Email as an Integration Device:
A Study of Work Place Information Seeking

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ABSTRACT

Being able to find relevant information is an important task for today's organisational members, but how is this achieved when there are so many sources and tools to choose amongst? By interviewing thirteen IT professionals about their information seeking activities, we have analysed their needs, their sources, and their tools and made interesting and novel discoveries. Our findings suggest that social issues are important also in such a seemingly individual task as information seeking. Lack of social awareness in search tools made people use email as a way to integrate different information environments and be able to relate to fellow employees. These insights should be used to design future work place information seeking tools to benefit from the social interactions that exist in a corporate setting.

Keywords

Organisational information seeking, email, search engines, intranet, work place, the web.

INTRODUCTION

The present period of history has been characterised as the Information Age. Since the volume of information that must be processed by organisations has increased dramatically, organisations need to have in place effective systems for information management in order to stay competitive (Soliman and Youssef, 2003). One important aspect of information management is being able to find the information you need, since this is often a prerequisite for being able to perform one's duties (Jadaan and Stenmark, 2008). Information retrieval, and in recent years also information seeking, has been studied by numerous scholars, but much of this work has been carried out in laboratories or with students and, until recently, not so many has examined real business environments.

Previous research has shown that employees are primarily concerned with accomplishing their tasks, and therefore employ satisficing strategies when using information systems, rather than on trying to become proficient with the tools at hand (Carroll and Rosson, 1987). It has therefore been suggested that only when we stop studying individual tool in great detail and instead look at what the user is trying to achieve can we begin to understand the bigger picture (Jones et al., 2001). Studies have also showed that organisational members do not only use specialised retrieval tools such as search engines when trying to find information. Instead, the engage in a variety of strategies and use numerous different sources, including personal hard drives, intranets, email and the web (e.g., Jones et al., 2001; Teevan et al., 2004; Whittaker et al., 2006). Recent work suggests that email, despite being designed as a communication tool, plays a central role in organisational information seeking (Jadaan and Stenmark, 2008) and in this paper we therefore look in particular at email and our research aim is to understand what role email plays in organisational information seeking and why this tool is being used for this seemingly unlikely purpose.

The rest of the paper is structured as follows. The next section presents related work on organisational information seeking behaviour. Thereafter we describe the site and the method used in this study. In section 4, we account for our empirical findings, and discuss these in section 5. Finally, we conclude the paper in section 6.

RELATED WORK

Our previous studies have suggested that organisational members move between and within three different information environments when searching for information; the local, the organisational, and the global (Jadaan and Stenmark, 2008). Much of the searching in these environments is carried out manually, i.e., without or with very little IT support. When tools were used, the tools were often designed to work in only *one* environment, thus forcing users to switch between many

applications in order to satisfy a single information need. Previously, most studies have focused on one information source or tool at a time, e.g., the web (Sellen et al., 2002), intranets (Géczy et al., 2007), or email (Whittaker and Sidner, 1996). Until recently, not many had looked at information seeking across different environments or when using several different tools. There are exceptions, though.

In their Keeping Found Things Found-study (Jones et al., 2001; Bruce et al., 2004) examined how managers, information professionals and researchers managed to re-find things on the web, but they also touched upon the way email and local files were used. They found that the two re-finding features explicitly supported by the web browsers (i.e., bookmarks and history lists) were relatively underused. Instead, their users engaged in a large variety of methods, including sending email to themselves, pasting URLs into documents or printing web pages. One conclusion from their studies was that no method or tool was able to provide the user with all support needed. These studies included the workplace but did not look at intranet usage and did not present any design implications.

Teevan et al. (2004) took a broader focus and examined how graduate students used local files, email and the web to find information. They found that many users preferred orienteering to teleporting. Orienteering means using both prior and contextual information to narrow in on the actual information target in a series of steps, without specifying the entire information need up front. Teleporting, in contrast, happens when a person attempts to jump directly to the information target. Teleporting represents the behaviour most search engines try to support, but Teevan and colleagues found that keyword-based search engines were not often used, and when they were used, it was usually part of an orienteering strategy. Orienteering allowed participants to take advantage of the large amount of contextual information they knew about their information target without having to fully specify their information need up front, thereby lessening the cognitive burden of finding information. Orienteering further gave people a sense of location during their search, and helped participants understand and trust the answers they found. Teevan et al. studied graduate students and not office workers, and consequently, the use of intranets was not covered in their study.

Another work related to our study is Whittaker et al. (2006) study of email as a unifying application in information management. Whittaker et al. argue that email is used for three key functions; task management, personal archiving and contact management. Task management relies on email's ability to remind us of current tasks just by letting us leave messages in the inbox as visual reminders. Personal archiving refers to storing reference information and finished tasks in email folders. Contact management means being able to locate colleagues and their colleagues. As Whittaker et al. remind us, email was not originally designed to support information management in this broad sense and hence there is a lack of direct support for many of these tasks. Although they briefly talk about search applications, they did not studied how email was used for information seeking purposes.

The studies referred to above all show that employees in today's organisations resort to a multitude of sources, tools and strategies in order to satisfy their information needs, and that more research and more efforts are needed to understand and support this complex situation.

RESEARCH SITE AND METHOD

This qualitative study took place in a large Swedish IT consultancy firm. The company has approximately 6,800 employees in Europe, North-America, South-America, Asia and Australia. Approximately 1,000 of these work in Sweden. The company has used electronic messaging since the early 1980s and now uses Microsoft Outlook for email. In the mid-1990s the company implemented an intranet, which today is based on Microsoft's Content Management Systems (CMS) and highly standardised. In addition to the CMS-based intranet, the company also uses Teamplace, a collaboration environment build on Microsoft Sharepoint, for projects and small working groups. Teamplace enables working teams to establish and run their own collaborative websites on the intranet to facilitate information sharing, document management and collaboration. The Teamplace environment can be searched using the search engine built into MS Sharepoint, while the remaining intranet is indexed by Google's intranet search engine.

Data was gathered via thirteen semi-structured interview with various employees whose job roles included project coordinators, mainframe technicians, procurement managers and system developers. The respondents were randomly selected from the company's phone book to provide for a representative subset of the organisation, and contacted via email. Individual in-depth interviews were scheduled and subsequently carried out at the respondents' work place. The interviews, which were all recorded and transcribed, varied in length between 46 and 88 minutes and focused on what information the respondents needed to carry out their job, where they obtained this information and how they went about finding the information.

In the data analysis we started with an open coding phase where the data was repeatedly read and grouped into concepts that were suggested by the data itself rather than being informed by theory (cf. Orlikowski, 1993). A first read-trough of our data resulted in identifying 215 information need situations. A detailed examination of these, where doubtful cases were removing and episodes where multiple sources were used to fulfil the same identified need were concatenated, resulted in a reduction to 88 completed episodes. Our previous work on the same data had revealed that users often had to switch between different

tools and sources in order to satisfy their information needs (Jadaan and Stenmark, 2008). We had also noticed that email seemed to be a key resource in our respondents' information seeking behaviour. When we now revisited and reanalysed the data, we thus paid particular attention to email and whether it was used as the sole information source, as the primary source combined with others, if it played a more secondary role, or if it was not used at all.

EMPIRICAL FINDINGS

Email was used heavily in the organisation. It was used as a communication tool, obviously, as the respondents used it to contact customers regarding changes in the requirements specification or suppliers for latest update other information concerning systems – but also for information seeking purposes. Email was used for information seeking activities both directly and indirectly. The email inbox itself was an important and direct source of information. It was often used as a storage facility, helping people to remember and re-finding things, and employees preferred storing things in their inbox rather than putting them on the intranet.

> "Is this something I need to remember or is it something technical that I might need to consult in the future? If it's something interesting you try to figure out where to put it so that you can find it again, or if someone else needs to find it. If I would to put it in Teamplace it would all turn in to one big mess, I think." Patric

Saved emails were also used to keep track of chronological details, e.g., when tasks were ordered or when questions were asked. This also provided accountability and helped employees cover their backs.

> "You get a lot of emails, and then you can save it to your personal folder. Then it goes to a local drive where I keep it and categorise it. If you are working with something, you create a folder and save all your email, all conversations. It is useful in the future to be able to go back if someone asks you why you did what you did, and then you can say "It was you who told me so" and show them the email. So you remember that you have an email on this somewhere and then you go look for it." Anne

Even when information was received through other channels, employees requested it to be emailed anyway. This behaviour obviously added to the flow of emails and to facilitate finding, some respondents used folders to categorise their information.

> "Even when you speak to someone on the phone I ask them to send an email so I don't have to take notes, because those notes tend to disappear so easily. If I get it in the computer, it doesn't go away. But in order to find it again, I have to maintain a folder structure where I keep things in separate folders." Mike

Some information though was not easy to categorise or too short-term to be worth categorising and this was often just kept in the inbox. Other users did not even bother to use folders at all and kept all their saved email in the inbox. A majority of the respondents admitted that the amount of email received was overwhelming and that they every now and then had to clean up their email system by throwing stuff away or moving it to backup disks.

Email was also often used for indirect information seeking in the sense that employees used email to find information that resided elsewhere, either in the head of some colleague or somewhere on the intranet. In cases when the users did not know in which department a sought-for employees worked, or what address or telephone number he or she had, they used the email system's directory to search for this information. When looking for information on the web or on the intranet, email was often used to hold URLs to such resources. Regardless of what sort of information the users were looking for they almost never used email's built-in search tool. Instead, they browsed through the folder where they figured this sort of information would reside.

> "No, I read through the emails or look at the subject lines. No, I don't use search, I look at the labels and I have my folders." Anne

The intranet was typically used to find intra-organisation information. Sometimes this information existed in the form of a project document or a department home page, but more often the intranet did not contain the information needed or at least not described in a way that all users could understand. Typically, the intranet provided a starting point and was used to learn whom to contact.

> "You can get an entry point and a name via the intranet but often you end up with this person you need to talk to in order to get the answer." Mary

When the organisational belonging of a colleague was known (or learnt from using email), the respondents searched the intranet for information such as what they looked like or what competence they had. The respondents often knew approximately where in the organisation a certain competence could be found and they navigated to that department's web page rather than to teleport via the search engine.

"I usually know in which department the employee works. Let us say that I search for chassis purchaser. The thing I do then is that I click my way down with the help of the menus even though it results in many clicks. I find the search engine very difficult to use – it doesn't work me." Mike

There were many project e-rooms on the intranet where project-specific information such as meeting protocol, project direction and conditions were kept, and rather than to try to search, people asked the person in charge to point them right. According to the respondents, the search engine would often return too many documents and often old and irrelevant ones, and the structure of the intranet was difficult to understand. Instead, the employees relied on colleagues to know where information was on the intranet and asked them for links.

"Often you know who works with this so you send them an email 'Do you have the link to that and that?' rather than to search on the intranet. You also get a lot of links to intranet sites sent to you by management […]. It's not like they would write that 'This information is available on the intranet' but they write that it can be found following *this* link and then they add the URL. Which shows that they don't expect us to be able to find it (laughs)" Chris

The public web was also a commonly used information source. All of the respondents used the web in their daily work and it was the typical starting point when wanting to get an overview of things or when looking for new ideas. In these situations, the respondents often had very vaguely expressed information needs. The public web was also the primary source of information when gathering general information about certain technologies or certain programming languages, or to get code examples that would help programmers code or decode programs.

"I search a lot on the internet. I search for code examples, class definitions or how encryption works. There is a site on the web I use, it's called the Mainsoft Code Project. You can see others' uploaded code examples and they also explain how they coded them. It's very useful. I normally start by using Google and see if I can find anything of interest. If not, then I'll go to Mainsoft" Fred

When searching for information on the public web, the respondents preferred sources they knew they had seen before and knew they could trust. Sometimes, pages were bookmarked so they could easily be re-found, and they were often vendor-driven sites where the respondents had to have user accounts in order to access the information. The respondents who regularly visited such sites found these pages to be very useful, in particular to find solutions to problems or to understand systems-specific error messages.

"We use different operating system and each one of them has a web page where we can access information and also report errors that have occurred in our operating systems. I also download updates and useful programs and there is also a large database where you can read about reported errors and the solution to them. We usually report the problems via these web sites and later on someone contacts you through email and the communication continues until the problem is solved." Lisa

Overall, the general opinion amongst the respondents was that it was easier to find information using the public search engines (almost always Google) than it was to find it with the corporate intranet search engine. Still, as when searching internally, email was always an option often used.

"When dealing with technical problems, we often google the web and go to particular interests sites to see if they have something. But eventually you often email the vendor and ask them, since you know that we are one of their prioritised customers." Chris

Most of the respondents claimed not to save documents on the local hard drive due to the fact that the documents they used were continuously updated and replaced, and that keeping a local copy would thus not be useful. The respondents who did save documents on their individual hard drive said they used folders that they arranged according to some personal structure. The reason for storing information locally was that they did not trust themselves being able to (re-)find information would they leave it on the intranet. Keeping a local copy speeded things up.

"Personally, I think the intranet is poorly structured. I spend much time searching our intranet for some trivial stuff I know should be out there. Like meeting minutes. This makes you insecure, and then you start to save a lot of information locally and use desktop search to find it. Stuff that I am personally responsible for, I always keep copies locally – it's much quicker." Joan

Joan was one of very few who used desktop search. The organisation did not endorse this technology and those who used it had installed it on their own initiative and in conflict with official policy. Storing documents on the local hard drive also meant that Windows built-in search function could be used to locate the files if the name or part of the name was known. However, a majority of the respondents never used search engines to teleport. Instead, they browsed through the folders where they figured this sort of information would reside.

DISCUSSION

Our respondents often used the corporate intranet as an information source but it was seldom searched via the search engine. The search engine produced too many results, the respondents complained, and too many duplicates. The resulting links were often perceived to be irrelevant. Teevan et al. showed that an orienteering strategy was preferred by graduate students and our study suggests that this is true also for corporate employees and on a corporate intranet. Instead of trying to teleport, one approach was to guess – based on organisational knowledge – where the information might reside and browse to this location via the menus. This strategy worked rather well for those who had worked for the company for many years and knew their ways around. However, even such veterans complained the intranet was poorly structured and their browsing strategy failed when the actual whereabouts of a certain piece of information could not be accurately predicted.

Another strategy, which was not observed in Teevan et al's study, was to follow links received via email. Such emails were received both as unsolicited email from e.g. managers or colleagues and as the result of explicit requests. When the email had been received earlier and already resided in the email system, the inbox and other folders had to be searched. Here, too, the built-in search function was not often used. Instead, the users resorted to orienteering based on what Whittaker et al. refer to as "indirect social and temporal cues" (2006, p.72). Our respondents typically tried to remember who sent the email or when the email was sent or what the email's subject line was and then sorted the emails accordingly. If no email containing the URL could be found or if they knew they had no such email, they would email a knowledgeable colleague and ask him or her to send them the URL.

The passing and storing of URLs in the email system was very obvious in our study, and regularly used as an information finding means. Almost all respondents explicitly said they needed to save the URL to a piece of information once they had found it. It was obvious that they were not sure they would be able to (re-)find the information otherwise. Saving URLs is a known (and anticipated) behaviour and the browsers have built in support for this in form of Bookmarks (in Netscape or Firefox) or Favourites (in Internet Explorer), but this feature was not often used by our respondents. Instead, they stored their URLs in emails. Bookmarking is a feature known to have many weaknesses (Jones et al., 2001). Firstly, it does not scale well; when the number of bookmarked pages gets too big, finding the right bookmark becomes almost as difficult as finding the right web page. Secondly, bookmarks are not easily shared from within the browser others; pasting the URLs into emails is thus a feasible option. Thirdly, bookmark present too little context to help the seeker find the relevant one when searching manually; saved emails containing URLs have already the additional contextual cues needed. Fourthly, there is no explicit search support for bookmarks; although not many users in our study exploited explicit search this is still a useful option to some.

The image that we find emerging from our analysis is the view of email as the hub around which much of corporate information seeking circles. As we have seen above, in addition to containing information in itself, email is used to find information on both the public web and the intranet. Email is thus the application that helps the user carry out information seeking across many different environments. Although it could be expected browsing via menus (i.e., orienteering) would be preferred to explicit searching (i.e., teleporting) we did not expect email to play such a central part in this information seeking strategy. There may be several explanations as to why email holds such a central position for organisational members. One straight-forward reason is, as Spence et al. (2005) observe, that email has been in existence much longer than other types of electronic media. Years of daily interaction has built up a familiarity with the tool that makes organisational members more prone to turn to it in the absence of more specialised tools.

When looking for web information – in particular intranet information – our respondents would rather "submit" their queries to a colleague than to the search engine. When asking a colleague who shares a working context, e.g., has attended the same meeting, is engaged in the same project, or has similar work tasks, less explicit information has to be provided. When asking for "Wednesday's meeting minutes" or "the phone number to that dude we had lunch with" the replying part immediately knows what is sought for. Search engines' matching and ranking algorithms do not yet exploit contextual information of this kind and cannot yet make this kind of connections.

In addition, a search engine typically returns hundreds of links. Not only may the "correct" link be hidden several pages down in the result list, but it is often impossible to determine which one is the correct link. A lot of time and effort has to be invested in evaluating the returned links. A knowledgeable colleague, in contrast, might have the precise URL that leads directly to the desired information. Submitting to a colleague instead of a search engine thus requires less effort.

Retrieval systems' relevance ranking is typically based on mathematical algorithms – this is the case with the intranet search engine used by our organisation – whereas human relevance ranking is often based on how *trusted* particular sources are. Our office workers preferred the added quality that human relevance ranking provided. A second illustration of this is the fact that Google, whose page rank algorithm exploits human linking activities in a way that "corresponds well with people's subjective idea of importance" (Brin & Page, 1988, p.109), was the preferred search engine amongst the respondents. Intranet search, where such linking is limited at best, was considered useless (despite the fact that it too was Google-powered). What separates the two Google implementations is that the public Google exploits social relationships.

Social issues such as trust and cognitive aspects such as explicit query formulation seem to be important factors in organisational information seeking. We therefore suggest that email's central position in corporate information seeking is not a result of its superior technical qualities but stems from the fact that it is a "people-centric" technology. Organisational members often find information by contacting people or by returning to messages previously received from other people. This does *not* mean that email is the perfect search tool – far from. The fact that email now is used for tasks other than for which it was originally designed (cf. Whittaker et al., 2006), means that the "right" tools are still missing. When designing the search tools of tomorrow, however, we do not think one should see email as the application to solve all these problems as e.g. Whittaker et al. (2006) suggest. Email holds a central position in information seeking much *due to the shortage of competing devices* for information management, and we suggest it is the social dimension of email that should be copied and exploited. Devices that remind us, point our attention to relevant things, help us keep found things found, allow us to collectively annotate and comment on links, and benefit from the actions of colleagues are highly needed, and while awaiting better tools people show great creativity in using what they have (e.g. email).

One way to make search tools more people-centric would be to incorporate social features more explicitly. Today we see a growing interest in social tagging, social editing, and other applications of social software. Social bookmarking services such as deli.cio.us or the intranet equivalent Dogear (Millen et al., 2006) let people add value to the entire community by tagging their own personal bookmarks for easier retrieval. These applications illustrate well how social software can enhance information retrieval, bookmark sharing, attention management and many of the other functions that corporate members need to carry out.

CONCLUSIONS

By interviewing IT-professionals about their information seeking activities, we have tried to understand how organisational members go about to satisfy their information needs in a multiple-source information environment. In particular, we have asked what role email plays in organisational information seeking and why this communication tool is being used for information seeking activities.

Our data shows that email is used as an integration device to keep together seeking activities spread across local files, the intranet and the public web, i.e., across the local, the organisational and the global information environments. Email is used for information seeking activities both directly, i.e., the personal inbox contains actual information that the user needs to retrieve and use, and indirectly, i.e., emails contains pointers to other resources such as fellow employees and URLs to web-based information.

This reasons why email has this status in the organisation are several, but when it comes to information seeking one important aspect is that email in a sense is highly people-centric. Email was design to connect people with one another whereas a search engine is designed to connect people with information. Although information is what the users are looking for, they prefer to get this from other people. Email also appears to be the least common denominator when looking for information in multiple sources and environments.

These findings suggest that current information seeking tools and their features are not yet perfected. Search tools at large have this far been isolated stand-alone algorithm-driven applications. Our findings suggest that future work place search tools should explore, visualise and exploit the connections and relationships that exist between fellow employees, as is currently done in many social media applications. More research has to be devoted to information seeking in corporate environments and in particular to understanding how to search tools may benefit from the social interactions that exist with the corporate setting.

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