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Email overload in academia

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By

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Abstract

The emergence of email as a viable and inexpensive communication channel has led to its increased presence in the daily lives of professionals. Email has become a ubiquitous tool in a faster paced and more globally connected world. Besides simple notes, professionals now use email to communicate tasks, important personal and organizational announcements, meeting requests, and share documents. As the importance of email has grown, professionals have made the email client a work nerve center.

The vast increase in the volume of email and the use of the email client as a multi-functional tool now threatens the productivity gains it once created. Business professionals suffer from email overload which is accompanied by stress and organizational breakdowns. As a result, many organizations have created email free holidays and professionals have declared email bankruptcy.

In this thesis the research on email overload is reviewed, analyzed, and extended through a study of email overload in academia. Using surveys and interviews of faculty at a large university, the researcher found that email overload was present in academia. The study also identified participants' behaviors in performing email triage, managing email and email overload, and the effects of email overload. The researcher was also able to discover characteristics of cyclical email volumes amongst faculty which may have a direct impact on determining methods of email organization and the occurrence of email overload. Additionally, the study identified that faculty have extended their email client ever further by using it as a task and project manager, information manager, workload barometer, and headline aggregator.

Table of Contents

1. Introduction 7

2. Literature Review 9

2.1. Introduction 9

2.2. Email Client Overload 10

2.2.1. Discovering Multi-functional Use of Email 10

2.2.2. Task Management 12

2.2.3. Information Management 15

2.3. Information Overload 19

2.3.1. Email as a Source of Information Overload 21

2.4. Redesigning the Email Client 23

2.4.1. Controlling Email Volumes 24

2.4.2. Task Management 27

2.4.3. Information Management 29

2.5. Summary 31

3. Methodology 31

3.1. Qualitative v. Quantitative 31

3.2. Case Study as Qualitative Methodology 32

3.3. Data Collection 33

3.4. Data Analysis 1

4. Results **41**

4.1. Email Access **41**

4.2. Email Triage **43**

4.3. Email Client Overload **47**

4.3.1. Task Manager **48**

4.3.2. Information Manager **51**

4.3.2.1. Filing Technique **53**

4.3.2.2. Folder Organization **55**

4.3.3. Workload Barometer **58**

4.3.4. Headline Aggregator **59**

4.3.5. Email Communication **60**

4.3.6. Conclusion **62**

4.4. Email Overload **64**

4.4.1. Sources of Overload **66**

4.4.2. Email Overload Management **69**

4.4.3. Email Overload's Effects **76**

5. Discussion **77**

6. Conclusion **83**

7. References **86**

8. Appendix A **93**

9. Appendix B **96**

1. Introduction

The emergence of email as a viable and inexpensive communication channel has led to its increased presence in the daily lives of professionals. Email has become a ubiquitous tool in a faster paced and more globally connected world. The IDC estimated that 84 billion email messages were sent daily in 2006 (Goldberg, 2007). This number was expected to increase to 97 billion messages in 2007 (IDC, 2007), and is greater than a 300% increase compared to the volume of messages sent daily in 2003 (Lynman & Varian, 2003). Messages can be sent globally with startlingly little effort, allowing distant organizations to collaborate. Within organizations, emails flow like conversations; discussions between colleagues that previously occurred over the phone or face-to-face now take place through email. Email messages also now include more forms of information. Emails transfer tasks, important personal and organizational announcements, meeting requests, shared documents, and other types of information. Email's ease of use, cost, efficiency, and reach has made it the primary tool for communicating in most of the professional world.

For most professionals, introduction to email was revolutionary. They could send the equivalent of postal letters, but with nearly immediate delivery. The availability of email also meant that professionals could better control their day. Unlike telephone calls, emails could be put aside for consideration until a more opportune time. This allowed professionals to increase their productivity by managing their day with fewer interruptions.

Today however, email has replaced the telephone as the main communication channel in the workplace. Due to individual behaviors and workplace pressures, email

has migrated from an asynchronous communication channel to a nearly synchronous communication channel. As a result, email threatens the very productivity gains which it once helped produce. Professionals and the organizations for which they work, are recognizing that email's growth is negatively impacting productivity. Professionals spend an uncomfortable amount of time simply organizing and storing email; finding time to read and to process emails is problematical. While email at first may have been seen as a time saver, it has become a continuously growing burden.

The seductive ability to use email for work tasks beyond simple communications has created an email and information overload crisis. By moving information and task management into the email client, professionals attempted to create a work nerve center. Professionals coordinate task delegation, archiving, record keeping, filing, task lists, and scheduling all from within the email client. By organizing their email according to their daily goals, professionals try to maintain a semblance of order. In cases where the volume of information becomes overwhelming, individuals and organizations have instituted outright email bans and email bankruptcy (Stross, 2008). Email bans limit email traffic by asking employees to avoid email during a given time period, while email bankruptcy refers to individuals who are so overwhelmed by email that they can not read all of their email messages. These 21st century practices indicate a state of frustration with email so acute that users and organizations risk missing information.

This frustration has not gone unnoticed. The academic and business communities recognize that individuals and organizations are suffering from email overload. In response, they have sought to identify the root causes of email overload and to suggest means to mitigate the problem. However, the complexity of email overload and the

variance of conditions under which it occurs requires more research than what is currently available. Most prior research has been limited to professionals in technology-focused corporations. In this thesis, research on email overload is reviewed, analyzed, and extended through a new study of email overload in academia. This report details the findings of the study and suggests new avenues for future email overload research.

2. Literature Review

2.1. Introduction

The growth in email volumes reflects its increased importance as a communication channel. Email has become accepted in the workplace as a dominant method for the exchange of ideas, and has become increasingly critical in the lives of professionals (Whittaker & Sidner, 1996).

Email users have responded to this growth in email by spending increasing amounts of time managing email. In parallel, research interest in email has expanded, and research studies are showing that a number of email issues plague information workers.

The issues with email can be categorized into two different classes. The first is the expansion of the email client into the Swiss army knife of software. Users have co-opted email clients to perform multiple functions, such as managing personal information and scheduling tasks. While users may see this as a perfectly natural extension of the email client, the software was designed to function as an asynchronous communication channel, not as a habitat for personal information (Ducheneaut & Bellotti, 2001).

Using the email client for multiple functions has degraded the quality of the email communication channel and of the user experience. Users have had to make significant compromises to use email clients as their personal information management tool, resulting in decreased satisfaction with email (Whittaker & Sidner, 1996).

The second class of issues relate to information overload. Information overload is a phenomenon that begins to occur after the human capacity for processing information is saturated (Shenk, 1997). As the daily amount of email sent and received by professionals grows, their ability to successfully process the information within their email client deteriorates (Ho & Tang, 2001). Continuing growth in email volumes will further increase the email user's likelihood of experiencing information overload.

2.2. Email Client Overload

The email client was originally designed for use as a tool in which to compose, send, and read simple asynchronous communications. As email volumes have grown, email has become a dominant communication channel that contains a considerable amount of information used by professionals to complete their daily functions. Users, recognizing that the inbox now contains significant amounts of information, have adapted the email client to perform a variety of functions.

2.2.1. Discovering Multi-functional Use of Email

McKay, interviewing professionals using email in 1988, noted that users were not only sending email but also managing other activities with their email client. These tasks included the organization of personal information, which they had received via email.

Professionals had developed a number of usage patterns to arrange their information for future review. McKay identified three individual types to illustrate the extremes in email usage.

Prioritizers organize their email in order of personal priority. They develop organizational schemes in which they neglect or delete email to ensure that certain emails remain within the email inbox window. *Archivers* focus on ensuring that personal information management is stored for later retrieval. As a result of building complex hierarchies of folders, these individuals spend a considerable amount of time filing and sorting email. *Managers* distribute emails to employees.

These three user types perform three very discrete functions in the email client. Prioritizers want to manage their email for time management. Archivers are interested in using the email client for personal information management. Managers are less interested in storing information and more interested in delegating tasks through their email client. These functions were further explored and detailed by Whittaker and Sidner (1996) in their seminal research.

Whittaker and Sidner (1996) captured email data from twenty interviewed employees working in the software industry. Their results led them to define the term email overload as the "use of email for functions that it was not designed for." They found users appropriating the email client to perform task management and personal archiving or information management.

This definition of email overload would serve as the basis for much of the subsequent research on the use of email clients for multiple functions. Other researchers have noted that within the five years since Whittaker and Sidner's work, the email client

had become a habitat for the many email users (Ducheneaut & Bellotti, 2001). Ducheneaut and Bellotti uncovered nesting patterns of behavior in a study involving twenty-eight professionals from three technology firms. The study showed that these professionals were essentially living in their email client. They conducted most of their work from their email client and used the client for their personal tasks. Ducheneaut and Bellotti organized their findings into four broad categories of functions: task management, including scheduling; task accountability and task delegation; information management, including record keeping, archiving and document management; and asynchronous communication.

As the volume of email message continued to grow, users further co-opted email clients to manage daily activities which had been previously handled outside of the client Nevertheless, these activities continued to predominately fall within the categories of task management, information management, and asynchronous communication (Gwizdka, 2004).

2.2.2. Task Management

In their 1996 study, Whittaker and Sidner found that the email inbox contained both unread and read messages. Email clients and email messages were originally designed to enable and support asynchronous communication. Users could visit their inbox, read and react to a message, and delete or file that message. According to this "one-touch model, messages are either unread or filed" (Whittaker & Sidner, 1996). The inbox, therefore, would be expected to contain only a limited number of unread messages. However, Whittaker and Sidner's findings did not support the one-touch

model (1996). The one-touch model failed to accurately represent how most individuals used and managed their inbox.

Whittaker and Sidner (1996) proposed that the user's reliance on the inbox as a task management tool partially explained why their observed email data showed that user inboxes were rarely emptied of messages. Bellotti and Ducheneaut (2001) further confirmed this hypothesis using participant interviews, video recordings, user email data, and surveys. They recognized from their own findings and other related studies that users were keeping messages as task reminders. Users stored email messages within the inbox even after reading the message. This behavior created an ongoing personal to-do list. It also created a central point from which professionals could delegate tasks. These two task management activities became embedded within the email client because of its criticality as a communication channel within organizations (Bellotti, Ducehneaut, Howard, Smith, & Grinter, 2005).

When a professional received an email message that contained a task, the professional would differentiate between two types of tasks. One task, *short-response* required only a short, simple, rapid response (Bellotti et al., 2005). The other task, *extended-response* required a lengthy response or action. While short responses can be generated almost instantly upon receipt of the message, extended-response tasks as the name implies, require more time for completion.

As users continually leave extended-task messages in the inbox, the email client begins to function as a to-do list. Users rely on repeatedly seeing these extended-tasks in the queue as a reminder to reply to a message, re-read an email or attached document, or perform an action required in the correspondence. With a quick glance of email

headings, users can direct their energies to the most urgent task. Users do not file these messages because they fear that tasks would not be completed and that messages would become less available for review (Whittaker & Sidner, 1996). Often, messages that are part of the user's to-do list are shifted within the email client so that they remain on the email horizon (i.e. within the immediate window displaying the inbox queue). To ensure this, users have developed a number of tactics.

Some messages are flagged or tagged with higher importance and the inbox is occasionally flag-sorted such that flagged messages bubble to the top. Many users resend messages to themselves (Bellotti et al., 2005). These messages are then the most recent and sit at the top of their inbox queue until they can be actioned.

In addition to maintaining their own personal task list, professional users employ the email client as a task delegation tool. As email becomes more prevalent within organizations, tasks are increasingly passed via email from managers to subordinates and among colleagues.

Multiple levels of task delegation can occur quickly and efficiently as managers at each level in a hierarchical organization distribute tasks to the individuals below them. By having their own personal to-do list ever present, managers can quickly assess their own availability to fulfill tasks and then determine whether whole tasks or components of a task should be directed to their subordinates. Colleagues in task groups can also distribute work efficiently among themselves so that the group as a whole is better able to successfully manage their workload.

Email also reduces the costs of task delegation. By simply forwarding a message, all task requirements can be passed along word for word. Prior to email, task delegation

would have required phone or face-to-face discussions, each of which carries an inherent risk that task requirements are mistranslated or lost completely. Email clients also provide a single place where managers can collate project information. As they receive task updates from their subordinates, managers can sort these messages and quickly assess the progress of projects and the individual tasks associated with them (Mackay, 1988).

For task management, the email client has become essential for most users. As the volume of information and the criticality of information embedded within emails has grown, email clients have been adapted to function as to-do lists and as centers for task delegation. As a result, email messages are no longer read and discarded, but instead are managed within the inbox queue to ensure task completion.

2.2.3. Information Management

Researchers also found that filing was an arduous and often unrewarding task. Filing is a cognitively difficult task because users must imagine future retrievals. As the filing system grows, identifying retrieval patterns becomes increasingly demanding. Users will often find multiple folders with similar labels, making searching for archived emails a time consuming task. These folder systems become increasingly burdensome to use as they grow and fail to provide the expected benefits of enhancing ones ability to retrieve emails (Bälter, 2001).

After creating folder hierarchies, users also must maintain them. Folders must be merged, eliminated, and relabeled. This work requires users to review previously stored emails to recall their thought patterns when filing their messages. Bälter demonstrated

that the folder cleanup process outweighs any searching benefits provided by folders (2001). Nevertheless, professional email users have continued to use folders, trying to overcome filing difficulties by developing archiving strategies (Bellotti et al, 2005).

Similar to Mackay (1988), others have identified four descriptive categories into which professionals fall: no filers, frequent filers, few folder filers, and spring cleaners (Whittaker & Sidner, 2003; Fisher, Brush, Gleave, & Smith, 2006).

No filers are professionals who simply succumb to the volume of email and are unwilling to commit time to filing all their messages. They leave their inbox largely undisturbed as messages continue to build in their queue (Whittaker & Sidner, 1996). Occasionally, users employing this filing approach execute purges in which large swaths of messages are deleted without review. This approach, termed email bankruptcy, has been noted in popular media as an indicator of the extreme email overload experienced today (Fitzgerald, 2004).

Frequent filers are individuals who make daily passes through their inbox, filing and sorting email to maintain a relatively small inbox (Whittaker & Sidner, 1996). As a result, all of their emails remain visible within their inbox without the need to scroll.

Few folder filers, unlike frequent filers, maintain only a limited number of folders (Fisher et al., 2006). They rely more heavily on the search functionality to retrieve archived messages and in general spend less time filing and sorting, but reap some of the benefits of removing email messages from the inbox.

Spring cleaners, intermittently clean their inbox of messages (Whittaker & Sidner, 1996). Users clean the inbox every few months by deleting messages and filing

emails into an extensive hierarchy of folders. They frequently readjust their folder labeling and hierarchical structure during these clean-up periods.

Whittaker and Sidner's (1996) subjects noted that none of their individual approaches to managing the volume of email in their inbox was ideal. While frequent filers found satisfaction that their inbox had a minimum number of items, they spent a substantial portion of their day filing and maintaining their folders. No-filers complained that the size of their inbox caused them to overlook critical messages and allowed them forget actions upon which their livelihood depended. In the middle ground, the few folder filers could not fully reap the rewards of filing with a small inbox, yet still spent time sorting and organizing email messages. Spring cleaners also were displeased with their filing strategy and often felt disgusted with volume of email in their inbox. Their dissatisfaction appeared to be directly correlated with the volume of email accumulating in their inbox. Only after message volumes reached a particular level would users clean their inbox.

Despite increasing message volumes into the 21st century, patterns of email filing have largely remained the same. Recent research has identified additional evidence of email clients used as archives. In the ten years since Whittaker and Sidner's study, individuals have stored ten times as much information and have 2.8 times as many folders in spite of technological improvements in search tools (Fisher, 2006). Despite the advances of email software including scheduling capabilities, greater storage capacity, and improved filtering techniques, the user's inbox remains in approximately the same condition as it was ten years earlier. However, new information management functions have crept in to the email client.

Users now are utilizing email and email clients as document management tools (Ducheneaut and Bellotti, 2001). In the digital age, professionals collaborating in the workplace share files, documents, and informational resources. Email provides a convenient channel to which all of this data can be attached and instantaneously distributed across organizations. Despite the lack of standard document sharing features, such as version management and organization structures outside of the individual email, users have adapted the client to serve as a document management tool.

New problems are created when email is used for document sharing. Miscommunications can occur as tasks are delegated among colleagues. As a result, email clients are being used to provide tracking and record keeping (Bellotti et al., 2005). The ability to store and file communications provides immediate access to records of accountability. Users rely on stored emails to prove they have responded to requests, completed tasks, and have performed their jobs in a timely manner.

As the volume of information communicated via email has grown, email clients have become the de facto information management tool for professionals. Messages have increasingly included documents and information important to the daily activities of business professionals; email clients have naturally been appropriated to store and maintain that information for future retrieval.

2.3. Information Overload

Information overload is a widely used term. Since the 1950s, researchers have written of sensual overload in cities and predicted the onslaught of information through developing communication technologies (Edmunds & Morris, 2000). From these initial efforts documenting the saturation of human sensory capacities and theorizing on the saturation of human cognitive processes, researchers have continued efforts to refine the definition of information overload.

The term has several meanings. The most simplistic definition is that information overload is having more relevant information than one can process or absorb (Edmunds & Morris, 2000). Klapp (1986) further defines information overload as a state in which the receiver cannot effectively process received information without interruption, causing errors and omission of information. This condition is reached when receivers experience large information volumes and high rates of information arrival (Klapp, 1986). Information loses it ability to inform and instead acts like noise, preventing the receiver from performing efficiently. This definition is supported by psychological studies that demonstrate the brain has limited processing capacity. The processing rate of the brain is initially high, peaks, and then declines with an upsurge in the rate of cognitive requests. The u-shaped curve that represents the brain's ability to process information clearly indicates that at greater than saturation capacities, humans are less efficient (Shenk, 1997).

The informational demands of modern society contribute to the growth of information overload. Business organizations dictate that professional survival is based on ones capabilities to retain vast amounts of information (Edmunds & Morris, 2000).

Employees cannot neglect their information environment, as it is the very key to their success in the workplace. Professionals force themselves to obtain and absorb large quantities of information in an attempt to keep up with customers and competitors. However, this is a losing battle. The organizational capacity to produce and distribute information far outweighs the human ability to process it, and this imbalance continues to grow (Farhoomand & Drury, 2002).

The results of information overload in the workplace have been noted by a number of researchers. Farhoomand and Drury (2002) stated that professionals suffering from information overload tend to overlook information that they would normally deem critical to the decision making process. They waste decision-making time trying to locate pertinent information lost in their voluminous number of emails. Information of irrelevant or dubious quality can be misinterpreted as credible reducing ability to properly assess decisions (Ho & Tang, 2001). Managerial decision-making as a whole suffers from the presence of unprocessed information.

The work of Janssen and Poot (2006) concurs with previous findings on performance losses. They further identify that information overload is associated with decreased job satisfaction, strain, and stress. In addition, Denning (2006) notes that individuals lose their ability to attend to one particular item. These effects if prolonged can result in the experience of additional stress-related health problems.

The effects of information overload extend beyond the individual. Surveys have identified that information overload can damage relationships in the workplace (Edmunds & Morris, 2000). Many professionals have identified information overload as allowing them less free time, thus putting tension on personal relationships and reducing self-

development (Ho & Tang, 2001). This can in turn place a strain on the entire organization, disrupting the culture of the business, and reducing the likelihood of a healthy work environment.

The loss in productivity and the deterioration of relationships is most vexing for business organizations. Businesses are built upon the foundation of strong relationships and rely on increasing productivity to boost their returns. The accelerating production of information in the workplace jeopardizes both of these fundamental elements to continued growth.

2.3.1. Email as a Source of Information Overload

Information overload is not defined in terms of an explicit source of information, but rather as the cumulative effect of all communication channels delivering information to the receiver. While email continues to supplement more traditional communication technologies such as fax and phone for external communications, it has replaced them as the dominant technology for communications within business organizations (Farhoomand & Drury, 2002). During the last ten years, the increased adoption of email has made it the most significant communication channel in the workplace (Dabbish & Kraut, 2006). Recent research in academia has further demonstrated this, as professors are on average spending 2.5 hours per day using email (Ahdoot, 2007).

Email was originally designed as an economical means to communicate through an asynchronous channel with similar characteristics of postal mail. However, user behavior has dramatically changed email's original purpose. Email has moved closer to a synchronous communication channel, as users expect the receiver to process messages

within minutes or hours, and not days. These emails hold increasingly complex pieces of information; many with attached documents or long discussion threads (Denning, 2006). They communicate significant pieces of information, yet are composed in an informal and vague manner. Messages are written in cryptic and ambiguous shorthand that leaves receivers puzzled as to their meaning (Janssen & Poot, 2006).

Besides emails that are read, a large number of emails are hardly reviewed by professionals (Ho & Tang, 2001). Users find that much of the received email is unwanted spam or other unsolicited electronic communications. Even though the user deletes many of these emails after barely scanning them, there is a productivity cost to this process. Each time an email is received, it has the potential to interrupt the user's current thought process. This interruption has an associated average recovery time of 64 seconds (Jackson, Burgess, & Edwards, 2006). Individuals cannot immediately restore their thought processes and as a result require greater time completing their original task. Email induced interruptions can inhibit the processing of information from other communication channels creating additional occurrences of information overload.

While spam has contributed to email volume growth, users also cite improper email usage. Receivers are often copied on email messages that do not relate to their work or interests (Farhoomand & Drury, 2002). The economics of email have made it easier for the sender to mindlessly "reply-to-all" or "cc" individuals rather than select the appropriate recipients. This can create avalanches, where users receive multiple copies of the same message from different colleagues (Janssen & Poot, 2006). Users often delete these messages but that their presence can contribute to overload (Dabbish & Cadiz, 2003).

Predictably, users note that their experiences of information overload are frequently the result of difficulties with email. From a survey of senior managers, Janssen and Poot (2006) found that roughly sixty percent of all information overload incidents are related to email. This finding is supported by the research of Farhoomand & Drury (2002), who confirm that the majority of white-collar workers recognize email as a leading cause of information overload.

More recently, business organizations have recognized that email is a chronic source of information overload. They have reacted by creating email free days in which employees are instructed to avoid emailing within their organization at all costs (Goodman, 2008). Such draconian measures to limiting the volume of sent email illustrate the extent to which email is impinging on the ability of business professionals to operate successfully under normal, daily conditions.

2.4. Redesigning the Email Client

The research on both email functional overload and email as a source of information overload indicates that email has become an increasingly significant technological issue within business organizations. Increasing email volumes have been shown to correlate to increases in the occurrence of email overload in both business professionals and professors (Dabbish & Kraut, 2003; Ahdoot, 2007). Researchers have responded to the exploratory research and direct requests from users with redesigned email clients and improved email etiquette. Some have proposed a set of rules, encouraging users to rethink their emailing habits, thus reducing email volumes (Jackson et al., 2006). Others have attempted to attack the growth of the inbox by creating tools

that aggregate information, improve task management within the email client, and reduce the burden faced by users when attempting to manage information communicated via email (Mock, 2001; Schuff, Turetken, D'Arcy, & Croson, 2007; Bellotti, Ducheneaut, Howard, & Smith, 2003; Kerr & Wilcox, 2004).

2.4.1. Controlling Email Volumes

The continuing growth of email received by professionals is being addressed in two ways: calls for increased email decorum, arguing for using proper email etiquette, and information aggregation techniques to collate related inbox messages. The shared objective is to present users with fewer messages to peruse and therefore would be less likely to be overwhelmed by a queue of unread emails.

Due to the inexpensive nature of email, sending messages across organizations has been made a thoughtless activity. In response, email advocates have proposed various back-to-basics rules to limit the number of emails sent. First, they suggest that users consider whether a particular group or individual truly requires the information being sent (Jackson et al., 2006). Second, in recognition that users often find messages ambiguous, email etiquette advocates urge users to be exceptionally deliberate in the message they are trying to communicate. They suggest that users err on the side of being overly explicit rather than assume that those they correspond with will comprehend convoluted communications. Third, while composing a message, email users should refine their subject line (Jackson et al., 2006). An effective subject line can assist users in determining the urgency of a message and ensuring that a message does not get deleted or overlooked.

When these practices are put into action, studies show that they make for considerable financial savings. By reducing the number of interruptions created by email, the time spent reading and responding to ambiguous email requests, and the time spent filing untargeted emails, businesses can enjoy increased employee productivity In one study, participating companies had their employees take email etiquette classes. Each of these firms realized a positive return on investment (Jackson et al., 2006).

Introducing organizational rules to affect email usage patterns attacks only the human side of the email overload problem. Software changes to email systems also can reduce email volumes. Aggregation of email messages and the information delivered via email can reduce the user burden of sorting, sifting, and searching through large queues of emails. One approach has been to reinvent the way email is displayed to users. Memory research has shown that successful retrieval depends on the context surrounding an event (Jovicic, 2000). Cognizant of this, researchers developed a timeline approach to email. By showing email organized via weekly timelines, users can quickly locate emails in their inbox.

Another approach to improving the visibility of important emails is an email categorization scheme. This approach includes a tool that is designed to specifically target the three types of filers originally identified by Whittaker and Sidner (1996). The tool creates categories and aggregate emails in the inbox into these categories. This preserves emails in the inbox, allowing the user to continue to use the email client as a to-do list, but reduces the overall volume of emails that a user must scan (Mock, 2001). The creation of categories has been accomplished in a myriad of ways including the utilization of pre-existing folder structures, semantic analysis of message content, and

user generated email tagging (Schuff et al., 2007). Such metadata about individual email messages provides users with multiple ways to aggregate and sort information so that it is accessible yet condensed. Recent email clients including Google's GMail and Yahoo! Mail have adopted this approach.

Difficulties and issues with these approaches remain. Using existing folder structures for categorizing emails in the inbox requires that users undergo the cognitive burden of creating a folder hierarchy. These systems also may become compromised if new categories are frequently introduced. User generated tags or categories impose a similar cognitive burden to filing, only delaying the work required for a user to maintain an organized inbox. Automatic semantic techniques attempt to limit user requirements by generating new categories as emails are received (Schuff et al., 2007). This type of system allows users to avoid creating folder hierarchies, but faces difficulties when emails span multiple subjects.

Recognizing these challenges, researchers have proposed other approaches. Email client designers have aggregated emails on the basis that present day emails are more conversational and less asynchronous compared to past practices. Email has transitioned into a medium where responses are expected nearly upon receipt (Janssen & Poot, 2006). As a result, email conversations are becoming increasingly similar phone and face-to-face to conversations. These conversations can be aggregated into a single inbox item, reducing the volume of email in the inbox and presenting the exchange in a manner that is more representative of the user's recollection.

Each of the discussed approaches attempts to reduce the volume of email in the inbox. They address email overload by either reducing the number of messages received

by the user or by aggregating information in an effort to reduce the processing of reading and finding information in the inbox. Having multiple techniques to reduce the volume of messages in the inbox allows professionals to pick the method with which they are most comfortable.

2.4.2. Task Management

Researchers have recognized that regardless of their ability to control volumes, professionals will continue to use the email client to manage their day-to-day tasks. Therefore, researchers and designers have used information from studies regarding email task management to assist them in redesigning the email client. They have attempted to invent a new email client, purposefully designed as a multi-functional tool, that successfully marries email and task management. The considered approaches have included the addition of task panes, creation of intelligent scheduling agents, and incorporation of other task centric tools.

As professionals receive both short response and extended-response tasks in their inbox, they must learn to manage them. Ideally this would mean responding and dismissing rapid response tasks while maintaining a list of extended-response tasks. Researchers have found that extended-response tasks, especially those that are interdependent, meaning their completion is dependent "upon the to-dos of others," seem to create a more intense sense of overload (Bellotti et al., 2003). Tracking a task through the inbox becomes an increasingly difficult job as the message queue grows. In response, designers created Taskmaster, an email system redesigned for task management (Bellotti et al., 2003).

The major design change incorporated into Taskmaster is the inclusion of an additional window in the email client called the *Thrask*. Within the Thrask pane, emails can be collected into tasks. Similar to the work on categorizing the inbox, this pane serves to organize the email while still providing the accessibility to information and to reminders that many professionals desire. Unlike categorization techniques however, this process allows emails to be removed from the inbox, yet still be visible in aggregate form. In addition, researchers have incorporated other common task list features including deadline gauges, necessary action indicators, and personal notes (Bellotti et al., 2003).

During user testing of Taskmaster, Bellotti et al. (2005) found that explicitly incorporating task lists within the email client but outside of the inbox improves professionals' satisfaction with email. However, it still requires significant time to manage tasks, add deadlines, and flag tasks with activity indicators. Rather than redesigning the interface, other researchers have sought to automate a number of task management actions using intelligent agents.

Scheduling tasks and meetings as part of greater tasks and projects requires that users consult calendars, flipping between windows, and locate times when all task participants are available. In addition, when professionals receive meeting requests, they must also consult either a separate application, a window within their current email client, or a paper day planner. Each of these actions takes considerable time. To assist users, a mixed-initiative user interface was designed. When messages are received, the intelligent agent analyzes whether the message contains meeting information. If so, the agent introduces a pop-up that informs the user whether they have time available at the

requested time. If time is not available the agent suggests subsequent times that are available for all participants included on the email message. Despite difficulties of when the user should be interrupted, the intelligent agent appeared adept at reducing the difficulties users face when attempting to schedule time for meetings (Kerr & Wilcox, 2004).

Introducing task centric features to the email client is a natural response to professionals co-opting the client to perform task management activities. These design changes have shown promise in reducing the sacrifices currently made by many users when managing their tasks through email.

2.4.3. Information Management

The efforts to assist users in information management are similar to those being used to collate messages in the inbox. Messages are automatically filed using either user generated rules or message mining techniques. User generated rules are available in many email clients including the most popular professional client, Microsoft Outlook. Users can set up rules based on a variety of email attributes (e.g. subject, sender, included recipients, etc.) and emails are directed to a specified folder. Message mining techniques work in a similar fashion but do not rely on user created rules. Instead, messages are mined for related information and then filed together.

One client combines message-mining techniques and user specified rules. The Automatic Clustering Email Management System requires that users weigh four standard email attributes (Schuff et al., 2007). Emails are then mined for connections based on

their message, subject, sender, and distribution. Based on the user-defined weightings, emails messages are organized into a hierarchical folder system.

Despite improvements, professionals have been generally dissatisfied with both approaches to filing. Manually created rules require substantial user input and sometimes require sophisticated technical know how. Two-thirds of users also simply do not believe that rules for filtering and filing their emails are possible (Ducheneaut & Bellotti, 2001). Automated filing techniques face the same challenges that plague their automated categorization counterparts: items spanning multiple subjects make filtering difficult. In addition, all filing techniques remove email from the inbox making the email messages easy to miss. This is especially true with technique such as those used in Microsoft Outlook, which file email as soon as it is received. Users then have to search through their folders to find filed emails.

Adding to the difficulty of assisting the user in information management is the co-opting of the email client as a document manager. As discussed above, users are increasingly relying on email clients as the central point for collaborating on documents. New technologies such as Microsoft Sharepoint, Google Docs, and Backpack Office Apps may help reduce the use of email as a document manager. However, some researchers have recognized that documents should be regarded as highly as email messages within the email client. They have created a system that provides views of documents from the email within which they were sent (Kerr & Wilcox, 2004). These changes provide users with an additional means of locating documents in a one-click fashion.

2.5. Summary

While this review of approaches to email message and email client improvements is not exhaustive, it does serve to illustrate the various avenues in which the researchers and designers are attempting to reduce the problem of both email functional overload and email as a contributor to information overload. These approaches are primarily based on the conclusions and recommendations of exploratory research on non-academic professionals. Research within the academic field remains limited and few researchers have focused on the actions of faculty within higher education institutions. In light of the diversity of strategies and tactics to managing email within the non-academic field, the neglect of research in academia is disturbing.

3. Methodology

3.1. Qualitative v. Quantitative

The goal of all research is to develop an understanding. The methodologies for doing so however are diverse. The two main approaches to research are qualitative and quantitative. While quantitative has been acknowledged as one proper methodology for research, its value in topics where there is little current understanding is limited (Myers, 1997). The general absence of defined variables within the topic of email overload makes quantitative research inappropriate. In addition, understanding email overload requires significant contextual information, as it is a social and cultural phenomenon rather than a naturally occurring one. This requires knowledge of the user's perspective. Qualitative research can traverse these obstacles while providing pertinent information from which future qualitative and quantitative studies can be completed.

As suggested by Chua (1986), within qualitative research there are three underlying philosophical principles: positivist, interpretive, and critical. These three principles are philosophically distinct. However, they have been the subjects of much discussion. Researchers have debated whether qualitative research can accommodate more than one of the three principles (Myers, 1997). For this study such an argument is less pertinent as an interpretive approach was generally taken. The objective of this study was an understanding and an exploration of email messages and email clients as information tools used by academic faculty. An interpretive perspective allows the researcher to understand the information system contextually and the process whereby the system influences and is influenced by the user (Walsham, 1993). Contextual understanding is critical when researchers attempt to assess both definitions of email overload and its application to the academia.

3.2. Case Study as Qualitative Methodology

The methods of conducting qualitative research are diverse and not always conducted in isolation. The case study is among the more popular techniques used in studying information systems and human-computer interactions. Case studies are inquiries into contemporary phenomenon within its real life context (Yin, 2002). While other more traditional experimental approaches may be desirable because of their concreteness, email overload is a naturally occurring phenomenon with little understanding or developed theory. Before experimental approaches can be considered, further exploration into the causes and responses to email overload must occur. The term case study also often refers to a unit for analysis. As the name suggests, case studies look

at particular groups for instances of a phenomenon or case. Through this unit a greater understanding of the phenomenon can occur.

For this particular exploratory case study, a group of eight professors were selected as the case. They were all faculty members of a college focused on information and computer sciences. The participants are members of departments that focus on information systems and technology, computer science, networking, human-computer interaction, network security, interactive media, and other similar fields. Of the eight participants, two were female and six were male. All the professors had more than three years teaching experience. In a typical school year, each professor would teach between four to nine classes. Besides teaching, three of the participants had expanded responsibilities including administrative tasks involving students within their department. All of the professors were working full-time during their participation in this study.

3.3. Data Collection

Collection of data within a case study can take a variety of forms. In this study, a survey was the first technique used for data collection (*Appendix A*). The survey instrument included sixteen questions of which six required quantitative responses about volumes of email, seven used a five point Likert scale to determine professors' experiences with email overload, and the last three were open ended questions regarding users email experiences and management tactics. Participants received this survey via email and returned it within six weeks. However, multiple requests for participation were sent during this six-week period.

After participants agreed to the study and completed the survey, the researcher conducted a series of semi-structured interviews as the principal approach for data collection. The interviewing method has a number of characteristics that are well-suited for this study.

A primary concern with a study regarding participant's communications is the need for privacy. Methods such as classical ethnographies are unacceptable in a privacy sensitive environment. Observation of communications between professors and students is likely to be seen as a violation of student's privacy rights. As a result, observation is clearly unacceptable. Interviews do not violate potential privacy issues as participants can refrain from offering detailed accounts of actual emails. The investigator did not require observation of the participant's email client during any point of the proposed study.

Additionally, interviews offer an opportunity to explore individualistic actions and the perceptions that underlie these actions (Gillham, 2000). This study, focused on email overload and email management and response tactics, lends itself to the interviewing process. Individuals must be probed to understand the underlying intentions of their email tactics. By questioning participants in a semi-structured format, the investigator can let participants follow their own train of thought but provide focus when necessary.

This methodology has been repeatedly used in email overload research. The pioneers of email overload research, Whittaker and Sidner (1996) and Mackay (1988), used interviews exclusively when they discovered the multiple uses of email and email clients. This methodology has been repeated in subsequent studies (Ducheneaut &

Bellotti, 2001; Bellotti et al., 2005; Fisher et al., 2006). These studies have explored other aspects of email overload and provided findings upon which this study and other research have been based.

In this study, each of the professors was interviewed face-to-face. This first interview was conducted in the participant's office and was recorded. For most of the participants, the interviews also were their first chance to get a more complete picture of the study and return their survey. Two of the participants had yet to complete the survey but returned the survey via email within a day of the interview. Because the interview was semi-structured, interview lengths varied from 16 minutes to 24 minutes. These interviews covered several of the same email topics but participants could also steer the direction of the interview. Participants were asked about their general email use, email management tactics, and email volumes.

The first segment of this interview involved participants telling a story of how they use email throughout the day. This technique has several advantages. As noted by Seidman (1998), storytelling allows participants to reconstruct rather than recall. This avoids the memory impediments that occur when participants are asked to remember something. Storytelling also allows participants to become engrossed in their story through which significant details are verbalized. As the participant tells the story, they also begin to reflect on their actions providing insights into their own feelings that may have been neglected in a question and answer interview. The storytelling technique, when used in moderation, conveys experiences as concretely as other techniques and provides opportunities for the discovery of additional details (Seidman, 1998).

The second portion of the interview was directed at examining the participant's experience with email overload. Participants were asked whether they experienced email overload and if so how often. These questions were generally open-ended, allowing the participants to interpret the questions and answer them as they saw appropriate. The last portion of the interview was used to better understand the type and volume of email received by the participants. Though general email volumes had been recorded through the initial survey, participants were asked to identify the groups of individuals with whom they converse and what affects these groups may have on their email behavior.

The second interview was conducted via email. This interview was used in a variety of ways. A portion of the interview was designated to clarify any answers given during the previous face-to-face interview. These were typically professor specific though some degree of ambiguity regarding email overload was found across all of the first round interviews. Participants were also asked universal questions about email and productivity and the decision making process during filing. Some of these questions were open-ended while others used five point Likert scales. The remainder of the interview was used to investigate the inferences and findings made during and after the first interview. By including these questions, the researcher could increase the external validity of his results. In total, participants were asked between 14 to 18 questions.

The timing of the second interview can contribute to its effectiveness. The researcher must time the interview so that participants can recall the previous interview yet have time to reflect on the previous questions and their answers. Providing participants with the opportunity to reflect can enhance their understanding of their

actions that they can then share with the researcher. The second interview was delivered approximately three weeks after the first.

Because of participants' time constraints, not every participant completed the second interview. Out of the eight participants, six completed the second interview (*Table 1*). Responses from the two participants who did not complete the second interview were still considered valid as they had provided significant corroborating information through the survey and the face-to-face interview.

Participant	Survey	Face-to-Face Interview	Email Interview
1	X	X	X
2	X	X	X
3	X	X	X
4	X	X	-
5	X	X	X
6	X	X	X
7	X	X	-
8	X	X	X

Table 1: Professor's participation

3.4. Data Analysis

After the first interview, the researcher transcribed the audio recordings. Transcription followed a standard set of rules and included nonverbal signals (Seidman, 1998). This process, though time consuming, provided the researcher with the opportunity to examine each statement made by the participants.

After transcription, hierarchical task analyses of participants' behavior for accessing, deleting, filing, reading, and responding to email were created. These task analyses were drawn out in the form of flow charts. This provided a means to visualize the patterns of participant email behavior. The flow charts also allowed for a visual comparison of task structure between users. As a second step, the transcriptions were winnowed by removing redundancies and speech impediments (i.e. "you know", "ah",

"like", etc…). Answers that veered off topic or failed to address the researcher's question were condensed while maintaining the thematic meaning of the participant's statement. The email interview was then attached to the end of the first interview (*see Appendix B for sample interview*).

The researcher then coded the revised transcript. The codes were generated by assessing the thematic meaning of the participant's statements. At times, because statement would have multiple thematic meanings, sentences or paragraphs were tagged with multiple codes. Each transcript was coded in a similar manner. Codes were often reused between participants because the researcher's questionnaires and interviews had targeted consistent topics across participants. Once each edited transcript had been coded, statements with similar codes were grouped into one report. These code reports allowed the researcher to review similar thematic concepts across participants.

Both the revised transcript and the code reports were continuously reviewed. As recommended by Glaser and Straus (1967), the transcripts and code reports were not addressed with a set of a priori concepts or hypotheses for testing. Instead, the researcher made every attempt to review these documents with an open mind and attitude, looking for only those connections that emerged as interesting or significant from the text. Special focus was directed towards interpreting conflict between the professor and their email. The tension and interplay between the user and email could be captivating and repeatedly led to professor's most revealing statements. Also, because email overload is often expressed as frustration or stress, focus during the analysis was given to any passages through which these emotions were expressed. As previously noted, this

interpreting process solely relies on the judgment of the researcher, making the second interview increasingly important for validation.

The edited transcripts and code reports were reviewed again, this time in light of the participants' previous answers on the survey. The survey data had been reviewed and analyzed using basic statistic techniques. The small sample size of participants allows for only descriptive analysis, yet in coordination with qualitative data from the interviews, this information served to assist the researcher in further recognizing emerging email overload themes. From the email volume data, the mean, median, range, variance, and standard deviation were calculated. In addition, a sanitized version of these statistics was created.

Two outliers were removed from the categories of email volume received daily and volume of email messages in the inbox. While outlier removal is a highly subjective practice, the researcher attempted to eliminate any bias by using the extreme studentized deviate (ESD) to identify data points as outliers (Moltusky, 2002). ESD utilizes the standard deviation from the full data set to determine outliers. Values that are approximately greater than two deviations from the mean are considered numerically distant from the data and labeled outliers (Motulsky, 2002). One data point in the categories of number of emails received daily and number of emails in the participant's inbox, were found to be outliers in this study.

The questions regarding email overload were also statistically analyzed. These questions were based in part from the 2003 study by Dabbish and Kraut. These researchers surveyed professionals across the country to analyze experiences of email overload. They found that their questions regarding email overload could be used to

create a scale that reflected user's experiences with email overload. Similar analysis was performed on the email overload questions used in this study. First, Pearson's correlation coefficient was calculated for the five email overload questions. Then the researcher calculated the Cronbach coefficient alpha of these same questions. This statistic is used to assess the internal reliability of a set of items that address a single topic. The Cronbach coefficient alpha for these questions was 0.8857, signifying that these questions reliably assess a participant's experiences with email overload.

While the sample size is less than that necessary to demonstrate the consistency of a scale, the Cronbach alpha result, in connection with Dabbish and Kraut's similar findings, demonstrate that the aggregated responses to the email overload questions provide a clear indicator of the professors' experiences with email overload. This information performed a critical function in triangulating the data from the first and second interviews to confirm participants' responses and to enhance qualitative analysis and interpretation.

As previously noted, the empirical materials from the second interview were first added to the edited transcripts that were previously created. This material contained information targeted to remove any inconsistencies or vagaries in the first interview. The information also included a number of results from questions with Likert scales. This data was tabulated in frequency tables. This data led to additional inferences about usage patterns, email and participant productivity, and participants' beliefs in email overload.

With all the data compiled, the researcher was able to make a number of observations that were consistent across the participants. The researcher also found a number of characteristics that indicated the likelihood of the user to experience both

email client overload and email information overload. These findings are detailed in the following section.

4. Results

The following section details the findings from the empirical materials collected during this study. Similar to prior research, the topics of email client overload and email information overload are used to organize the study's findings. However, unlike prior research, in which these two forms of email overload are considered in isolation, the present findings suggest that the two types of overload are closely correlated. Professors' attempts to manage their email are thwarted by their own efforts to adapt the email client with additional functions.

4.1. Email Access

The email access patterns for the eight participants were consistent. Each participant accessed email in the morning, either during or shortly after their morning routine. For most, this meant accessing email from home before going to their office at school. Once the participants arrived at school, they all noted that unless they were due at a meeting or class, accessing email was their first work activity.

For all participants, the email client then remains open for the remainder of the day. It was checked repeatedly during the day, either as a provocation of email notifications or because participants had trained themselves to look at the email throughout the hour.

"I've trained myself now that if I'm not teaching, or if I'm not in class, probably every fifteen minutes I glance over at it. See what else has come in. I think I wrote on your little survey that I probably check email forty, fifty times a day." (Participant 4)

While a rarity, a few of the participants noted that there were times when the email client was closed. This occurred most often during class, when the notebook being used in the office was also used in the classroom. Participants recognized class time as an inappropriate time to receive email.

"The only times I'm really disconnected is when…I'm in a class or in a social engagement where it just not appropriate." (Participant 3)

After class or a meeting, participants found themselves going back to their email immediately. For the two participants that carried a mobile device with email connectivity capability, this meant connecting even before they got back to their office. Even during occasions where they generally felt other forms of communication were inappropriate, participants with mobile devices would sneak a glance at their email queue.

Before leaving the office, participants noted that they would check their email once again. For all but one of the participants, this was not the last time that they would check their work email. Participants described checking their work email again at night while at home.

"I check before I leave the office and at night before I go to bed. My house is wireless and the notebook is always right next to me." (Participant 8)

During the workweek, each of the professors in the study reviewed their inbox at least once every few hours.

Frequent weekend access to email was less consistent across all eight participants. While most of the participants found themselves checking their work email at least a few times during the weekend, some participants specifically noted that they try to refrain from doing so because they wished to keep their free time separate from their work. Participants noted that weekend access to email was helpful to ease them back into the workweek by reducing the number of email messages that would need review on Monday.

4.2. Email Triage

After accessing the email client, every participant engaged in email triage. Email triage is the process where a user filters, sorts, and generally organizes their email queue. This process differed across the participants though a few characteristics were consistent depending on the time elapsed since the participant last accessed their email.

When participants accessed their email for the first time in the morning, over half the participants reported a consistent pattern of behavior. The first step was the scanning of emails that had arrived overnight. Participants noted that they only used subject or sender during this phase of the triage process. Participants were often scanning for any emails would which impact the schedule of their day. They were looking for meeting requests or cancellations to meetings or classes.

> *"So I'll check for that to see if I need to alter my schedule or whatever based on any news." (Participant 7)*

The second task in the triage process was the removal of junk email. The participants used sender to identify any spam or junk email which had made it through the filters provided by their institution and their department. A few of the participants would immediately delete an email if they didn't recognize the email address.

> *"Because I've had some students send me email from yahoo, or whatever accounts and it's like I'll take one look at it if I don't recognize it, I'll delete it. And just because I just I can't be bothered with opening every piece. I simply can't." (Participant 1)*

Others were more hesitant to delete a message, fearful that it contained information that might be interesting or significant. These participants used the subject as an additional indicator of whether an email was spam.

When discussing spam, most users were not simply referring to email from advertisers or business with whom they were acquainted. Spam also included messages from their institution, academic associations, or colleagues that they felt had little personal value. For example, one participant noted that they were unlikely to more than glance at general institution announcements regarding day-to-day operations.

The third step in a participant's email triage activity was moving through the remaining emails in the queue. All participants moved through the queue by looking at one email after the other in newest to oldest order.

Three of the participants noted that moving in this chronologic pattern, from newest to oldest, was not ideal. Instead they wanted a client to show emails from oldest to newest.

"One of the things that gets me about [Microsoft] *Outlook is that it, it filters backwards. So, I'd like to start with the oldest email and then move to the newest." (Participant 6)*

However, this was the organization scheme with which they were presented and they had not made any attempts to deviate from it.

After these two triage steps, participants used different methods for looking at the remaining emails in the queue. Some users opened one email message at a time, some utilized the preview screen available in many email clients, and others opened a number of consecutive emails as separate windows and then close those windows after they had completed any necessary actions. These behaviors did not have any specific patterns across participants and were repeated by the participants throughout the day.

There were noticeable processing patterns when the participants received a message that required a response. Each participant analyzed each message for the type of required response. Participants noted that they made a clear distinction between short responses, messages that required a short message or action, and long responses, messages that demanded a well composed message or for the participant to organize materials for a response.

Participants reacted to short responses as quickly as possible. This method for responding was noted by the entire faculty in the study.

"I'll respond to easy ones in the morning, if it's a quick yes no or I have to write a couple lines of code, I'll do that." (Participant 4)

"I tend to answer things that can be answered quickly." (Participant 2)

"I tend to answer things that can be answered quickly. Things that take longer I will usually flag and then come back to later." (Participant 3)

"And that might put [longer responses] back in the queue a little ways because I might want to go through and knock off all the real quickies first, and then go back and get the longer ones." (Participant 6)

The morning triage routine then left long responses in the email queue. Many of the users mentioned that during morning email triage, this type of message would be flagged or left unopened so that they were easily identifiable later in the day when the user would have more time.

"… I like that red flag so that I can then go see what I haven't accessed before." (Participant 1)

Email triage tasks conducted during the rest of the day are different than those conducted in the morning. Participants did not scan the email queue in the same fashion as they had in the morning. Instead, they were more likely to start moving through the queue one by one. Also, depending on time available, participants would begin composing messages for the long response emails. This process started with looking for emails that they had mentally noted, were flagged, or left unopened during morning triage. If the participant did not have time or information necessary to compose a response during the day, the response rolled to the next day where it would again be reviewed and reprioritized.

While the email triage process was not entirely consistent among the participants, some there were identifiable factors that could assist in predicting user behaviors. In the morning, email triage involved scanning for high impact items, schedule changes, or high priority requests. This scanning process was not used later during the day. One significant difference when comparing the inbox in the morning versus the inbox throughout the day is the number of emails that have not been reviewed. This growth in volume likely contributes to the morning email triage process.

As noted, users continually accessed their email throughout the day, performing email triage each time. This would help limit the amount of outstanding email for that particular day. In contrast, overnight, email from spammers and students would fill the faculty member's inbox requiring them to scan the email inbox in the morning to identify high priority items and eliminate obvious junk. Two participants affirmed this interpretation by commenting that during vacations, they would log in to scan the inbox so that upon arriving back home, it would not be necessary to move through the first step of the morning email triage process.

4.3. Email Client Overload

Faculty who participated in the study used the email client for many purposes besides the basic email functionality. Participants found the email client as a place to manage their tasks, information, and schedule. The client also acts as a workload barometer and a window into the day's hot topics.

4.3.1. Task Manager

Professors in the study viewed email as their most critical communication tool. Nearly all the participants felt strongly about this.

> *"Email is it. Right, realistically, if you aren't going to come to my office, you are going to get me on the email. So the most important."*
>
> *(Participant 4)*

Even the one participant who believed face-to-face communication was more important, recognized that email was the most widely used communication channel in the workplace.

One reason for email's importance is the nature of information that email messages transport. Email messages convey the majority of tasks that professors need to complete during the day. It is the main channel for communicating with students and colleagues. As a result, email messages contain significant references to tasks related to their courses and to department responsibilities.

Email is also a key channel through which participating faculty received new job related opportunities. Multiple participants noted during their interviews, as they glanced at their email, that they had received notifications to submit papers for publications and opportunities to attend conferences.

> *"…they're notices of calls for papers, because that's a big part of what I get for email frankly." (Participant 8)*

Many of these opportunities, such as participating in conferences, webinars, and other academic related activities carry with them related work tasks. While some of these messages are removed during email triage, the remainders are left in the queue.

Participants also noted that they received newsletters, articles, and informational emails during the day. Many of these were the result of participants joining different distribution lists, and news servers. Reading these emails keep faculty up to date within their own specialty. This was a chore that the participating faculty would complete when they had a lull in the day. During the rest of the day, however, these emails were left in the queue.

Depending on the volume of email and the workload for the week, task oriented emails would begin to accumulate in the email inbox. All of the participants demonstrated a particular pattern of using this queue within the email client to manage their tasks throughout the day. As email was received, if a message made it through initial triage, the email was flagged or left unopened specifically to keep it in the inbox.

> *"I'll use the little red flag, some kind of flag. Often things that I, okay I've read it, I need to know that I need to go back to this but I can't deal with it right now." (Participant 7)*

These messages represented tasks that the participant hoped to complete either presently or at future time.

As the participants went about their day, they continually accessed their email. During these times, they repeatedly saw the subject of emails representing unfinished tasks. Whether the task involved writing a response, simply reading the email's contents, or some other larger job, the email's subject served as a reminder. Several of the participants mentioned that reviewing the inbox cause them to reprioritize tasks within their heads.

"Absolutely, I'm not attaching any numbers to these [emails]. It can drop back because if the dean sends out something or a faculty colleague sends out something it boosts the priority of those messages and these have to sit." (Participant 2)

Other participants would utilize the email flagging which they had performed during an earlier triage process. They would sort the queue by flag. This would make flagged emails rise to the top of the queue. Participants using this method noted that they would then scan the list and create task lists in their head.

The effectiveness of inbox as a task manager is constrained by the participant's screen size. Participants found that once their emails had fallen off the email horizon, which is the portion of the inbox immediately visible on the screen, that remembering to respond to or action upon emails became increasingly difficult.

"…a lot of things I say I'm going to get through, get back to it later, and you know, once it goes out of your window of view its forgotten and so sometimes it takes a while." (Participant 1)

This screen size limitation of the email client increases as the task list grows. For participants who found emails constantly rolling into the next day or week, this problem manifested itself more overtly.

Nevertheless, all of the participants maintained emails in the inbox as a digital checklist. Each participant had a mental checklist of tasks which they reconciled throughout the day with their digital one, reprioritizing outstanding tasks to either incorporate new tasks they had received or tasks that they had forgotten. For participants

in the study, the email inbox is an important place to receive tasks and maintain the current status of their task list.

4.3.2. Information Manager

For the professors in this study, using email as a task manager was only one use of the email client. They also found the email client as a key to managing all information received electronically. Participants noted three general reasons for saving email. The client was used to track current projects or discussions, provide records of conversations with students and colleagues, and maintain personally relevant information.

Participants stated that one of the main uses of the email client was tracking current projects such as research papers and class activities. The professors and their research groups used email extensively to discuss issues and transfer different resources between each other. During various times of the year, participants noted that they would have significant volume of email discussing their current research findings or parts of a paper that they were jointly writing.

> *"If I'm writing a paper, there are times, when we are going back and forth... And if its coming up to a deadline... we are doing a lot of back and forth." (Participant 1)*

As part of this collaboration process, the document being discussed would also be distributed. Research papers were attached to email messages constantly and were reviewed as the paper was passed back and forth.

A number of participants also found email as a way to maintain records of their communications. For all of the participants, this was a critical factor when discussing

issues with their students. Because students have the opportunity to challenge grades, the faculty felt it necessary to keep most of their conversations with students.

> *"Some of it we have to because of the nature of business here, especially stuff from students, because if someone complains about a grade... Oh, he sent me an email I never got back to, well, look I have the record of when you sent me one and when I sent it back." (Participant 8)*

> *"So if I get one that's going to take a long time to respond I'll generally call unless I want to leave a document trail. And if I want to make sure that everything I say is documented, then I'll respond with an email message." (Participant 6)*

They had various approaches for doing so, but they all felt the obligation to save student emails and used email extensively to do so. Conversations with colleagues and the university administration were also saved for the same reason; they could be reviewed if any issues were to arise in the future.

The last reason cited by participants for saving email was their feelings that a particular message contained information that would be relevant in the future. For many of the professors, this was the default choice when faced with the question of whether to retain the email or delete the email. If a message had the slightest potential to be useful in the future it was often saved. This was demonstrated by the professors' preference for an email client because it had a larger storage capacity. Those that did not have this luxury complained that they often had to clean up their email by deleting emails in their inbox.

4.3.2.1. Filing Technique

As emails were received and reviewed, participants identified messages that they felt should be saved but were not directly related to a task. There were three approaches to saving these emails. Depending on their preferred approach the participants could be placed into two distinct groups. One group of users was constant email filers. The other user group either had no filing habit or only periodically emptied the inbox.

The first group filed email messages throughout the day as a part of daily triage.

"Several times a day I will consider moving some messages to sub folders." (Participant 5)

The process was incorporated within their scanning of existing and new messages in the inbox. As emails were reviewed, they were either instantly deleted or moved to a folder. Filing along with deleting was seen as means to maintaining a small inbox.

The other group of users had two general approaches. They either never filed email, preferring to leave it in the inbox, or periodically filed their email. Only one participant never filed email and was only able to do so because of unlimited storage space available in email clients such as Google's Gmail or Yahoo Mail.

"I delete very little and I don't do subfolders. I'm one of those tall, tall stacks thing." (Participant 3)

The email queue in the inbox continued to grow, limited only in size by the occasional deletion of junk email.

The periodic cleaners, which Sidner and Whittaker (1996) termed spring cleaners, filed for two reasons: because their email client had limited storage capacity or because they had free time available to do so.

> *"…I get a note from the [institution's] server that I have over, that I reached my quota limit. And then I have to go in and clean up files that that have emails and attachments that I have left around." (Participant 5)*

Many of the participants waited to engage in filing activities until they received multiple warnings that they had exceeded their email storage capacity. Outside of these occasions, little if any filing of email occurred and all saved email remained in the inbox.

The spring cleaners were unique however as their patterns of filing often aligned with the cyclical volumes of email that they received. During the study, participants noted various patterns in email volumes. They found that significantly more emails were received throughout the school terms than the summer months. Some participants felt this rather acutely as they noted a sudden shift during the first few weeks of summer.

> *"The weirdest time of the year is actually after the end the first week of summer. Right after, not even breaks, but the first week of summer. It's because I'm still in the habit of checking my email all the time but then I go down to maybe ten a day. I'll get a much smaller number than I used to. It's real it's weird. You know, no one wants to talk to me... It's a paradigm shift compared to the rest of the year." (Participant 4)*

During the school year, the volume of email messages received was also cyclical. At the beginning and end of each school term, faculty noted that email volume was higher than during the middle of a term.

"… we live in a cyclic environment, the quarter is very predictable, there are certain times at the beginning of the quarter, at the end of the quarter, finals week, when your load goes up simply because of the nature of what you are doing and the interactions you have with students." (Participant 2)

They cited students' questions about classes during the first part of the term and questions about grades and final assignments during the end of the term as the reason for the rise in emails received. After a term however, they noted that they had a break. For the periodic cleaners this was the opportune time to file and delete emails remaining in the queue.

4.3.2.2. Folder Organization

The filed emails were placed for saving in folders with various labels. The organization of these folders differed across participants who filed. They all organized their folders by project. A few participants also created a time based folder structure.

Folders organized around projects included classes, papers, committees, or other administrative matters. Each of the projects would have an individual folder and could contain more specific subfolders.

"[My] folders are structured based on topic." (Participant 6)

"They are 2 types of labels: broad ones with subfolders (i.e., courses with all my course correspondence in it) and specific (for things that I am working on now - committees, projects, trips, etc.)" (Participant 1)

While the existence of some folders was dependent on the activities in which the participant was involved, all of the participants created folders for each of their classes. Depending on their filing method, they would fill these folders with emails over the course of the term.

Interestingly, only one participant stated that they ever created folders with person specific labels. That particular participant noted that this was rare and only a few folders based on this organization structure currently existed.

> *"They're folders... within outlook and a personal area so it's not backed up on to doesn't take up room on [the institution's] server... I have files for classes for various groups, for various, occasionally for some individuals." (Participant 5)*

The failure of this organization structure is likely related to the volatility and temporary nature of a professor's contacts. Students move in and out of the professors lives every few weeks. Person specific folders therefore are likely to be irrelevant for the long term. The maintenance of a person specific organizational structure would be extremely time and effort expensive.

The other organization structure, where the user creates time-oriented folders, was used by three participants.

> *"The folders are named for the months. December 07, January 08." (Participant 2)*

Folders were labeled for specific periods of time, usually a specific month. Messages received or sent during this month were placed in the folder. As a result, June emails

would end up in a June folder and so on. This organization structure though, was never used in isolation.

All three participants with time-oriented organization structure also used the project-based structure. The participant would file critical emails in the specific project and those emails which were less critical or spanned a number of project specific folders fell into the time-oriented folders.

> *"Basically I have all the little folders that I've actually stuffed stuff in. So, from different classes' passwords like from last quarter… And then I have my big ubiquitous old email. Which in here, I have pre 3/1/07, all these old pre. There 2000 thousand emails in there." (Participant 4)*

Together by filing and using folders to save email, the participants had co-opted the email client as an information management tool. This tool maintained critical information that they thought would be required in the future. However, the participants often criticized this information tool.

Most of the faculty participating in the study felt that while they were constantly battling to file emails, saved emails provided little future returns. In fact, participants often felt that emails were placed in folders and never seen again.

> *"But actually, when it, it comes down to it, there's almost never a time when I need to go back and find that stuff. So it's sort of a self imposed burden [laughing]... It's sort of the addict syndrome. I might need this so drag it in the folder. Why not store it? But the fact is you never need... to go back, seldom need to go back." (Participant 5)*

They maintained organizational structures to ease in locating emails in the future when in fact they did not often need to undertake these searches. Many participants also noted that saving such an extensive amount of email was ridiculous. Nevertheless, emails continued to be extensively saved by all of the participants.

4.3.3. Workload Barometer

Information management was a core function of the email client in the academic environment. However, it performed a number of other novel functions because it was the most widely used application on the participants' computers. The email client was employed as a workload barometer by half of the participants.

In the morning, participants who began the email triage process with scanning the inbox, used the inbox as a barometer of the workload for that day. As previously written, more than half the participants, accessing their email for the first time, spent the first few minutes scanning the inbox, reviewing prior day messages and emails that were left in the queue as tasks.

> *"I scan to see if there's any urgent things or things that, for example in the morning, if there's pertaining to what I have to do [today] first thing. So I'll check for that to see if I need to alter my schedule or whatever based on any news." (Participant 7)*

By first clearing the junk email from their inbox, participants in this category were left with an inbox full of tasks. Because reading, responding to, and acting on email was a significant portion of each participants day, the volume, urgency, and work necessary

prior to removing the emails in the queue indicated how much work was required of the participant for that day.

Many participants noted that they could anticipate whether they could complete their planned tasks and schedule for the given day.

> *"I do in the morning is to fire up my exchange outlook client and then I start looking at email. And my problem is that that can lead me astray from the things I want to do for the rest of the day." (Participant 6)*

The queue could also create an immediate emotional response, as the participants saw their day co-opted by the requests of others.

Using the inbox as a workload barometer hardly overloads the email client. However, it does demonstrate that email has a direct impact on the participants' perceptions of the upcoming workday. While this limited study cannot demonstrate the lasting nature of this initial impression, participants clearly noted that the workload barometer could provide immediate anxiety or concern as soon as they wake up. Participants can become overloaded even before reaching the office because they accessed email from home before work.

4.3.4. Headline Aggregator

For faculty, the email client is a storage unit for information. The participants in the study each developed individual techniques to keep personally relevant emails for their future use. Information messages were sorted, read during a daily lull, and discarded or filed. Prior to being read, an observer would think that these emails were simply cluttering the inbox, as approximately two-thirds to ninety percent of emails

received by participants were only informational. This created difficulties for faculty trying to identify high priority tasks. Colleagues, professional associations, or list services often sent these informational emails. However during the day, these emails did in fact serve a purpose for multiple professors in the study.

These participants noted that they were using the subject lines of informational emails as a window into the hot topics of the day. Email subjects provided a quick view into what others were talking about that day. Regardless of whether the email was ever read, it immediately made the participant aware of a new topic that could capture their attention. This information, whether focused on a personal hobby or a professional focus, kept faculty up to date in the day's events.

Despite an inability to read all of the information received, the participating professors were reluctant to develop rules that would delete these emails. Part of the apprehension for deleting stems from the fear of deleting something of greater value than initial appearance would indicate. However, it also appears that the reluctance to delete the information emails also stems from the fear of losing insight into the popular topics. For many of the study's participants, the email client was used as a headline aggregator providing services similar to a RSS reader.

4.3.5. Email Communication

Despite the faculty's use of the email client as a home for most of their informational needs, the email client had some serious failings in performing its original function of improving communication. Students were the single largest group with whom

faculty communicated. Yet, when communicating with students, many of the professors thought that email was not the ideal communication tool.

Participants noted two problems when using email to communicate with students. The first problem is that students become reliant on email as an answering system. Faculty complained that some students would email questions to them without first thinking through their questions.

> *"… what I don't want them to do is to say well, to just quickly, I've thought of a question, I'll email the professor without having thought about it."*
>
> *(Participant 6)*

The near negligible costs of email made sending questions to faculty an easy solution to any problems that students come across during their studies. If students were instead faced with the choice of whether having to wait to speak face-to-face with their professors or spending another ten minutes on a problem, they may choose the latter.

The second issue noted when using email as a communication tool with students is the individual nature of email discussions. When students send messages to their professors, the participants noted that only themselves and the student are usually on the email. As a result, the professor must respond to each student individually. Because student questions tend be repetitive and cover the same topic, email was an ineffective way to respond. The professors noted that as a result they sometimes scan student emails to identify any common themes. If a theme develops, the professor will refrain from answering any questions until class, during which the answer only needs to be given once.

"So I'm always doing content analysis of my email messages also to see if there's any consistent themes across them... My barrier for that is usually very low so if I have a class of 30 and I get two emails about the same topic, I'll go over it in class." (Participant 6)

Other professors also noted that they specifically asked students not to send them questions. Instead, students should post their questions in Internet forums created specifically for their class. This way, any response by the professor could be read by all the students and hopefully reduce the number of questions sent to the professor.

"I try to encourage students in my class (which happens to be online) to ask questions in [our class discussion board] so that all students can benefit from the answer… and to minimize the email I get." (Participant 1)

4.3.6. Conclusion

Paradoxically, despite for the participants' ambitions to adapt the email client for tasks which it was not originally designed, each participant noted that they failed to use features and functions provided to enhance their ability to handle daily messaging tasks. The functions left unused included filtering rules, inbox sorting and filtering functionalities, advanced search capabilities, email address books, and several others.

"I probably have to do a better job too looking at some filtering stuff but there is just a lot of junk…" (Participant 1)

"If I don't remember who it's from or it's just someone... I've got... hundreds of emails from him, then I'll use the search capability in here. And the search capabilities pretty weak. That's the thing I wish were a little more sophisticated. It's just, in Outlook at least, all you can do is say look for this term, and it looks for that term everywhere. And it's only that one term." (Participant 8)

"And, you know, I [keep emails in the queue] for a couple of reasons. Most importantly that's one way to save email address. And that's not right. I shouldn't save the whole thing just to keep somebody's address. That's kind of silly, but that's what I do." (Participant 6)

For most of these functions, the failure by participants to explore the email client, the lack of an intuitive interface, and the imperfect implementation of a feature all contributed to user hesitation to use available email management features.

Despite participants' understanding that their email client did not perfectly perform as a communication tool, they continually used it for additional functions. Participants suffered as a result. None of the features were used without participants noting that the features were far from perfect and required personal adjustments. Numerous improvements could be made to these functions to enhance their ability to help faculty manage their information and tasks.

4.4. Email Overload

Email overload was a familiar topic for all participants. Their email experiences differed quite significantly, but they were aware that this issue affected many individuals. In this study, the professors separated into two categories, those that had daily experiences with email overload and those that were relatively email overload free. Email overload is subjective because it relies on an individual's ability to process information and tolerance for unprocessed information to accrue. However, triangulating three data items provided comfort that participants were at a minimum consistent in their responses and that their responses were not influenced by any particular email episodes shortly before participant and researcher interactions.

Mean of Email Overload Variables

Participant	Mean
1	3.71
2	1.43
3	2.57
4	2.29
5	3.00
6	3.86
7	4.00
8	2.29

Table 2: Mean of Email Overload Variables

Four out of the eight professors experienced acute email overload. These participants responded strongly on the initial questionnaire that they had trouble managing their email, difficulty locating messages, struggles reading all of their important email, and in general felt that email caused stress in their life.

Among these four participants the average response to a series of seven questions, which as previously described showed a strong Cronbach alpha correlation, ranged from three to four on a 5-point Likert scale. In comparison, the average response among users

identified as infrequently experiencing email overload ranged from 1.43 to 2.57 (Table 2).

These four participants further distinguished themselves during their second and third interviews. It became apparent that these individuals were having significantly different experiences with email overload compared to their colleagues. These individuals repeatedly referred to their inability to manage their current email and they felt that email overload occurred either weekly or daily.

These experiences were characterized by reactions of disgust with the amount of information that they had to manage. It was also distinguished by frustration with the ability of a single email message to sidetrack their entire day. All four of these participants noted that one simple question could lead them down various paths in their attempts to identify and compose the correct response.

> *"And my problem is that [one email] can lead me astray from the things I want to do for the rest of the day. Because I get requests to do things that take time and they kind of scale and scroll out of control." (Participant 6)*

The other four professors in the study did not feel that they experienced email overload. In general, they were able to manage their messages, find important email when necessary, and could read all of the important email that they received. Their responses to the questionnaire and during the interviews were consistent in stating that email overload was not an issue for them. They rarely experienced it and did not feel they had to make any changes to their email management approach.

4.4.1. Sources of Overload

Various responses were offered when participants were asked what attributes of their email experiences caused a feeling of overload to occur. One attribute was sheer volume.

> *"Well I guess, combination of content and numbers that there are too many emails that I really have to respond to [causes overload]."*
>
> *(Participant 7)*

They noted that email volumes forced them to check email more frequently so that the inbox would not become flooded with messages. Even imagining a full inbox elicited reactions of disgust, frustration, and fatigue from the four email-overloaded participants. This was a particular problem when the professors were on vacation and away from their inbox for prolonged periods of time.

> *"The day to day, I'll be gone from my computer for a couple of hours and I come back and there'll be fifty messages that have stacked up. You are going [sighing], you sigh and you just go through the process of the triage." (Participant 5)*

> *"If I did not do [manage my email] when I was on vacation I would (groaning), I would really be depressed because it would be just. I mean right now I get pages for one day, let alone going away for a week or two weeks. I just couldn't, be able to manage…" (Participant 1)*

In addition to volume, the email-overloaded professors also noted the unknown as a cause of email overload. Messages in the inbox and folders that had not yet been

reviewed or had been forgotten were one of the biggest causes of email overload. Information was scattered everywhere within the email client making it difficult to review and recall. The inbox and numerous folders contained messages that participants had not been able to fully read and react to or had been overlooked.

> *"And it becomes a quandary because I know there are things that I probably should organize better but I ultimately just say I don't know what's here, I haven't looked... at these for a week or more. I don't know if I'm losing (laughing), I don't remember [if] I'm losing anything valuable…" (Participant 5)*

This professor's description typifies the email overload experience that other professors encountered. Professors felt that there was so much information that much of it went unread and the knowledge that important messages could go unread was disturbing. However, the professors felt that there were few options for correcting this situation.

Even messages that had been read and could be recalled created email overload. According to the overloaded professors, the decision of which emails to save or delete and where to file saved messages caused email overload. These seemingly simple choices, when repeated throughout the course of the day, contributed to the feelings of overload.

All of the participants in the study, even those who did not experience overload, noted the struggle that they faced in deciding whether an email should be saved or deleted.

> *"I've [got] a thousand emails, that's silly. I don't need to keep a thousand emails. I should delete more of the ones that don't require a response. I'm*

envious of the people that have a very small inbox because I think they're better organized than I am. So I try to do a better job of deleting material rather than just leave it sitting around and I wouldn't look at it again anyhow. And that's part of the informational overload sort of thing." (Participant 6)

The demands of the professors' job, as previously noted, required that some emails be saved. The archiving of each email though could affect each professor's future productivity. If a message was unnecessarily saved, it could make locating important emails more difficult. The professor would waste increasing amounts of time as their searches became slower. However, the other choice, deletion, was even more concerning as the information would be lost forever.

For professors who filed their email, once an email was saved, the next decision was where to file a stored email. Of the four overloaded professors, three of them noted that they worried where to file an email because they doubted their ability to recall its stored location. Participants found that predicting their future retrieval patterns was a taxing process.

"Moving messages to sub folders requires a commitment - it is easier to just leave a message in the inbox." (Participant 5)

The repetition of this process for each saved email multiplied its effects. However, failing to correctly file an email would cause it to be essentially lost in a sea of folders and other emails.

The last key factor in email overload was correspondents' expectations. When messages in the overloaded professors' inboxes were from individuals who expected or

required responses quickly, the likelihood of email overload occurring increased. In particular, students were noted as having high expectations that their emails would be answered as soon as they were read. For the participating faculty, this unfortunately could not always be the case.

> *"And, as a teacher, I don't know, students want immediate responses. Sometimes you can do it sometimes you can't [shaking head]."*
>
> *(Participant 1)*

Friends and family were also noted as having high expectations that they would receive responses to their emails in a short period. All of these unmanageable expectations created feelings of email overload.

4.4.2. Email Overload Management

While participants were eager to identify the causes of email overload, they had difficulty trying to identify successful approaches to managing or eliminating email overload. Nevertheless, looking across the study, it is possible to identify some factors and user tactics that appear to be effective in limiting email overload.

Two personality traits emerged during conversations about email overload management. Participants noted that decisiveness and discipline were critical to managing their email. The frequency with which these terms were used did not differ between the group who avoided being overloaded and the group who frequently experienced email overload. The overloaded group recognized that they often lacked these characteristics when dealing with email and envied individuals who possessed these traits and avoided email overload.

The term discipline can be found repeatedly in the professors' questionnaires and interviews. Professors used the term to describe their ability to limit access to email. Email can be an addictive distraction. Millions of people can be reached with the click of a button. This can be distracting and also create opportunities for procrastination. Participants routinely noted that they often used email as a tool to postpone more urgent work. For the participants who were not overloaded, the ability to stop looking at messages when other work required focused attention was critical to avoiding email overload.

> *"So there are times when I have to ignore the email because I have to do something. I will just not bother with email. So I can get done what I have to do. And, and that takes discipline." (Participant 2)*

> *"… once in a while, when I'm working on a paper or trying to work on something that needs real concentration I will find the disciplineness [frowning] of not allowing email interrupting my train of thought." (Participant 3)*

For those email-overloaded faculty, email was allowed to dictate the day. Email, rather than the user, determined the next task.

> *"But as time has gone on, I will actually, like I said a couple times an hour, feel obliged to click the send receive and take a look at what's going on even if I'm... in the middle of some other project. And it tends to take, I allow it to take priority. So it is an imposition. I allow it to be an imposition." (Participant 5)*

Discipline allowed half of the participants to maintain a balance between completing personally satisfying work and responding to the request of others.

The concept of decisiveness was less directly discussed. During the course of the study, participants mentioned the nearly constant decision-making that needed to occur during the triage process. Emails needed to be saved, labeled, and filed. Other emails needed to be reprioritized in a constant juggling process as new messages were received. The volume of email and the speed at which it arrives can overwhelm the receiver's ability to processes it. For the email-overloaded professors, the repetitive decisions during the triage process were burdensome. They contributed to the users feeling of being overwhelmed by their email.

For professors who avoided email overload, their ability to quickly make a decision and not question their decision enabled them to manage their email in a shorter period. Many of these professors could easily delineate their thought processes when going through the inbox.

> *"I'll either a act on it, b this is junk and chuck it, or c if I knew I have to do something for it, I'll just mark it as unread." (Participant 4)*

Moving more efficiently through the inbox, professors successfully managing their email left less emails unread or unprocessed at day's end, thereby reducing the likelihood of experiencing email overload.

Another successful email management technique, one that was dictated by the email client, was simply not filing at all. Only one participant employed this method. However, when other participants were asked about this management technique, they noted that this approach could potentially eliminate email overload. Not filing email has

been practiced in some of the more popular web email clients that offer unlimited storage such as Yahoo! Mail and Google's Gmail. Unfortunately for most users, leaving email in the inbox indefinitely is not an option due to space constraints. Nevertheless, not filing removes two decisions during the email triage process, which messages to save and how to file saved messages.

Participants in the two groups also differed over their views of whether managing email was productive. The participants with effectively managed their messages saw email as part of the job.

> *"I would actually say I much more, it is a part of my day. It's ingrained put it that way. It's been ingrained so far that over the last. Let's say 8 or 9 years ago, when I was doing other things email was just something I look at once or twice a day. Being a teacher and actually having student questions all the time, it's an integral part." (Participant 4)*

Spending time responding to their emails was more incorporated into their view of their occupation. Emails were integral to their daily functions and had become the job.

These individuals also considered processing emails received during the day a sign of productivity. A managed inbox provided a sense of accomplishment.

> *"Right now, email is my dominant communication channel with others. I do derive satisfaction from having done a certain amount each day to keep the information flow moving." (Participant 2)*

Participants with this attitude felt personally rewarded when they finished the day and found the inbox either nearly clear or completely reviewed.

Email-overloaded participants did not have the same consistent view. Many saw it as an occupational inconvenience that they managed but didn't consider a core function. It was not as comprehensively seen as a component of the job.

Regarding email and productivity, the email-overloaded professors found processing email to be unproductive. While some theoretically considered contributing to any conversation productive, they had difficulty translating that belief into the daily actions required when responding to and managing email. Email-overloaded professors also found email productive only part of the time. A few of the participants from the email-overloaded group compared email to other forms of communication and thought that many of the requests they received would be more effective if communicated via telephone or face-to-face.

> *"…I'm more likely to hit the phones or wait to see the person... Because I just think that's much more efficient." (Participant 6)*

They struggled with email as a medium and as a result found it to be unproductive.

Despite differing beliefs in email effectiveness, it was the professor's most critical medium for communication. Students, colleagues, and university administrators all expected that the faculty would read and respond to their emails. As mentioned, these groups anticipated a response to their message as soon as it was sent. Managing these expectations was one measure which some of the participants felt would reduce the pressure to respond immediately. For one of the professors who avoided email overload, publishing the times during which she would access or respond to emails limited any feelings of angst when messages remained unread and unanswered in the inbox.

> *"I believe by posting this message I am making an honest effort to inform potential emailers of what may take place. Students go on break and I think that many of them don't understand that faculty deserve a break as well… I feel much better having made an effort to inform…" (Participant 2)*

This tactic though was not a silver bullet. Other participants felt that recipients would still expect immediate responses.

Instead of trying to alter correspondents' expectations, some professors attempted to alter their correspondents' email format. A number of professors requested that correspondents use standardized subjects. This eased the process of determining which emails deserved priority. This was particularly useful when managing emails from students in the professor's classes. Students were encouraged to put the course number along with the title of their message in the subject of their email. Professors could then place a higher priority on these emails without excessively scanning the inbox.

This also assured an email from a student would not be erroneously deleted. Because the students with whom professors interact are constantly changing, professors could not consistently rely on the email address as an indicator of an email's importance. If a student's email came from a domain outside of their institution, the participants noted that they might accidentally delete the email. A course number in the subject reduced the likelihood that this would occur. By setting their correspondents email format, the participants perform triage more efficiently and thereby reduce email overload.

The last effective email overload management tactic was immediately responding to emails. Participants who did not frequently experience email overload noted that they responded to emails as quickly as possible.

> *"… if I get an email, assuming that I'm not on the phone or talking to somebody, I will at least look at it. If it's something that I can respond to right away, I'll do that. I really try and get things taken care of as quickly as possible." (Participant 8)*

Often, these professors could only respond to emails requiring short responses because of time constraints. But, because most emails necessitate only one-line responses, the inbox contained few messages. Those failing to approach email this way had an inbox with a mixture of urgent, more complex messages and short response emails making it difficult to determine an individual's workload.

This method of immediately responding initially seemed contradictory to participants' feelings regarding email discipline. How could these two conflicting approaches to email both be effective in combating email overload? From participant interviews, it became clear that the discipline needed to close the email client was used sparingly. The professors who successfully managed their email answered emails immediately yet retained the ability to disconnect from their email when necessary. It was the balance of these two concepts that contributed to successful management of a professor's email.

4.4.3. Email Overload's Effects

The individual characteristics and tactics discussed were critical for professors to manage their email and avoid feeling overloaded. Nevertheless, email overload did affect the participants. For participants in this study there was one recurring effect of overload. When email overload occurred, participants noted that they had less time to spend on each individual email. There were more emails to go through, more emails to action, and more information and tasks to manage. As a result, participants were increasingly likely to miss an important email because each message was not given full consideration.

> *"… when I come back from several days gone I'm going to be moving through my emails pretty quickly and it probably means I'll miss out on some good ones." (Participant 6)*

Even when participants read the email, they noted that they misread, misinterpreted, or glossed over portions of the message.

Participants also noted that their responses were likely to be less complete. Because participants had spent less time reading the message, their responses did not fully answer their correspondents' questions. Professors also spent less time crafting their response so that they could move on to the next task. As a result their emails had to be interpreted, increasing the possibility of miscommunication (Figure 1).

All of these problems were exacerbated for participants who did not feel that email itself was productive. These professors wanted to get through their email as quickly as possible so that they could move on to other job functions. The proper review of messages was a secondary concern. These participants noted that the likelihood and quality of a response dropped dramatically when they experienced email overload.

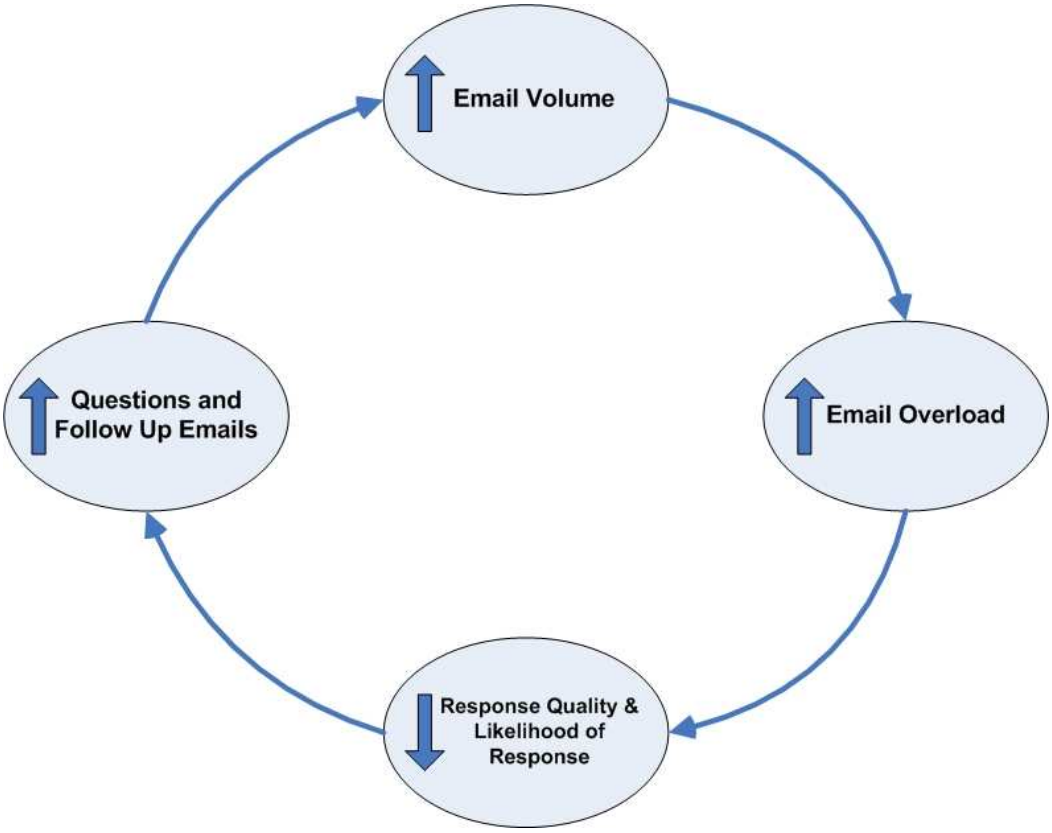

Figure 1: The circular effects of email overload

5. Discussion

The following section reviews this study in light of previous research, identifying similarities and differences in results and conclusions. The researcher discusses the relationship between email client overload and email overload, the effects of patterns in email volume, the need to communicate email as a job function, the vicious circle of email overload, the impact of email interruptions, and the complexities of identifying each factor creating email overload.

While other studies have examined either email client overload or email overload, few have identified the relationships between the two. Email overload has primarily been seen as a consequence of email volumes. Findings published by Ahdoot (2007) and

Dabbish and Kraut (2003) demonstrate a positive correlation between email volume and email overload. Only the recent research of Bellotti, Ducheneaut, Howard and Smith (2003) introduced the concept of email quality and email interdependence as a cause of email overload. Meanwhile, other email overload research has only referred to the co-opting of the email client to perform functions besides communication. The results in this study, however, indicate that the two forms of email overload are closely related. The participants' insistence to use the email client as the Swiss army knife of software, despite its failings, can create the illusion of received email volumes greater than reality, thereby leading participants to more frequently experience email overload

Professors' use of the email client as an information management tool causes the email inbox to fill with messages. As user struggles with the decision of whether to save an email and how to file it, they leave messages in their inbox, filling the inbox with both read and unread emails. This can create the perception of a constantly growing amount of information to consume. It also creates an appearance of an increased workload as many professors use the inbox as a workload barometer. The feelings associated with email overload, including stress and inability to focus, are likely to follow.

The use of the email client as a task manager also has the potential to create the appearance of increased email volumes. For professors involved in the study, emails were specifically left in the inbox to act as reminders of responses and actions needed to be completed. Upon completing these tasks, the messages would be deleted or filed. However, for many participants, tasks began to pile up in the inbox. Similar to leaving emails to be filed, these tasks would become intermingled with emails that had not yet been read. A perception of increasing information to process was the likely result as the

number of messages in the inbox grew. In addition, a professor's inability to differentiate quickly between tasks and unread emails made task completion more difficult. Users may find that they have to reread messages to redetermine whether they should be filed or need to be actioned. It is unsurprising then that email overload, including a decreased rate of information processing and the complete failure to read critical information, is a more frequent occurrence.

Unlike most previous email overload research, this study has focused on professionals working in academia rather than in the corporate world. Despite repeated results that demonstrate the uniqueness of an individual's email and their interactions with messages, researchers generally have failed to expand the breadth of their studies to include participants from other fields. As a result, this study has yielded some unique results.

The cyclical nature of email volumes within academic institutions is the first exceptional result. As previously mentioned, all of the participants found that message volumes were cyclical throughout the year. Participants also noted that the individuals with whom they corresponded changed on the same cyclical calendar. Students moved on to their next classes and professors became involved in an entirely new set of students. This is a unique email pattern that has not been noted in any other research.

The impact of this pattern is multifaceted. For spring cleaners, those individuals who only file occasionally, cyclical email volume may work in their favor. By timing their filing to the cyclical school year, professors could clean the inbox when the volume of received emails was reasonably low. These professors could leave emails in the queue, yet avoid overload because they knew that they would have the time to review

their email and delete or file it. Interestingly, none of this study's participants who used a spring cleaning approach experienced email overload. Their comments bore out the convenience they found in coordinating their filing with the end of each school

The cyclical volume of email for professors also provided a reoccurring opportunity to reevaluate the contents of their inbox, folders, and filing system. After the end of the semester, participants could determine which email and information to save with a more complete perspective. This backward looking perspective also would allow professors to identify multi-email themes from email received during the entire school period. These themes likely would be easier to recall in the future because professors had proactively identified a theme. Rather than being forced to guess at themes or categories of email that might emerge, spring cleaners could identify themes for the school period and then file their messages. This would reduce the burden of trying to identify future retrieval patterns when filing email.

All of these new results are intriguing, as they may lead to creation of different email clients for users in academia. However, one of the most significant findings is the importance of a professor's opinion on email's productivity. Professors, who viewed email as a task and received mental satisfaction from completely reviewing their daily email, were less likely to experience email overload. While universities have spent resources on educating their professors on effective ways to use email (Ahdoot, 2007), they may also need to emphasize that email is not only a component of a professor's job but is critical to their personal and students' success.

Besides differentiating itself by the results produced, this study also confirmed that much of the research in previous studies is applicable to professionals in the

academic field. Professors adapted the email client for many of the same purposes and experienced many of the same failings.

In particular, this study and previous research demonstrates that users continue to file email despite improvements in search tools, and that filing is an inefficient approach to locating information. Previous studies have had difficulty explaining this disconnect. In this study, participants' comments indicated that filing has multiple purposes. While filing helps finding emails at a future time, filing also ensures that the participant has reviewed the email and does not have unknown information stored away. This component, knowing your email, cannot be replaced with improved search tools.

The findings of this study also identify that email is a disruptive force for many users during the day. By interjecting itself into the user's attention, email can sap the user's ability to focus on one task and thereby decrease productivity (Dabbish & Kraut, 2003). Interruption, the ability to cause the user to reallocate their attention focus from a task to the notification of a peripheral display (Zhang & Vronay, 2005), should be used cautiously. The user's attention should be inviolable as it is a precious commodity. To empower the user, so that they feel that a peripheral display is beneficial rather than a distraction, they must be allowed to control whether it occupies the center of their attention or remains in the periphery (Weiser & Brown, 1996). By placing things in the periphery, the user can be "attuned to [them] without attending to [them] explicitly" (Weiser & Brown, 1996). By allowing the user to customize the factors for determining notification, the peripheral display empowers the user to keep information at the periphery. Microsoft Outlook now includes the ability to create a small pop-up window when an email is received from a particular individual or group. This study shows that

this feature is frequently used but the results demonstrate that professors may still find this intrusive. Further research in this field is necessary as email interruptions continue to be an significant psychological issue.

This study also concurs and extends previous research that demonstrates a vicious circle can occur, where each experience of email overload increases the likelihood of experiencing overload again in the future (Janssen & Poot, 2006). Prior research noted that an individual experiencing email overload changes their filing and management patterns. This leads to a decreased ability to manage email. Results from this study extend the vicious circle from one individual to the community of users in which one participant experiences email overload. Professors in this study noted that email overload causes them to create less complete responses. The result is likely the accumulation of additional emails to determine the exact answer from one email. These additional emails will likely affect not only the professor but also the person with whom they are communicating. The volume of email increases across a community because of email overload and can induce email overload in other individuals.

Lastly, the results of this study also concurred with the findings of prior research regarding the general user characteristics that reduce the occurrence of email overload. A user's ability to control or avoid email overload is the result of personal characteristics and email management tactics. No one tactic is likely to be sufficient for every user, but by making improvements to the email client interface and the capabilities of the email client, increasing email volumes can be managed.

6. Conclusion

Email has grown in importance in both the business and academic environments. This is a communication channel that likely will not be replaced in the near term. Email's positive and negative impacts on users have been documented in this study accompanied with links to findings from prior research. The objective in all of this research is to better understand the various users, the difficulties that they face, and use this information to improve their interaction with email so that they can see improvements in their productivity and satisfaction with their lives.

The results of this study though, provide more questions than answers. As an exploratory case study, this was the goal. The researcher hopes that the information presented here will open up many more avenues of study.

Future email overload studies in academia should expand into other departments and universities. Results from such studies will determine whether the results presented here apply across a larger population of professors. The findings of this study are clearly professor centric and neglect a large portion of the academic environment, namely students and staff. Any future research should investigate the occurrence of email overload among the student and staff populations. Increased understanding of the entire academic environment may lead to breakthroughs in reducing email overload in academic settings. The researcher suggests that the use of systematic email volume measurement systems, case studies of a longer duration, and if possible ethnographies will serve to strengthen the results of these future studies.

Compared to previous studies, this study has also shown that there are a number of differences in user behavior and the volume of email traffic. Researchers need to take

a further look at different organizations. What are the difficulties for email users and their personal email? Are there any differences among business organizations, such as financial institutions, legal firms, and health care providers. These organizations in particular face great challenges regarding the security and safety of customer information. Customer confidentiality may require that professionals engage in additional activities before transmitting emails. These activities may contribute to the increased likelihood of email overload.

Research across other populations will also prevent investigators from making sweeping generalizations. The findings of this study indicate that researchers in this field must be extremely cautious when extrapolating from one case or sample population to a greater population. Email behavior and reactions have shown them to be very individualistic. Though patterns across users do exist, researchers need to ensure that they do not make oversimplify the problem of email overload and user behavior when managing email.

The individual nature of email use also demonstrates the need for greater flexibility in email clients. Today's clients provide a generic interface and feature set for all users. Greater structuring of email clients must be created so that users of varying levels of expertise and sophistication are accommodated. Current features in clients need to be revisited and either scrapped or reinvented so that users can take advantage of them. This means features must be easier to use and understand, more accessible, and more flexible. With further studies, researchers may find that email clients need to be tailored to a specific organization. Organizations must also realize that dictating one email client for all employees may be counter productive. This common practice reduces costs

because the organization needs only the expertise to support one application. However, the savings achieved may be offset by the increased time and energy spent by each employee frustrated by a client that does not meet their needs.

All of these recommendations, in coordination with ongoing email redesign efforts, may give rise to new email clients that will improve the user experience. With these efforts, email can once again become a desired tool rather than a hindrance.

7. References

Ahdoot, J. (2007). *Email overload: Information overload and other negative effects of email communication*. Unpublished master's dissertation, California State University, Long Beach.

Bälter, O. (2001, April). Keystroke level analysis of email message organization. *The Future is Here, 2(1),* 105-112. Retrieved April 14, 2007, from ACM Digital Library database.

Bellotti, V., Ducheneaut, N., Howard, M., & Smith, I. (2003). Taking email to task: the design and evaluation of a task management centered email tool. Proceedings of CHI '03: SIGCHI Conference on Human Factors in Computing Systems, 345-352. Retrieved April 14, 2007 from ACM Digital Library database.

Bellotti, V., Ducheneaut, N., Howard, M., Smith, I., & Grinter, R. E. (2005). Quality versus quantity: E-mail-centric task management and its relation with overload. *Human-Computer Interaction, 20,* 89-138. Retrieved August 15, 2007, from http://www.parc.com/research/publications/files/5646.pdf.

Chua, W.F. (1986). Radical developments in accounting thought. *The Accounting Review*, 61, 601-632. Retrieved February 19, 2008 from JSTOR.

Dabbish, L. A., & Kraut, R. E. (2006). Email overload at work: An analysis of factors associated with email strain. *Proceedings of CSCW '06: the 2006 20th Anniversary Conference on Computer Supported Cooperative Work,* 431-440. Retrieved April 15, 2007, from ACM Digital Library database.

Denning, P. J. (2006). Infoglut. [Electronic version]. *Communications of the ACM, 49*(7), 15-19. Retrieved April 22, 2007, from ACM Digital Library database.

Ducheneaut, N., & Bellotti, V. (2001, September/). E-mail as habitat: An exploration of embedded personal information management. *Interactions, 8*(5), 30-38. Retrieved March 26, 2007, from ACM Digital Library database.

Edmunds, A., & Morris, A. (2000). The problem of information overload in business organisations: A review of the literature. [Electronic version]. *International Journal of Information Management, 20*(1), 17. Retrieved April 22, 2007, from http://www.chl.chalmers.se/main/inst_bygg/kursmaterial/edmunds.pdf.

Fisher, D., Brush, A. J., Gleave, E., & Smith, M. A. (2006). Revisiting Whittaker & Sidner's email overload ten years later. *Proceedings of CSCW '06: the 2006 20th Anniversary Conference on Computer Supported Cooperative Work,* 309-312. Retrieved April 14, 2007, from ACM Digital Library database.

Fitzgerald, M. (2004, June 7). Call it the dead e-mail office. *Wired*. Retrieved September 10, 2007 from http://www.wired.com/culture/lifestyle/news/2004/06/63733

Gillham, B. (2000). *Case Study Research Methods*. London: Continuum Books.

Glaser, B., & Strauss, A. (1967). *The Discovery of Grounded Theory*. Chicago, IL: Aldine Publishing.

Goldberg, A. (2007, October 16). Email backlash takes root in tech heartland. *Bangkok Post*. Retrieved October 16, 2007 from http://www.bangkokpost.com/gadget/gadget.php?id=228

Goodman, K. (2008, March). The 30-day e-mail detox. O, The Oprah Magazine, 203-206.

Gwizdka, J. (2004). Email taks management styles: the cleaners and the keepers. *Proceedings of CHI '04 Extended Abstracts on Human Factors in Computing Systems*, 1235-1238. Retrieved July 18, 2007 from ACM Digital Library database.

Ho, J., & Tang, R. (2001). Towards an optimal resolution to information overload: an informediary approach. *Proceedings of Group '01: the 2001 International ACM*

SIGGROUP Conference on Supporting Group Work, 91-96. Retrieved May 8, 2007 from ACM Digital Library database.

IDC. (2007, April 9). *IDC reveals the future of email as it navigates through a resurgence of spam and real-time market substitutes*. Retrieved September 20, 2007 from http://www.idc.com/getdoc.jsp?containerId=prUS20639307.

Jackson, T. W., Burgess, A., & Edwards, J. (2006, June). A simple approach to improving email communication. *Communications of the ACM,* 49*(6)*, 107-109. Retrieved September 21, 2007 from ACM Digital Library database.

Janssen, R., & Poot, H. d. (2006). Information overload: Why some people seem to suffer more than others. *Proceedings of NordiCHI '06: the 4th Nordic Conference on Human-Computer Interaction,* 397-400. Retrieved April 4, 2007 from ACM Digital Library database.

Jovicic, S. (2000). Role of memory in email management. *Proceedings of CHI '00: CHI '00 Extended Abstracts on Human Factors in Computing Systems*, 151-152. Retrieved April 22, 2007, from ACM Digital Library database.

Kerr, B., & Wilcox, E. (2004). Designing remail: reinventing the email client through innovation and integration. *Proceedings of CHI '04 Extended Abstracts on Human*

Factors in Computing Systems, 837-852. Retrieved September 18, 2007 from ACM Digital Library database.

Klapp, O. E. (1986). *Overload and Boredom: Essays on the Quality of Life in the Information Society*. Westport, CT: Greenwood Publishing Group Inc.

Lyman, P., & Varian, H.R. (2003). *How much information*. Retrieved September 18, 2007 from http://www.sims.berkeley.edu/how-much-info-2003.

Mackay, W. E. (1988). More than just a communication system: Diversity in the use of electronic mail. *CSCW '88: Proceedings of the 1988 ACM Conference on Computer-Supported Cooperative Work*, United States. 344-353. Retrieved May 1, 2007, from ACM Digital Library database.

Mock, K. (2001). An experimental framework for email categorization and management. Proceedings of SIGIR '01: the 24th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, United States, 392-393. Retrieved April 20, 2007, from ACM Digital Library database.

Moltusky, H. Dr. (2002). Detecting outliers. Retrieved April 29, 2007, from http://www.graphpad.com/articles/outlier.htm.

Myers, M. D. (1997, June). Qualitative research in information systems. *MIS Quarterly*, 21, 241-241. *MISQ Discovery,* updated version, last modified: January 4, 2008. Retrieved February 19, 2008 from http://www.qual.auckland.ac.nz

Schuff, D., Turetken, O., D'Arcy, J., & Croson, D. (2007, February). Managing e-mail overload: solutions and future challenges. *Computer*, 40, 31-36. Retrieved September 1, 2007 from IEEE Xplore database.

Seidman, I. (1998). *Interviewing as Qualitative Research*. New York: Teachers College Press.

Shenk, D. (1997). Data smog: Surviving the information glut. San Francisco, Calif.: Harper Edge.

Stross, R. (2008, April 20). The daily struggle to avoid burial by e-mail. *The New York Times,* C4.

Walsham, G. (1993). Interpreting information systems in organizations. New York, NY: Wiley & Sons.

Weiser, M., & Brown, J. S. (1996). The coming age of calm technology. Retrieved December 18, 2006 from http://www.cc.gatech.edu/~keith/classes/ubicomplexity/pdfs/foundations/weiser-calm.pdf

Whittaker, S., & Sidner, C. (1996). Email overload: Exploring personal information management of email. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems: Common Ground*, 276-283. Retrieved March 26, 2007, from ACM Digital Library database.

Yin, R. K. (2002). *Case Study Research, Design and Methods, 3rd ed*. Newbury Park, CA: Sage Publications.

Zhang, L., Tu, N., & Vronay, D. (2005). Info-lotus: A peripheral visualization for email notification. *CHI '05: CHI '05 Extended Abstracts on Human Factors in Computing Systems*, United States, 1901-1904. Retrieved December 20, 2006 from ACM Digital Library database.

8. Appendix A

Survey: E-mail Overload # _____

Please answer the following questions to the best of your knowledge. If for any reason you feel uncomfortable answering a particular question, please feel free to skip it. To ensure that all responses are kept confidential, please do not include your name on this form. Thank you.

1) How many e-mail messages do you receive in a typical 24 hour period? _____

2) How many e-mail messages do you read in a typical 24 hour period?

_____

3) How many e-mail messages do you send in a typical 24 hour period?

_____

4) How many e-mail messages do you delete in a typical 24 hour period?

_____

5) How many e-mails do you currently have in your inbox? _____

6) How many e-mails folders have you created for storing e-mail?

_____

For the following six questions, if you will be returning the survey via e-mail, please either bold your response or enter your response at the end of the question.

7) I can manage my e-mail efficiently… __

1 2 3 4 5

(Strongly Disagree) (Strongly Agree)

8) I have trouble locating information in my inbox or folders… __

1 2 3 4 5

(Strongly Disagree) (Strongly Agree)

9) I can read all of the important e-mails that I receive… __

1 2 3 4 5

(Strongly Disagree) (Strongly Agree)

10)I sometimes miss important information or important messages… __

1 2 3 4 5

(Strongly Disagree) (Strongly Agree)

11) My e-mail interrupts my work… __

1 2 3 4 5

(Strongly Disagree) (Strongly Agree)

12) I feel stressed because of my e-mail… __

1 2 3 4 5

(Strongly Disagree) (Strongly Agree)

13) Managing my e-mail is overwhelming … __

1 2 3 4 5

(Strongly Disagree) (Strongly Agree)

14) In a typical 24 hour period, how frequently do you check your e-mail?

_____ Times

15) When do you check your e-mail (e.g. every time an e-mail arrives, every few minutes, every evening, etc…)?

_____

_____

_____

16) When do you typically respond to your e-mail (e.g. every time an e-mail arrives, every few minutes, every evening, etc…)?

_____

_____

_____

In the space below, please detail times during which you would be willing to be interviewed. As mentioned, interviews will last twenty to thirty minutes.

Thank you for your participation.

9. Appendix B

Email Interview

Please treat the following questions as if they were asked during a face-to-face interview. The questions should be answered with as much detail as possible. Please avoid one-word answers. For questions with a scale, please bold your selection. This entire questionnaire should take you 15 to 20 minutes.

Thank you again for your participation in the study!

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1) Do you file your emails into folders? If so, how are those folders structured? How often will you file emails?

2) How do you find emails in your inbox or in folders? Please explain the process step by step.

3) When we were discussing the queue, you mentioned that you had a number of reasons for leaving emails in there. One of those reasons was saving email address. What are the other reasons you leave email in the queue?

4) You noted for emails that will have lengthy responses and to which you wish to document your response, that you may have to put them back in the queue. What does this process involve? How do you identify later that you need to respond to this email?

5) I feel compelled to save my emails.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)

If so, where does this feeling derive from? Is this a personal preference or an expectation of those with whom you associate?

6) I feel that the decision of what to save and what to delete is a burden.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)

Do you think that having to make this decision so often during the day contributes to your response one way or the other?

7) When I look at my email client, the amount of email saved in folders and the queue causes me to feel overwhelmed.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)

8) The amount of email saved in folders and the queue causes me to feel annoyed.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)

9) I feel stressed because of the possible unknown information in either my folders or my queue.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)

10) I feel that the decision of where to file email is an inconvenience that contributes to the feeling that managing email can be burdensome.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)

11) When you are filing are you worried that you won't recall where and why you put your email in a particular location? Do you think that filing is the optimal way to maintain your inbox?

12) Do you feel that the expectations of individuals with whom you converse contributes to your feelings of email overload? For example, if your colleagues expect quick response this causes additional stress.

13) Do you think that communicating your availability to others, thereby setting their expectations as to when they might anticipate a response, would help reduce your feelings of email overload?

14) I feel that answering email is itself productive.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)

Please explain your feelings. Why do you think this is the case?

15) I feel personal satisfaction from having completely reviewed and responded to the
email received during a given day.

1	2	3	4	5
(Strongly Disagree)				(Strongly Agree)