

A Survey of Personal Information Management Practices

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ABSTRACT

In this paper, we describe results of a two-part written questionnaire completed by 47 people about how they manage personal information and transfer information among electronic devices. We found three main methods used to transfer files among computers: email to self, USB drives, and network storage. For transferring information among electronic devices such as digital cameras and MP3 players, participants reported using the software and cables that came with the devices to transfer files, or simply using a USB connection. Interestingly, participants reported that they did not typically transfer files from their cell phone to their other devices or computers. With regard to saving information found on the web, almost all participants reported using bookmarks, and over half sent email with the information to themselves. We also asked users to estimate their number of bookmarks, number of email folders, and number of email messages in their Inbox. These were all found to follow exponential distributions, indicating a large number of users with small numbers and a few users with large numbers. These results extend our understanding of users' personal information management behaviors and help inform the design of PIM tools.

1. INTRODUCTION

We administered a two part questionnaire that asked about users' practices in managing their personal information and transferring information among computers and electronic devices. The questions were administered as part of a broader study of how users find information found on the Web that was conducted in the spring of 2007. In this paper, we focus on the administration, analysis, and results of the questionnaire data.

2. METHOD

Forty seven (47) participants were recruited broadly from the University of North Carolina community using posts to listservs. One of the main listservs used for recruitment is for campus-wide informational messages and is distributed to all students, faculty, and staff that opt-in. We recruited a diverse sample of mainly graduate and undergraduate students with a few faculty and university staff: age ($M = 26.0$ years, $s.d. = 8.3$), gender (17 male, 30 female), status (undergrad/no degree = 27, graduate student/primary degree = 14, faculty/staff = 6). Over 25 different departmental affiliations were represented (e.g. Biology, Economics, Nursing, Religious Studies, Languages). Participants generally had a large amount of experience conducting searches on the web ($M = 9.5$ years, $s.d. = 2.0$) and all participants reported using a computer on a daily basis.

The questions were administered in two parts, one during each of two sessions of the main study. The sessions were scheduled about one week apart. The first questionnaire asked about demographic information and participants' experience using

computers to search for information. The second questionnaire was more detailed and asked about the types and locations of computers used, electronic devices used (cell phone, MP3 player, PDA, digital camera) and how information was transferred among the devices. The second questionnaire also inquired about methods used for saving information and asked participants to give estimates of how many email folders and email messages they had. The questions from the second questionnaire are shown at the end of this paper.

Participants were given a paper copy of the questionnaire and asked to write their responses directly in the spaces provided. The questionnaires were administered at the start of each session, before participants did any of the tasks for the main study. Up to eight participants worked at the same time, but each completed their own questionnaire independently.

3. RESULTS

3.1 Computers Used

We asked about what types of computers were used in a typical week. Almost half the participants, 49% (23), used both desktop and notebook computers, while 40% (19) used only a notebook, and 11% (5) used only a desktop. Almost all users, 96% (45), reported using a Windows-based computer in a typical week, with 13% (6) using the Macintosh OS and 4% (2) using Linux/Unix (note that some participants used more than one OS in a week). The locations that they used computers also varied and many participants reported using computers in multiple locations: 68% (32) reported using a computer at home, 45% (21) at work, 62% (29) at school, and 55% (26) in a portable location. With regard to the computers used, 85% (40) of participants considered one to be their "primary" computer. Of these, 75% (35) considered their notebook computer to be their primary computer. The university has a laptop computer requirement for undergraduate students and encourages all students to purchase laptop computers, so this result is not surprising.

3.2 Transferring Data Among Computers

We asked participants to describe: 1) how they "transfer, share, and synchronize files among the computers" that they used, and 2) what problems they encountered when doing so. These were open response questions so the participants could write answers in their own words. A single coder (the author) coded each response into an open list, resulting in a list of coded responses and frequency counts. Table 1 shows the most frequently mentioned methods of transfer and the number of participants who mentioned each method. Table 2 shows commonly mentioned problems with transferring files.

Emailing files to self, or leaving email attachments in the Inbox was the most commonly mentioned method of transferring files among computers, mentioned by almost half our participants

(47%). However, participants noted that using email to transfer files has limitations. They mentioned having problems emailing large files, and some described how they used email for small files and USB drives or CD/DVDs for larger files.

The use of USB “flash drives” (also referred to as “pen drives” or “thumb drives”) was a commonly reported (34%) means of transferring files among different computers. Some problems mentioned in using USB drives were running out of space on the drive and occasional problems getting different computers to recognize the USB drive.

Method of transfer	Percentage of participants
Email to self	47% (23)
USB drive	34% (16)
Don't transfer much – use mostly one computer	30% (14)
Shared Network Drive / Storage	21% (10)
FTP to a server	11% (5)
Burn CD/DVD	9% (4)

Table 1. Methods of Transferring Files Among Computers

Participants also reported transferring files by putting them on a shared network drive or server that is accessible from the computers being transferred among. Two main methods were described: using a shared network drive (21%), and using FTP/SSH to transfer files to a server (11%). We should note that the university provides students with space on a network drive which can be accessed either as a shared network drive or through FTP/SSH. One problem mentioned with this approach is that the network drive was not always accessible due to network and connection problems. About a third of our participants (30%) primarily used a single computer and reported not doing much file transfer.

Problems when transferring files among computers	Percentage of participants
File transfer/compatibility problems	20% (9)
File size too big	17% (8)
Hard to find / most recent version	11% (5)

Table 2. Problems Transferring Files

Participants mentioned two common problems that seemed to cut across the method used to transfer the files. The first had to do with file transfer or compatibility problems. Participants described situations in which files did not open properly after transfer, not having the proper software to open files on the computer transferred to, and damaged or missing files. In the second problem class we observed, participants described difficulties in finding a transferred file and in knowing which file was the most recent version.

3.3 Electronic Devices

We asked about how participants transferred, shared, or synchronized files among the different electronic devices and computer that they used. These were also open-answer questions and were coded using a method similar to that described in the previous section.

Many participants described using software and cables that came with device to transfer files, or by connecting the device through a USB port and then copying files. Responses included using iTunes with iPods (9 responses), memory cards with cameras (5), and the use of USB cables with digital cameras (10) and iPods (6). A few responses (4) described using email to transfer files from a cell phone to a computer. However, a number of participants (13) specifically mentioned that they do not typically transfer files between their cell phone and computer.

3.4 Web Information Keeping Methods

We asked participants if they used any of six specific keeping methods to save “interesting or important web sites”. The six methods were based on keeping practices identified from previous research studies of PIM practices, especially [3]. The six methods and percentage responses are shown in Table 3.

Keeping Method	% Response
Save as a bookmark/favorite	98%
Send myself an email with the URL	57%
Write it down on paper	36%
Copy the URL into a file	23%
Save a copy of the web page to my hard drive	17%
Save it to del.icio.us or other bookmarking site	11%

Table 3. Web Information Keeping Methods

Aula, et al. [1] conducted a study in which they asked participants to rate how often (never, rarely, sometimes, often, almost always) they used various finding and refinding methods. Comparing their results and ours provide insights and also some points for further exploration. In our study almost all users (98%) reported using bookmarks. Aula et al. found a similar number (92.4%). However, in the Aula et al. study, the median response was that bookmarks were used “sometimes”, indicating that many users do use bookmarks, but only sometimes. Aula et al. reported that emailing URLs to self and writing URLs down on paper were not commonly used strategies. However, many of our participants reported using these methods. Further study is needed to understand more about the context and frequency of this use.

3.5 Bookmark Use

Participants were asked to write down an estimate of how many bookmarks they had on their primary computer. User-reported estimates can be inaccurate, but they are easy to obtain, can provide an idea of the general size or trends of the measure, and have been used in other studies [1]. Our participants reported having an average of 49.5 bookmarks (*median* 30, *s.d.* 64.1) with a minimum of 2 and a maximum of 300. One outlier greater than 10 standard deviations from the mean was removed from this

analysis (the outlier indicated 1000 bookmarks and 20000 email messages). These results indicate that while 98% of our participants reported using bookmarks, half reported having 30 or fewer. Our data compares with that from Boardman and Sasse's study published in 2004 [2] and the survey results from Aula et al. published in 2005 [1]. Boardman and Sasse reported an average of 16.8 bookmarks per user, with a minimum of 0 and a maximum of 180. Aula et al. reported a larger average of 220 bookmarks and 30 folders, with 14.4% having less than 50 bookmarks.

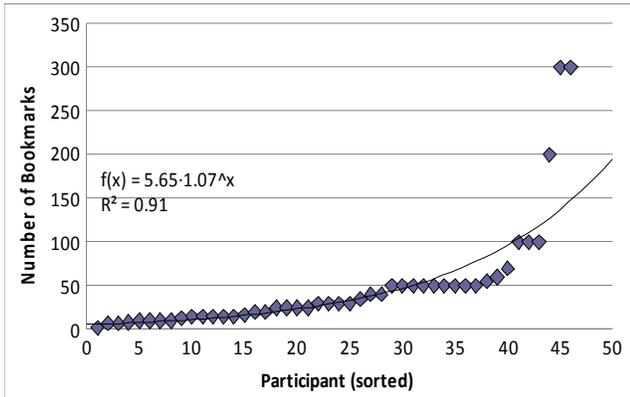


Figure 1. User-reported estimates of number of bookmarks

Figure 1 shows a graph of the estimated number of bookmarks reported by our participants, sorted by size. An exponential trend line has been computed and displayed with an R^2 value of 0.91, indicating a good fit. This suggests that the number of bookmarks that people have follows an exponential distribution.

3.6 Email Folders and Inbox

We also asked participants to give estimates of the number of email folders they had and the number of email messages in their Inbox. Figures 2 and 3 show these numbers, sorted in increasing order. For each, an exponential trend line has been computed and displayed. The R^2 values are 0.95 and 0.94, indicating good fits for both curves. This suggests that the number of email folders that people have and the number of email messages in their Inboxes follows an exponential distribution.

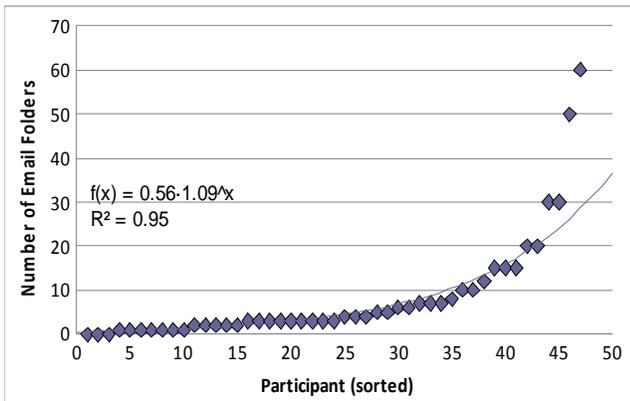


Figure 2. User-reported estimates of number of email folders

We were interested to see if there was any correlation between the number of folders and the number of email messages. A simple

hypothesis here is that people with more folders are “filers” and might be more likely to file messages, resulting in fewer messages in their Inbox at any given time. However, a correlation analysis resulted in a Pearson's $r = -0.18$, indicating only a small negative correlation between these two variables.

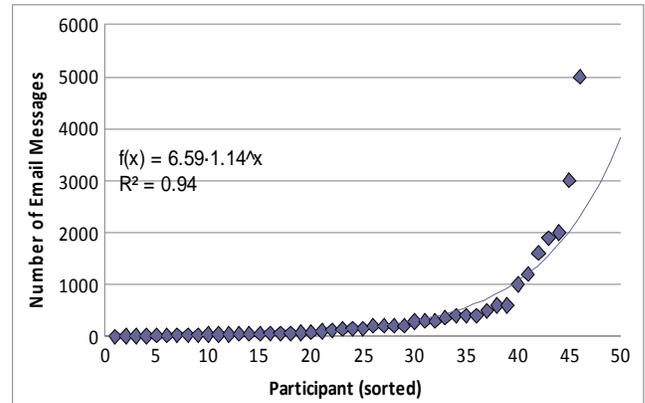


Figure 3. User-reported estimates of Inbox size

4. SUMMARY AND CONCLUSIONS

Participants in our study used three main methods for transferring files among the computers they use: 1) email to self, 2) USB drives, and 3) network-based storage accessible from many different computers. The choice of method may be influenced by file size due to limitations that many email systems place on the size of attachments.

Our participants typically used either simple USB connections or the software and cables that came with devices such as digital cameras and MP3 players to transfer files between these devices and their computer. Files were not typically transferred between their cell phone and computer.

We found that participants made use of bookmarks, email, and writing down notes as primary methods to save information found on the Web. While bookmarks were reported as being used by almost all our participants, half estimated having 30 or fewer bookmarks.

An analysis of user provided estimates of the number of their bookmarks, email folders, and email messages in their Inbox showed that these all follow an exponential distribution. An correlation analysis found little correlation between the number of folders and Inbox size.

Across all the types of transfer that we examined, email played a role. Our participants reported using email to transfer files between computers, a few used it to move files between their computer and cell phone, and many used it to save information found on the Web. The “overloaded” functions of email have been reported on before, e.g. [4][3]. Our study further illustrates the important “common denominator” that email plays in people's need to access data from multiple locations and on multiple devices. These results contrast with the conclusions of Aula et al. [1] that experienced users do not often email themselves as a method for saving information. Our study was conducted approximately two and a half years after Aula's which may account for these differences, or they may be due to differences in

the populations studied. This is an area for which additional research is needed.

These results extend our understanding of how users manage their personal information and help inform the design of PIM tools.

5. ACKNOWLEDGMENTS

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6. REFERENCES

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Questions

1. Describe the computer(s) that you use in a typical week.
 - a. Computer type: Desktop or notebook
 - b. Operating system: Mac, Windows, Linux, other _____
 - c. Location: portable, home, work, school (library, lab, etc.), other _____
2. Do you consider one of the computers listed above as your primary computer? If so, which one?
 - a. Yes or no
 - b. If yes, which one? _____
3. Briefly describe how you transfer, share, and synchronize files among the computers that you use. For this question, consider only the computers you use – mobile devices will be asked about in a later question. If you use only one computer, just enter “one computer” for this question.
4. List and briefly describe common problems that you have transferring, sharing, and/or synchronizing files among the computers that you use. For this question, consider only the computers you use – mobile devices will be asked about in a later question. If you use only one computer, just enter “one computer” for this question.
5. Which of the following devices do you own and use in a typical week?
 - a. Cell phone
 - b. MP3 player (iPod, etc.)
 - c. Personal digital assistant (Palm, Pocket PC, Blackberry, etc.)
 - d. Digital camera
6. Briefly describe how you transfer, share, and synchronize files among the devices and computers that you use.
7. Briefly describe any problems that you commonly have transferring, sharing, and/or synchronizing files among the devices and computers that you use.
8. What methods do you typically use to save interesting or important web sites? (check all that apply)
 - a. Save as a bookmark/favorite
 - b. Send myself an email with the URL
 - c. Copy the URL into a file
 - d. Save a copy of the web page to my hard drive
 - e. Save it to del.icio.us or other bookmarking site
 - f. Write it down on paper
 - g. Other (please specify) _____
9. Estimate how many bookmarks you have on your primary computer.
10. How many email folders do you have?
11. How many email messages are in your inbox?