François-Xavier Paré
McGill University, Montréal, Québec, Canada

The Many Facets of Document Importance: A Case Study of Office Workers

Abstract: This paper examines the notion of document importance in personal information management. Based on a literature review and the results of a previous study, we propose a typology of the factors that can affect office workers' perception of the importance of electronic documents. A methodology for testing and refining this model is then described.

Résumé : Cet article examine la notion d'importance relative des documents dans la gestion personnelle de l'information. En se basant sur une revue de la littérature ainsi que sur les résultats d'une précédente étude, nous proposons une typologie des facteurs pouvant conduire un employé de bureau à considérer un document numérique comme important. Une méthodologie visant à tester et raffiner ce modèle est ensuite proposée.

1. Introduction

Perhaps now more than ever, efficient document management is crucial to any organization's success (Eppler and Mengis 2003). Despite the implementation of complex, large-scale knowledge and document management systems, a significant part of an organization's documents still resides on its employees' computers. As a result, office workers tend to enjoy a significant degree of freedom when it comes to managing their documents. Thus, every worker tends to develop his/her own particular methods and habits for handling the electronic documents under their control. The discipline called Personal Information Management (PIM) aims to study those habits, and to develop tools to enhance the management of information (Barreau and Nardi, 1995; Landsdale, 1988; Neumann, 1989; Bellotti and Smith, 2000). The word *personal* in PIM alludes to the fact that the information is used, owned and under direct control of an individual, although the information is not necessarily private or confidential, or even about the individual (Landsdale, 1988; Henderson, 2005).

In the last forty years or so, PIM researchers have tried to learn more about individuals' information management habits. As a result, there is now a significant and growing body of knowledge exploring the way workers handle information in the workplace. The present study will focus on a specific aspect of PIM that has been neglected so far: the notion of document *importance*. This study, part of an ongoing doctoral research project, seeks to further our understanding of the concept of document importance and its impact on personal information management in a work context.

2. Background, Statement of the Problem and Research Question

In today's organizations, employees often have to deal with significant amounts of information, and managing that information is now an unavoidable component of many office workers' daily tasks. Through several studies, it has been estimated that office workers can spend 25 to 60 percent of their time working with documents (Meier and Sprague, 1996; Gordon, 1997). The efficient management of information is therefore a major factor in the overall productivity of office workers.

The sheer quantity of information that needs to be processed and the relative complexity involved in its management are at the root of various problems, ranging from minor inconveniences to what has been called information overload. Information overload can be defined as the "moment when the amount of available information exceeds the user's ability to process it" (Klapp 1982, 63). Coined by Alvin Toffler in his 1970 book Future Shock, the term has now entered the common vocabulary. However, the phenomenon itself is probably much older, as some have traced it back to the late 19th century. In the last thirty years, the information overload and its corollaries have been studied extensively, notably in the management literature (Eppler and Mengis, 2003; Edmunds and Morris, 2000).

The general agreement in the literature seems to be that the problem of information overload is increasing, and this is due to several factors. For one, there is an increase in the absolute amount of information produced every year across the globe (Lyman and Varian, 2003). Of course, not all of that information is relevant to everyone, which means that there is a diminishing signal-to-noise ratio. The recent advances in technology (e.g. low storage costs, higher available bandwidth, and development of the Internet) are largely to blame for this state of affairs. Information technology has made it easier and cheaper than ever to publish, duplicate and send information (Carlson, 2003). For example, although extremely useful in the workplace today, e-mail brings its share of inconveniences in the form of cluttered inboxes (Whittaker and Sidner, 1996). Furthermore, workers and especially managers tend to accumulate more information than necessary. There are several reasons for this: because they believe that more information enables better decision-making; because they receive a lot of unsolicited information; because they want to make sure they don't miss important information, etc. (Butcher, 1998).

Information overload has very important consequences in organizations, as demonstrated by a series of studies conducted by Reuters in the 1990s. About half the managers interviewed for the 1998 edition viewed information overload as a problem that increased job demands, caused stress and tension, and reduced their overall job satisfaction (Reuters, 1998). Another set of consequences includes reduced attention span and, perhaps more critically, an adverse effect on decision quality. For example, Hwang & Lin (1998) have demonstrated that both information repetitiveness and diversity can impede decision-making. As Bergman and others remark, the main problem to the accumulation of information used to be one of storage. However, in today's virtual environment, the problem has shifted from a physical to a cognitive one: "when searching for a specific information item, irrelevant and unimportant items distract the user's attention" (Bergman et al., 2003, 876). Ultimately, this can result in reduced worker efficiency (Edmunds and Morris, 2000; Eppler and Mengis, 2003).

It should be noted, however, that not all information is of equal importance. Out of all the information that workers have to deal with every day, some may be more important, more vital than others. When faced with an abundance of information, it becomes necessary to prioritize what is essential or comparatively more important. In that sense, one of the main dangers of information overload is that relatively useless information competes for workers' time and attention, and constitutes noise that may detract from the more crucial items (Jones, 2004).

Although there have been many studies about personal information management in the workplace, very few have tackled the notion of document importance and its impact on the management of documents (Kwasnik, 1991; Whittaker and Hirschberg, 2001; Bondarenko and Janssen, 2005). Therefore, there is little doubt that the question of the relative importance of personal information deserves further attention and research. We need a clearer understanding of what makes information important, and what criteria people apply to information in evaluating its importance (Badenoch et al., 1994). Such an inquiry is a necessary step towards enhancing the management of personal information in the workplace.

In 2006, we conducted a small-scale pilot study, interviewing office workers about their personal information management habits. Among the observations made in that project was the fact that workers do consider the relative importance of a document when deciding how to handle it, notably when determining where it should be placed in the computer's file system (Paré, 2006). Our results also showed that documents could be deemed important for a variety of reasons, all of which could probably be narrowed down to several distinct categories. Therefore, in order to deepen our understanding of this notion of importance in the management of personal information, our focus now turns to the following research question:

- What are the factors that affect office workers' decisions to consider electronic documents as important?

By answering the above question, we seek to better define the nature of important information, to determine the factors that can lead a person to consider a document more valuable than another, and eventually handle it differently. Perhaps a document is necessary to the fulfillment of a crucial task, or could be used as a proof to back up an assertion, etc. This is a relatively unexplored topic of investigation, which deserves closer attention. Our conclusions could be used to determine how best to handle such important documents and contribute to the growing literature on PIM.

For the purposes of our research, we consider that *important* information is information that is of particular value, significance or usefulness, or is crucial to a worker's job. We also consider information in the form of documents, which are the information units most often manipulated by workers on a daily basis. We assume that a document is important if it contains at least one important element of information. Additionally, in order to limit the scope of our study, we focus on electronic documents.

3. Literature Review and Theoretical Framework

Personal Information Management

The origins of Personal Information Management (PIM) as a field of study can be traced back to the information use studies of the 1960's and 1970's. The first researchers that touched upon PIM were in fact studying the information behavior of scientists and professors, more specifically their personal indexes and collections of documents (Jahoda et al., 1966; Soper, 1976). Those early studies were often more concerned with the amount of documentation present in their participants' offices – number of books, articles, etc. – than its organization, although exceptions such as Engelbart (1960) or Murphy (1980) did focus on the habits and organization methods of their participants rather than the quantity of material they owned.

Starting in the early 1980s however, the accent was resolutely put on determining why individuals organized their information in a certain way. This emphasis on analyzing the underlying factors that result in people adopting certain organizational habits in particular has continued to this day in the field of PIM, and the present study is in many ways a part of this movement.

A milestone of the early 1980s was Malone's (1983) investigation of office workers' document organization habits. In his investigation, Malone identified two distinct kinds of organization, *neat* and *messy*, but noted that messiness didn't necessarily imply disorganization. He also suggested a possible relation between job content and neatness: subjects whose jobs were characterized by routine, more standardized tasks (e.g. office clerks) usually had a neater office than, for instance, research scientists, whose job was far less linear and predictable, and who were often involved in many different projects at the same time (Landsdale, 1988). Malone then identified two major units of document organization: *files* (where the elements are arranged in some systematic order) and *piles* (where no specific order prevails). Finally, and perhaps most importantly, he identified two main functions of desk/office organization: *finding* and *reminding*. Maintaining files, of course, helps us find our documents later on. Piles, on the other hand, mostly act as reminders, reminding the worker of what needs to be done. These observations and concepts have been studied and expanded by many PIM researchers to this day.

Another significant study in the same vein was that of Cole (1982), who put forth the idea that workers can have three levels of interaction with their own files: *action information documents* are readily at hand and often found on piles and surfaces close-by; *personal work files* are usually held in file cabinets and accessed from time to time; *archive storage* is usually found in a remote location and rarely accessed. A parallel can be traced here between these three stages and the document life cycle, also referred to as the *three ages* theory in archival science, in which an organization's documents are separated into active, semi-active (or intermediate) and inactive documents (Rousseau and Couture, 1994).

The next major study worth mentioning here is that of Barbara Kwasnik, who interviewed professors and asked them why they had classified certain documents the way they had (Kwasnik, 1991). She also asked them to sort a day's mail in her presence. After recording and coding their answers, she obtained a series of descriptive attributes that the participants used to justify their classificatory decisions (e.g. "on the top shelf" was a location attribute, "correspondence" a form attribute, etc.). In the end, she identified over thirty different attributes grouped in seven categories: situation, document, disposition, order/scheme, time, cognitive state and value. She found that attributes related to context (situation attributes) were the most frequently invoked by her subjects, even before documents attributes (such as author, topic, form, etc.) It is also worth noting that although Kwasnik's study was done in a paper environment, her results were later confirmed by Barreau (1995), who conducted a similar study with electronic documents.

There has been a steady stream of PIM studies since then, with researchers turning their attention to specific aspects such as electronic file and folder hierarchies (Jones et al., 2005; Henderson, 2005), e-mail (Whittaker & Sidner, 1996; Ducheneaut & Bellotti, 2001) and Internet bookmarks (Abrams et al., 1995; Gottlieb & Dilevko, 2001; Jones et al., 2002). However, those are for the most part beyond the scope of our study. We shall therefore focus our attention on the notion of importance, as approached in the PIM literature.

The notion of importance in PIM

There are relatively few references to the concept of document importance in the PIM literature. And as we shall see, although it does occur in the literature, the terminology used varies significantly. The concept can be traced back to Malone (1983) and his description of piles, whose function was in large part to remind the worker of important things to attend to. It was later remarked that the computer desktop is often used for the same purpose as the pile: a document lying on the desktop can remind the worker that something needs to be done (Barreau and Nardi, 1995). In other cases, the desktop simply gives quick and convenient access to the most useful or frequently used documents and software applications (Ravasio et al., 2004).

Kwasnik (1991) also alluded to the concept of importance as one of the dimensions used by her participants in explaining their classificatory decisions, although she employed the term *value*. In her coding scheme, the *value* category included the following attributes: Important, Interesting, Needs improvement, Not valuable, Secret/Confidential, Unspecified value, Works for me. However, this category was not the most often mentioned by her participants, showing up in about 6% of their explanations.

Whittaker & Hirschberg (2001) also tackled the idea of importance in their study of personal paper archives. Looking at the factors influencing the decisions to keep paper documents instead of discarding them, they identified the notions of perceived value and personal relevance, which can both be viewed as judgments of importance. Among the reasons for keeping documents was, of course, a document's uniqueness, or irreplaceableness, which is often true of personal notes or legal documents. Beyond that, local paper copies were kept for better availability, out of mistrust for storage institutions or even for sentimental reasons. The authors also highlighted the fact that "the changing value of stored information, as work priorities and personal interests shift" (p. 166) could make determining the value of documents a difficult task for workers.

Hertzum (1999, 2), for his part, divides the value of a document in two broad types: evidential value ("providing evidence of an organization's structure, procedures [and] transactions") and informational value ("the value of its contents for reference, contemplation and research"). In an organization, document archives thus serve several purposes: accountability, operational continuity, planning, legal evidence, disaster recovery, research and corporate history (ibid.). In a similar vein, Bondarenko and Janssen (2005) distinguish two types of activities: administrative activities (very structured or standardized tasks) and research activities (mostly unstructured tasks). According to the authors, in the case of administrative tasks, the document itself is important, whereas in a research-type activity, it is the information within the document that is important. Harper et al. (2001) insist on the distinction between operational documents, used in the course of everyday tasks, and strategic documents, which form the organizational and legal framework for these tasks.

Although our viewpoint in this study is definitely at the individual level, it is also useful to keep in mind that information can be of specific value to the organization. Badenoch et al. (1994) consider five criteria to evaluate the value of information: quality, utility, impact on productivity, impact on effectiveness, and impact on financial position. Burk and Horton (1988), for their part, rate the value of information resources using three criteria: effectiveness, strategic importance to activities it is intended to support, and strategic importance to the organization. It is of course impossible to completely separate

the objectives of the individual users and those of the organization, even though the objectives can sometimes be in contradiction. As such, the organization's goals and objectives are part of the contextual fabric in which our study will be situated.

On the more practical side, some researchers have noted that current information management software is lacking with regard to managing documents of varying importance. For example, when discussing the features of modern operating systems, Ravasio et al. (2004, 176) remarked that "technical file metadata is, for the most part, useless to users and should be replaced by more user-friendly attributes", and that the exact nature of such attributes should be an area of future research. This was echoed by Jones et al. (2005). In a study of workers' personal information organization, they noticed that some participants had developed a special folder naming system to ensure that folders would be kept in a certain order. Since the default ordering was alphabetical, the most important folders were numbered, or given leading characters such as "aa" to force their listing at the top, or "zz" to push them at the bottom. The importance of a document may change over time, depending on the context or the task at hand. Nevertheless, there are certainly cases where important documents should be marked as such, yet this task is not really facilitated by today's tools.

In their user-subjective approach to PIM systems design, Bergman et al. advocate three principles, one of which is the subjective importance principle: "information items should be characterized by their subjective importance, and […] this attribute should determine their visual salience and visibility" (Bergman et al., 2003, 874). Whittaker & Hirschberg (2001) suggest that it might eventually be possible to automatically identify superfluously archived documents based on the lack of access, or because their content has little to do with the rest of the archive. At first glance, overall frequency of access in particular might indeed be an interesting and useful measure of a document's importance for a worker, although there may be other valuable approaches. It is also easy to imagine a document being very significant, yet being seldom read or used in the course of a worker's daily operations.

Document roles

Another relevant section of the literature is devoted to examining the *roles* of documents. It isn't hard to imagine that a significant link exists between the importance of a document and the role this document plays in a worker's information space or in the organization as a whole. Typologies of such roles have thus been developed by several authors and are worth mentioning here, although space constraints prevent us from describing them in details. For example, Hertzum (1999, 17) provides a typology of roles in his article entitled "Six Roles of Documents in Professionals' Work". Sprague (1995, 34) provides a different perspective by stating the nine roles documents can have in organizations, along with prototypical examples of such documents. Meier and Sprague (1996) eventually contracted the above typology in the following three categories, noting that these weren't necessarily mutually exclusive: communication mechanisms, business process vehicles and organizational memory. Lastly, Tyrväinen and Päivärinta (1999, 3) propose a series of 11 facets that can be used to identify and describe documents, two of which are especially interesting to us (purpose of creation and purpose of use), as they tend to tie into the notion of importance.

There is obvious overlap between the various models presented above, but also some significant differences, notably in the approach followed in each case. For instance, Hertzum looks at documents from an individual's perspective, whereas Sprague's focus

is more on the organization as a whole. Nevertheless, these models are somewhat complementary, and certainly provide interesting insights into the roles of documents. Although none of these authors explicitly mentions the concept of importance as part of their models, there is no doubt that such typologies can provide an interesting basis for analyzing document importance. As such, these typologies form an important building block for our theoretical framework.

Theoretical Framework

Drawing from the literature on personal information management (Cole, 1982; Malone, 1983; Whittaker and Hirschberg, 2001), document roles (Sprague, 1995; Hertzum, 1999; Tyrväinen and Päivärinta, 1999) and the value of information (Burk and Horton, 1988; Badenoch et al., 1994), as well as the field observations we made in Paré (2006), we have developed a typology of the factors which can lead office workers to consider documents important. This typology forms the framework for our research. Our goal is now to test, enrich and refine this new model.

The model itself consists of four categories of factors:

1) Role/value of the document for the individual
- Reminding function
- Information needed by/to be shared with others
- Source of data/objective information
- Source of opinion/influence
- Evidence of job/task accomplished
- Personal work files/notes

2) Role/value of the document for the organization
- Documentation of legal contracts and agreements
- Record of policies and standards to be respected
- Representation of a status at a point in time
- Strategic value
- Impact on productivity/effectiveness

3) Temporal factors
- Stage in the document life cycle
- Application or relevance to current projects (and relative importance of these projects)

4) Uniqueness/irreplaceability
- Uniqueness/existence of copies
- Availability of substitutes

4. Methodology

Although it stems in part from empirical observations, the above typology is mainly grounded in theory, and still needs to be tested before we can consider it to be representative of office workers' reality. Thus, our planned methodology at this point includes two main phases. The first, more qualitative and exploratory in nature, consists of in-depth interviews with office workers, which will allow us to deepen our understanding and fine-tune our typology of factors. A second phase, involving questionnaires, will seek to test the validity of our model on a larger scale.

Setting and sample

In this study, we have chosen to look more closely into the personal information management habits of support staff in an academic environment, more specifically office workers in a university setting. Two types of office workers will be asked to participate: departmental secretaries, as well as administrative assistants, who usually work with a dean or an assistant dean.

There are several reasons why this type of candidate and setting are especially interesting. First, support staff forms an essential part of any organization, yet there has been very little attention given to the information behavior of support staff in organizations, at least from a PIM angle. In fact, the bulk of the PIM literature has repeatedly focused on a select few types of individuals: professors/researchers (Case, 1986; Kwasnik, 1991), professionals (Jones, 2002) and managers (Barreau, 1995; Mackenzie, 2000), which could all be considered so-called knowledge workers (Drucker, 1973; Kidd, 1994). Some have argued that knowledge workers make more interesting participants in PIM studies, because of the supposedly non-linear nature of their work (Malone, 1983; Kidd, 1994). Knowledge workers are therefore perceived as having more complex and fractured tasks, which may seem more interesting to analyze.

However, one could argue that managing electronic documents is as central to an office worker's tasks as any other worker. And while it may be true that the nature of their work is sometimes more clerical in nature, it is not necessarily devoid of complexity. As a matter of fact, an administrative assistant's information space may well be as complex as his/her superior's. An interesting aspect of secretaries' work, for instance, is that on the one hand they can work in a relatively structured frame, with rules set either by their superior or by their department, but on the other hand, they can have a certain degree of freedom with regard to how they organize and prioritize their documents. It would be especially interesting to observe how they deal with these seemingly conflicting aspects.

As for the academic setting, it appears to be an interesting one in which to conduct such a research. Universities are complex, document-heavy environments, and thus provide a potentially rich environment for our study. In that sense, it is our hope that this study will have a positive impact on the way electronic documents are managed in universities.

For this research, our initial target is to reach around 12 to 15 participants, who will mainly be recruited via letter and/or e-mail. The participants will probably come from various departments and faculties. Despite this variation, efforts will be made to ensure relative uniformity in the participants' job description, with the aim that they will form a fairly homogeneous group, as their main tasks and responsibilities will probably be relatively similar from one department to the other. This should facilitate the identification of significant trends and patterns, while helping control variables such as job content and type of work environment.

Data Collection and analysis

As mentioned earlier, data collection will consist of two phases. In the first, participants will be invited to interviews. These interviews will be semi-structured, which means that there will not necessarily be fixed, precisely ordered questions, but rather a series of questions to be used as a starting point, with probes and follow-up questions added as appropriate. The idea is to give the participants enough freedom to express themselves, while still making sure that all the topics of interest are covered. The follow-up questions and probes also have a second role, which is to ensure that the interviewer fully

understands what the participant is saying. This ongoing confirmation of what is being expressed can significantly improve the validity of our results. The planned duration of each interview is about 45 minutes to an hour. Follow-up interviews with certain participants are also a possibility.

Visual observation will also be used. The participants will be interviewed in their office, in part to add a visual component in the description of their document organization habits. Ideally, participants will illustrate their answers by demonstrating how they have organized their files. Other visual cues such as general office set-up and level of clutter will provide the researcher with additional insights. The method of interviewing participants in a natural setting - their office - is quite common among PIM and HCI (Human-Computer Interaction) researchers, and has proven successful in the past (Malone, 1983; Ducheneaut and Bellotti, 2001). During the interviews, handwritten notes will be taken. The interviews will also be audio-taped and transcribed. Although we don't expect to deal with very delicate subject matters in the course of this research, it is important to make sure that the participants cannot be readily identified. In order to ensure privacy and confidentiality, the interviewees will therefore only be identified by numbers and/or nicknames. When possible, screen shots of the contents of key directories or other interesting elements from their computer workstations will be printed out or otherwise captured, in order to help in the analysis phase.

The planned second phase, more quantitative in nature, will seek to expand on the results of the first phase and test the model. Questionnaires will be devised to try and establish to what degree the typology obtained is accurate, but also which factors are the most prominent among those sampled. In terms of data collection and analysis, Kwasnik's (1991) study provides an interesting method, which we will try to emulate to a certain extent. Barreau (1995) also reprised this method, with good results. By analyzing the participants' discourse during the interviews, we will seek to identify the various factors mentioned in relation to the notion of importance and code them accordingly. We will then compile the factors mentioned and calculate the frequency of each factor.

5. Expected contributions

It is our hope that our research will have several positive outcomes, such as:

- Adding to the existing body of knowledge in PIM and related disciplines, especially regarding the notion of document importance.
- Providing more insights into the information management habits of a significant group of workers: office support staff.
- Contributing to the enhancement of current PIM practices and tools.

6. Bibliography

Abrams, D., et al. 1998. Information archiving with bookmarks: personal web space construction and organization. *Proceedings of the SIGCHI conference on Human factors in computing systems, Los Angeles, California*: 40-48.

Badenoch, D., et al. 1994. The value of information. In *The value and impact of information*, eds. M. Feeney & M. Grieves. West Sussex: Bowker Saur.

Barreau, D. K. 1995. Context as a factor in personal information management systems. *Journal of the American Society for Information Science* 46(5): 327-339.

Barreau, D. K., and B. A. Nardi. 1995. Finding and reminding: File organization from the desktop. *SIGCHI Bulletin* 27(3): 39-43.

Bellotti, V., and I. Smith. 2000. Informing the design of an information management system with iterative fieldwork. *Proceedings of the conference on Designing interactive systems: processes, practices, methods, and techniques*: 227-237.

Bergman, O., et al. 2003. The user-subjective approach to personal information management systems. *Journal of the American Society for Information Science and Technology* 54(9): 872-878.

Bondarenko, O., and R. Janssen. 2005. Documents at Hand: Learning from Paper to Improve Digital Technologies. *Proceedings of CHI 2005, Portland, USA, April 2005*: 121-130.

Butcher, H. 1998. *Meeting managers' information needs*. London: ASLIB.

Carlson, C. N. 2003. Information overload, retrieval strategies and Internet user empowerment. In *Proceedings: The Good, the Bad and the Irrelevant (COST 269),* ed. Leslie Haddon.

Case, D. O. 1986. Collection and organization of written information by social scientists and humanists: a review and exploratory study. *Journal of Information Science* 12(3): 97-104.

Cole, I. 1982. Human Aspects of Office Filing: Implications for the Electronic Office. In *Proceedings of the Human Factors Society 26th Annual Meeting*, ed. Richard E. Edwards. Santa Monica: Human Factors Society.

Czerwinski, M., et al. 2006. Digital Memories in an Era of Ubiquitous Computing and Abundant Storage. *Communications of the ACM*, 49(1): 44-50.

Dourish, P., et al. 1999. Presto: An experimental architecture for fluid interactive document spaces. *ACM Transactions on Computer-Human Interaction* 6(2): 133-161.

Drucker, P. F. 1973. *Management: Tasks, Responsibilities and Practices.* New York: Harper & Row.

Ducheneaut, N., and V. Bellotti. 2001. E-mail as habitat: An exploration of embedded personal information management. *Interactions* 8(5): 30–38.

Edmunds, A., and A. Morris. 2000. The problem of information overload in business organisations: A review of the literature. *International Journal of Information Management* 20(1): 17-28.

Engelbart, D. C. 1961. Special considerations of the individual as a user, generator, and retriever of information. *American Documentation* 12: 121-125.

Eppler, M.J., and J. Mengis. 2003. A Framework for Information Overload Research in Organizations: Insights from Organization Science, Accounting, Marketing, MIS, and Related Disciplines. *Working Paper #1/2003 ICA*, University of Lugano, Lugano.

Ferraioli, L. 2005. An Exploratory Study of Metadata Creation in a Health Care Agency. *Cataloging & Classification Quarterly* 40(3-4): 75-102.

Gordon, M. 1997. It's 10 a.m. do you know where your documents are? The nature and scope of information retrieval problems in business. *Information Processing & Management* 33(1): 107-122.

Gottlieb, L., and J. Dilevko. 2001. User preferences in the classification of electronic bookmarks: Implications for a shared system. *Journal of the American Society for Information Science and Technology* 52(7): 517-535.

Harper, R., et al. 2001. Safety in Numbers: Calculation and Document Re-Use in Knowledge Work. *ACM: GROUP 2001, Sept. 30-Oct. 3, 2001, Boulder, Colorado*: 242-251.

Henderson, S. 2004. How do people organize their desktops? *CHI '04 extended abstracts on Human factors in computing systems*: 1047-1048.

Henderson, S. 2005. Genre, Task, Topic and Time: Facets of Personal Digital Document Management. *Proceedings of the 6th ACM SIGCHI New Zealand chapter's international conference on Computer-human interaction*: 75-82.

Hertzum, M. 1999. Six Roles of Documents in Professionals' Work. In *ECSCW99: Proceedings of the Sixth European Conference on Computer Supported Cooperative Work (Copenhagen, DK, September 12-16)*, eds. S. Bødker, M. Kyng, and K. Schmidt.

Hwang, M. I., and J. W. Lin. 1999. Information dimension, information overload and decision quality. *Journal of Information Science* 25(3): 213–218.

Jahoda, G. E., et al. 1966. Characteristics and Use of Personal Indexes Maintained by Scientists and Engineers in One University. *American Documentation* 17: 71-75.

Jones, W., et al. 2002. Once found, what then? A study of "keeping" behaviors in the personal use of web information. In *65th Annual Meeting of the American Society for Information Science and Technology (ASIST 2002), Philadelphia, PA*, ed. E. G. Toms.

Jones, W. 2004. Finders, keepers? The present and future perfect in support of personal information management. *First Monday* 9(3).
http://firstmonday.org/issues/issue9_3/jones/index.html (accessed April 8, 2007).

Jones, W., et al. 2005. Don't take my folders away! Organizing personal information to get things done. *CHI '05 extended abstracts on Human factors in computing systems, April 02-07, 2005, Portland, OR, USA*: 58-64.

Karger, D., and W. Jones. 2006. Data unification in personal information management. *Communications of the ACM* 49(1): 77-82.

Kidd, A. 1994. The marks are on the knowledge worker. *Proceedings of CHI '94*: 186-191.

Klapp, O. 1982. Meaning lag in the Information society. *Journal of Communication* 32(2): 56–66.

Kwasnik, B. H. 1991. The importance of factors that are not document attributes in the organization of personal documents. *Journal of Documentation* 47(4): 389-398.

Lansdale, M. 1988. The psychology of personal information management. *Applied Ergonomics* 19(1): 55-66.

Lyman, P., and H. R. Varian. 2003. *How Much Information 2003*. http://www.sims.berkeley.edu/how-much-info-2003 (accessed April 8, 2007).

Mackenzie, M. L. 2000. The Personal Organization of Electronic Mail Messages in a Business Environment: An Exploratory Study. *Library & Information Science Research* 22(4): 405-426.

Malone, T. W. 1983. How do people organize their desks: implications for the design of office information systems. *ACM Transactions on Office Information Systems* 1(1): 99-112.

Meier, J., and R. Sprague. 1996. Towards a Better Understanding of Electronic Document Management. *29th Annual Hawaii International Conference on System Sciences (HICSS-29), January 3-6, 1996, Maui, Hawaii*: 53-61.

Murphy, J. E. 1980. Filing of Personal Reference Collections. *American Journal of Hospital Pharmacy* 37(5): 618.

Neumann, L. J. 1999. Paper, piles, and computer files: Folklore of information work environments. *Library Trends* 47(3): 439-469.

Paré, F.-X. 2006. *L'importance relative des documents : impacts sur l'organisation personnelle de l'information en milieu de travail*. Unpublished paper presented at the 74ème Congrès de l'ACFAS, McGill University, May 2006.

Ravasio P. et al. 2004. In Pursuit of Desktop Evolution: User Problems and Practices with Modern Desktop Systems. *ACM Transactions on Computer-Human Interaction* 11(2): 156-180.

Reuters. 1998. *Out of the Abyss: Surviving the information age*. London, Reuters.

Rousseau, J.-Y. and C. Couture. 1994. *Les fondements de la discipline archivistique*. Ste-Foy: Presses de l'Université du Québec.

Soper, M. E. 1976. Characteristics and use of personal collections. *Library Quarterly* 46(4): 397-415.

Sprague, R. 1995. Electronic document management: Challenges and opportunities for information systems managers. *MIS Quarterly* 19(1): 29-50.

Tyrväinen, P. and T. Päivärinta. 1999. On Rethinking Organizational Document Genres for Electronic Document Management. *32nd Annual Hawaii International Conference on System Sciences (HICSS-32), 5-8 January, 1999, Maui, Hawaii*.

Whittaker, S. and C. Sidner. 1996. Email overload: Exploring personal information management of email. *Conference on Human Factors in Computing Systems (CHI 1996), Vancouver, B.C.*

Whittaker, S. and J. Hirschberg. 2001. The character, value and management of paper archives. *ACM Transactions on Computer Human Interaction* 8: 150-170.