Intentional Information Fragmentation in Email Management

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Thesis submitted to the Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

Master of Science
In
Computer Science & Applications

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August 29th, 2012
Blacksburg, Virginia

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ABSTRACT

Personal Information Management (PIM) studies the practice of storing, organizing, and retrieving information by an individual in support of their roles and tasks (Bergman, et al., 2004). One important problem in PIM is information fragmentation (IF) – the condition of having data in different formats, distributed across multiple locations, manipulated by different applications, and residing in a generally disconnected manner (Tungare, 2007). IF can conflict with the PIM ideal that users should have access to the right information at the right time, in the right place, in the right form, and of sufficient completeness and quality to perform the task at hand (Bergman, et al., 2004). It is typically assumed that IF is unintentional, and occurs as a result of the many applications and devices we use to do our daily work. It is further assumed that IF is "bad" or has negative consequences. In this thesis, I study when IF occurs intentionally. Intentional IF (IIF) refers to the fragmentation in PIM that occurs when a person fragments his or her own personal data purposefully. Although research into the problem of IF has been growing quickly in the past decade, IIF has not been investigated in the literature. Prior studies have portrayed IF as a problematic type of information management. Email is a common context in which IF is found. While IF in email may be unintentional, such as when required by an employer, it is also likely to be intentional, as is the case when users use separate email accounts for different purposes. To further the research in this field, this project investigated the phenomenon of IIF in email by conducting and analyzing data from an online survey. In addition to finding the extent of IIF in email, the survey addressed what motivates the participant to purposely fragment their email as well as the advantages and disadvantages in doing so. My study is the first that has explored intentional fragmentation of information. The findings of this study show that IIF exists in email usage, revealing that IIF occurs across a user's devices and also across a user's multiple email accounts. The two most common motivations for IIF are to keep information separated by the user's social roles (work, school, personal communications, etc.), and to filter out extraneous information in order to simplify their information management. These results show that in addition to the negative consequences of IF there also exists positive uses of IF, that is helpful for some users.

for Mom, Dad, Erin, and Grammy

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1. Introduction

Personal Information Management

Personal Information Management (PIM) describes both the study and practice of storing, organizing, and retrieving information such as files and emails by an individual in support of his or her roles and tasks (Bergman et al., 2004). Bergman et al. (2004) describe an ideal PIM environment in which people have access to the right information at the right time, in the right place, in the right form, and of sufficient completeness and quality to perform the task at hand. One challenge that people have using their personal information is information fragmentation (IF).

Information Fragmentation

IF has been described as "the condition of having a user's data in different formats, distributed across multiple locations, manipulated by different applications, and residing in a generally disconnected manner" (Tungare, et al., 2007, p. 1). Reimer et al. (2009) further explains how IF often means the user must re-find information, re-create connections with other information, and open multiple applications. This causes an increase in both time and effort prior to the user being able to access information. In short, previous studies have found that IF produces inefficient and, thus, less effective PIM. However, research to date has failed to investigate possible motivations for and positive consequences of IF, or what, for the purposes of this study, will be considered *intentional IF*.

Intentional IF

Intentional IF (IIF) occurs when a person fragments his or her own personal data purposefully. Conversely, unintentional IF (UIF) happens when personal information is fragmented against the will of the user. IIF and UIF are orthogonal to types of IF that have been studied in the past, meaning that they can occur simultaneously with any of the types of IF that were previously identified.

About this Study

I studied the role of IIF in email by conducting a study using an online questionnaire. The study investigated whether individuals intentionally fragment their email information, and if so,

what the positive and negative consequences of IIF in email usage are. In addition, the study explores the general email management strategies reported by people as related to IF. A total of 281 people responded to the survey. The average age of the participants was 44 years, with a range from 18 to 80 years of age. Half of the participants were male (49.8%), half female (50.2%). Nearly every type of occupation was represented in the participant population.

Overview of the Thesis

This thesis is organized as follows. Chapter 2 reviews related work that has studied various types of information fragmentation: device fragmentation, format fragmentation, and application fragmentation. This chapter also explores PIM within the context of email. Chapter 3 discusses the research method used to study users' information fragmentation habits in their email usage. Chapter 4 presents the results of the study, organized by the research question that they answer. Chapter 5 provides a discussion on the results of the study, connects the results to the current literature, possibilities for future work, and implications for design.

2.   Previous Work

Introduction

PIM examines the storing, organizing, and retrieving information such as files and emails by an individual in support of his or her roles and tasks. IF, which is a subset of PIM, is "the condition of having a user's data in different formats, distributed across multiple locations, manipulated by different applications, and residing in a generally disconnected manner". Email has been a subject of PIM research for many years, and is also a target for intentional fragmentation due to its frequent use in many contexts.

Definitions

Application Fragmentation – A type of IF that involves the same information being stored in separate applications.

Project Fragmentation – A type of IF that involves using the same information across different format-related collections.

Device Fragmentation – A type of IF that occurs when people use information across multiple devices.

Is Information Fragmentation Positive or Negative?

Previous work has found evidence of both positive and negative effects of IF. Reimer (2009) found that IF often means the user must re-find information, re-create connections with other information, and open multiple applications. This caused an increase in both time and effort before the user could access their information. Jones (2005) noted that the project fragmentation problem could negatively affect users' email management practices since the number of collections they must organize may increase if a person has different email accounts. They also presented results that indicate that some users print everything of importance to organize a paper-based filing system, while other participants save email references into electronic files to include in a computer-based filing system. Both of these strategies are intentional organizational techniques with positive effects for the users who employ them. Tungare and Perez-Quinones (2008) found an example of IF where users were keeping two address books; one on their cell phones that stored phone numbers and another on their laptop

that stored email addresses. These two contact management databases were kept separate intentionally, with a positive effect.

Application Fragmentation

Karger et al. (2006) studied application fragmentation, which they defined as having the same personal information stored in separate applications. Application fragmentation can create inefficiencies when, for instance, a user changes their name due to marriage and they are solely responsible for updating and synchronizing that information in each of their applications. A possible solution they presented is Karger et al.'s own prototype, Haystack, that uses a semistructured data model to allow users to reference arbitrary objects – a digital document, a physical document, a person, or a task (2003). These objects can then be annotated, related to other objects, viewed, and retrieved. Principles from this prototype are not used widely in practice since they do not extend existing applications, and therefore require a more dramatic change in PIM usage. William Jones et al. presents another prototype, Universal Labeler, which takes a different approach to this problem (2005). Unlike Haystack, Universal Labeler integrates personal information through extensions to existing applications, including email, and it does not require users learn a new application.

Project Fragmentation

Bergman et al. (2006) described another type of IF, namely project fragmentation. This type of IF occurs when someone is working on a single project, but stores and retrieves information items relating to that project from separate format-related collections, such as documents, emails, and favorite web sites. Bergman et al. (2006) performed a study to determine whether participants think of their information in terms of projects or data formats when organizing these collections, finding that participants were 2.5 times more likely to describe their information in terms of projects as opposed to data formats. Participants also used different data formats, often stored in the same folder, to work on a single project. These results show that Bergman and associates' (2006) participants did in fact organize their information collections more as projects than as data formats. They described project fragmentation as being time consuming, increasing cognitive workload, and "forcing a person who is working on a single project to store and to retrieve information items from different locations with no structural connection between them".

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Device Fragmentation

Additionally, Tungare et al. (2007) described fragmentation due to storing and using information across multiple devices. They found that using more than one device to work on the same task "requires stopping work on the first device, transferring current data to the second device, opening and loading an assortment of applications to complement or replace the applications being used on the first device, and then restarting work on the original task." By changing devices to work on the same task, users are compelled to stop what they are doing, which breaks the task continuity and introduces inefficiencies. They created a framework, Syncables, to support seamless task migration across multiple devices, and minimize the break in continuity from using more than one device to accomplish a task.

Intentional IF

Tungare and Perez-Quinones (2008) conducted a study of 220 knowledge workers, finding that participants tended to use their devices in certain frequently occurring configurations. One example of IF in the study was users keeping two address books; one on their cell phones that stored phone numbers and another on their laptop that stored email addresses. These two contact management databases were kept separate intentionally. In fact, one participant even mentioned using different names for the same person in the two address books as a result of two different contexts of use, using a full name for a contact's email address, but only a first name for phone information. A follow-up study examining mental workload produced results showing that "in systems where users lacked the freedom of choice, they turned to solving problems by adopting workarounds," such as IIF (Tungare & Perez-Quinones, 2009, p. 3432). Additionally, in their work on PIM, Jones and Teevan (2007) emphasized the impact of an individual's roles such as parent, employee, and friend on IF. They found that social roles are a potential motivation for participants to engage in IF.

PIM in Email

Email has been a subject of PIM research for many years (Bishop 2011, Dabbish 2006, Ducheneaut 2001, Elsweiler 2008, Fisher 2006, Gwizdka 2004, Hanrahan 2011, Siu 2006, Tang 2009, Tungare 2009, Whittaker 1996), and is a prime target for intentional fragmentation due to its frequent use in many contexts. Whittaker et al. (2006, p. 68) put it well when they said, "we

tend to live in our email." In 2001, Jones et al. found that several participants in a qualitative study emailed URLs to themselves or others, printed emails, saved information from emails to their hard drive, and pasted information from emails into documents. Participants chose to email URLs to themselves since they could provide context for the web page through the subject line and additional comments within the email. Emailing is an effective way to store information like a URL and, as long as the email is in the participant's inbox, it serves as a powerful reminder (Jones, et al., 2001; Whittaker, et al., 2006). Participants chose to print their emails for similar reasons, such as being able to read the information, share the information with others, and carry the information with them (Jones, et al., 2001). Hanrahan built a prototype, Mail2Wiki, to embed sharing functions directly in email, which allow users to offload content to a shared space to be crystallized and reused collaboratively later on (2011). This study found that Mail2Wiki reduced the time it took for information to be offloaded from email, reduced the number of mouse clicks needed to offload the information, and reduced users' perceived mental workload. Hanrahan's prototype provides a streamlined way for users to offload information from email to another application, which is already a practice that many users engage in.

Summary

Most previous studies have found that IF has a predominantly negative effect on users. Application fragmentation has been shown to cause inefficiencies (Karger, et al., 2006). Project fragmentation can cause a number of problems for users including being time consuming and increasing cognitive workload (Bergman et al., 2006). Device fragmentation has been found to cause a break in task continuity, compelling users to stop what they are doing, which introduces inefficiencies (Tungare, 2007).

However, not all uses of IF have negative consequences. Tungare et al. (2008) found that some people intentionally fragment their information across devices to help them have the right information and context at the right time.

Although researchers have begun to delve into the causes of IF, there remains a dearth of knowledge on the topic of IIF. We, as a research community, do not know how widespread IIF is, nor do we know what the benefits and disadvantages of IIF are. The study described in this thesis will further the wealth of IF knowledge by expanding the research to date investigating IIF in individuals' email usage.

3.   Method

The main purpose of this thesis is to determine whether individuals purposefully fragment their email information and to investigate the motivations for doing it, as well as understanding the positive and negative consequences of IIF in individuals' email usage. In addition, I investigate the general email management strategies reported by people as related to IF.

Research Questions

The following research questions guide the work of this thesis.

1. Do people intentionally fragment information in email? If so, how do they do it? Do they do it along the previously known categories (application, format, device) or do they use some other axis of fragmentation?
2. What are the motivations and advantages for those that intentionally fragment their email information? Do they achieve those goals (does IIF have a positive effect)?
3. What are the negative side effects and/or problems faced when intentionally fragmenting emails?
4. What general strategies do people report with regard to how they use their email?

The goal of Research Question 1 is to determine whether participants fragment their email information, and if so, whether this fragmentation is intentional. One way of fragmenting email information is by having more than one email account. If a participant is required to have two or more accounts by an external entity such as work or school then I consider this to be unintentional information fragmentation (UIF). However if a participant is not required, but chooses to have multiple accounts then this is a way for them to intentionally fragment email information. Similarly, if a participant was required to have more than one account previously, but currently uses only one email account then this shows that their previous fragmentation could have been unintentional. Participants who use their email accounts differently on different devices such as smart phones, tablets, laptops, and desktops demonstrate device fragmentation.

The aim of Research Question 2 is to determine what the motivations and advantages are for those who intentionally fragment their email information. To learn about device fragmentation I asked participants who use email differently on their devices why they intentionally fragment their email information across multiple devices. In order to determine participants' motivations

for intentionally fragmenting their email accounts, I asked respondents who have more than one email account how having multiple accounts is helpful to them.

The purpose of Research Question 3 is to determine the problems and disadvantages that occur when a user intentionally fragments their email information. To assess the disadvantages of IIF across multiple accounts I asked participants who previously used multiple accounts, but now use one account why they consolidated their email information to a single account. In order to understand how often IIF leads to problems in email, I asked participants with multiple accounts if they have any trouble keeping their email accounts separate. In order to determine why some users have problems intentionally fragmenting their email information across multiple accounts, I asked why they had difficulty keeping their accounts separate. In order to gauge satisfaction with IIF, I asked participants with multiple accounts if they have considered eliminating one or more email accounts, resulting in fewer accounts to manage. Finally, to understand the disadvantages of IIF I asked respondents who have considered eliminating one of their multiple accounts why they have contemplated doing so.

The goal of the final Research Question is to explore the general email management strategies of participants. I asked participants how frequently they used each of their accounts and what the primary purpose (work, school, personal communications, etc.) of each account was. I also asked which email provider and client (or application) was used with each account. In addition, I examined which devices were used with each account. For participants with multiple accounts, I asked them, for each account, whether it was set up to automatically forward emails to another of the participant's accounts. I also asked multiple account users whether they forward individual email messages between their accounts. Finally I asked all respondents whether they save emails to their file system, whether they print emails, and whether they copy and paste information from emails to other applications.

Procedure

The study was conducted via an online questionnaire survey, hosted at http://www.qualtrics.com. This study was approved by the Virginia Tech Institutional Review Board, and was given IRB number 12-311; refer to the IRB approval letter for this study in the Appendix. To recruit participants I used a variation of the snowball sampling technique by recruiting through social networking websites that encourage people to share a survey with their

friends. I wanted insight into an average email user, so I reached out to both students and professionals in order to get the widest range of participants possible. The survey was distributed widely via student and faculty email lists at Virginia Tech, social networking sites, and email lists of former executives who had built a network of contacts through more than 30 years of work in telecommunications, IT, and finance in the DC metro area.

I used a combination of yes/no, multiple choice, Likert-type, and free response questions in the survey. There were not a set number of questions in the survey; the questions that a respondent saw depended on their previous answers. The minimum possible number of questions that a participant could be presented with was 14. Some questions that were presented to respondents with multiple email accounts were asked more than once. For example I asked how frequently they used each account, which email provider it was registered with, and which email client the account was used with *for each email account*. To be presented with the maximum number of questions possible, 111, a participant would have to use ten email accounts. Figure 1 is a logical flow of the survey questions. The complete survey is included in the Appendix.

In order to analyze the open-ended questions I needed to find common categories of answers. I created categories for the most common answers by performing a keyword spotting technique while reading all of the free response answers for a given question. I could then sort each answer into these categories to get a rough quantitative view of a qualitative question. For example, when I asked why some multiple account users had considered eliminating an account I created the category of *simplicity* after performing keyword spotting on all of the answers. Answers like "I have too many accounts so I'd like to eliminate the accounts that I don't need", "Simplicity", and "to simplify my life" I classified in the *simplicity* category. Analysis of qualitative data is inherently subjective and both my categories themselves and the way that I sorted answers into them reflect this subjective nature.

Figure 1. Logical Flow of the Survey

Beginning of Survey

Informed Consent Process

Do you use more than one email account?

No → Which email provider do you use?

Yes → Why?
How many accounts do you use?
Which email providers do you use?
Do you access your accounts equally?
For each account: How often do you access it?

Does your account serve more than one purpose such as work, school, family communication, etc.?

No → Describe the purpose of your account.

Yes → Describe the purposes of your account.

Did you ever have more than one account?

No

Yes → Why did you have more than one account?
Why did you stop using more than one account?

Does each of your accounts serve a specific purpose?

No

Yes → For each account: What is the purpose of it?

Do you have any problems keeping your multiple accounts separate?

No

Yes → Why?

Have you considered merging your accounts to have fewer?

No

Yes → Why?

How is having more than one account helpful to you?

Do you ever forward emails from one of your accounts to another?

No

Yes → Why?

Do you save emails to text files, PDFs, etc.?

No

Yes → Why?

Do you print emails?

No

Yes → Why?

Do you copy & paste information from emails to other applications?

No

No → Why?
What types of applications do you typically transfer email information to?

End of Survey

Participants

There were a total of 281 people who responded to the survey. The average age of the participants was 44 years (SD = 15.34), with a range from 18 to 80 years of age. Figure 2 depicts a histogram of participants' ages; Figure 3 shows a similar histogram of female participants' ages, and Figure 4 displays a histogram of the male's ages. Both genders were well represented in the participant population; 49.8% of participants were male, 50.2% female. Nearly every type of occupation was represented in the participant population. Students (11.8%), managers (14.3%), and consultants (10.7%) each made up more than 10% of the participant population. More than 5% of the sample population worked in administration (6.4%), finance (8.9%) or software development (5.4%). Retirees also made up 5.4% of the participant population. Table 1 presents a detailed description of participants' occupations, while Figure 5 shows a basic overview of the most common occupations.

Figure 2. Distribution of Participants' Ages
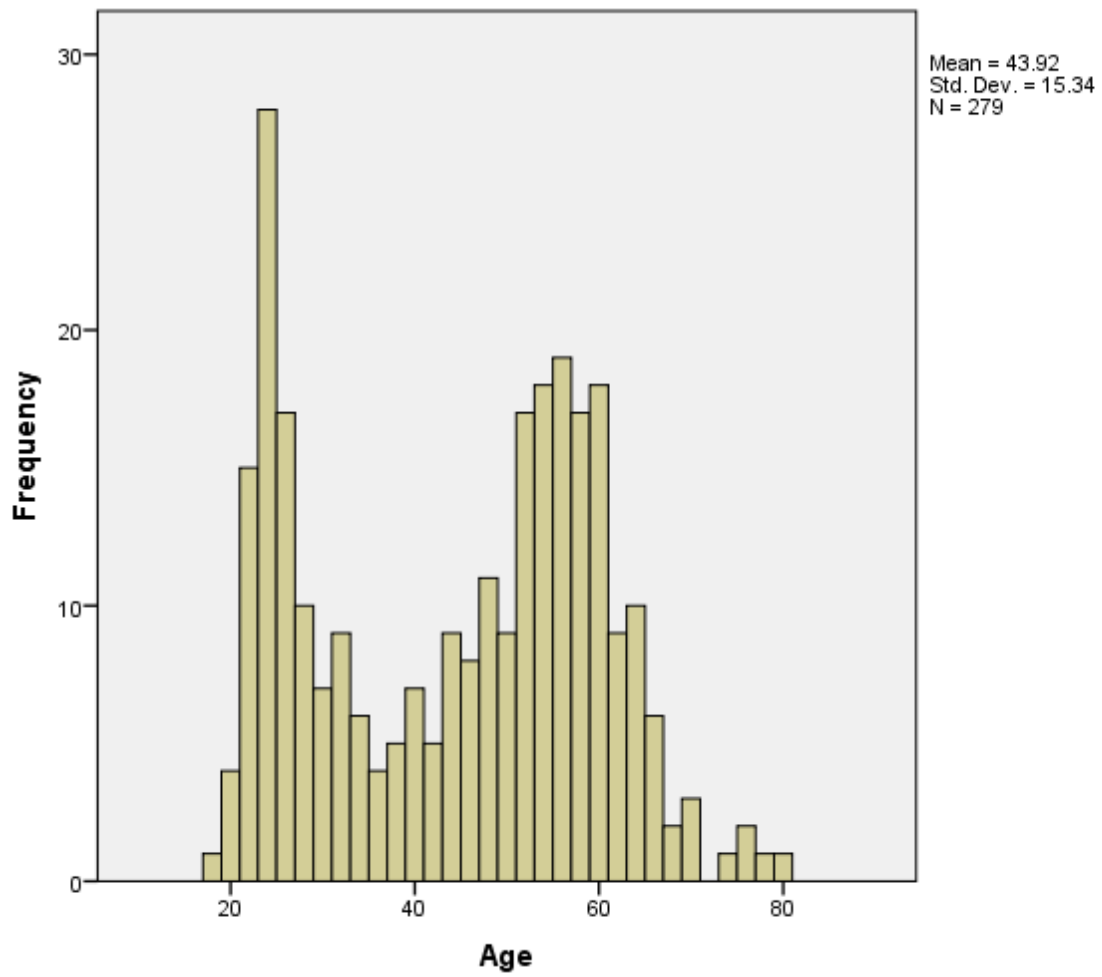
Figure 3. Distribution of Female Participants' Ages

Mean = 43.92
Std. Dev. = 15.34
N = 279
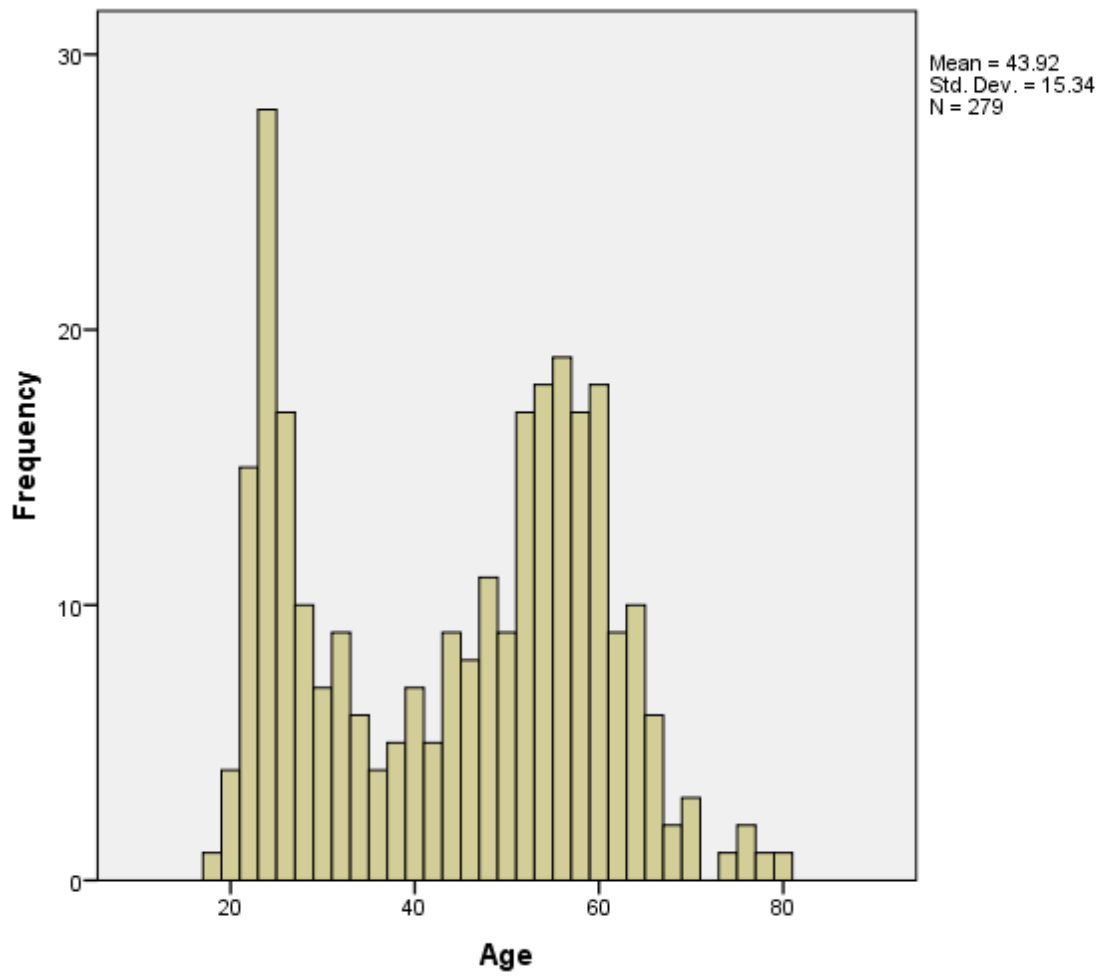
Figure 4. Distribution of Male Participants' Ages
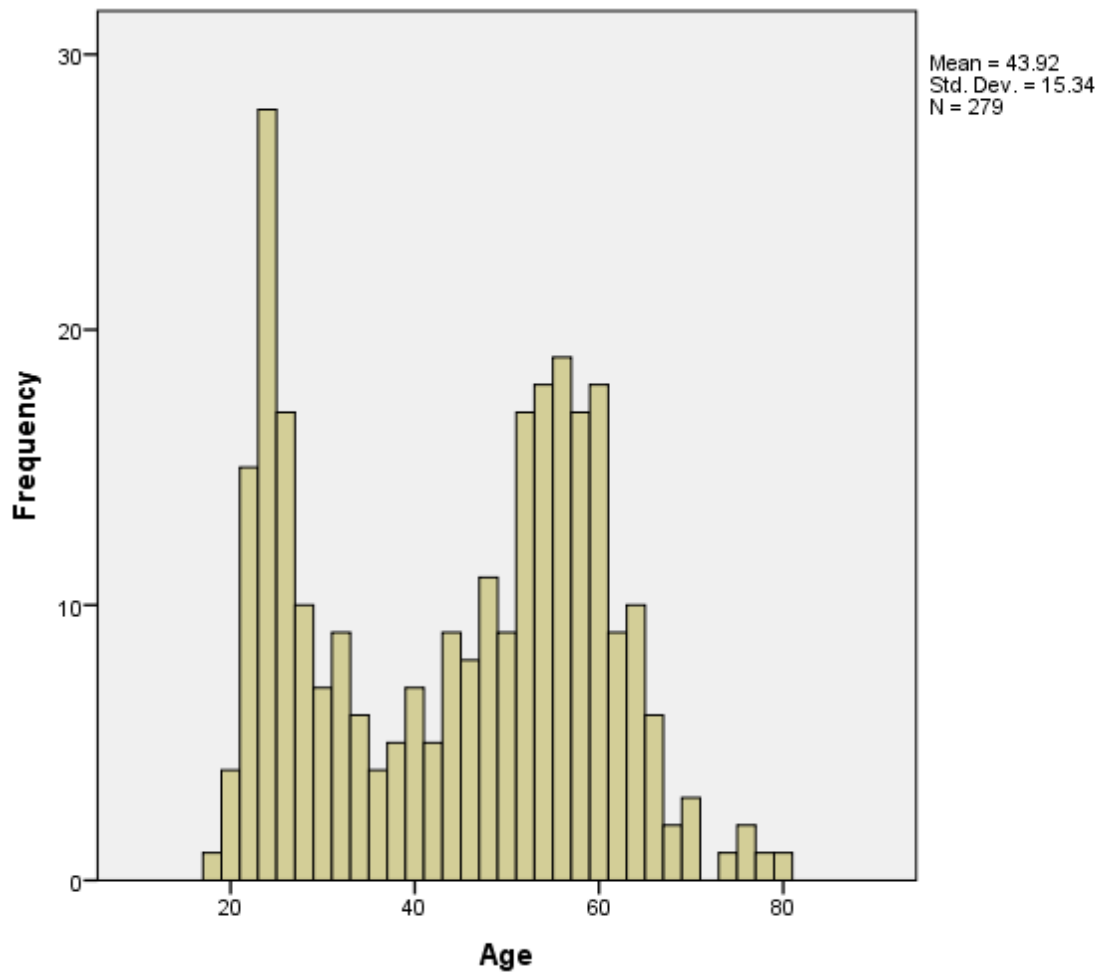
Figure 5. Participants' Occupations

Occupations (N = 280)

Legend:
- Management
- Student
- Consulting
- Finance
- Administration
- Software Development
- Retired
- Teacher/Faculty
- Sales
- Other (23 Categories)
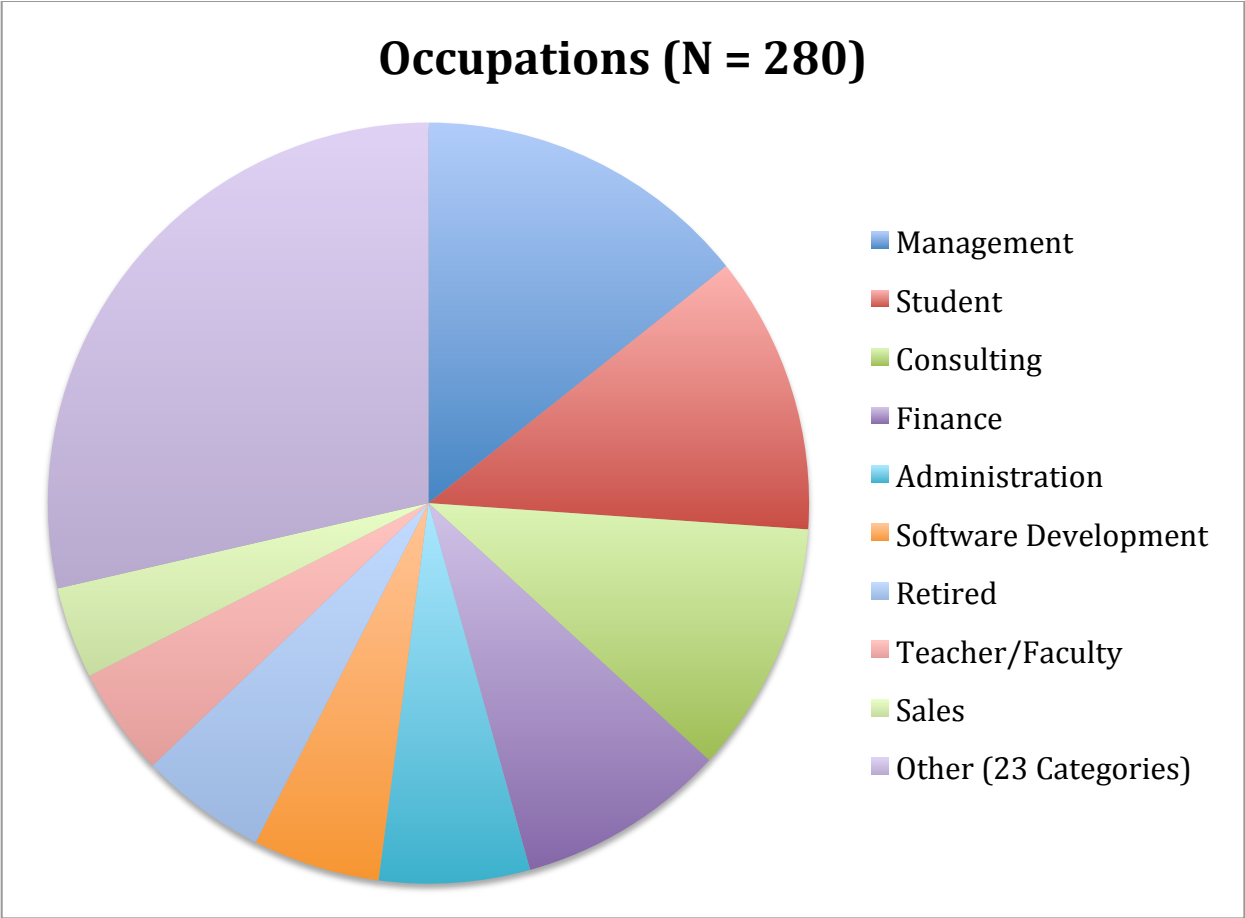
Table 1. Distribution of Participants' Occupations

Occupation	Percentage (Frequency)
Accounting	2.9 (8)
Administration	6.4 (18)
Architecture	.4 (1)
Banking	2.1 (6)
Computer Networking	1.1 (3)
Construction	.7 (2)
Consulting	10.7 (30)
Design	.4 (1)
Emergency Rescue	.4 (1)
Engineering	2.1 (6)
Finance	8.9 (25)
Healthcare Practitioner	1.8 (5)
Homemaker	1.4 (4)
Human Resources	2.9 (8)
Law Enforcement	.4 (1)
Legal	1.1 (3)
Management	14.3 (40)
Marketing/Merchandising	2.1 (6)
Public Relations	2.1 (6)
Quality Control	.4 (1)
Research	1.8 (5)
Retail	1.1 (3)
Retired	5.4 (15)
Sales	3.9 (11)
Software Development	5.4 (15)
Software Support	1.4 (4)
Student	11.8 (33)
Teacher/Faculty	4.6 (13)
Unemployed and looking for work	1.8 (5)
Unemployed and not looking for work	.4 (1)

Summary

This chapter presented the research method I followed in this research. The survey conducted is similar (in approach) to other PIM studies. The next chapter presents the results of the data collection.

4.   Results

Research Question 1: Existence of IF in Email

The majority of the 281 total participants (88.9%) reported using more than one email account, which may indicate that IF does occur in email. Of the 31 participants who did not use more than one account at the time of data collection, 11 (35.5%) indicated using more than one account in the past. This finding shows that 92.9% of respondents have used multiple email accounts at one point, and 88.9% of participants still use more than one account.

I wanted to investigate how many email accounts participants use. I found that about one-tenth (11.1%) of respondents use only one account. Participants with more than one account have an average of nearly three accounts (2.91, SD = 1.137). Therefore my average participant fragments their information between two or three accounts (2.70, SD = 1.229). I used a two-tailed Pearson correlation to determine that participants who used more email accounts checked their accounts, on average, significantly less (-.238, p = .00006, N = 280) than those with fewer accounts. I also found a highly significant correlation using a two-tailed Pearson correlation (-.210, p = .00043, N = 279) between a participant's age and their number of accounts. My younger respondents were significantly more likely to use more accounts than the older participants. For a full description of all significant correlations found, refer to Table 12.

In order to determine if multiple account users exhibited IIF or UIF, I asked participants with more than one account how having multiple accounts is helpful to them as a free-response question. I found that only 9.1% of respondents with multiple accounts reported that they did not want to have more than one account, but were forced to do so by an external entity such as work or school. The remaining majority of multiple account users (90.9%) exhibited IIF and reported benefits such as separating social roles in their lives (personal, work, school, etc.) and filtering spam emails as benefits of this IIF. Figure 6 presents an overview of IIF across email accounts.

I asked participants with one account, but who reported having used more than one account prior to data collection whether they were previously obliged to have more than one account or chose to do so intentionally. Of these 11 participants, nine (81.8%) were required by an external source (e.g., work, school) to have one or more of the prior multiple accounts. The remaining two participants in this category cited spam management and voluntarily having a second email for work as the reasons they had multiple accounts. This finding shows that most of

these participants choose to avoid IF by having only one account; they demonstrate UIF. A limitation of the current study is that I did not ask multiple account users this question.

Figure 6. Intentional IF across Email Accounts

IIF by Multiple Email Accounts

- More than one account on purpose
- Required to have multiple accounts
- One email account
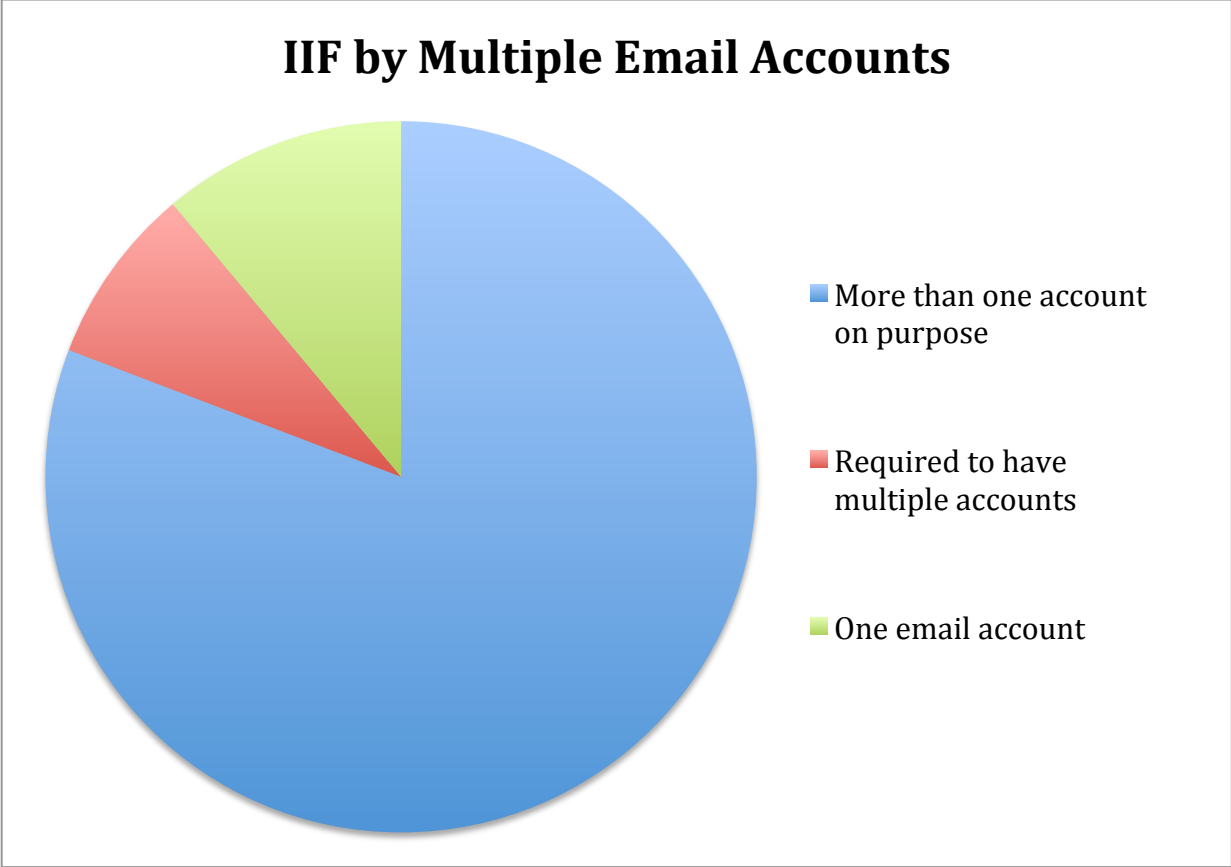
In order to investigate device fragmentation, I asked all respondents whether they use their accounts the same way on all of their devices (e.g., smart phone, tablet, laptop). The majority of both respondents with more than one account (M = 82.7%, SD = 29.3) and those with only one account (74.2%) indicated using each email account the same way on all of their devices. I found, using a two-tailed Pearson correlation, that men were significantly more likely to use their email accounts the same way on all of their devices (.120, p = .04439, N = 279). For a full description of all significant correlations found, refer to Table 12. I also found that a greater percentage of single account users demonstrate IF by device compared to multiple account users. To determine whether this was statistically significant or not, I compared the average percentage between single account users and multiple account users with an independent samples t test. My findings reveal that multiple and single account users are not significantly different in terms of their likelihood to fragment information from their email accounts across multiple devices (t(278) = -1.429, p = .154). Figure 7 depicts the most commonly used devices for using email accounts.

Figure 7. Commonly Used Devices
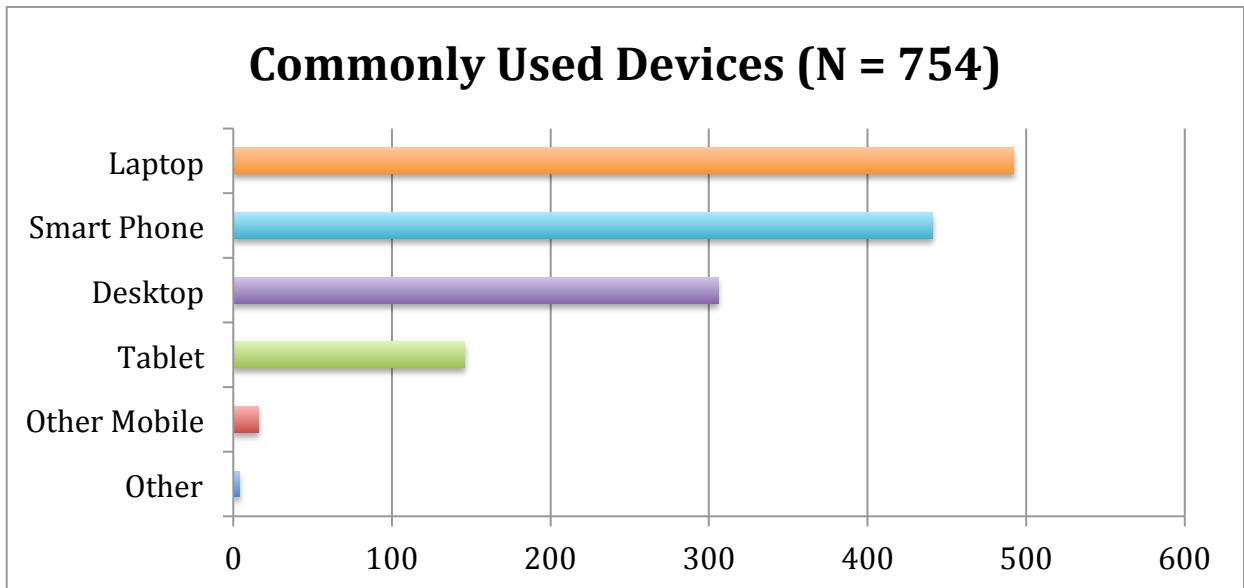
Research Question 2: Motivations and Advantages for Intentionally Fragmenting Email Information

In order to understand participants' motivations for fragmenting their email accounts, I asked participants who have more than one email account how having multiple accounts is helpful to them. Findings for this free-response question show that respondents who use more than one email account have two main motivations for doing so. One reason for having multiple accounts is to help participants keep information relating to their social roles (e.g., work, school, personal) separated. A majority of respondents (80.5%) who have more than one account cited separating information by social roles as an advantage of having multiple accounts. For example, one participant wrote, "I like keeping all of my emails (work/personal) totally separate. If I don't want to work in the evening/over the weekend, I don't even want to see work emails in an inbox I check at home." Approximately one-quarter of these participants (23.4%) reported having more than one account to filter out spam messages from their most used account(s). Providing an example of this motivation for having multiple accounts, one participant responded by writing, "I also have a 'throw away' account that I use for online shopping; this handles the bulk of the mass mailing that I receive." Another participant simply wrote, "Less spam on main account." Figure 8 shows the reasons participants intentionally use multiple accounts.

Figure 8. Participants' Reasons for Intentionally Using Multiple Accounts

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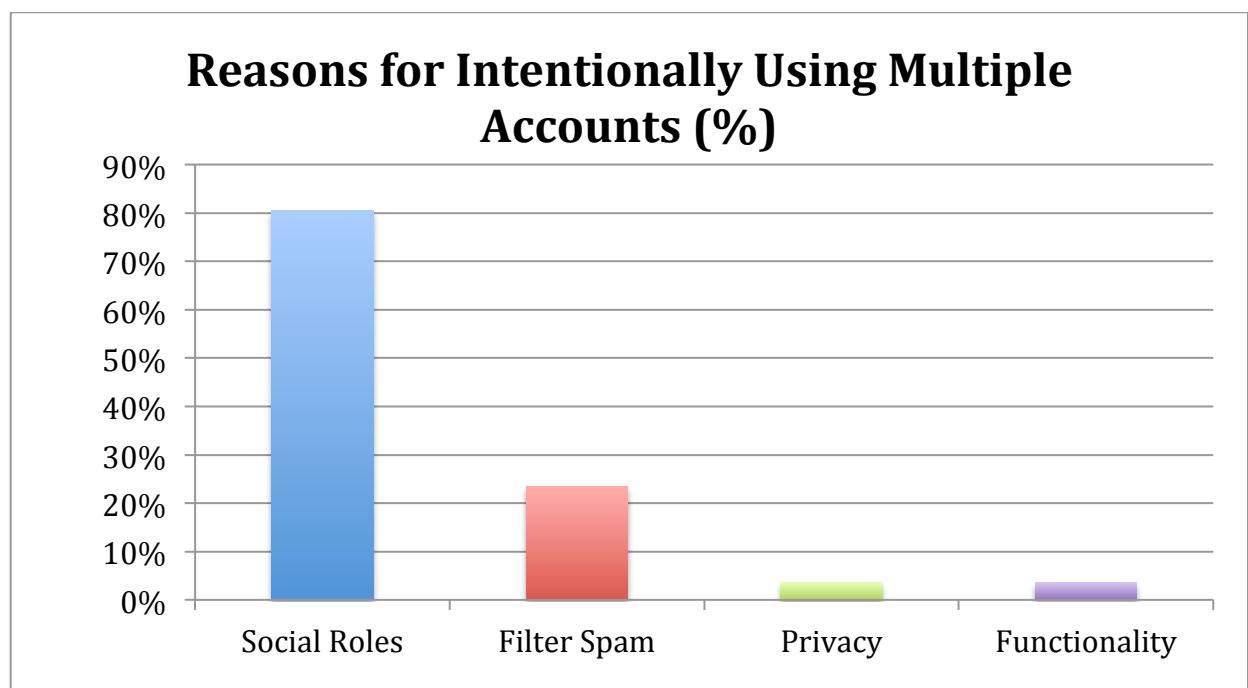
There were a few additional reasons that participants cited for using multiple accounts. Less than ten percent of respondents (9.1%) did not want to have more than one account, but were required to by an external force, such as work or school. For instance, one participant wrote, "It is necessary (not helpful). I cannot use personal email account for work and cannot use work email for personal." Privacy is another reason why participants use more than one account; however only 3.5% of respondents cited privacy as a motivation. One of these respondents wrote, "Honestly, I've ordered adult toys on the internet and don't want it to be searchable from my primary account." A few participants who use multiple accounts (3.5%) reported doing so because of functionality issues with one or more of their email accounts. For example, one participant said, "I prefer on[e] account, but set up the second one with gmail because some people couldn't receive my emails from aol." In general, these findings show that separating social roles is by far the most commonly cited motivation for using more than one email account.

To assess why participants fragment their email information across multiple devices, I asked all participants who do not use their email account(s) the same way on all their devices to explain how they use their account differently on their various devices (e.g., smart phone, tablet, laptop). Participants who have one email account reported using smart phones to filter incoming email, but preferred to manage and compose emails on a laptop or desktop computer. For example, one participant wrote, "I only read my email on my smartphone. I always compose and reply via my desktop computer or laptop." This filtering action is also the main motivation for multiple account users who use their email information differently across their devices, although it is important to note that using devices differently is not IF unless some information cannot be accessed on certain devices.

Participants who have multiple email accounts use their accounts differently on various devices for multiple reasons. Nearly one-third (30.5%) of responses indicate that participants with multiple accounts use smart phones and tablets to filter and read new emails, but prefer to manage and compose emails from their laptops or desktops. One-quarter of responses (25.4%) reported using different email clients for their different devices. One respondent wrote, "Gmail web client on laptop/desktop. Outlook for windows mobile on my phone (Palm Treo)." In about one-quarter of responses (22.0%), participants reported using devices differently to keep social roles, such as work and school, separate. As an example, one respondent wrote, "tablet and smart phone are for personal emails – laptop is for work" and another wrote "I only access my work

email from my laptop. I access my personal email on my laptop, desktop, and cell phone." This motivation indicates IIF, whereas most other reasons for using devices differently are not examples of IF at all. In less than one-quarter of responses (15.3%), participants reported using their accounts differently on various devices due to limited functionality on one or more devices, usually smart phones and tablets. For instance, one respondent wrote, "BBerry is not able to do some core functionality" and another wrote, "Attachments are difficult to read on devices other than my laptop." This lack of functionality is one potential reason many participants filter emails from smart phones and tablets, and use laptops or desktops for managing and composing emails. Finally, in less than one-tenth of responses (6.8%), participants use their smart phone for accessing email archives, but use their laptop or desktop for reading, composing, and managing new emails. One respondent wrote, "Smart phone just to look things up in my email archives, laptop or desktop for reading new emails." Of these results, separating social roles is the only motivation for using devices differently that can be considered IF, the rest are simply organizational techniques. Figure 9 presents a detailed look at motivations for using accounts differently on different devices.

Figure 9. Motivations for Using Accounts Differently on Different Devices
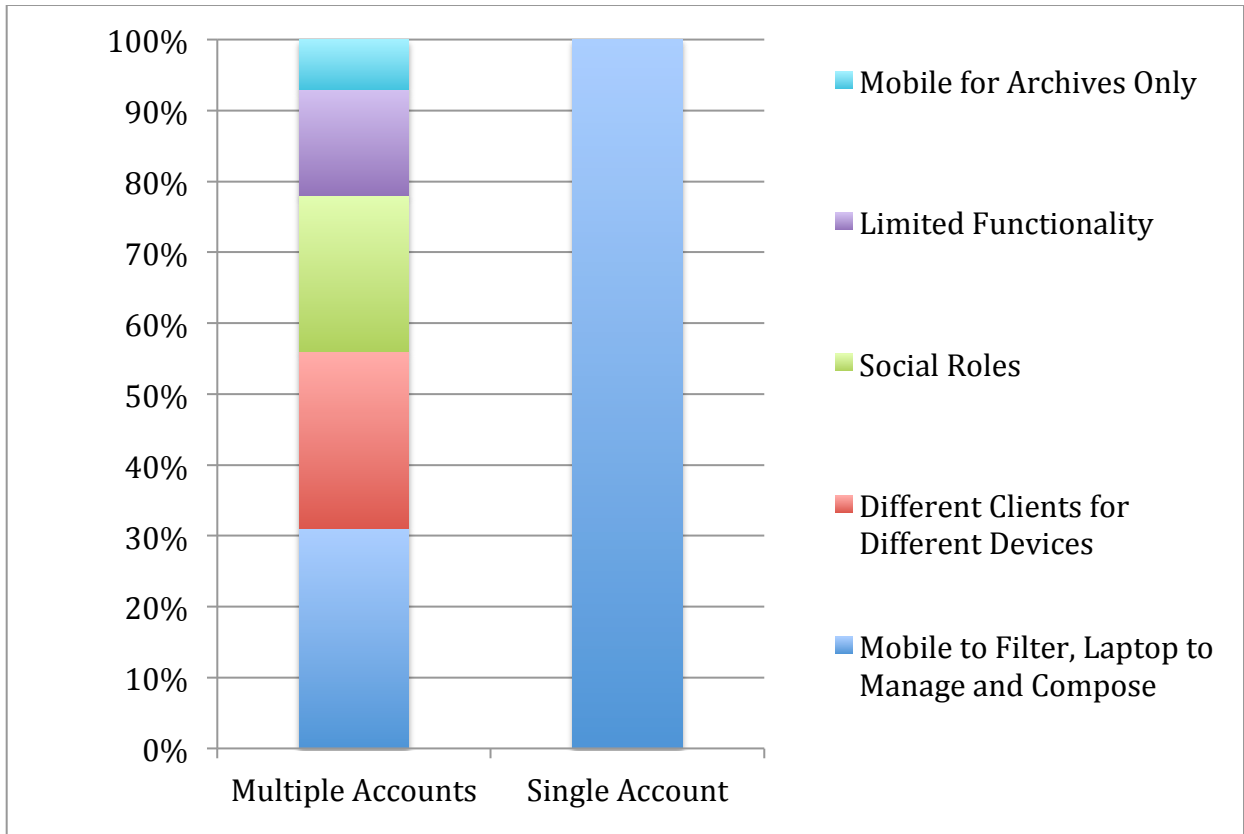
Research Question 3: Problems and Disadvantages from Intentionally Fragmenting Email Information

To determine the disadvantages of intentionally fragmenting email information across multiple accounts I asked participants who use one email account now, but have used more than one account in the past why they chose to consolidate their email into a single account. Out of these 11 participants, six (54.5%) got rid of an email account when they left their workplace, which indicates UIF that was required by an employer. The remaining five participants (45.5%) reported eliminating an account because it was easier or preferable for them to only have one account to manage. These results show that each of the 11 participants who previously had multiple accounts, but now only use one prefer to avoid IF in their email information by consolidating to one account. Eight of these participants were retired, unemployed, worked in sales, consulting, or accounting and had an average age of 59.38 years old. The remaining three of these 11 participants were students, with an average age of 20.67.

To assess problems associated with IF across multiple email accounts I asked respondents with more than one account if they have any problems keeping their accounts separate. I received responses from 249 participants on this question. A majority of multiple account users (93.6%) reported having no problems keeping their email information in each account separate. This shows that only sixteen respondents (6.4%) with more than one account had problems keeping their accounts separate.

In order to determine why this minority of users has problems intentionally fragmenting their email information I asked them why they had difficulty keeping multiple accounts separate. Half of these respondents (50.0%) reported problems keeping their accounts separate due to a lack of functionality of their accounts, clients, or devices. One participant said of emails, the "iPhone does not show which [account] they are coming from" but that "Outlook merges all accounts but Hotmail together." Another difficulty that about one-third of participants (31.3%) reported in keeping accounts separate was that people sent emails to the wrong account, resulting in organizational problems. One participant's response was "my friends or wife send personal email to the work account." Less than one-fifth of respondents (18.8%) indicated difficulty in keeping accounts separate because, as one person put it, they "like everything in one place."

In order to gauge participant satisfaction with IIF I asked respondents with multiple accounts if they have considered eliminating one or more email accounts, resulting in fewer

accounts to manage. I received responses on this question from 246 respondents. Three-quarters of the participants (75.2%) reported that they have not considered eliminating any accounts, which indicates that they are satisfied with their current IIF across email accounts. Only one-quarter (24.8%) of respondents who have multiple accounts reported considering eliminating one or more accounts. Using a two-tailed Pearson correlation I found that participants with more accounts were significantly more likely to consider eliminating one or more of their accounts (.233, p = .00022, N = 246) than those with fewer accounts. In addition, using a two-tailed Pearson correlation I found that the more frequently that a participant uses their accounts the less likely they are to have considered eliminating one of their accounts (-.167, p = .00883, N = 246). For a description of significant correlations found, refer to Table 12.

To further understand the dissatisfaction that participants experience with IIF, I asked respondents who have considered eliminating one of their multiple accounts to tell us why they have contemplated doing so. Most of these participants (57.4%) mentioned contemplating doing so in order to simplify their email management, indicating that this IF is negative. About one-third of these respondents (31.1%) have considered eliminating an account that they no longer use, which may also result in simplifying their email management and indicate negative IF. For example, one participant said, "I don't use it and don't care to, enough I say!" Less than one-tenth of these respondents (8.2%) cited spam management, to "cut down on the total amount of spam I receive between all accounts" as one person put it, as a reason for considering eliminating an account. Excessive spam emails are another indicator of negative IF. Less than 5% of these participants (4.9%) mentioned cost as a factor compelling them to eliminate an email account. As one respondent stated, I have considered eliminating an account with "Yahoo because they charge me an annual fee." Finally, one participant, representing 1.6% of these participants cited a lack of client functionality as a consideration for eliminating an account. Figure 10 shows reasons why participants have considered eliminating an email account.

Figure 10. Motivations for Considering Eliminating an Account
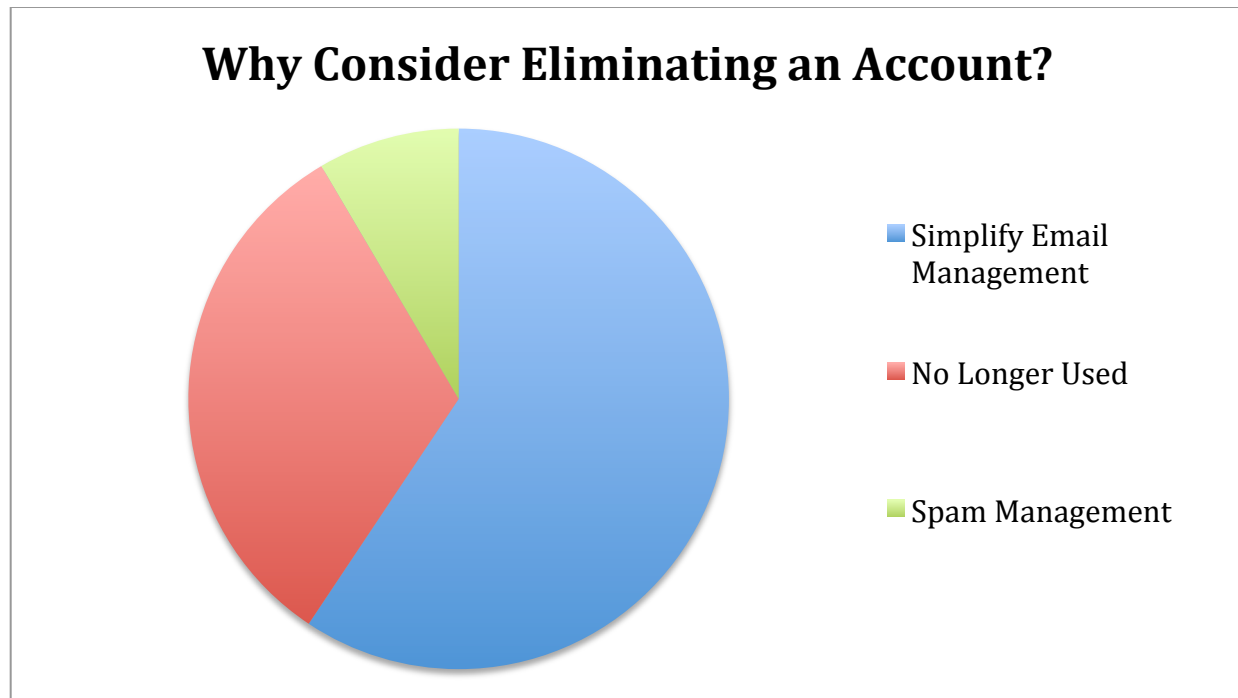
Research Question 4: General Email Management Strategies

I wanted to examine how frequently respondents use their email accounts. Participants with a single account reported checking it more than 2-3 times a day, which was the most frequent option available in the survey. Multiple account users indicated checking each of their two most frequently used accounts more than 2-3 times a day. However users with three or more accounts reported checking both their third and fourth most frequently used accounts less frequently, only 2-3 times per week. Using a two-tailed Pearson correlation I found that participants who checked each of their accounts frequently were more likely to use more devices (smart phones, laptops, etc.) with each account (.291, $p = 7.24 \times 10^{-7}$, N = 280). Put another way, the more devices a respondent used for each of their accounts, the more likely they were to check their accounts frequently. Refer to Table 2 for a detailed description of how frequently participants used their email accounts; refer to Table 12 for a description of significant correlations.

Table 2. Distribution of Email Account Usage Frequency

Usage	Single Account Users	Multiple Account Users									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
N	31	249	249	139	52	21	7	3	2	1	1
Median	> 2-3 times / day	> 2-3 times / day	2-3 times / day	2-3 times / wk	2-3 times / wk	Once / wk	Once / wk	2-3 times / wk	2-3 times / day	2-3 times / day	2-3 times / day
Never	1	0	2	11	4	2	1	0	0	0	0
< Once / mo	0	0	8	21	10	4	1	0	0	0	0
Once / mo	0	0	6	3	0	1	1	1	0	0	0
2-3 times / mo	0	1	9	11	6	3	0	0	0	0	0
Once / wk	0	0	7	9	3	1	1	0	0	0	0
2-3 times / wk	2	4	31	20	8	1	1	1	0	0	0
Once / day	3	9	34	17	3	3	0	0	0	0	0
2-3 times / day	7	20	50	18	7	3	1	1	1	1	1
> 2-3 times / day	18	215	102	29	11	3	1	0	0	0	0

In order to learn about participants' email management strategies, I asked which email provider and which email client, or application, they use for each of their accounts. I found that Gmail was the most common email provider and client for single account users. I also found that multiple account users were most likely to use Gmail for their second, third, fourth, and fifth most frequently used accounts. However, multiple account users were most likely to use an account provided by their employer for their most frequently used account. The most commonly used email client for multiple account users' main email account was Outlook. Other providers that respondents used were Yahoo, Internet providers, university provided accounts, AOL, Hotmail, MSN, personal domains, Yandex.mail, apple, mail.ru, network solutions, Facebook, and GoDaddy. For a detailed description of which email providers participants used, refer to Table 3. Other clients, or applications, that participants used frequently were Yahoo, Hotmail, AOL, MSN, Mail.app, Thunderbird, Lotus Notes. Less frequently used clients included iPhone, GoDaddy, groupwise, vistaprint, webmail, blackberry, entourage, Facebook, smartermail, school, work, goodlink, exchange, promail, windows mail, and internet service providers. Refer to Table 4 for a detailed description of which email clients, or applications, participants' used.

I determined how many multiple account users utilize more than one client or application in their personal email management. Three-quarters (75.5%) of respondents with more than one account use multiple email clients or applications to facilitate their email management.

Table 3. Distribution of Email Service Providers

Provider	Single Account Users	Multiple Account Users									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
N	31	246	248	139	52	20	6	3	2	1	1
Most Common Provider	Gmail	Employer	Gmail	Gmail	Gmail	Gmail	-	-	-	Yahoo!	Yahoo!
Employer	1	93	37	9	6	0	0	0	0	0	0
University	0	16	20	19	7	0	0	0	0	0	0
Personal Domain	2	8	8	4	4	3	1	0	0	0	0
ISP*	5	15	32	9	3	3	0	1	0	0	0
Gmail	11	73	87	47	15	8	2	1	1	0	0
Yahoo!	5	17	34	21	7	3	2	1	1	1	1
Hotmail	2	6	7	15	4	0	0	0	0	0	0
AOL	4	12	16	9	3	1	1	0	0	0	0
MSN	0	3	3	3	0	1	0	0	0	0	0
Other	0	3	4	3	3	1	0	0	0	0	0

ISP stands for Internet Service Provider (e.g. Comcast, Verizon, Time Warner, etc.)

Table 4. Distribution of Email Clients or Applications

Client	Single Account Users	Multiple Account Users									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
N	31	248	248	136	52	20	6	3	2	1	1
Outlook	5	81	61	24	10	3	1	0	0	0	0
Yahoo!	4	16	31	18	4	2	1	0	0	0	0
Hotmail	2	5	8	12	3	0	0	0	0	0	0
MSN	0	2	1	2	0	0	0	0	0	0	0
AOL	4	12	15	9	3	1	1	0	0	0	0
Gmail	8	69	77	43	16	7	1	1	1	0	0
Mail.app	2	13	18	11	9	4	1	1	1	1	1
Thunderbird	2	4	6	3	1	1	0	0	0	0	0
Lotus Notes	2	30	11	2	0	0	0	0	0	0	0
Other	2	16	20	12	6	2	1	0	0	0	0

I asked respondents what the primary purpose of each of their accounts was. Single account users were most likely to use their account for personal communications. I found that participants with more than one account used their primary account in a work context. However, their second and third most used accounts were most likely used for personal communications. Other common purposes that participants reported included school, spam management, and running their own business. Less common purposes reported were for volunteering, networking, applying for a job, gaming, web app account management, travel, privacy, college promotions, functionality, community, PTA, backup, church, and unused accounts. For a detailed description of the purpose of participants' email accounts refer to Table 5.

Table 5. Distribution of Email Account Purposes

Purpose	Single Account Users	Multiple Account Users									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
N	31	249	248	138	50	21	7	3	2	1	1
School	6	37	28	23	5	0	0	0	0	0	0
Work	12	167	74	32	16	3	2	1	1	0	0
Personal	30	134	171	76	20	12	2	3	2	1	1
Spam	6	30	31	40	20	8	3	0	0	0	0
Other	1	6	9	8	2	2	0	0	0	0	0

I asked participants which devices they used to access each of their email accounts. I found that respondents with a single account were likely to access their email account with both a laptop and a smart phone. Participants with multiple accounts were likely to access their first, second, third, fourth, and fifth most frequently used accounts from both a laptop and a smart phone as well. Other devices that respondents reported using were tablets, desktops, cell phones, and iPods. Refer to Table 6 for a complete description of which devices participants used to access each of their email accounts.

Table 6. Distribution of Device Usage

Device	Single Account Users	Multiple Account Users									
		1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
N	31	249	249	138	52	21	7	3	2	1	1
Smart Phone	21	163	148	71	21	11	3	2	1	0	0
Tablet	7	45	55	21	11	5	2	0	0	0	0
Laptop	21	172	155	87	38	14	3	1	1	0	0
Desktop	19	92	101	56	19	9	4	2	2	1	1
Other Mobile Device	2	7	4	2	1	0	0	0	0	0	0
Other	0	1	2	1	0	0	0	0	0	0	0

I asked respondents with more than one email account whether they had any accounts that were set to automatically forward all email messages to another one of their accounts, and if so, why they chose to do so. Less than one-quarter of multiple account users (22.5%) automatically forward at least one of their accounts. For a detailed description of automatic account forwarding refer to Table 7. When I investigated why some participants forward an account automatically I found that it was usually to simplify their email management. Other reasons participants reported for this behavior included to have their emails available from anywhere and to work around limitations in functionality of the device or email client. Using a two-tailed Pearson correlation I found that participants who have more accounts were significantly more likely to forward all emails from at least one account to another of their accounts (.146, p = .02163, N = 249). I also used a two-tailed Pearson correlation to find that younger participants were significantly more likely (-.179, p = .00461, N = 249) to forward all emails from one account to another of their email accounts. For a full description of all significant correlations found, refer to Table 12. For a complete report of why participants automatically forward all messages from one of their accounts to another, refer to Table 8.

Table 7. Distribution of Automatic Email Forwarding Among Users with Multiple Accounts

Account*	N	Yes (Percent)	No (Percent)
1	249	13 (5.2%)	236 (94.8%)
2	249	29 (11.6%)	220 (88.4%)
3	139	27 (19.4%)	112 (80.6%)
4	52	10 (19.2%)	42 (80.8%)
5	21	5 (23.8%)	16 (76.2%)
6	7	1 (14.3%)	6 (85.7%)
7	3	0 (0%)	3 (100%)
8	2	0 (0%)	2 (100%)
9	1	0 (0%)	1 (100%)
10	1	0 (0%)	1 (100%)

Accounts are in order of usage frequency.

Table 8. Motivation for Automatic Email Forwarding Among Users with Multiple Accounts

Motivation	1st	2nd	3rd	4th	5th	6th
N	9	25	24	9	4	1
Functionality	4	2	5	2	1	0
Simplification	5	21	18	3	2	1
Availability	2	3	1	4	1	0

In addition, I asked participants with more than one email account whether they ever forwarded individual email messages or threads from one account to another. About two-thirds (65.5%) of participants with multiple accounts reported forwarding individual email messages or threads from one account to another.

I asked multiple account users who occasionally forward email messages or threads from one of their accounts to another what their motivations for doing so were. A motivation for a majority (61.2%) of participants who forward individual emails is to manage, store, and print information in their intended location to help them stay organized. About one-third of participants (32.7%) forward individual messages to ensure that they are available when and where they are needed. Another reason that some respondents (11.6%) cited for forwarding single emails is to view and use the email information from an email account with greater functionality than the original email account provides. Some participants (9.5%) reported forwarding individual email messages to serve as a reminder to take action later. These results suggest that most participants who forward information between two or more of their email accounts do so for organizational purposes. Also, many participants forward emails between their accounts to have important information available when and where they need to access it.

I asked participants who copy and paste information from emails to select which types of applications they transfer this information to. An overwhelming majority (87.1%) indicated that they copy and paste information from emails into word processor applications like Microsoft Word and Google Documents. Nearly one-half of respondents (45.2%) reported copying and pasting information to a calendar application such as Google Calendar or iCal. Almost one-quarter (23.7%) of participants copy and paste information from emails into to do list applications like Wunderlist and Google Tasks. Over one-fifth (21.5%) of respondents reported

copying and pasting information into contact management applications such as Google Contacts. Less than one-fifth (15.1%) reported copying information from emails to note taking applications like Evernote and Microsoft OneNote. Almost one-tenth of participants (9.7%) indicated copying information from emails to other applications including websites, web search fields, customer relations management systems, Microsoft Excel, Facebook, text or PDF documents, data analysis software, photo albums, and even other email accounts. These findings show that word processors and calendars are the two most commonly used types of applications when copying and pasting information from emails.

To assess application fragmentation, I asked respondents who copy and paste information from emails into other applications to select why they did so. Table 9 presents the findings from this question. Over one-half (54.3%) of participants reported that they copy and paste email information to other applications in order to be stored and preserved. Almost one-third of respondents indicated the following reasons for application fragmentation: to share information with others using other applications (32.4%), to edit and review information in other applications (30.3%), or to be reminded of important information (28.2%). About one-fifth of participants prefer to re-find information in applications other than email (20.7%) or copy and paste information from emails to other applications to keep the information in other applications up-to-date (19.7%). These findings indicate that most participants who copy and paste information from emails to other applications do so to store and preserve their information.

Table 9. Motivations for Copying and Pasting from Email into Other Applications (N = 188)

Motivation	Percentage (Frequency)
Prefer to read information in other applications	9.0 (17)
Prefer to edit/review information in other applications	30.3 (57)
Prefer to store/preserve information in other applications	54.3 (102)
Prefer to re-find information in other applications	20.7 (39)
Prefer to share information with others in other applications	32.4 (61)
Prefer to compare two or more documents in other applications	8.5 (16)
Prefer to be reminded about important information in other applications	28.2 (53)
Want to keep my information up-to-date on all of the applications that I use	19.7 (37)

Note: This question allowed participants to select all answers that applied to them. Therefore, percentages total greater than 100.

To determine why respondents intentionally fragment email information by storage location, I asked participants who save email messages to their file system to select why they do so. Table 10 shows the findings from this question. Nearly one-half of these participants reported saving email messages on their file system to store and preserve information (46.7%) or to re-find information later (46.0%). About one-quarter of respondents indicated saving email messages on their file system to remind them of the importance of an email (24.1%). These results indicate that the most common reasons participants intentionally fragment information by storage location are to store and re-find information.

Table 10. Motivations for Saving Email Messages to the File System (N = 137)

Motivation	Percentage (Frequency)
Prefer to read emails on the file system	7.3 (10)
Prefer to edit/review an email on the file system	5.1 (7)
Prefer to store/preserve an email on the file system	46.7 (64)
Prefer to re-find information an email when I need it later on the file system	46.0 (63)
Prefer to share an email with others on the file system	2.9 (4)
Prefer to compare two or more documents when I use the file system	4.4 (6)
Prefer to remember the importance of an email on the file system	24.1 (33)

Note: This question allowed participants to select all answers that applied to them. Therefore, percentages total greater than 100.

To determine why respondents intentionally fragment email information by data format (digital versus paper), I asked participants who print emails to select why they do so. Table 11 shows the findings of this question. More than one-third (38.5%) of participants who print emails indicated that paper copies of emails are a better reminder of important information than digital copies. Just under one-quarter of respondents prefer to edit and review (24.2%) or store (24.2%) paper copies of emails when compared to digital copies. About one-fifth of participants prefer to read a paper copy (21.1%), share a paper copy with others (17.4%), re-find information on a paper copy (16.1%), or compare two or more documents when using paper copies instead of digital ones (16.1%). These findings indicate that the most common motivation is to serve as a reminder, although participants have many other reasons for intentionally fragmenting their email information by data format (digital versus paper) as well.

Table 11. Motivations for Printing Emails (N = 161)

Motivation	Percentage (Frequency)
Prefer to read a paper copy of an email	21.1 (34)
Prefer to edit/review a paper copy of an email	24.2 (39)
Prefer to store/preserve as a paper copy of an email	24.2 (39)
Prefer to re-find information when I need it later as a paper copy of an email	16.1 (26)
Prefer to share a paper copy of an email with others	17.4 (28)
Prefer to compare two or more documents when I use paper copies	16.1 (26)
A paper copy of an email is better at reminding me of the importance of information in emails	38.5 (62)

Note: This question allowed participants to select all answers that applied to them. Therefore, percentages total greater than 100.

I asked all respondents whether they save email messages to their file system. About one-half (48.9%) of all participants reported saving email messages (not attachments, but messages) to their file system. Using a two-tailed Pearson correlation I found that older respondents were significantly more likely (.311, p = 1.18 X 10^{-7}, N = 279) to save email messages to the file system. A two-tailed Pearson correlation determined that men in my study were significantly less likely than women to save email messages to the file system (-.204, p = .00059, N = 279). For a detailed description of significant correlations, refer to Table 12.

More than one-half (57.5%) of all of my participants printed emails. A two-tailed Pearson correlation revealed that older participants were significantly more likely to print emails than younger respondents (.408, p = 1.29 x 10^{-12}, N = 279). Using a two-tailed Pearson correlation I found that male participants were significantly less likely than my female respondents to print emails (-.126, p = .03499, N = 279). In addition, using a two-tailed Pearson correlation I discovered that out of all participants with multiple accounts, those who forward individual emails between their accounts are significantly more likely to print emails (.201, p = .00145, N = 249). I used another two-tailed Pearson correlation to determine that out of all participants who use multiple accounts, those who automatically forward one account to another are significantly less likely to print emails than those who keep their accounts separate (-.183, p = .00380, N = 249). Participants who copy and paste email information to other applications are significantly more likely to print emails than those who do not (.122, p = .04218, N = 280) according to a two-tailed Pearson correlation. Respondents who save email messages to their file system were also significantly more likely to print emails (.220, p = .00021, N = 280), as determined by a two-tailed Pearson correlation. For a description of significant correlations, refer to Table 12.

Finally, I asked all respondents whether they copied and pasted email information into other applications. Two-thirds (67.1%) of all participants copied and pasted information from emails to other applications. In addition, using a two-tailed Pearson correlation I found that of all participants who currently use one account, those who had multiple accounts previously were significantly more likely to copy and paste information from emails to other applications (.451, p = .01089, N = 31). I also used a two-tailed Pearson correlation to discover that of all participants who use multiple accounts, those who forward individual messages from one of their accounts to another are significantly more likely to copy and paste information from emails to other

applications than those who do not forward emails between accounts (.151, p = .01683, N = 249). For a detailed description of all significant correlations, refer to Table 12.

Table 12. Significant Correlations

Correlations

		Age	Male	# of accounts	Accounts used the same way on all devices	Ever use >1 account	Required to have separate account (for work, school, etc.)	Problems keeping multiple accounts separate	Considered eliminating email accounts	Ever forward messages or threads to another account	Forward 1+ email accounts	Copy email content to other apps	Save messages to the file system	Print emails	Avg. account usage frequency	Avg. # of devices used with each email account
Age	Pearson Correlation	1	.064	-.210**	-.075	-.109	.336	-.083	-.085	.075	-.179**	.002	.311**	.408**	.104	-.059
	Sig. (2-tailed)		.28583	.00043	.20941	.56783	.31253	.19087	.18368	.23522	.00461	.97913	.00000012	.0000000000013	.08256	.32663
	N	279	278	279	279	30	11	249	246	249	249	279	279	279	279	279
Male	Pearson Correlation	.064	1	.061	.120*	-.044	-.043	.000	.087	-.025	.039	.028	-.204**	-.126*	.010	.025
	Sig. (2-tailed)	.28583		.31208	.04439	.81618	.90003	1	.17316	.68959	.54541	.64165	.00059	.03499	.86981	.68212
	N	278	279	279	279	31	11	248	245	248	248	279	279	279	279	279
# of accounts	Pearson Correlation	-.210**	.061	1	.052	[c]	[c]	.108	.233**	.075	.146*	.050	-.113	-.077	-.238**	-.036
	Sig. (2-tailed)	.00043	.31208		.38279	0.00000	0.00000	.08935	.00022	.23945	.02163	.40422	.05881	.19711	.00006	.54320
	N	279	279	280	280	31	11	249	246	249	249	280	280	280	280	280
Accounts used the same way on all devices	Pearson Correlation	-.075	.120*	.052	1	.129	-.222	-.028	.061	-.106	-.016	-.109	-.018	-.019	-.088	-.017
	Sig. (2-tailed)	.20941	.04439	.38279		.48840	.51134	.65972	.33690	.09572	.79836	.06815	.75835	.75573	.14050	.77771
	N	279	279	280	281	31	11	249	246	249	249	280	280	280	280	280
Ever use >1 account	Pearson Correlation	-.109	-.044	[c]	.129	1	[c]	[c]	[c]	[c]	[c]	.451*	-.091	-.140	.110	-.060

Correlations

		Age	Male	# of accounts	Accounts used the same way on all devices	Ever use >1 account	Required to have separate account (for work, school, etc.)	Problems keeping multiple accounts separate	Considered eliminating email accounts	Ever forward messages or threads to another account	Forward 1+ email accounts	Copy email content to other apps	Save messages to the file system	Print emails	Avg. account usage frequency	Avg. # of devices used with each email account
	Sig. (2-tailed)	.56783	.81618	0.00000	.48840		0.00000					.01089	.62487	.45306	.55563	.75025
	N	30	31	31	31	31	11	0	0	0	0	31	31	31	31	31
Required to have separate account (for work, school, etc.)	Pearson Correlation	.336	-.043	.ᶜ	-.222	.ᶜ	1	.ᶜ	.ᶜ	.ᶜ	.ᶜ	-.149	-.043	-.043	.267	-.180
	Sig. (2-tailed)	.31253	.90003	0.00000	.51134	0.00000						.66178	.90003	.90003	.42797	.59634
	N	11	11	11	11	11	11	0	0	0	0	11	11	11	11	11
Problems keeping multiple accounts separate?	Pearson Correlation	-.083	.000	.108	-.028	.ᶜ	.ᶜ	1	.078	.087	.094	-.030	-.058	-.042	-.030	.079
	Sig. (2-tailed)	.19087	1	.08935	.65972				.22530	.17110	.13823	.63595	.36070	.51393	.63862	.21187
	N	249	248	249	249	0	0	249	246	249	249	249	249	249	249	249
Have you Considered eliminating email accounts	Pearson Correlation	-.085	.087	.233**	.061	.ᶜ	.ᶜ	.078	1	.066	.092	.077	.005	-.113	-.167**	.040
	Sig. (2-tailed)	.18368	.17316	.00022	.33690			.22530		.30515	.14867	.22817	.94286	.07561	.00883	.53740
	N	246	245	246	246	0	0	246	246	246	246	246	246	246	246	246
Ever forward messages or threads to another account	Pearson Correlation	.075	-.025	.075	-.106	.ᶜ	.ᶜ	.087	.066	1	-.054	.151*	-.004	.201**	.110	.013
	Sig. (2-tailed)	.23522	.68959	.23945	.09572			.17110	.30515		.39810	.01683	.95581	.00145	.08361	.84355
	N	249	248	249	249	0	0	249	246	249	249	249	249	249	249	249
Forward 1+ email accounts	Pearson Correlation	-.179**	.039	.146*	-.016	.ᶜ	.ᶜ	.094	.092	-.054	1	.000	.015	-.183**	-.083	.044

Correlations

		Age	Male	# of accounts	Accounts used the same way on all devices	Ever use >1 account	Required to have separate account (for work, school, etc.)	Problems keeping multiple accounts separate	Considered eliminating email accounts	Ever forward messages or threads to another account	Forward 1+ email accounts	Copy email content to other apps	Save messages to the file system	Print emails	Avg. account usage frequency	Avg. # of devices used with each email account
	Sig. (2-tailed)	.00461	.54541	.02163	.79836			.13823	.14867	.39810		.99793	.81199	.00380	.19094	.48773
	N	249	248	249	249	0	0	249	246	249	249	249	249	249	249	249
Copy email content to other apps?	Pearson Correlation	.002	.028	.050	-.109	.451*	-.149	-.030	.077	.151*	.000	1	.031	.122*	.093	-.018
	Sig. (2-tailed)	.97913	.64165	.40422	.06815	.01089	.66178	.63595	.22817	.01683	.99793		.60969	.04218	.11882	.76363
	N	279	279	280	280	31	11	249	246	249	249	280	280	280	280	280
Save messages to the file system	Pearson Correlation	.311**	-.204**	-.113	-.018	-.091	-.043	-.058	.005	-.004	.015	.031	1	.220**	.027	-.045
	Sig. (2-tailed)	.00000012	.00059	.05881	.75835	.62487	.90003	.36070	.94286	.95581	.81199	.60969		.00021	.65430	.45414
	N	279	279	280	280	31	11	249	246	249	249	280	280	280	280	280
Print emails	Pearson Correlation	.408**	-.126*	-.077	-.019	-.140	-.043	-.042	-.113	.201**	-.183**	.122*	.220**	1	.069	-.099
	Sig. (2-tailed)	.0000000000013	.03499	.19711	.75573	.45306	.90003	.51393	.07561	.00145	.00380	.04218	.00021		.24937	.09969
	N	279	279	280	280	31	11	249	246	249	249	280	280	280	280	280
Avg. account usage frequency	Pearson Correlation	.104	.010	-.238**	-.088	.110	.267	-.030	-.167**	.110	-.083	.093	.027	.069	1	.291**
	Sig. (2-tailed)	.08256	.86981	.00006	.14050	.55563	.42797	.63862	.00883	.08361	.19094	.11882	.65430	.24937		.00000072
	N	279	279	280	280	31	11	249	246	249	249	280	280	280	280	280

Correlations

		Age	Male	# of accounts	Accounts used the same way on all devices	Ever use >1 account	Required to have separate account (for work, school, etc.)	Problems keeping multiple accounts separate	Considered eliminating email accounts	Ever forward messages or threads to another account	Forward 1+ email accounts	Copy email content to other apps	Save messages to the file system	Print emails	Avg. account usage frequency	Avg. # of devices used with each email account
Avg. # of devices used with each email account	Pearson Correlation	-.059	.025	-.036	-.017	-.060	-.180	.079	.040	.013	.044	-.018	-.045	-.099	.291**	1
	Sig. (2-tailed)	.32663	.68212	.54320	.77771	.75025	.59634	.21187	.53740	.84355	.48773	.76363	.45414	.09969	.00000072	
	N	279	279	280	280	31	11	249	246	249	249	280	280	280	280	280

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

c. Cannot be computed because at least one of the variables is constant.

5.   Discussion

This chapter is divided into three sections. First I discuss the outcomes of the analysis of the questionnaire data. Next I examine how this study adds knowledge to the current PIM literature. Finally I discuss implications for the design of PIM tools and future work.

Outcomes

Research Question 1: Do people exhibit IIF in their email management?

I expected to see participants demonstrate IF, and also IIF, by dividing their personal email across multiple email accounts. I found that my respondents fell into one of three groups. First, 80.8% of respondents had more than one account on purpose, which may indicate IIF. Second, 8.1% of my multiple account users were required to have more than one account, possibly indicating UIF. Finally, 11.1% of participants avoided IF altogether by using one email account, wanting to keep their email information consolidated.

Participants exhibited IIF by device as well. I found that less than five percent of respondents (4.0%) intentionally fragmented their email across devices. All of these participants exhibited IIF by device in order to keep their social roles separate.

Research Question 2: Why do people exhibit IIF in their email management?

The most common motivation for participants to practice IIF due to multiple accounts was to keep their social roles (personal, work, school, etc.) separate as a way of organizing (80.5%). This finding may indicate that the main reason why users exhibit IIF is to organize their personal information in a way that their current PIM tools do not allow, or it may also indicate how important the proper context is in PIM. Participants also benefited by filtering out spam messages (23.4%) by having more than one account. This suggests that a motivation for IIF is to remove extraneous information in order to make organization of a user's important information simpler. Personal privacy (3.5%) and functionality of clients and devices (3.5%) were other reasons that respondents cited.

Participants in my study who exhibited IIF by device did so for only one reason. I found that they did so to keep their social roles (work, school, personal, etc.) separate, by only using email on certain devices with certain social roles.

Research Question 3: What drawbacks do people experience with IIF?

A majority (54.5%) of participants who use one account, but previously used multiple accounts eliminated an account when they left their workplace, which indicates UIF that was required by their employer.

Most (93.6%) multiple account users had no problems keeping their accounts separate. Additionally, three-quarters (75.2%) of participants with more than one account have not considered eliminating any accounts, which indicates that they are satisfied with their multiple accounts.

Less than half of participants (45.5%) who currently use one email account, but previously had more than one account reported eliminating an account to make their email management easier, indicating that they no longer wanted this IF. The majority (57.4%) of multiple account users who have considered eliminating an account would do so in order to simplify their email management, signifying that they no longer wanted this IF. More than one-quarter (31.1%) of these participants considered eliminating an account that they no longer use, which would also simplify their email management. Less than one-tenth (8.2%) of these users cited spam management as their reason for considering eliminating an account, indicating that they want to filter the unnecessary information from their email management.

Research Question 4: What are people's general email management strategies?

I found out a lot about my average participant, and due to a very diverse participant population my average participant is a good approximation of an average email user. My average participant uses about three accounts (2.70), checks their two most frequently used accounts more than two or three times a day and checks their other account only two or three times a week, and manages each of their email accounts from both a smart phone and a laptop. Their employer provided their most frequently used account, it fits in their social role of work, and they use Outlook to check it. Gmail provides their other two accounts, they use these accounts for personal communications and they use the Gmail client for these accounts. The average user prints emails some of the time, and occasionally copies and pastes information from emails into word processor applications like Microsoft Word or Google Documents.

I discovered some notable differences between the email management of participants younger than 40 years of age when compared participants 40 years or older. The younger group consisted of fewer participants (110) than the older group (169). However, the younger group had more women (53.2%) than the older group (48.5%). Gmail (46.1%) and schools (16.7%) were the top email providers for participants under the age of 40. The two most frequently used email applications for younger participants were Gmail (48.7%) and Outlook (17.9%). In contrast, older respondents had email provided by an employer (26.3%) or Gmail (23.6%) most commonly. Outlook (34.6%) and Gmail (19.4%) were the top email applications used by older participants. A greater percentage of younger participants (34.0%) forward all emails from one account to another than participants 40 years or older (14.4%). However a greater percentage of older participants (69.9%) forward individual email messages between their accounts than younger respondents (59.2%). More of my older participants (59.2%) save email messages to their file system than participants under 40 years old (33.6%). Older participants (72.8%) also print emails more than younger respondents (34.5%).

Connecting Results to the PIM Literature

First, I have shown that IIF does exist in the real world, and that it should be addressed in future IF work. I have found IIF in email management. I also found IIF by device. Most of the participants who engage in IIF have no problems with this fragmentation.

Second, I found a number of motivations and benefits of IIF in participants' email usage. The most common motivation for IIF in my study was to keep social roles (work, school, personal, etc.) separate. I also found evidence that email users exhibit IIF to filter out unwanted information, in order to simplify their information management. In addition, some users engaged in IIF for enhanced privacy.

I found that the majority of participants checked email from both a smart phone and a laptop, and the most common motivation for IIF by device was to use the phone to filter incoming messages, but reply and compose emails from their laptop. This shows that people take advantage of the strengths of their devices, like the phone's immediacy and the larger form factor of the laptop. This also indicates that many people engage in PIM activities with certain frequently occurring patterns of devices, an idea which was studied in the 2008 work of Tungare and Perez-Quinones.

Jones, Munat, Bruce, and Foxley presented results in 2005 indicating that some users print everything of importance to organize a paper-based filing system, while other participants save email references into electronic files to include in a computer-based filing system. My study found that participants reported saving email messages to their file system to store (46.7%) and re-find (46.0%) information. Participants of my study also reported printing emails to store (24.2%) and re-find (16.1%) their email information in a paper-based filing system.

Implications for Design of Future PIM Tools

One of the main motivations for participants to engage in IIF was to keep certain social roles (work, school, personal, etc.) separate from one another in order to aid their organization of personal information. Consequentially, future PIM tools should allow users to separately organize their information for each of their own personal roles. For example, email clients and applications could allow users to label their accounts "Home/Social/Work/etc.". A common organizational technique found in this study was using multiple email accounts, each with a purpose or role, but viewing them all at the same time in the same place. Future email applications could give users a list of all of their email accounts, labeled by purpose. A main view could present messages from each of the user's accounts in a unified inbox. If a user goes on vacation and no longer wants to see messages from their work email account, but still need to keep track of personal email then the application could allow the user to deselect the "Work" account, removing the "Work" messages from the unified view and leaving only the relevant information. Current PIM tools already have some features to enable this unified view of many accounts, such as Gmail's feature that allows users to view multiple accounts and reply to a message using the email account that received the message.

Another common benefit of IIF was participants' ability to filter out extraneous information from their collection. Therefore, future PIM tools should include flexible information filtering mechanisms. Designers of new tools should be wary of overloading users with excessive information or out-of-context information.

We found that some people have one or more accounts set to automatically forward to another of their accounts. Gmail, the most commonly used client in this study, allows users to reply from the account that received an email. In this case the user gives the illusion of managing multiple email accounts to the outside world, while they are only checking,

organizing, and composing emails from one account from their own point of view. This indicates that there are some cases where it is beneficial for people to create a virtual fragmentation for others, but ultimately avoid fragmentation in their own information management.

In both the study described in this paper and Jones et. al's 2005 study it has been found that some participants prefer to store, organize, and re-find information in either a paper-based or computer-based organizational structure. New PIM tools should allow users to easily convert their personal information into a readable paper format, and also into a usable digital format that users can store in their existing computer-based structure.

Future Work

I asked participants with one account, but who reported having used more than one account prior to data collection whether they were previously obliged to have more than one account or chose to do so intentionally. A limitation of my study is that I did not ask this question of participants with multiple accounts. This was one of few questions in my questionnaire that directly asked participants whether their fragmentation was intentional, and if I were going to do this study again I would ask multiple account users, for each of their accounts, if their accounts were required by an external entity such as work or school. It would also be interesting to know if single account users who did not ever have multiple email accounts have an account because they are required to, or if it is by choice.

Another limitation of this study is that it is biased towards US email users. The online survey was primarily distributed among students and faculty at a US university, as well as employees of US finance and telecommunications companies. An example of this bias is in the most frequently used email provider. The most common provider in the study was Gmail, which was the second most popular email provider in the US in 2011 (http://www.geekwire.com/2011/stats-hotmail-top-worldwide-gmail-posts-big-gains/), next to Yahoo! Mail. However Gmail may not have been the most commonly used provider in the study if Americans were not the target participants since it is only the third most popular email provider worldwide. Hotmail is the most commonly used provider in the world, followed by Yahoo! Mail.

There remains a lot to learn about IIF since it was first discussed in this thesis. I have only studied IIF in email management, but I believe that it is extremely likely that IIF exists in most PIM environments since it is commonly used as a workaround for technical or functional limitations. Since I have learned that IIF exists across different devices, future research should explore why people do this and whether current applications on various devices could be improved to either reduce the need for this IIF or make it easier for people to engage in this IIF.

I found that some participants who exhibited IIF were considering eliminating their fragmentation. It would be interesting to investigate how, when, and why these users go from beginning to engage in IIF happily to not wanting IIF in their email management anymore.

I have found that information fragmentation is commonly used intentionally as an organizational technique to solve socio-technical problems. The most common problem that participants of this study experienced was keeping social roles separate; people only want to see work information when they are at work and only want to see shopping deals when they are shopping. Fragmentation arises when the technical functionality of PIM tools does not allow users to organize and interact with their information the way they would ideally like to.

6.   Conclusions

Information fragmentation is not always negative; it is only negative if it necessitates re-finding information, re-creating connections with other information, or causes an increase in time or effort required to complete a task. Users commonly leverage IF intentionally as an organizational technique. The most common reason that people intentionally introduce fragmentation to their personal information is to resolve differences between how technology allows them to use their information and how they would ideally use this information. Most people who exhibit IIF do so in order to organize information in a way that reflects how they think about this information.

References

Bergman, O., Beyth-Marom, R., & Nachmias, R. (2006). The project fragmentation problem in personal information management. Paper presented at The Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Montreal, Quebec, Canada.

Bergman, O., Boardman, R., Gwizdka, J., & Jones, W. (2004). Personal information management. Paper presented at The CHI '04 Extended Abstracts on Human Factors in Computing Systems, Vienna, Austria.

Bishop, T. (2011, March 29). Stats: Hotmail still on top worldwide; Gmail gets bigger. *GeekWire.* Retrieved July 26, 2012 from http://www.geekwire.com/2011/stats-hotmail-top-worldwide-gmail-posts-big-gains/

Dabbish, L. A., & Kraut, R. E., (2006). Email overload at work: An analysis of factors associated with email strain. Paper presented at The Proceedings of the 20th Computer Supported Cooperative Work (CSCW), Alberta, Canada.

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

Elsweiler, D., Baillie, M., & Ruthven, I. (2008). Exploring memory in email refinding. ACM Transactions on Information Systems, Vol. 26, No. 4, Article 21.

Fisher, D., Brush, A. J., Gleave, E., & Smith, M. A. (2006). Revisiting Whittaker & Sidner's "Email overload" ten years later. Paper presented at The Proceedings of the 20th Computer Supported Cooperative Work (CSCW), Alberta, Canada.

Gwizdka, J. (2004). Email task management styles: the cleaners and the keepers. In Proceedings of CHI, Vienna, Austria.

Hanrahan, B., Bouchard, G., Convertino, G., Weksteen, T., Kong, N., Archambeau, C., & Chi, E., H. (2011). Mail2Wiki: low-cost sharing and early curation from email to wikis. In *Proceedings of the 5th International Conference on Communities and Technologies* (C&T '11). ACM, New York, NY, USA, 98-107.

Jones, W., & Anderson, K. M. (2011). Many views, many modes, many tools … one structure: Towards a non-disruptive integration of personal information. Paper presented at The Proceedings of the 22nd ACM Conference on Hypertext and Hypermedia, Eindhoven, The Netherlands.

Jones, W., Bruce, H, & Dumais, S. (2001). Keeping found things found on the web. In CIKM '01: Proceedings of the 10th International Conference on Information and Knowledge Management (pp. 119-126). New York, NY: ACM Press.

Jones, W., Munat, C. F., Bruce, H., & Foxley, A. (2005). The universal labeler: Plan the project and let your information follow. In Proceedings of the 68th Annual Meeting of the American Society for Information Science and Technology. Charlotte, NC: American Society for Information Science and Technology.

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

Karger, D. R., Bakshi, K., Huynh, D., Quan, D., & Sinha, V. (2003). Haystack: A customizable general-purpose information management tool for end users of semistructured data. In Proceedings of the First Biennial Conference on Innovative Data Systems Research (CIDR), Asilomar, CA, USA, January 5-8.

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

Reimer, Y. J., Bubnash, M., Hagedal, M., & Wolf, P. (2009). Helping students with information fragmentation, assimilation, and notetaking. Paper presented at The JCDL '09, Austin, TX, USA.

Siu, N., Iverson, L., Tang, A. (2006). Going with the flow: email awareness and task management. Paper presented at The Proceedings of the 20th Computer Supported Cooperative Work (CSCW), Alberta, Canada.

Tang, C., Matthews, J. C., Dill, S., Wilcox, E., Schoudt, J., Badenes, H. (2009). Global differences in attributes of email usage. In proceedings of the International workshop on intercultural collaboration. 184-194.

Tungare, M. (2007). Understanding the evolution of users' personal information management practices. Paper presented at The Proceedings of the 11th IFIP TC 13 International Conference on Human-Computer Interaction – Volume Part II, Rio de Janeiro, Brazil.

Tungare, M., & Pérez-Quiñones, M. (2008). It's not what you have, but how you use it: Compromises in mobile device use. Computing Research Repository, Human-Computer Interaction.

Tungare, M., & Pérez-Quiñones, M. (2009). Mental workload in multi-device personal
information management. Paper presented at The CHI 2009, Boston, MA, USA.

Tungare, M., & Pérez-Quiñones, M. (2009). You scratch my back and I'll scratch yours:
combating email overload collaboratively. In Proceedings of CHI 2009, 4711-4716.

Tungare, M., Pyla, P. S., Sampat, M., Pérez-Quiñones, M.: Syncables: A framework to support
seamless data migration across multiple platforms. In: IEEE International Conference
on Portable Information Devices (IEEE Portable). (2007)

Whittaker, S., Bellotti, V., & Gwizdka, J. (2006). Email in personal information management.
Communications of the ACM, 49(1), 68-73.

Whittaker, S., & Sidner, C. (1996). Email overload: exploring personal information management
of email. In Proceedings of CHI '96, ACM Press (1996), 276-283.

Appendix A: IRB Approval Letter for Study

VirginiaTech

MEMORANDUM

DATE: March 20, 2012

TO: Manuel A. Perez-Quinones, Daniel Shanahan

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires May 31, 2014)

PROTOCOL TITLE: Information Fragmentation in Email Accounts

IRB NUMBER: 12-311

Effective March 20, 2012, the Virginia Tech IRB Administrator, Carmen T. Green, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: **Exempt, under 45 CFR 46.101(b) category(ies) 2**
Protocol Approval Date: **3/20/2012**
Protocol Expiration Date: **NA**
Continuing Review Due Date*: **NA**
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Invent the Future

Appendix B: Survey Questions

Consent Information

This survey will ask you a few open-ended questions along with some multiple-choice questions about your email management habits and experiences. It will take 15-20 minutes to complete; you can stop at any time and for any reason without penalty by leaving the webpage.

There are no more than minimal risks involved in the study, and no promise or guarantee of benefits has been made to encourage you to participate. No personally identifiable information will be collected during this survey. Your participation will give Virginia Tech's Personal Information Management research group, led by Dr. Manuel Perez-Quinones, more insight into people's information management habits and frustrations. Dr. Perez and Masters candidate Daniel Shanahan are the investigators of this study. The aggregated, confidential data from this survey may be used in a future publication.

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If you have any questions or comments about this survey feel free to contact:
Daniel Shanahan at dshan88@vt.edu

This study has been approved by the Virginia Tech Institutional Review Board, which protects human subjects in research. If you have questions about this research or its conduct, research subjects' rights, or who to contact in the event of a research-related injury to the subject, you may contact:

David M. Moore
Chair, Virginia Tech Institutional Review   Phone: 540-231-4991
Board for the Protection of Human Subjects   Email: moored@vt.edu
Office of Research Compliance
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, VA 24060

IRB Number: 12-311

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By beginning the survey, you acknowledge that you have read this information and volunteer to participate in this research, with the knowledge that you are free to withdraw your participation at any time without penalty.

By beginning the survey, you agree that you are 18 years of age or older.

In what year were you born?

In what year were you born?

Do you use more than one email account?

Do you use more than one email account?
○ Yes
○ No

One email account big block

How often do you view your email account?
○ Never
○ Less than Once a Month
○ Once a Month
○ 2-3 Times a Month

- ○ Once a Week
- ○ 2-3 Times a Week
- ○ Once a Day
- ○ 2-3 Times a Day
- ○ More than 2-3 Times a Day

With which email provider is your account registered?

- ○ Gmail
- ○ Yahoo! Mail
- ○ Hotmail
- ○ MSN
- ○ AOL
- ○ Email from your University or School
- ○ Email from your Employer
- ○ Personal Domain
- ○ Other (Please specify)

Which email application (or client) do you use to view emails from your account?

- ○ Outlook
- ○ Mail.app
- ○ Thunderbird
- ○ Gmail
- ○ Yahoo! Mail
- ○ Hotmail
- ○ MSN
- ○ AOL
- ○ Other (Please specify)

What is/are the purpose(s) of your email account?

- ☐ School
- ☐ Work
- ☐ Personal communication (friends, family, etc.)
- ☐ Website offers and potential spam
- ☐ Other (Please explain)

What device(s) do you use to view emails from your account?

- ☐ Smart phone
- ☐ Other mobile phone
- ☐ Tablet
- ☐ Laptop
- ☐ Desktop
- ☐ Other device (Please specify)

Do you use your account the same way on all of your devices (tablet, etc.)?

Do you use your account the same way on all of your devices (smart phone, tablet, etc.)?

Loop: How often do you access your account?

How often do you view your ${lm://Field/2} frequently used email account?

○ Never
○ Less than Once a Month
○ Once a Month
○ 2-3 Times a Month
○ Once a Week
○ 2-3 Times a Week
○ Once a Day
○ 2-3 Times a Day
○ More than 2-3 Times a Day

With which email provider is your ${lm://Field/2} frequently used account registered?

○ Gmail
○ Yahoo! Mail
○ Hotmail
○ MSN
○ AOL
○ Email from your University or School
○ Email from your Employer
○ Personal Domain
○ Other (Please specify)
  [_____]

Which email application (or client) do you use to view emails from your ${lm://Field/2} frequently used account?

○ Outlook
○ Mail.app
○ Thunderbird
○ Gmail
○ Yahoo! Mail
○ Hotmail
○ MSN
○ AOL
○ Other (Please specify)
  [_____]

What is/are the purpose(s) of your ${lm://Field/2} frequently used email account?

☐ School
☐ Work
☐ Personal communication (friends, family, etc.)
☐ Website offers and potential spam
☐ Other (Please explain)
  [_____]

What device(s) do you use to view emails from your ${lm://Field/2} frequently used account?

☐ Smart phone
☐ Other mobile phone
☐ Tablet
☐ Laptop

Why do you save email messages to the file system?

Why do you save email messages to the file system?

☐ Because I prefer to read emails on the file system, not through an email application.

☐ Because I prefer to edit/review emails on the file system, not through an email application.

☐ Because I prefer to store/preserve emails on the file system, not through an email application.

☐ Because I prefer to re-find an email when I need it later on the file system, not through an email application.

☐ Because I prefer to share an email with others from the file system, not through an email application.

☐ Because I prefer to compare two or more documents when I use the file system, not through an email application.

☐ Because I prefer to remember the importance of an email on the file system, not through an email application.

Do you print emails?

Do you print emails?

○ Yes

○ No

Why do you print emails?

Why do you print emails?

☐ Because I prefer to read a paper copy of an email rather than a digital one.

☐ Because I prefer to edit/review a paper copy of an email rather than a digital one.

☐ Because I prefer to store/preserve information as a paper copy of an email rather than a digital one.

☐ Because I prefer to re-find information when I need it later as a paper copy of an email rather than a digital one.

☐ Because I prefer to share a paper copy of an email with others rather than a digital one.

☐ Because I prefer to compare two or more documents when I use paper copies rather than digital ones.

☐ Because a paper copy of an email is better at reminding me of the importance of information in emails rather than a digital copy.

Demographics

Which of the following best describes your occupation?

[▼]

Please indication your sex.

○ Male

○ Female