Brief Annotated Bibliography on E-mail Research

Brad Mehlenbacher, 21 February 2007

Bälter, O. (2000). Keystroke level analysis of e-mail message organization. *Proceedings of CHI 2000 Conference*. The Hague, Amsterdam, 105-112.

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).

Begole, J., Tang, J. C., Smith, R. S., & Yankelovich, N. (2002). Work rhythms: Analyzing visualizations of awareness histories of distributed groups. *Proceedings of the ACM 2002 Conference on Computer Supported Cooperative Work (CSCW)*. New Orleans, LA, 333-343.

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).

Bellotti, V., Ducheneaut, N., Howard, M., Smith, I., & Grinter, R. E. (2005). Quality versus quantity: Email-centric task management and its relation with overload. *Human-Computer Interaction, 20* (1/2), 89-138.

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, (5b0 event-based collation of documents and discussions, and (6) getting a task-oriented overview, at a glance, rather than scrolling around inspecting folders.

Campbell, C. S., & Maglio, P. P. (2003). Supporting notable information in office work. *Proceedings of CHI 2003 Conference*. Ft. Lauderdale, FL, 902-903.

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).

Danis, C., Kellogg, W. A., Lau, T., Dredze, M., Stylos, J., & Kushmerick, N. (2005). Managers' e-mail: Beyond tasks and to-dos. *Proceedings of CHI 2005 Conference*. Portland, OR, 1324-1327.

In this paper, we describe preliminary findings that indicate that managers and non-mangers 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].

Dabbish, L. A., Venolia, G., & Cadiz, J. J. (2003). Marked for deletion: An analysis of email data. *Proceedings of CHI 2003 Conference*. Ft. Lauderdale, FL, 924-925.

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.

Ducheneaut, N., & Bellotti, V. (2003). Ceci n'est pas un objet? Talking about objects in e-mail. *Human-Computer Interaction, 18* (1/2), 85-110.

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 messsages 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).

Ducheneaut, N., & Watts, L. A. (2005). In search of coherence: A review of email research. *Human-Computer Interaction, 20* (1/2), 11-48.

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].

Fallows, D. (2002). Email at work: Few feel overwhelmed and most are pleased with the way email helps them do their jobs. *PEW/INTERNET Report: Work*. Available online: http://www.pewinternet.org/PPF/r/79/report_display.asp

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].

Fallows, D. (2003). Spam: How it is hurting email and degrading life on the Internet. *PEW/INTERNET Report: Public Policy*. Available online: http://www.pewinternet.org/report_display.asp?r=102

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].

Gwizdka, J. (2000). Timely reminders: A case study of temporal guidance in PIM and email tools usage. *Proceedings of CHI 2000 Conference*. The Hague, The Netherlands, 163-164.

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.

Henderson, S. (2005). Genre, task, topic and time: Facets of personal digital document management. *Proceedings of CHINZ 2005 Conference*. Auckland, NZ, 75-82.

Analyzed the folder structrure 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.

Hill, K., & Monk, A. F. (2000). Electronic mail versus printed text: The effects on recipients. *Interacting with Computers, 13* (2), 253-263.

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).

Jackson, T. W., Burgess, A., & Edwards, J. (2006). A simple approach to improving e-mail communication: Going back to basics. *Communications of the ACM, 49* (6), 107-109.

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 messsaged received were copied unnecessarily, 13% received were irrelevant or untargeted, 41% received were for infomration purposes, 46% stated specific actions required, 56% respondents felt that e-mail was used too often rather than face-to-face or phone conmunication, 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.

MacKay, W. E. (1989). Diversity in the use of electronic mail: A preliminary inquiry. *ACM Transactions on Office Information Systems, 6* (4), 380-397.

Email research indicates that email can create problems in accelerated decision making, in facilitating efficient information exchange, and in producing information overload. Twenty-three partipants 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.

Mark, G., Gonzalez, V. M., & Harris, J. (2005). No task left behind? Examining the nature of fragmented work. *Proceedings of CHI 2005 Conference*. Portland, OR, 321-330.

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].

Neustaedter, C., Bernheim Brush, A. J., & Smith, M. A. (2005). Beyond "from" and "received": Exploring the dynamics of email triage. *Proceedings of CHI 2005 Conference*. Portland, OR, 1977-1980.

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), medum-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).

Neuwirth, C. M., Chandhok, R., Charney, D., Wojahn, P., & Kim, L. (1994). Distributed collaborative writing: A comparison of spoken and written modalities for reviewing and revising documents. *Proceedings of the Human Factors in Computing Systems Conference*. Boston, MA, 51-57.

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.

Whittaker, S., & Sidner, C. (1996). E-mail overload: Exploring personal information management of e-mail. *Proceedings of CHI 1996 Conference*. Vancouver, BC Canada, 276-283.

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.