"Everything goes into or out of the iPad" – the iPad, Information Scraps and Personal Information Management

Paris Buttfield-Addison, Christopher Lueg, Leonie Ellis, Jon Manning
School of Computing and Information Systems
University of Tasmania
Sandy Bay, Tasmania, Australia
{paddison, Christopher.Lueg, Leonie.Ellis, jam6}@utas.edu.au

ABSTRACT
Personal information management (PIM) is of considerable interest to the information science community. Traditionally the domain of paper, desktop computers and laptops, we have seen the widespread introduction of tablet computers in PIM. In this paper we discuss the findings of the first stage of a multi year study into the emergent role of tablets in PIM with a particular focus on information and knowledge workers. We discuss a set of observations on how the use of tablet computers affects PIM and how it fits into the process of collecting and managing information. In particular, heavy tablet users appear to be supplanting paper with tablets for the purposes of micronote taking. A major finding detailed in the paper is an unexpected increase in the use of paper by heavy tablet users.

Author Keywords
Information management, personal information management, information behaviour.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
Many individuals spend much of their working life ensconced in an office or cubicle. Thus, while they are conducting their work on a desktop computer or laptop, they are regularly printing or otherwise receiving paper, books and other physical ephemera in addition to emails and other digital equivalents.

Personal information management (PIM) is largely concerned with the study of the processes of information capture, organization and re- finding of information that individuals deal with in their daily lives (Jones and Teevan, 2007). Large bodies of PIM research exist, exploring everything from the challenges of different styles of PIM, such as pilers versus filers (Malone, 1983), to the challenges of PIM, such as fragmentation and retrieval (Bergman, Beyth-Marom, and Nachmias, 2006; Jones and Teevan, 2007; Bernstein, Van Kleek, Karger, and Schraefel, 2008), to support systems to alleviate said challenges (Boardman, 2004). In addition to this general research covering physical documents in the management of a user's personal information, a growing body of research scholarship suggests that information scraps – defined by Bernstein et al. (2008) as information items that fall outside all PIM tools designed to manage it – are a vital, ubiquitous, but little understood facet of PIM. These information scraps fall outside of the tools designed to manage personal information because they are often small, hastily created, created within other items of information or captured in an ad-hoc or informal way. Past work suggests that physical paper is still the primary medium for information management in offices, especially when it comes to information scraps (Campbell and Maglio, 2003; Sellen and Harper, 2003; Lin, Lutters, and Kim, 2004; Whittaker, 2011).

The rapid adoption and creation of personal and mobile computing technology, as well as the spectacular pace of research in connected fields, has resulted in a popular assumption that all this new technology must be integrated into daily practice. Many organisations, in the early years of such information technology being available, seized upon the concept of a 'paperless office,' where the office would be transformed from a scene overflowing with paper and documents to one where all information would be kept in an electronic retrieval system. In their seminal work *The Myth of the Paperless Office*, Sellen and Harper (2003) discuss how this idea has not taken root, owing largely to the fact that the affordances of physical paper that are not replicated by computers provide a level of physicality, familiarity and ease of use to information management that a 'paperless office' cannot easily provide.

Indeed, large bodies of research point out the numerous benefits and challenges of paper-based PIM – individuals most definitely enjoy, and derive organisational benefit out from, the use of paper (Campbell and Maglio, 2003; Sellen and Harper, 2003; Lin et al., 2004; Buttfield-Addison et al., 2009).

An interesting new angle on the intersection of paper-based PIM and computer-based PIM is presented by the rapidly rising popularity of tablet computers. These tablets, which match physical paper in size, are smaller and more portable than laptops computers and are more capable of displaying document-style content than smart phones.

This paper presents the results of the first stage of an ongoing study of personal document and information management by office-bound workers, originally

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.
OZCHI'12, November 26–30, 2012, Melbourne, Victoria, Australia.
Copyright 2012 ACM 978-1-4503-1438-1/12/11…$10.00.

designed to understand the nature of the filing and piling organisation techniques, and highlights the role of the tablet in the evolving patterns and systems that individuals use with their information. We suggest that the resurgence of the tablet computer, particularly those resembling the popular Apple iPad, may in fact be merely eroding the office dominance of paper, particularly when it comes to information scraps and other fragmented information.

Our preliminary results discuss how, where, and why the tablet fits in to daily information management tasks. We specifically focus on the issues individuals face in information replication and fragmentation between the tablet and other forms of information storage and the relationship of the tablet to paper. This paper concludes with some preliminary recommendations for support system design and future work that considers the tablet.

In this work, the word *tablet* is used to refer to any tablet computer running the Android operating system, the iOS operating system, the BlackBerry PlayBook operating system or the HP webOS operating system; we only consider tablets to be devices with a diagonal screen size of greater than 7". Essentially, we use the term tablet to refer to any tablet computer not running a traditional desktop operating system such as Windows or OS X, but rather running a dedicated tablet-centric operating system. The term tablet, in this case, refers to portable computing devices that are larger than smartphones and that use a touchscreen as the primary method of interaction. It does not refer to "tablet PCs," a term that generally refers to laptop computers that provide a touchscreen as an additional input method. It is outside the scope of this study to discuss or determine whether the type, or operating system, of a tablet affects how it is used.

RESEARCH METHODS

The study was conducted in two stages: a questionnaire survey distributed widely via email to numerous information technology companies, web startups, universities, legal and financial institutions and multinational corporations and a follow- up set of semi-structured interviews with a subset of survey participants.

Since we wanted to study the PIM patterns of individuals who worked in offices, we concentrated on employees of medium- to large-organisations, including, for example, technology startups, law firms, universities and offices of international companies. Our audience entirely consisted of knowledge workers, including university staff, academics, administrative personnel and professionals. The initial survey was administered via the Internet. The results discussed in this paper encompass data from the first 507 participants of the online survey, who participated between 2010 and 2012. Compared to other studies in the PIM area, such as the 50 participant study of Whittaker and Hirschberg (2001), and the 10 participant study of Malone (1983), the level of participation in this study was excellent. Participants were recruited through existing business relationships and colleagues of the researchers. Care was taken to ensure existing relationships did not bias the data, which was anonymised prior to analysis. The survey was designed to collect solely qualitative data.

The second stage of the study comprised a series of semi-structured interviews with a subset of survey participants – a survey question as to whether they would be willing to participate in a follow-up interview was used to recruit interview participants; all those who indicated "yes" in the surveys participated in the interviews. As a research method, such interviews provide an exceptionally strong basis for pursuing topics whilst allowing flexibility for relevant diversions (Drever, 1995). Since a key aspect of this research was the examination of real-world practice, the natural setting and flow of semi-structured interviews in participants' offices was most suitable. Originally inspired by the pioneering study of office organization conducted by Malone (1983), the prompting questions in the semi-structured interviews included a request for a tour of the office, queries regarding the reasons for the location of a particular piece of information, and questions regarding the storage means, acquisition means and nature of a variety of pieces of information and documents in the office.

The comments and answers by the 96 semi-structured interview participants were noted and complemented with annotations and observations made by the researcher. Photographs and sketches of participants' offices were collected and created to document the position, size and layout and design of each office.

The semi-structured interview participants were a diverse collection of professional information workers in a wide range of countries: Australia, the UK, New Zealand, United States, Sweden and India. The interviews were conducted in these countries whilst travelling on unrelated business – any inherent cultural differences are outside the scope of the results reported in this paper. It is important to note that we use the term 'information scrap' interchangeably with the term 'micronotes' (Lin, et al., 2004) in the study.

RESULTS

76% of the survey participants indicated that they used tablets. This can be seen as representative of a general industry trend away from stationary technology (that is, desktop computers and workstations) towards mobility (Tungare and Perez-Quinones, 2008). The data suggests that tablet users are cleanly spread between two distinct types of user: Heavy Users and Occasional Users. Deriving from the data, we define Heavy Users as those who either use or attempt to use their tablet in almost all of their everyday PIM related tasks. Occasional Users are the remainder, all of whom noted using their tablet on a daily basis but did not incorporate it in every facet of their PIM. Being a paper on the impact of tablet computer use in PIM, these results do not discuss users who do not use these devices in their daily work. This paper is singularly focused on tablet using individuals, and the impact such use has on their PIM patterns.

Heavy Users are exemplified by the following interview participant quote, from a practicing lawyer: *"I use the iPad for everything – if I have to annotate a document, I*

use the iPad, if I have to print a document, I print from the iPad, if I have a document I've written on with a pen, I take a photo with the iPad. Everything goes into or out of the iPad."

The Occasional User archetype is typified by this participant quote, from a university professor in the humanities: *"I do my email on the iPad and make meeting notes on the iPad, but I don't go out of my way to get my documents into the iPad. It's always with me but my life is fragmented between it, my paper stuff, my laptop and my desktop computers."*

No tablet	23
Heavy tablet user	51
Occasional tablet user	22

Table 1. The breakdown of tablet use by participants in the semi-structured interview phase of the study.

The facets of PIM we considered for this classification stem from Barreau's (1995) oft-cited four stage framework: acquisition, organisation, maintenance and retrieval. Table 1 shows the breakdown of tablet use by participants in the semi-structured interviews.

Our first substantive finding was that certain activities were transplanted from other devices upon acquisition of a tablet. A typical example of this behaviour: "*I used to carry my [smart]phone to meetings so I could email myself notes, but now I don't – I don't receive calls during the day on that phone so I don't need to carry it around. I have the iPad and make my notes on that.*" This echoes and extends the findings of Tungare and Perez-Quinones (2008), where it was observed that certain activities were moved from one device to another upon the acquisition of a multi-purpose device. All tablet-using participants reported that, due to their tablet, they were using their conventional computers significantly less, regardless of whether their conventional computers were laptop or desktop machines. Participants reported working on projects with both paper documents and the tablet, where before they noted they instead used their computer: *"I make less notes on paper since I got the iPad, so I often carry a printout of something I need to annotate and make the notes on the iPad while I read the paper."*

We found a strong suggestion that users frequently considered the tablet to have a complementary role to that of paper. One participant, a CEO of a manufacturing company, observed: "*I used to make notes about documents in Evernote on my Mac while I read a PDF document alongside it on the screen, but now I print the document and make notes on my iPad without using the Mac at all for it.*"

All heavy users noted that they "*used to use a lot less paper before I got the iPad*", with many commenting "*my regular computer usage has gone way down, but I use paper a lot more often, but I use it with the iPad now.*" When asked to elaborate, most Heavy Users observed that they "*used to use paper for write scrappy notes, but use the iPad for that now*"; all Heavy Users further noted that they "*print more paper so I can make notes about the contents (on the iPad) without being tethered to my computer.*" The suggestion that heavy use of the tablet may actually increase the use of paper for certain tasks is intriguing.

All Heavy and Occasional users expressed concern that they "*might not have everything needed on the iPad*" when discussing how they often only took the tablet with them when leaving the office. "*There's no way I'm going to take anything else with me, that'd just be annoying, but I get worried I have not copied something to my iPad or that it's not in my notes on there*" remarked one participant, an immigration attorney whom we categorised as a Heavy User.

The role of the tablet in PIM

As with Bernstein, et al.'s (2008) study on information scraps, we find Lin, et al.'s (2004) micronote lifecycle an invaluable lens through which to focus our results. Particularly we find the Record, Transfer, Refer and Completion/Archiving/Disposal stages to be essential to understanding what role the tablet is taking in individuals' PIM. What follows are the key findings, as seen through the stages of Lin, et al.'s (2004) micronote lifecycle.

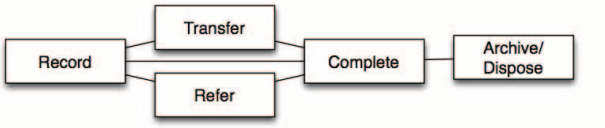

Figure 1. The stages of the micronote lifecycle used as a lens for this work.

Record

The record stage of the lifecycle involves the capture or creation of the information involved. A comparison between the present work and Lin, et al.'s (2004) study illustrates both the changing times as well as the rapid incorporation of the tablet into users' daily activities: in the previous study, only one participant (of 29) did not use paper for recording micronotes. The tablet was the primary and preferred information recording device for 51 of our interview participants, and was a preferred method for 22; by primary, we mean these participants indicated that they did the majority of their information recording on the device, and by preferred we mean these participants indicated that they preferred to do the majority of their information recording on the device (even if sometimes they were not able to, whether through not having the device with them at the time or the device's inability to handle information recording as part of a procedure they needed to follow).

Illustrating the opportunistic behaviour observed by previous studies – again, for example, Lin, et al. (2004) – we note that the tablet typically replaced paper, though only as being "*the closest thing I can make the note on*". All but three of the tablet-using participants observed that they *"feel safe putting the information into the iPad because I'm not going to lose it or the cleaner won't throw it away or something"*; because of this, they

observed, *"I'm more likely to actually make a note, because I feel confident it's not going anywhere when it's in the iPad."* All but two tablet-using participants observed *"paper is less flexible than the iPad, it doesn't sync anywhere, I have to write legibly if I use paper, and I can't email it to people!"* This emphasis on ease of accessing previously-recorded notes and transferring such notes to others has further implications in later stages of the micronote lifecycle.

All but 3 of the Heavy Users of tablets observed that they *"feel like they're wasting time if I forget to bring the iPad and have to make a paper note instead, because then I have to waste time later copying it into the iPad."* Occasional Users expressed a similar sentiment, with more than half of the participants in this category suggesting that they *"often transcribed notes made on stickies or documents into the iPad because it feels more permanent"*; several continued that "*this makes me feel like I'm creating more work for myself because I end up with a few copies of my info!*"

All tablet users in the survey used more than one application on their device to make notes – all but 5 used the popular Evernote application, while many also used Apple's Pages application, and the tablet's built-in Notes application. All Heavy Users observed an annoyance with the fragmentation created from using different applications: *"Sometimes I put a note in Pages, sometimes in Evernote. It gets kind of confusing figuring out where I put stuff."* The fragmentation brought about by the potential increase in use of paper due to the tablet, as well as the wide range of applications used by any one iPad-using individual, strongly point to the fact that tablet may be increasing the classical PIM challenge of fragmentation substantially.

It is worthwhile to note that the aforementioned applications provide only the means for entering text, and do not provide the same ease of sketching pictures that paper affords. The users in this study did not note that this was a serious disadvantage in their note-taking behaviour; this may be related to the fields of work that the interview subjects were in, but it is also possible that users either care primarily about text and not sketches in their notes.

Transfer

In the transfer stage of the micronote lifecycle, the tablet again presents a slightly different approach to that which had been observed before. The original discussion on the transfer stage of the micronote lifecycle observed that information often had to be preserved while one was unable to use their usual infrastructure – for example, a sticky note created while an individual was on lunch break – meaning that the note was destined from the outset to be swiftly utilised or transferred to a more permanent form (Lin, et al., 2004). Tablet users in the present study defied this, instead preferring to create their note on the tablet: *"Why would I use a sticky note when it's always available and searchable on my iPad?"* was a unanimous sentiment.

An additional observed benefit to the tablet users was the ease of transferring information scraps to other individuals: *"I can email my iPad-based note to my colleagues with minimal editing, and that's something I do all the time"*. This contrasts with a sentiment expressed by all but one of our participants who did not use tablets: *"If the stuff on my scraps of paper needs to be passed on to workmates, I feel bad because it's so messy and it takes a lot of time to either type it up or rewrite it so I can email or photocopy it for them"*. This suggests that the digital nature of the micronotes, with their inherent advantage of legibility over hand-written text, acts to reduce the cognitive overhead involved in transferring and interpreting other's information scraps.

Refer

Lin, et al. (2004) defines two steps in the process of referencing (making use of) a micronote: noticing the note and interpreting its content. We found that Heavy tablet users had a tougher time referring to notes in a timely manner, despite past research suggesting quite the opposite; it has previously been suggested that those using digital devices (thus relying on notification features and other similar functionality) are up to twice as likely to remember to act on the note (Intons-Peterson, 1993; Lin, et al. 2004). Tablet users in the present study observed that they tended to not recall that information had been stored in the device: *"[I have a] tendency to forget about notes I'd made in the iPad, so by the time I find them they're not so useful"*.

One notable benefit noticed by the tablet users appears to be in the legibility of referring to past notes: as one user noted, *"I couldn't read a thing from my old paper notes even a day after writing them. It was worse than trying to read a medical prescription! I can always figure out what I meant in my iPad notes."* Past studies have noted that interpreting the handwritten note can be a painful process, so it appears that the tablet renders an improvement here (Lin, et al. 2004; Bernstein, et al. 2008).

Completion, Archiving and Disposal

The final stages in the micronote lifecycle are those of completion, archiving and disposal. A micronote or information scrap is deemed complete when the information it contains has been transferred, acted upon or otherwise utilised and won't be required again – following this, the information is typically either disposed of or archived (Lin, et al. 2004; Bernstein, et al. 2008).

Past studies have noted that users of paper notes often keep their old information scraps for long periods, sometimes years (Lin, et al. 2004; Bernstein, et al. 2008) – the present study is no different, at least when it comes to paper. Participants noted that they "*keep far too much of the paper scraps and documents I've scribbled on*", also noting that "*the old useless paper I keep around makes it a lot harder to find the stuff I actually want or need to find still!*"

Participants using the tablet, however, expressed the sentiment that *"I keep as much old information as I used to in the iPad, but it doesn't feel like it's interfering with my ability to find relevant stuff now"*. The low storage requirements of text and other formats common in micronote taking mean that there is very rarely any

requirement to discard notes on the tablet in order to make room for more, which we found contributed to a sense of never needing to delete notes.

Many participants noted that they often fragmented their information further, due to their tablet usage. Heavy tablet users noted that they were *"afraid that [their] stuff was becoming messier due to the iPad, because of all the notes I make in the iPad and eventually copy part of or all of elsewhere, I end up with more copies of the same thing than I would've had previously."* The fact that many tablets back up stored information, and automatically duplicate notes and documents on the user's desktop computer system in order to make stored content more available to the user, can only contribute to this fragmentation.

The tablet: accumulating information scraps?

A striking theme to emerge from the data was the tendency of the tablet to assume the role of other information creation and collection mediums. It thus appears that the tablet is being used to collect scraps of information that, prior to its existence, may have accumulated elsewhere in the form of physical information scraps.

The following list shows the six most common locations users noted placing a scrap of information when they did not use tablets or were Occasional Users. This was determined by analysing mentions during both the interviews and surveys of where information was noted, coding them and consolidating similar types:

- Nearby empty piece of paper
- Nearby sticky note
- Blank paper removed from nearby printer
- Emailed to self via desktop computer
- Text file or Word document on computer
- Back of otherwise used piece of paper

The following list shows the six most common locations users noted placing a scrap of information when they were Heavy Users of tablets:

- In the tablet built-in notes app
- In the tablet third-party Evernote app
- In the drafts folder of the tablet built-in email app
- Emailed to self via tablet
- In the tablet third-party Pages app (specific to iPad)
- Nearby sticky note

The difference in scrap location, or medium, between non- users/occasional users and heavy users underscores the possibility that the tablet is actually changing individuals' information behaviour. Bernstein, et al.'s (2008) exploration of the information scrap lifecycle, as well as Lin, et al.'s (2004) study of micronotes, found that mobile devices typically offered insufficient flexibility to handle the majority of information scrap/micronote activity. The prevalence of tablet use in the present study suggests that this has changed.

DISCUSSION

With the evolution of consumer technology, the manner in which individuals collect, maintain and use micronotes (Lin, et al. 2004) and information scraps (Jones and Teevan, 2007; Bernstein, et al. 2008), appears to have evolved as well. Lin, et al.'s (2004) micronote lifecycle can be observed in full in the tablet-use of participants in the present study; each stage adapted by the participants to involve the tablet accordingly. The use of the tablet appears to provide users with several concrete benefits over the paper-based approach that has appeared so popular and is documented so thoroughly in other work:

- no need to archive or dispose of old information, since participants felt that the tablet provided easy access to new information without the old information getting in the way (as it had when their scraps were paper-based, where there is a fixed amount of physical space in which papers can be stored and accessed);
- ease of transferring information to others through email or other digital means – as compared to the paper-using participants who all commented on the time consuming annoyance of doing so with paper;
- a higher likelihood of actually noting something important down because of the perceived permanence of putting in the tablet.

On the other hand, the use of the tablet also appears to present users with several challenges not present in the PIM worlds' of their paper-centric colleagues; all observed challenges represented a form of fragmentation:

- a higher likelihood to fragment their notes even further across multiple mediums, mostly due to the tablet's perceived permanence versus the fact that most paper notes are eventually transcribed to another location, either as part of deliberate organisation activity or as simply tidying up. The increasing prevalence of synchronisation tools, including the iCloud service introduced by Apple to support the iPad and other Apple-manufactured computers, may affect this point in the future as such tools become more established;
- due to this fragmentation, most tablet users suggested that they had to spend more time managing their information scraps since they often inadvertently noted something when they did not have the tablet present, and had to spend time duplicating the information in the tablet if they wished to keep all of the information they deemed important within the device;
- users also used different applications on the tablet to make notes, often without any form of synchronisation or cohesion between them. This problem is obviously not inherent to the tablet technology, but is nonetheless worth mentioning; while tools that provide synchronisation services exist, interoperability with tools from other providers is a rare feature, a fact to which we attribute developers of these

> tools seeking to create a "vendor lock-in" scenario, where users are encouraged to continue using the developer's tools because the effort involved in moving to other tools is considered to be not worth it. **(**

It is clear that the tablet is assuming many of the roles that used to predominantly be the domain of paper, many participants noted a significant rise in their usage of paper following their acquisition of an tablet, while at the same time reducing their paper usage for information scrap/micronote purposes. This is a highly unexpected finding that certainly warrants further investigation.

CONCLUSION

This paper has presented data from an exploratory study examining the nature of personal information management carried out by information workers in offices. Originally designed to illuminate the challenges faced by the two archetypal PIM strategies, filing and piling, the findings of this first stage of a multi-year investigation presented an intriguing collection of findings related to the increasingly popular tablet computer. Ultimately, our results underscore the rapidly rising popularity of personal mobile computers; however, we can also observe a change in individuals' treatment of micronotes themselves as compared to the behaviour observed in past studies: users take more notes, keep the notes for longer periods of time, and share notes to colleagues and friends more frequently. **(**Does the tablet meet the goal of the optimal mobile micronote system suggested by Lin, et al. (2004), by having *"the ubiquitous convenience of paper, the intuitive writing process of a digital pen, and the computational functionality of a PDA"*? In some ways, it does, as evidenced by the tangible benefits that tablet users are experiencing in their daily PIM tasks; however, there is work to be done – the non-trivial list of challenges faced, mostly in the realm of fragmentation, by tablet users over their paper-based micronote counterparts illuminates the path ahead. The intriguing observation that general paper usage on the whole went up for tablet users, while going down in their use of paper for micronotes, is perhaps the most astounding, and further study is warranted to determine the intricacies and implications of this finding.

If tablets are supplanting the use of paper for the purposes of micronote collection, then future design and research for tablet computers should be conducted with an aim to enhance this role, rather than attempting to supplant paper in the role of reviewing documents. Findings from this study suggest that the emerging technology of tablets, and indeed other emerging highly mobile technologies, need to be evaluated in terms of their impact upon PIM – particularly with respect to the intricacies of paper usage. The next stage of the research continues, and it is expected that further findings on the nature of tablets and other mobile devices in PIM, in addition to recommendations for future software, tool, and research design will be forthcoming.

REFERENCES

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

Bergman, O., Beyth-Marom, R., & Nachmias, R. The project fragmentation problem in personal information management. Proceedings of the SIGCHI conference on Human Factors in computing systems, CHI '06 (2006), 271-274.

Bernstein, M., Van Kleek, M., Karger, D., & Schraefel, M.C. Information scraps: How and why information eludes our personal information management tools. ACM Transactions on Information Systems, 26, 4 (2008), 1-46.

Boardman, R. Improving Tool Support for Personal Information. PhD Thesis: Imperial College London (2004).

Buttfield-Addison, P., Lueg, C., & Manning, J. The pile of least effort: supporting lived document management practices. Proceedings of the 21st Annual Conference of the Australian Computer Human Interaction Special Interest Group, 21 (2009).

Campbell, C. & Maglio, P. Supporting Notable Information in Office Work. Extended abstracts on Human factors in computing systems, CHI'03 (2003), 902-903.

Carroll, J., Howard, S., Vetere, F., Peck, J., & Murphy, J. Identity, Power And Fragmentation in Cyberspace: Technology Appropriation by Young People. ACIS 2011 Proceedings (2011), paper 6.

Drever, E. Using semi-structured interviews in small scale research. Edinburgh: Scottish Council for Research in Education (1995).

Intons-Peterson, M.J. External Memory Aids and Their Relation to Memory. Cognitive Psychology Applied (1993), 142-166.

Jones, W., & Teevan, J. Personal Information Management. Washington: University of Washington Press (2003).

Lin, M., Lutters, W.G., & Kim, T.S. Understanding the micronote lifecycle: improving mobile support for informal note taking. Proceedings of the SIGCHI conference on Human Factors in computing systems, CHI '04 (2004), 687-694.

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

Sellen, A., & Harper, R. The Myth of the Paperless Office. Boston: MIT Press (2003).

Tungare, M. & Perez-Quinones, M. It's Not What You Have, But How You Use It: Compromises in Mobile Device Use It. Article from Cornell University Library (2008). Retrieved 9 December 2011 from http://arxiv.org/abs/0801.4423

Whittaker, S. Personal Information Management: from information consumption to curation. Annual Review

of Information Science and Technology, 45, 3-62 (2011).

Whittaker, S., & Hirschberg, J. The character, value, and management of personal paper archives. ACM Transactions on Computer-Human Interaction, 8, 2 (2001), 150–1.