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bobcatsss

BOBCATSSS 2010 @ Parma, Italy

Dates: Monday 25th, Tuesday 26th, Wednesday 27th January, 2010

**Bridging the digital divide:
libraries providing access for all?**

“Personal Information Management strategies in Higher Education”

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Introduction

Personal Information Management (PIM) is a complex non-linear process, described by Jones (2007) as the acquisition, organisation, maintenance and retrieval of the information people keep for their own use; it is, however, a concept with which we are all familiar. For students growing up with digital information, but studying in a transitional environment, the complexity is marked by the increasing importance given to their strategies for organising information which are themselves complicated by the rapidly changing digital formats. This paper reports on the initial findings of a larger study which aims to better understand the factors that influence student’s PIM in the digital environment and sets out through a literature review and case study to identify the key issues for students and their PIM in an academic setting.

Management of personal information collections is often performed without conscious thought; mundane items such as shopping lists and to do lists reside alongside complex

reports, research notes and emails that require more formal decisions in keeping or discarding. The need for information systems to organise items such as photos, videos, emails, documents and then use them in diverse ways is obvious, however the unique nature of each individual system creates methodological challenges in how to collect and analyse data and how to study the behaviour of user interaction with these items.

Literature Review

Background

PIM research has emerged from studies of information seeking and behaviour across diverse disciplines including Human-Computer Interaction, Psychology and Information Science. Recent studies have begun to investigate the interaction between the user and the system in more depth, not just to aid the improvement of system design but to begin to understand the thoughts and motivations of users when interacting with formal systems. These have previously been thought of as the realm of sociologists and psychologists, however the methods used in those disciplines can clearly support study within other fields and introduce new ways of looking at User Studies.

Early studies of information seeking can be described as ‘system-centred’ and focused on the use of resources and information repositories, thus focusing on where to find these objects rather than on the behaviour or needs of those using them. With the increased application of electronic systems the focus shifted to how users interacted with the system. Users Studies attempted to look at relationships, encompassing not only the recognised systems associated with information seeking but also human interaction, recognising users needs and how they affect user interaction with a particular system.

Studies into Everyday Life Information Seeking (ELIS) (Choo & Marton, 2003; MacKenzie, 2003; Lloyd, 2007) clearly show that motivation and use have an impact on the information seeking process. In the workplace “context-dependant and corporeal” knowledge are important facets of learning which ensure that once initial training is completed workers become what Lloyd describes as ‘practitioners’. It was this socio-cultural practice which connects shared experiences and encourages shared understandings (Lloyd, 2007) and it is these behaviours that are crucial to understanding the influences on PIM strategies. Taking social and cultural aspects of information seeking behaviour and looking at them in relation to PIM has begun to create a picture of how users organise their personal information spaces. This direction for research into PIM has however, so far, primarily focused on the workplace (Barreau, 2007; Pikas, 2006; Whitaker & Sidner, 1996).

PIM is frequently described as a burden to users (Malone, 1983; Lansdale, 1988; Whitaker & Sidner, 1996). The difficulty in comparing data sets and accessing participants in a natural setting has led to a lack of empirical research into the behaviour surrounding PIM activities and the issues and processes are widely unexamined. Kelly (2006) calls for the development of varied approaches to studying PIM behaviours and the development of a set of common tasks to facilitate PIM research and develop theories of PIM behaviour to enable results to be generalised and increase validity and reliability. The majority of PIM related studies each look at a single tool; email (Whitaker & Sidner, 1996), bookmarks (Abrams et al, 1998; Jones et al, 2002), and files (Barreau, 1995; Barreau & Nardi, 1995) rather than a holistic picture of how the use of these tools relates to the behaviour and motivation of users in their PIM activities. Little research has been done to understand the methods or strategies employed by university students during their PIM activities and how these activities enable the knowledge creation during production of assessed coursework.

PIM and Higher Education Students

Today's higher education students inhabit a new digital environment (CIBER, 2008), academic applications are increasingly embedded into their courses (e.g. WebCT, Moodle) and rich online tools allow them to save both electronic and 'real world' artefacts for later search and retrieval. New behaviours in this digital environment are emerging. No longer turning to books and traditional library services for their information students use an array of digital resources and turn to "peer-based learning" (Digital Youth, 2008) rather than traditional authority figures to support their educational needs.

In this increasingly complex digital environment students seek information for both personal and academic needs and to accomplish this they acquire information in a number of ways. Re-finding information is a crucial skill, way-finding techniques such as signposts and context help give a degree of certainty to the process as it relies on not only recall but also recognition. The personal information collections of students are neither purely personal nor work related but often an integrated combination of these leading to greater complexity. Additionally the proliferation of mobile digital devices, allowing the capture of information like never before, creates a rich and varied set of information objects to organize. Digital formats rapidly evolve making the digital environment one of flux; formats popular today will be obsolete tomorrow and trends in popular culture such as Facebook and Twitter are quickly superseded. The growth of the mobile device market has increased the problem of fragmented information collections making organisational strategies problematic.

Whilst previous studies provide insight into PIM behaviour they do not focus on the emergent behaviours in a digital environment including the impact that newer Web 2.0 and social networks have on strategies. Nor do they consider diverse and complex academic resources such as proprietary software and hardware or how to control information objects held in subscription databases. Students need to adapt a broad strategy to deal with the recent

explosion of electronic resources alongside the more traditional print based resources and integrate other concepts such as their personal interactions with peers, both in person and via social networking online, and the saving of 'information scraps' such as post-it notes (Bernstein et al, 2001). Understanding the complexity of the human processes involved in PIM relies on key concepts from Sociology, Psychology and Information Science. It is the intention of this study to explore this environment through existing theoretical lenses to aid understanding of the student's complex cognitive processes when engaged in PIM and of the factors which can influence their strategies. This preliminary study aims to establish the extent to which students exhibit behaviours reported in the literature, notably the use of a range of electronic resources, and to identify what might be the key PIM issues for students acquiring, organizing, maintaining and retrieving their information items in an academic setting.

Methods

This study focuses on understanding the methods students adopt to cope with this increasingly complex digital environment through the use of a case study of students studying in the Department of Information and Communications at Manchester Metropolitan University.

The initial research has been mainly quantitative in nature using pilot data gathered via a questionnaire which was distributed to Library and Information Management students in the Department of Information and Communications in the autumn term of 2008. It was distributed to students studying on the Information Management and Librarianship routes across all three year groups and a total of 43 (16 third years, 11 second years and 16 first years) completed questionnaires were collected. In addition screen captures of 15 students

personal work spaces were taken to assist in the creation of 'show cards' for use during the interview process in order to aid discussion of organisational strategies.

Qualitative analysis of an online discussion forum (<http://www.donationcoder.com>) provided rich descriptions of user interactions with PIM software and helped to create a comprehensive list of available software and its functions. Key functional requirements from this analysis emerged through iterative coding of the discussion using NVivo and these requirements providing the focus of the next stage of the study.

Findings

Previous studies of students working in the new digital environment highlight two main areas of potential impact on PIM behaviour. First information collections become fragmented across multiple devices when working at home and on campus due to the profusion of mobile devices. Secondly, use of non digital items and printing is still common which causes problems in integrating information from electronic and physical items, supporting the idea of students operating in a transitional environment. The questionnaire sought to ask students about their methods for storing and organising information and their use of technology within this information environment.

Storage and Organising

The widespread use of laptops, PDAs and other mobile devices has the potential to lead to an increased problem with fragmentation of information across multiple devices but also enables students to save multiple copies of their information items and assignments for to back-up and to work off campus. In the Department of Information & Communications the results from the questionnaire suggest that using traditional methods of storage is the norm, printing is still common, as is the use of the networked storage known as the H:Drive. However the majority of students also store their information items on devices other than their networked

drive which impacts on the retrieval of information items when it is time to prepare assignments.

When asked about their use of resources it was reported that books and other traditional physical resources are still used for research. Overall, students rely on text more than any other format for their research although use of peer reviewed journals is infrequent.

Student research may be performed many weeks in advance of the submission date and as such the need to organise information items is crucial. Semantic naming and the ability to organise and connect themes is fundamental to knowledge creation; it is through applying personally meaningful document names that items can be re-found. When asked about their naming conventions, students described using variations of the format- “week1'subjectmatter'.doc” or “Year folder- subject- assignment no- research”. Few students admitted that they couldn't remember or find their information items; this could be because they do not want to admit, or are unaware, of the fact that their methods of organising and storing their items are failing them.

Finally the students were asked to categorise themselves as either ‘Frequent Filers’, ‘Spring Cleaners’ and ‘Non-Filers’ as used in Whitaker and Sidner (1996) in their work building on that of Malone (1983) to categorise and compare students organising habits. The majority used some sort of organisational structure, either classifying themselves as ‘Frequent Filers’ or ‘Spring Cleaners’ and this was further evidenced in the exploration of personal information spaces in order to create ‘show cards’ for the forthcoming interview process.

Students keep their information items for extended periods, some admit to keeping them indefinitely; this is in keeping with previous studies which report that digital items are rarely deleted or archived, this takes up valuable screen space which can have serious implications

for re-finding, becoming a burden over time.

Use of technology

Software specifically aimed at PIM activities is hard to define, some applications offer a limited feature set, simply to capture screen shots, take notes or produce mind-maps whilst others offer an 'all-in-one' solution. There are at present over 300 different applications that can be described as PIM software however surprisingly few students use them, even those freely available on campus such as Endnote and Inspiration. Students in this study were more aware of Web-based software such as Delicious, Digg and Stumbledupon, however only a very small number of students use them.

Social networking sites are popular amongst students, particularly Facebook and You Tube, conversely there is little evidence of students in this study using these applications to support their learning or store their information items. Despite the high profile and increasing interest from academia including many HE Libraries, Second Life is not a popular choice amongst the students in the Department. Other popular social networking sites such as Flickr, Bebo, Friends Reunited, MySpace and LinkedIn had few active users amongst those questioned illustrating the transient nature of these applications.

Defining functional requirements in PIM software

It was apparent from the questionnaire findings that students were not using PIM software to assist in their studies. Whilst a number of interchangeable terms may be used to define PIM Software; note-taking software, personal information manager, outliner, and web companion among them, non use or the difficulty in identifying use may arise because collections of personal information are unique and the way in which users interact, organise and use the information varies considerably.

In order to investigate and compile a comprehensive list of current PIM systems a rich source

of user discussion about these software applications was found on the DonationCoder¹ forum and enabled the exploration of functional requirements. These included the need for multiple data views, the ability to add a wide range of data types, a robust search and filter function, and a text editor for direct note-taking. The need for these formatting and text editing functions revealed that meaning is often created through the use of bullet points, underlining and other formatting conventions which can become problematic when working with digital items.

Discussion

It is evident from the initial investigation that students are forming strategies of sorts to help them in their PIM activities, but are not seemingly using known PIM software to assist them. Conversely the participants in the discussion group having experience of using the PIM software were clearly able to identify and articulate the functionality they wanted from the software. In order to explore this further and to begin to identify the key issues for students and their PIM we discuss the picture gained of student experience and what was expressed as desirable with respect to functionality in the discussion group in respect to the key PIM stages of acquiring, re-finding and using information

Issues in Acquiring information

Acquiring information is the start of the PIM process, and is perhaps the most common of all PIM activities. It has been said that we inhabit a world of information overload, (Bawden & Robinson, 2008; Allen & Wilson, 2003; Lyman & Varian, 2000) leading to distraction, time wasting and stress. For students this seems an accurate description, they receive handouts in lectures, make notes, and follow electronic links from their virtual learning environment and

¹ <http://www.donationcoder.com>

research coursework via books, journals and web pages. Integrating the information found from these diverse sources is a complex cognitive process and the decisions and factors that influence students requires further enquiry. It was found that users predominantly use digital items when discussing their PIM needs; however students still operate in a period of transition between physical resources and increasingly digital items. Non-digital items still require a method of integration; post-it notes, business cards, lecture handouts, camera phone images, are hard to integrate although some applications are beginning to offer the ability to incorporate these non-digital items with their digital counterparts. Evernote (www.evernote.com) provides their users with multiple capture options including scanning and importing photos from mobile phones, images are indexed and using Optical Character Recognition (OCR), text can be searched. This flexibility offers a more holistic approach to PIM, recognising the diverse array of items in any one collection and offering original solutions to deal with it.

Barreau and Nardi (1995) suggested categories of ephemeral, working and archived to categorise information items. Assessing the needs of users in this study it is apparent that both ephemeral and working documents are the predominant focus. Both Barreau and Nardi (1995) and Malone (1983) reported that users archive little and fail to maintain their collections. This is consistent with findings from this study. Our students stated that they use relatively standard naming conventions when they save their files which might suggest that they are not concerned with the naming and placing of items which might subsequently facilitate the maintenance of the collection and dealing with duplication and version control associated with working on campus, at home and using mobile devices. These issues cause an unnecessary additional burden which could be relieved through the use of PIM software if these functional requirements could be met.

It appears from the findings of this study that once items are collected users keep everything, making few keeping or discarding decisions and rely on filtering or organising activities to enable re-finding; the ability to search or filter results by keyword or tag is seen as very important by users in the discussion group, although few students make use of sophisticated PIM software which offers this function and it seems few of them use more than the folder structure of their operating system to control their items. For this reason, it may be that for students the structure of the information and not the search function is currently their basis for user satisfaction.

Issues in re-finding and using information

Once the information is collected the most significant activities in PIM are organisation and retrieval. Whilst this study did not examine the student's re-finding and using activities, the analysis of the discussion group did provide some insight into the participant's PIM activities and requirements when using a PIM system. A personal information management system should provide support for organisation of resources and enable development and acquisition of knowledge. Users in the discussion group found that they often wanted to simply capture and 'drop' the information into their collection and decide later how to organise it suggesting that a requirement to store items in a hierarchy may place a high cognitive burden on the user by requiring decisions at creation time about the items content and where it fits in the existing system., This is especially likely for accidental encounters when the user may not even read the information but simply adds it to the collection for later use. This supports the earlier research of Malone and Lansdale (Malone, 1983; Lansdale 1988) who report that the difficult task of classification is often deferred as long as possible. Furthermore both Malone (1983) and Abrams et al (1998) have stressed the difficulties users have when creating labels and such a requirement may present an unnecessary barrier to collection. Some PIM applications allow for notes to be named or re-named later which assists the user in integrating items into

their collection in a more meaningful way rather than simply adding to a miscellaneous folder and left there forgotten.

A personal information management system should also enable the development and acquisition of knowledge and this is illustrated by applications that allow users to annotate; thus adding valuable user created content directly to the file. Malone (1983) and Ravasio et al (2004) reported that their users found that the value of their information was enhanced by the connections between items which was supported by comments by forum participants.

Although many note-taking applications are now evolving into PIM applications the note-taking function is still very important to users and they require the ability to create their own data inside the application in the same way as writing a sticky note. It was however the organisation of their information items and the ability to see them in different views that was the most important feature for users in the discussion group. Offering multiple views and relationships between items allows for users with different working practices to make the application suit their own unique needs.

The PIM activities associated with the re-finding and use of captured information are complex as is illuminated by the discussion group participant's expressions of need for flexibility as well as the software features which support the viewing, grouping, annotating and linking of items.

Summary

The personal information collections of students are complex due to the transitional and possibly fragmented nature of their environment being both digital and physical, with items from multiple applications such as WebCT, Email, and Word; and on multiple devices such as Laptops, Campus hard drives, and portable USB pen drives.

PIM is crucial to students when they are completing their Assessed Coursework and the difficulties associated with integrating digital and physical resources may provide a barrier to their understanding and application of knowledge. Where multiple applications are needed to open files stored in a common folder, for example when gathered for a piece of coursework, the fragmentation can lead to difficulties in forming associations and relationships between related documents. The process can be slow and awkward, it is difficult to know which folder or files to look in, and switching between a number of applications is both time consuming and cumbersome especially when trying to compare or integrate data between them. This often leads to problems with redundancy or duplication (Whitaker & Sidner, 1996), the same item stored in multiple locations with different names or versions.

Karger (2007) found that the relationship between objects provides users with additional information; these associations allow users to more easily navigate their information items and construct connections between them. Ravasio et al (2004) found that users “desire linking” between their information items, finding the fragmentation of items across multiple applications inconvenient. These research findings are consistent with findings from this study supporting the need for a unified view of data which supports viewing, grouping, annotating and linking items flexibly.

Further Work

Whilst previous studies provide insight into the issues involved they neither focus on the emergent behaviours of using new digital information items nor consider diverse and complex academic resources. Students need to adapt a broad strategy to deal with their electronic resources alongside more traditional print based resources and integrate other emerging notions of personal interactions with peers, via social networking websites, and the saving of ‘information scraps’ (Tweets, RSS, etc).

Whilst PIM research generally seeks to evaluate the usability or accessibility of existing PIM systems and find ways to improve them it is not the intention of this research to do so, but to develop an understanding of the factors which influence the creation of PIM strategies. This will be achieved by a qualitative approach using ethnographic interviews and observations, and developing interview aids such as show cards and photographs to enable discussion of the issues surrounding workspaces in relation to PIM activities as studying PIM in a natural setting is problematic. This in-depth semi-structured approach aims to ascertain how students articulate their PIM activities and identify other influencing factors in order to further understand the PIM needs of students.

Acknowledgements

I thank my Director of Studies, Dr Frances Johnson for her support and feedback throughout the preparation of this paper.

References

- Abrams, D., Baecker, R., & Chignell, M. (1998). *Information Archiving with Bookmarks: Personal Web Space Construction and Organization*. ACM SIGCHI Proceedings 1998, 41-48.
- Allen, D., & Wilson, T.D. (2003). Information Overload: Context and Causes. *The New Review of Information Behaviour Research* 2003.
- Barreau, D. (1995). Context as a factor in personal information management systems. *Journal of the American Society for Information Science*. 46 (5), 327-339.
- Barreau, D., & Nardi, B. (1995). Finding and Reminding: File Organisation from the Desktop. *SIGCHI Bulletin*.
- Barreau, D. (2008). The Persistence of Behaviour and Form in the Organization of Personal Information. *Journal of the American Society for Information Science and Technology*. 59(2), 307-317.
- Bawden, D., & Robinson, L. (2009). The dark side of information: overload, anxiety and other paradoxes and pathologies. *Journal of Information Science*. 35, 180.

Bernstein, M., VAN KLEEK, M., & KARGER, D. (2001) Information Scraps: How and Why Information Eludes our Personal Information Management Tools ACMCHOO, C.W.& Marton, C., 2003. Information Seeking on the Web by Women in IT Professions. *Internet Research*, 13(4), 267-280.

CIBER, 2008. *Information behaviour of the researcher of the future*. A CIBER briefing paper.

Ito, M., et al. (2008). Living and Learning with New Media: Summary of Findings from the Digital Youth Project.

Jones, W., S. Dumais, et al. (2002) "Once Found, What Then?: A Study of "Keeping" Behaviors in the Personal Use of Web Information.

Jones, W. & Teevan, J., (Eds.) (2007) Personal Information Management IN Personal Information Management. Seattle: University of Washington Press.

Karger, D. R. (2007) Unify Everything: It's all the same to me. IN JONES, W. & TEEVAN, J. (Eds.) Personal Information Management. Seattle: University of Washington Press.

Kelly, D. (2006). Evaluating Personal Information Management Behaviours and Tools. *Communications of the ACM*. 49(1).

Lansdale, M. (1988) The Psychology of Personal Information Management. *Applied Ergonomics*, 19(1), 55–66.

LLOYD, A., 2007. Recasting information literacy as sociocultural practice: implications for library and information science researchers. *Proceedings of the Sixth International Conference on Conceptions of Library and Information Science- "Featuring the Future"*. Retrieved 24th October 2008 <<http://informationr.net/ir/12-4/colis34.html>>

Lyman, P., & Varian, H. (2003). How Much Information, retrieved 18th December 2009 <<http://www2.sims.berkeley.edu/research/projects/how-much-info-2003/>>

MALONE, T. (1983) How do people organize their desks? Implications in the design of office information systems. *ACM Transactions on Office Information Systems*, 1, 99-112.

MCKENZIE, P., (2003). A model of information practices in accounts of everyday-life information seeking. *Journal of Documentation*, 59(1), 19-40.

Pikas, C. (2006). Personal Information Management Strategies and Tactics used by Senior Engineers. *Proceedings 70th Annual Meeting of the American Society for Information Science and Technology*

Ravasio, P., Gutterman Schar, S., & Krueger, H. (2004) In Pursuit of Desktop Evaluation: User Problems and Practices with Modern Desktop Systems. *ACM Transactions on Computer-Human Interaction*, 11, 156-180.

Whitaker, S., & Sidner, C. (1996). *SIGCHI Proceedings 1996*.