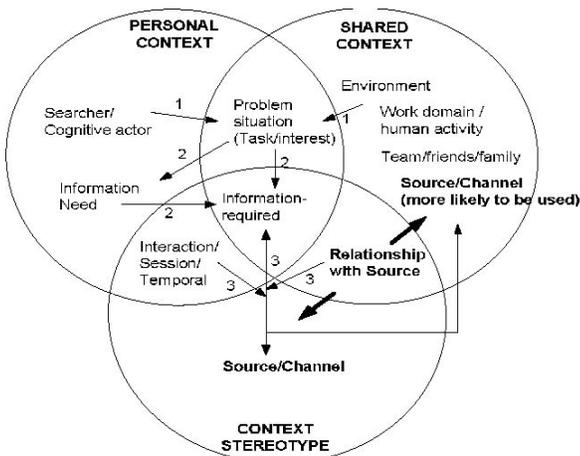
The Contextual Identity Framework [3] provides a way to make sense of context by understanding its three views – personal context, shared context and context stereotype. While researchers have tried to list down the elements of context, there has been no clear direction in trying to make sense of which of these elements lie inside or outside the boundary of context, and which of these can be incorporated as part of context. Also, where exactly would

information source (or source type) fit within context is not clear from past research, though past frameworks of information seeking and behavior have included information sources. [35] shows information seeking behavior as making a demand either (for information) on information systems or other information sources. [36] shows the 'source preference' of a searcher to fulfill his/her immediate needs and classifies information sources as internal (memory or direct observations) or external (direct interpersonal contact or recorded literature) to the searcher. Krikelas' [36] flowchart-like model also shows an arrow from 'personal files' to 'memory' [36].

Building upon the contextual identity framework [3], Figure 3 shows a workflow of interaction among the different possible elements of context. E.g. The environment of a seeker's shared context plays upon the seeker or cognitive actor (personal context) to bring about a problem situation (interaction between personal context and shared context) requiring a need for information (which is part of the person's personal context as it resides in the person's head). This gives rise to knowledge or information (interaction between the three views of context) that needs to be sought from a source (context stereotype or shared context, depending upon the level of closeness with the source). The seeker then approaches a source (personal or impersonal) for this information. Depending upon the interaction between the seeker and the source, and the relationship shared by the seeker and the source, the source passes the knowledge sought to the seeker.

Figure 3. Interaction among different elements of Context

The question arises as to in which of the three views of the Contextual Identity Framework can information source/channel be placed. The information need which arises owing to the task or problem situation can be fulfilled (filling the gap as per Dervin's



[5] sense making theory) by getting information from an information source (a person, internet, books, etc.) which can be seen as part of context stereotype (if the seeker doesn't identify with them) or part of shared context (if the seeker sees them as belonging within his/her circle of shared context). E.g. if a person is familiar with a source, s/he is more likely to identify it as part of his/her shared context and likely to use it. Similarly, if the source is easy to use, the person is more likely to use it. In case of interpersonal sources, a previous working relationship with a source or a high comfort level with him/her would inspire usage. All these factors help make the source part of the person's shared context (as per the contextual identity framework defined by [3]).

Thus, the degree of success in the process of a seeker getting information from a source depends to a large extent on the seeker/actor placing the source as part of his/her shared context, which in turn depends upon the relationship shared by the seeker and the interpersonal source i.e. the cost incurred by the seeker in getting the information out of the source. If the seeker is not comfortable with the source, then s/he would view him in the circle of context stereotype. If the seeker is very comfortable with the source, then s/he might see him as part of his/her shared context. For human or interpersonal sources, the seeker-source relationship has been found important in a number of studies [1]. There can be different aspects to this relationship such as *social risk* e.g. embarrassment, loss of face, revelation of incompetence or *social benefit* (e.g. relationship building, making an impression) and other factors such as *willingness to share* and *level of closeness*.

For impersonal sources such as library or search engines, factors that help determine whether the seeker sees the source as part of his/her shared context can be *ease of information extraction*, *comfort level in using the system*, etc. The searcher's *system-knowledge* (searcher's familiarity/expertise with the Information System and searching techniques) will also determine his/her level of comfort in using an impersonal source such as an online search engine or a knowledge repository.

As discussed above, the seeker may see the source as belonging to a context stereotype (not part of his/her in-group) or within his/her shared context depending on the relationship (or system familiarity) the seeker has with the source. Under general circumstances, this source is an external element and may be placed under context stereotype. It is only the closeness of the relationship shared by the seeker with the source that might pull the source within the shared context of the seeker. A source that is part of the seeker's shared context is more likely to be used, as opposed to a source in the context stereotype view of context (as per [3]). However, if a seeker has a low comfort level in using a source or an unfavorable relationship, the source or the channel is unlikely to make it to the seeker's shared context, and has lower chances of being used (unless the person goes for least effort, as opposed to source quality, as posited by Zipf (1949)'s principle of Least Effort). The seeker-source relationship may be seen as continuum. This implies that the seeker might place a particular source in between the two circles of context stereotype and shared context as well.

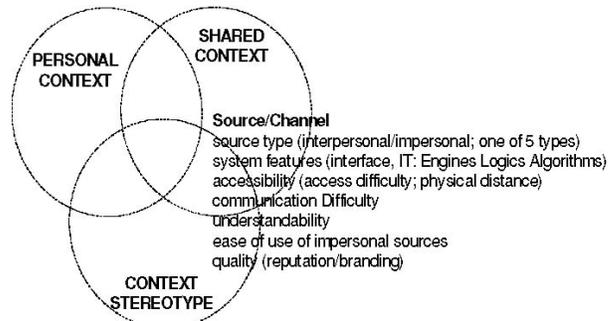


Figure 4. Variables of the Source/Channel

Figure 4 shows different variables pertaining to the source or channel that have been studied in past research and could be used in exploring research questions based on source choice (discussed in the beginning of the paper). These variables identified in Figure 4 are:

- Source type (see the different classifications discussed in Section 3)

- System features (in the case of electronic sources)
- Accessibility (one of the cost factors in the cost-benefit evaluation of an information source by a seeker; time taken to establish a channel of communication or to reach a particular source; see [1][27]).
- Communication difficulty (the difficulty in communicating with the source e.g. immediacy of feedback or synchronicity [37])
- Understandability ([24][1])
- Ease of use (the degree to which a person believes that using a particular system would be free from effort; applies only to impersonal sources such as websites or online information retrieval systems; part of a large number of studies based on [38])
- Quality (accuracy, relevance, specificity, reliability, timeliness, expertise, reliability, precision, comprehensiveness, conciseness, topicality, novelty, understandability, scope, etc. of sources; see [1][27])

While the variables discussed above could be explored as independent variables, mediators or moderators, the dependent variable studied utilizing sources could be the choice or preference for a particular information source or the use of one or more information sources. Future studies could empirically explore how the seeker-source relationship determines the likelihood of the source being part of shared context, which in turn could possibly affect perceived source quality and subsequent usage of the source. A possible research model is shown in Figure 5 below.

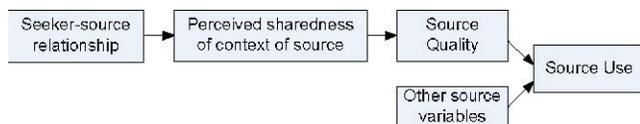


Figure 5. Possible research model

5. CONCLUSION

In this paper, I have proposed a way of classifying information sources comprehensively that also takes the channel of communication into account. A workflow of interaction among different elements of context was presented. We also saw where information sources could fit within the different views of a seeker's context when s/he is faced with a task that requires looking for information for which the person will need to consult an information source. A possible framework for future empirical studies exploring the degree of perceived sharedness (which would impact perceived source quality and subsequent usage) has been provided. It is hoped that these models and frameworks will help us better understand information sources in relationship to the context of information seeking behavior, and help lend greater rigor to empirical studies relating to a person's choice of information sources.

This also has practical implications for managers and practitioners. By understanding how three views of context coexist and work in tandem, and where among these views information sources could fit, managers can better place resources such that employees feel them to be a part of their shared context (as opposed to context stereotype). E.g. employees with shared norms and similar expertise can be seated together so that they

feel a greater level of cohesiveness and develop a feeling of shared context. Employees could also be provided sustained training and support for usage of different systems so that the increase in familiarity helps them develop a degree of familiarity and sharedness for the source. The framework is also useful for designers of search systems to better understand how context works, and to design search systems (impersonal information sources) such that they are more likely to be placed by a seeker within his/her shared context. This understanding might be one of the first steps towards the design of information seeking search systems that take context into consideration, as opposed to information retrieval systems that are in prevalence today.

Future work will involve conducting theoretical and empirical studies that explore the variables pertaining to information sources and the role of context in source choice.

6. ACKNOWLEDGMENTS

I'm grateful to my Ph.D. advisors Associate Professors Yunjie (Calvin) Xu and Danny C.C. Poo for their guidance.

7. REFERENCES

- [1] Xu, Y. (C.), Tan, C.Y. (B.) and Yang, L. 2006. Who Will You Ask? An Empirical Study of Interpersonal Task Information Seeking. *Journal of the American Society for Information Science and Technology*, 57(12), 1666-1677.
- [2] Dervin, B. 1997. Given a context by any other name: Methodological tools for taming the unruly beast. In P. Vakkari, R. Savolainen and B. Dervin (eds.) *Information seeking in context: Proceedings of an International Conference on Research in Information Needs, Seeking and Use in different Contexts* (Tampere, Finland, 14-16 Aug 1996), London, UK: Taylor Graham, 13-38.
- [3] Agarwal, N.K., Xu, Y.(C.) and Poo, D.C.C. 2009. Delineating the boundary of 'Context' in Information Behavior: Towards a Contextual Identity Framework. *ASIS&T 2009 Annual Meeting* (Vancouver, B.C., Canada, Nov 6-11).
- [4] Ingwersen, P., Ruthven, I. and Belkin, N. 2007. Conference Report. First Int. Symposium on Information Interaction in Context (IiX 2006) (Copenhagen, Denmark, Oct 18-20, 2006), *ACM SIGIR Forum*, 41(1), June 2007, 117-119.
- [5] Dervin, B. 1983. An overview of sense-making research: concepts, methods and results to date. In *International Communications Association Annual Meeting* (Dallas, TX, May).
- [6] Vakkari, P. 1999. Task complexity, problem structure and information actions. Integrating studies on information seeking and retrieval. *Information Processing and Management*, 35(6), 819-837.
- [7] Case, D.O. 2007. *Looking for information: A Survey of Research on Information Seeking, Needs and Behavior* (Second Edition). Oxford, UK: Academic Press.
- [8] Choo, C. and Auster, E. 1993. Environmental scanning: Acquisition and use of information by managers. In M. Williams (Ed.), *Annual review of information science and technology*, Medford, NJ: Learned Information, 28, 279-314.
- [9] Howe, D. 1993. *The Free On-line Dictionary of Computing*, FOLDOC. Retrieved Aug 30, 2010 from <http://foldoc.org/index.cgi?query=context&action=Search>
- [10] Courtright, C. 2007. Context in Information Behavior Research. *Annual Review of Information Science and Technology (ARIST)*, 41, 273-306.

- [11] ISIC website. 2010. About ISIC. Information Seeking in Context (ISIC) 2010 (Muricia, Spain, Sep 28 – Oct 2). Retrieved August 30, 2010 from <http://www.um.es/isic2010/pagina-tablon.php?id=15231>
- [12] IIX website. 2010. Call for Papers and Posters. Information Interaction in Context Symposium, 2010 (New Brunswick, NJ, Aug 18-22). Retrieved August 30, 2010 from <http://www.iix2010.org/call-for-papers/>
- [13] Ingwersen, P. and Jarvelin, K. 2005. *The Turn: Integration of Information Seeking and Retrieval in Context*. Dordrecht, The Netherlands: Springer.
- [14] Jarvelin, K. and Ingwersen, P. Oct 2004. Information seeking research needs extension towards tasks and technology. *Information Research*, 10(1).
- [15] Ingwersen, P., Jarvelin, K. and Belkin, N. 2005. In *Proceedings of the ACM SIGIR 2005 Workshop on Information Retrieval in Context (IRiX)*, SIGIR 2005 IRiX Workshop (Salvador, Brazil, Aug 19).
- [16] Cool, C. 2001. The Concept of Situation in Information Science. *Annual Review of Information Science and Technology (ARIST)*, 35, 5-42.
- [17] Christensen, E.W. and Bailey, J.R. 1997. A source accessibility effect on media selection. *Management Communication Quarterly*, 10(3), 373-388.
- [18] Chakrabarti, A.K., Feineman, S. and Fuentevilla, W. 1983. Characteristics of source, channels, and contents for scientific and technical information systems in industrial R&D. *IEEE Transactions on Engg. Management*, 30, 83-88.
- [19] Kuhlthau, C.C. 1999. The role of experience in the information search process of an early career information worker: Perceptions of uncertainty, complexity, construction, and source. *Journal of the American Society for Information Science*, 50, 399-412.
- [20] Morrison, E.W. and Vancouver, J.B. 2000. Within-person analysis of information seeking: The effects of perceived costs and benefits. *Journal of Management*, 26, 119-137.
- [21] O'Reilly, C.A., III. 1982. Variations in decision makers' use of information sources: The impact of quality and accessibility of information. *Academy of Management Journal*, 25 (4), 756-771.
- [22] Gerstberger, P.G. and Allen, T.J. 1968. Criteria used by research and development engineers in selection of an information source. *J. Applied Psychology*, 52(4), 272-279.
- [23] Hardy, A.P. 1982. The selection of channels when seeking information: Cost/benefit vs. least-effort. *Information Processing & Management*, 18 (6), 289-293.
- [24] Swanson, E.B. 1987. Information channel disposition and use. *Decision Science*, 18, 131-145.
- [25] Bystrom, K. and Jarvelin, K. 1995. Task complexity affects information seeking and use. *Information Processing and Management*, 31(2), 191-213.
- [26] Daft, R. and Lengel R. May 1986. Organizational information requirements, media richness, and structural design. *Management Science*, 32(5), 554-571.
- [27] Zimmer, J.C., Henry, R.M. and Butler, B.S. 2008. Determinants of the Use of Relational and Nonrelational Information Sources. *Journal of Management Information Systems*, 24(3), 297-331.
- [28] Binz-Scharf, M.C. and Lazer, D. 2006. Searching for Answers: Knowledge Sourcing Strategies. Paper prepared for presentation at the Annual Meeting of the Academy of Management (Aug 11-16, Atlanta, GA), *The Institute for Quantitative Social Science, Harvard University*.
- [29] Choo, C.W. 1994. Perception and use of information sources by chief executives in environmental scanning. *The Library & Information Science Research*, 16, 23-40.
- [30] Rulke, D.L., Zaheer, S. and Anderson, M.H. 2000. Sources of managers' knowledge of organizational capabilities. *Organizational Behavior and Human Decision Processing*, 82(1), 134-149.
- [31] Zipf, G. 1949. Human behavior and the principle of least effort: An introduction to human ecology. New York: Addison-Wesley.
- [32] Yitzhaki, M. and Hammershlag, G. Jul 2004. Accessibility and use of information sources among computer scientists and software engineers in Israel: Academy versus industry. *Journal of the American Society for Information Science and Technology*, 55(9), 832-842.
- [33] Gray, P.H. and Meister, D.B. 2004. Knowledge sourcing effectiveness. *Management Science*, 50(6), 821-834.
- [34] Zimmer, J.C. and Henry, R.M. 2007. Antecedents to Relational and Nonrelational Source use: An Exploratory Investigation. In *Proceedings of the 40th International Conference on System Sciences (HICSS'07)* (Waikoloa, Hawaii, Jan 3-6).
- [35] Wilson, T.D. 1981. On user studies and information needs. *Journal of Documentation*, 37, 3-15.
- [36] Krikelas, J. 1983. Information-seeking behavior: patterns and concepts. *Drexel Library Quarterly*, 19, 5-20.
- [37] Dennis, A.R. and Valacich, J.S. 1999. Rethinking Media Richness: Towards a Theory of Media Synchronicity. Proceedings of the 32nd Hawaii International Conference on System Sciences (Jan 5-8, 1999, Maui, Hawaii), 1-10.
- [38] Davis, F.D. Sep 1989. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319-340.
- [39] Dourish, P. 2004. What we talk about when we talk about context. *Personal and Ubiquitous Computing*, 8, 19-30.