**Brief Annotated Bibliography on E-mail Research**
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Relationship between alternative e-mail organizational strategies and time required for the strategy is modeled mathematically at the keystroke level (for five users). Author separates e-mail user types into Beginner, Frequent Filer, Spring Clearner, and No Filer, and found that (a) if stored messages are less than 100, having no folders is efficient; (b) zero to three folders are less efficient than four to 20 in terms of folder searching, (c) more than 30 folders is not efficient in general, (d) time differences across strategies are insignificant provided stored messages number less than a few thousand, (e) file cleanups are less efficient, and (f) folder-dependent searches are more efficient than folder-independent ones (p. 112).


Authors argue that “One area of interest for further exploration is the difference between being reachable for communication and being available for it. Availability depends not only on physical presence but also on mental receptivity to communication” (p. 342).


Interviewed twenty-eight individuals from a diverse pool of occupations across three organizations. Approximately 280 activities were coded by two researchers: 35% involved announcements, dialogue, discussion, negotiation; 28% involved organizing, arranging, coordinating, scheduling; 8% were not activities; 2% involved coauthoring, document review, and; 1% involved formal information gathering. Forty-five percent of all activities involved more than 20 people, thirty percent involved only two, and 10 percent involved three. Major challenges for email users are (1) keeping track of lots of concurrent actions, (2) marking things as important or outstanding, (3) managing activity extending over time or keeping track of threads of activity, (4) managing deadlines and reminders, (5a) collation of related items including email and documents, (5b) event-based collation of documents and discussions, and (6) getting a task-oriented overview, at a glance, rather than scrolling around inspecting folders.

Some studies of diaries and scheduling systems have considered how individuals use diaries with a view to proposing requirements for computerised time management tools. Others have focused on the criteria for success of group scheduling systems. Few have paid attention to how people use a battery of tools as an ensemble. This interview study reports how users exploit paper, personal digital assistants (PDAs) and a group scheduling system for their time management. As with earlier studies, we find many shortcomings of different technologies, but studying the ensemble rather than individual tools points towards a different conclusion: rather than aiming towards producing electronic time management tools that replace existing paper-based tools, we should be aiming to understand the relative strengths and weaknesses of each technology and look towards more seamless integration between tools. In particular, the requirements for scheduling and those for more responsive, fluid time management conflict in ways that demand different kinds of support.


Examination of how contemporary electronic and paper-based technologies including PDAs, e-mail, laptops, cell phones, postits, notepads, and scrap paper are used to manage appointments, to-do lists, and other types of notable information. Many of the 28 participants interviewed reported that “… notes need to be temporary, viewable, mobile, postable, transferable, short, easy to create and destroy” and results suggest that “… paper is still the preferred method for handling notes, even though electronic tools were widely available” (p. 902). Authors found that notes contained a wide range of information types, such as “… names, phone numbers, e-mail addresses, URLs, to-do items, references, how-to’s, appointments/meetings, passwords, phone messages, procedures, policies, product specifications, server addresses, directory paths, helpdesk numbers, research paper references, install keys for software, the person’s schedule, and configuration parameters” (p. 903).

In this paper, we describe preliminary findings that indicate that managers and non-managers think about their e-mail differently. We asked three research managers and three research non-managers to sort about 250 of their own e-mail messages into categories that “would help them to manage their work.” Our analyses indicate that managers create more categories and a more differentiated category structure than non-managers. Our data also suggest that managers create “relationship-oriented” categories more often than non-managers. These results are relevant to research on “e-mail overload” that has highlighted the use of e-mail for activities beyond communication. In particular, our findings suggest that too strong a focus on task management may be incomplete, and that a user’s organizational role has an impact on their conceptualization and likely use of email [Authors’ Abstract].


Study of what characteristics of an email message make it more likely for the message to be discarded. Hypothesized that the following factors are influential: owner of message, importance of message, whether a message is read or unread, number of recipients, whether the message is part of a thread, length of the subject header, number of attachments, address type, top sender, and history of message. Analyzed 16199 email messages of six employees from a broad range of jobs: highest person sent to in the past, sender internal to organization, the less the number of recipients, and the highest person received from in the past.


One of the earliest studies of the role of objects in e-mail (that is, the thing related to the transfer of attachments and embedded links). Interviewed 28 advanced e-mail adopters (from fairly experienced at eight years to very experiences at 11 years) in three organizations (large, medium, small). Following demographic questions, participants were asked to select the 10 most recent e-mail messages that they had received and describe and draw a visual representation of the conversation that the messages were part of. E-mail messages contained references and common grounding related to the objects, the objects discussed were highly variant (deictic references), and the e-mail messages quoted and generated historicity around the work objects. Most interestingly, the content of the e-mail messages often became the thing or object (“Ceci n’est pas une pipe”), that is, “… e-mail conversations sometimes become objects in themselves” (p. 104). Authors suggest that useful e-mail features should include the ability to point inside attached objects and supporting version control. Authors conclude that “Progressively transformed into a habitat, e-mail has … become a powerful way to organize one’s work and rapidly access work objects rather than a poor textual envelope for things better discussed face-to-face” (p. 107).

E-mail research encompasses a vast and diverse body of work that accumulated over the past 30 years. In this article, we take a critical look at the research literature and ask two simple questions: What is e-mail research? Can it help us reinvent e-mail? Rather than defining an overarching framework, we survey the literature and identify three metaphors that have guided e-mail research up to this day: e-mail as a file cabinet extending human information processing capabilities, e-mail as a production line and locus of work coordination, and, finally, e-mail as a communication genre supporting social and organizational processes. We propose this taxonomy so that designers of future e-mail systems can forge their own direction of research, with knowledge of other directions that have been explored in the past. As an illustration of the possible future work we want to encourage with this review, we conclude with a description of several guidelines for the reinvention of e-mail inspired by our journey through the literature [Authors’ Abstract].


E-mail earns high marks in the workplace as a tool of communication, an aid in many work tasks, a facilitator of good working relationships, and even a source of pleasure and fun in the workplace. On the other hand, for a smaller number of people, e-mail in the workplace has made them too accessible to others, and can be a distraction or source of misunderstanding and additional stress. Workers generally behaved very responsibly with their e-mail in the workplace, considering it a work tool. Pleasantly, workers found spam to be a small problem in their work-e-mail inboxes, in contrast to their personal-e-mail inboxes [Author’s Abstract].


Spam, which by the middle of 2003 represented about half of all email messages, has made online life unpleasant or annoying to nearly three-quarters of email users. People feel that spam has undermined the reliability of email and its effectiveness as a tool for communicating. They are bothered by spam’s deceptive and often unsavory content, by the time it takes to deal with spam, and they are frustrated by their lack of control over the influx of spam. The volume of spam in personal email accounts far outscored the volume in work email accounts, due in part to costly measures that defend most workplaces against spam. People want to do the right thing to counteract spam, but very often they are not sure what that is [Author’s Abstract].

Interested in both email and PIM (Personal Information Management) tools. Define four types of information: prospective (future), ephemeral (current short-lived), working (current medium-span), and retrospective (past). Surveyed 12 participants in diverse organizations. Found link between prospective information and working or retrospective information, naturally. Users organize information around events. Email does not support task-oriented use very well and users employ flagging as a strategy for helping them manage prospective information. Future research needed on user personality styles and email folder use.


Analyzed the folder structure of six knowledge workers and, although not specifically focused on email folders, this research has obvious applications to the latter. Author found that folder names represented genre (class of document, e.g., presentations), task (project, event, or activity, e.g., PhD recruitment), topic (particular subject matter, e.g., Web development), or time dimension (particular time period, e.g., 2000, Old, Week1) of the documents they contained.


Authors were interested in whether receiving a message via traditional hardcopy letter or e-mail influenced the recipients’ perceptions of the message. In their sample of 44 students responded to a formal letter on a scale of 13 items, six regarding the candidate (Impolite-Polite, Sincere-Insincere, Unconfident-Confident, Enthusiastic-Unenthusiastic, Individual-Faceless, Inefficient-Efficient) and seven regarding the letter itself (Personal-Anonymous, Carefully prepared-Slapdash, Informal-Formal, Unclear-Clear, Well structured-Poorly structured, Concise-Wordy, Poorly presented-Well presented). Of course these items point to some of the shortcomings of the study in general. Still, no differences were found in how respondents’ perceived hardcopy versus e-mail messages. Authors conclude with statement that addresses the short history of e-mail use: “As little as five years ago [1995] email was not commonly used except by staff in universities and computer related industries, now it accounts for a large part of the communications received by many people at work and at home” (p. 262).

Authors surveyed a UK company with 2850 e-mail users and received 875 responses. Respondents were asked how many e-mail messages they received daily and what percentage of the messages were unnecessary or irrelevant. Findings included that 16% of messages received were copied unnecessarily, 13% received were irrelevant or untargeted, 41% received were for information purposes, 46% stated specific actions required, 56% respondents felt that e-mail was used too often rather than face-to-face or phone communication, and 45% felt their e-mail messages were easy to read (p. 107). Pre- and post-testing after training on whether one’s e-mail is necessary, targeting e-mail, effective subject headers, getting to the point, attachment use, and inbox management showed improved e-mail composition. Authors calculated cost for this company’s employees reading e-mail per year was 9.8 million pounds per year (at 29 minutes for reading 23 messages per day per 2850 employees). Interestingly, authors cite previous Jackson article recommending setting e-mail reading duration to higher number to reduce cost of e-mail reading on employee time. Productivity in this study is based solely on e-mail messages x time x employee and not on rhetorical quality or problem-solving significance of the messages communicated.


Email research indicates that email can create problems in accelerated decision making, in facilitating efficient information exchange, and in producing information overload. Twenty-three participants were interviewed as heavy email users. Describes three cases (the “prioritizer,” the “archiver,” and the “task-manager”): Both the prioritizer and the archiver feel overwhelmed, but receive many more emails than the task-manager. There is a significant range in mail folder use, from 9 to 100 folders. Most users treat the inbox as “an online ‘to-do’ box.” Prioritizers do not read all of their mail, limit the number of times they read mail per day, subscribe to a limited number of distribution lists, keep fewer messages in their inboxes, and keep fewer mail folders (p. 391). Archivers subscribe to more lists, maintain a large number of mail folders, tend to read all of their mail to try to, and have difficulty finding filed mail (p. 392). Email is at the center of work as an information, time, and task management space.

We present data from detailed observation of 24 information workers that shows that they experience work fragmentation as common practice. We consider that work fragmentation has two components: length of time spent in an activity, and frequency of interruptions. We examined work fragmentation along three dimensions: effect of collocation, type of interruption, and resumption of work. We found work to be highly fragmented: people average little time in working spheres before switching and 57% of their working spheres are interrupted. Collocated people work longer before switching but have more interruptions. Most internal interruptions are due to personal work whereas most external interruptions are due to central work. Though most interrupted work is resumed on the same day, more than two intervening activities occur before it is. We discuss implications for technology design: how our results can be used to support people to maintain continuity within a larger framework of their working spheres [Authors’ Abstract].


Focus on “email triage: the process by which one goes through unhandled email and decides what to do with it” (p. 1977). Compared traditional thread-sorting email versus “providing users with additional meta-level attributes that can provide users with an understanding about which emails should be handled first” (p. 1977). Distributed a survey to 2000 random employees in Microsoft and received 233 responses. Divided email users into low-volume triagers (50 new emails daily), medium-volume triagers (50-100 new emails daily), and high-volume triagers (more than 100 new emails daily). Medium number of rules used were between 5 and 9, with number of rules increasing as volume increases. Users did not tend to group by thread/conversation. Thirty percent performed triage sequentially, nineteen percent performed it by priority, and fifteen percent used both (the remaining ranked both approaches neutral). Most interestingly, users often searched for emails they could quickly address (and that acted to clutter their inbox) and then, in a second pass, reviewed more important emails. Heavy users tended to perform triage throughout the day and more likely at night. All participants felt their email management “strategy was pretty good, but realized there were likely other, more efficient, strategies” (p. 1980).

Most significant finding is that voice annotations produced a greater number of words and tended to focus on audience and purpose more than text annotations, which focused on substance. Voice annotations tended to include reasons for the comments in terms of polite language use. Writers viewed the producers of voice annotations more positively than the text annotators.


Knowledge work, which consists of goal-oriented activities that require high levels of competency to complete, comprises a large and increasing amount of work in modern organizations. Because knowledge work seldom has single correct results or methods for completion, externally specified, quantified measures of performance may not always be the most appropriate means for managing the performance of knowledge workers. Two competing models of flow, a type of subjective performance, are proposed and tested in a sample of work experiences from engineers, scientists, managers, and technicians who study and design national defense technologies at Sandia National Laboratories. Results support the definition and model that conceives of flow as the experience of merging situation awareness with the automatic application of activity-relevant knowledge and skills. Ways in which this definition and model of flow can be incorporated into theories of knowledge, performance, and social networks are explored.


This article summarizes the preliminary findings from a recent study of scientists in four disciplines with regard to computer-mediated communication (CMC) use and effects. Based on surveys from 333 scientists, we find that CMC use is central to both professional and research-related aspects of scientific work, and that this use differs by field. We find that e-mail use focuses on coordination activities, and its biggest effect is helping to integrate scientists into professional networks. We do not find gender differences in use, but there is some evidence that e-mail is having a differential, positive effect for women. Furthermore, CMC use is positively associated with scientific productivity and collaboration.

The research program at IBM’s® Collaborative User Experience (CUE) group supports an e-mail system used by millions of people. We present three lessons learned from working with real-world enterprise e-mail solutions. First, a pragmatic, system-level approach reveals that e-mail programs are generally used idiosyncratically, often for many different goals at once. This fact has strong implications for both the design and assessment of new features. Second, we discuss how viewing e-mail as an element of corporate collaboration—not just communication—provides insights into problems with current systems as well as potential solutions. Third, we describe constraints imposed by the realities of software development and how they shape the space of feasible new designs. Finally, we illustrate these lessons with an overview of CUE research strategies in the context of an extended case study of one specific new technology: Thread Arcs. Although not all researchers work with an enterprise-level product team, we believe the experiences described here will be useful to anyone wishing to see their ideas ultimately implemented on a broad scale.


Email is one of the most successful computer applications ever developed. Despite its success, it is now dogged by numerous problems. Users complain about feeling overwhelmed by the volume of messages they receive, they have difficulties too in organizing and managing their email data, but most importantly they have problems in using email to manage collaborative tasks (Bellotti et al., 2003, Balter, 1998, 2000, Mackay, 1988, Whittaker and Sidner, 1996, Whittaker et al., 2002a). These require extended interaction with others for their definition and execution (Bellotti et al., 2003, Venolia et al., 2001, Whittaker and Sidner, 1996). As a result, users are often concurrently working on multiple outstanding tasks as they await responses from others concerning these tasks. This requires users to: (a) create reminders, (b) identify messages that relate to the same task, and (c) combine information from these related messages. Currently people try to use the email inbox to do this, but our data indicate it is ineffective for these purposes. Other recent approaches attempt to tackle Collaborative Task Management, but we show that these offer at best only partial solutions. In contrast, we present two systems, TeleNotes and ContactMap, that directly address Collaborative Task Management. These are motivated by empirical research into *paper-based* and *people-based* task management strategies. We describe how our systems implement these different strategies and present evaluation data for each system in use. We contrast the success of these two approaches with earlier work and discuss outstanding design and theory problems arising from our research.

Although e-mail applications were originally designed primarily for communication, users often use e-mail for task management and personal archiving purposes, producing e-mail overload, which the authors define as “… the use of e-mail for functions that it was not designed for” (p. 276). Study consisted of 20 participants representing a wide range of jobs, from first-level managers to administrative assistants: quantitative data include mailbox contents of 18 users (e-mail message number, age, size, number of messages in each archive, and conversational threads) and qualitative data include one-two hour semi-structured interviews with each participant. Quantitative data revealed that the average number of inbox items was 2482 and filed items was 858. Users received an average of 49 messages per day. Messages that required “… more than a certain amount of time or effort to process” included to dos, to reads, messages of indeterminate status, and ongoing correspondence (p. 278). E-mail filing is a cognitively challenging task because, to be successful, files must be archived in a way that anticipates future retrieval goals. Authors separated user types into no filers, frequent filers, and spring cleaners and each strategy had strengths and weaknesses in terms of inbox and file management implications. Design features such as threading or semantic classification systems can help reduce e-mail overload.


Email has been characterized as both a killer app for the Internet and the “unexciting and mundane electronic medium we love to hate” [1]. Though this appraisal seems paradoxical, it reflects the findings of several studies my colleagues and I completed over the past seven years investigating the role email plays in task performance, socialization, and interpersonal influence. Not surprisingly, we love email when it helps us and hate it when it hurts us. The problem my research highlights is the unexpected difficulty we have applying familiar communication metaphors to predict the outcomes of email communication.