Email as a habitat

An exploration of embedded personal information management

Nicolas Ducheneaut and Victoria Bellotti

Email and personal information management

Email has become more like a habitat than an application. It is used for a wide range of tasks such as information management and for coordination and collaboration in organizations. Our research shows that email is the place in which a great deal of work is received and delegated and is a growing portal for access to online publications and information services. It has become the place where PC users spend much if not most of their workdays (the application is always on, and is often the focus of attention). This, and the burgeoning quantities of messages and attachments that email delivers to people each day, has led users to co-opt it as a personal information management (PIM) tool. In fact this simply follows from what we have found to be a common tendency of knowledge workers, which is to *embed personal information management directly into their favorite workspaces.*

In this article, we explore further these new and unanticipated uses that are made of email, and suggest potential design ideas to support them better. We present the findings from four months of fieldwork conducted at three companies, and ensuing analysis during which we confirmed and expanded some earlier intuitions about the use of email as a PIM tool. We conclude that email is definitely overloaded, but also that this process depends on factors such as a user's role and the nature of their workplace.

A field study

Prior to the work reported here, extensive fieldwork on personal information management and email was conducted in a series of studies. These totaled over 60 formal and informal interviews with PC users in a range of professions from the creative arts, through business and administration to scientific (including site visits, face-to-face interviews and phone surveys in the USA and UK). Based on this research, one of the authors, during the design of a prototype information management tool, made the following observations about email for PC users:

- Email is used throughout the day by many people

- It is the major means of non-face-to-face communication

- It is now the main means of document exchange

- It is co-opted by its users for many information management functions, such as to-dos (by marking-up or re-sending oneself messages) and contact management (by sorting by name and filtering)

- Email is overloaded, providing inadequate support for certain tasks it is routinely used to accomplish.

Curious about these findings, we decided to gather more detailed information about current information management behaviors of email users. Twenty-eight interviews were conducted at three different email-experienced organizations to gain three different organizational snapshots of well-evolved email practices (the names of the last two organizations have been replaced with fictitious ones):

- Xerox PARC, the authors' large, established research center. PARC has about 400 staff members located in a single building on a small Xerox campus in Palo Alto, California. Most employees belong to an approximately 5- to 10-person group in one of six labs. Researchers conduct mainly within- but also some cross-lab projects, which may be more or less commercially oriented. Each employee has a private office, generally located near to the rest of his or her group. Ten interviews.

- MediaWorld, a 150-person, rapidly expanding, multimedia production company that produces animated content for web sites. The employees in MediaWorld are divided into a number of different types of group including writers, artists, animators, engineering, web design, quality control, and marketing. The offices are open-plan and spread over two buildings on the same block in San Francisco with people located close to members of the same role grouping. Twelve interviews.

- LeadDesign, a small, 6-person, design consulting firm working on (typically) shorter projects. The employees are not all full time, with two spending a considerable amount of time working on private projects for other clients. They range from graphic through HTML to some web programming skills targeted towards corporate image and web design. While they have a shared office space, they often work remotely from it and they do a great deal of

collaboration with their clients remotely. Six interviews.

What we did

Drawing on earlier research, we designed a semi-structured questionnaire on the PIM- and work process-related uses of email. The interviews were conducted, by the authors of this report, in the workplace of each of the interviewees and they were asked to show us the contents of their email to illustrate their answers. We asked them a series of specific questions for background information and then about email. These questions about email were developed from findings in the previous, more open-ended research on personal information management and the role of email mentioned earlier.

The entire proceeding was video recorded and where possible, the camera was used to try to capture the details of the interviewees' foldering scheme and the general organization of messages. We also took digital photographs of interviewees' workspaces and some surrounding areas (to document something of their opportunities for face-to-face communication).

Each of the tapes was transcribed and photos and images inserted into the transcript. The results were collated and a variety of qualitative and quantitative analysis methods were used to understand the data. Some of the results of these analyses are presented below.

What we found

The individuals in our sample are fairly experienced in their profession on average (8 years) with extensive email experience (11 years on average), but it is interesting to note that they are relatively recent users of their current application (3 years). The range of either incoming or outgoing communication volume is extremely wide, from 3 to 100 messages per day (incoming mean, 42; median, 40 and outgoing mean 17; median 12). For these people, email has definitely become a to-do list; 72% of our respondents send reminders to themselves, and 83% leave messages in their inbox as reminders.

Foldering and finding: What is efficient?

Recently Bälter (2000) published a study suggesting that extensive and deep filing of email is not as efficient time-wise as a flat and simple file structure with only a few folders (under 30 folders depending on various factors). This is because the time saved on searches is outweighed by the time spent filing. Still, this doesn't seem to stop some people from gradually accruing increasingly complex filing schemes for their email as time goes by. The complexity of the filing structures used varies greatly, from only one inbox to more than 400 folders! The mean number of folders was 90.8 (with a median of 27, just under Balter's limit). But we found that, even after age and job experience are accounted for, there is a *correlation between greater email experience and increasing numbers of folders* (with a Pearson's

correlation coefficient of .438 and significance of 0.022). Does experience really lead to greater inefficiency?

We found that folders tend to be organized in terms of one or more of the following criteria and the proportion of each varies immensely between email users:

- Sender: Either a person or a distribution list;

- Organization: E.g., a client, or a professional body;

- Project: A coordinated effort or a contractual undertaking;

- Personal interests: Either professional or private.

It seems plausible that gathering related emails together is considered useful in preserving meaningful context for historical communications and activities and is not simply a strategy for supporting finding at a later date. However, further detailed observation would be required to fully understand how folders are used in this respect.

On the other hand, we found that folder hierarchies are generally shallow, with a typical depth of two levels. The reasons invoked for this were:

- Scrolling/clicking down is generally a hassle ("I just want to toss things in there");

- Users want recent/frequently accessed items to be easily accessible, and it is hard to keep track with deep folders ("some items I want accessible all the time"; "a cache of recently accessed messages would be nice"). Nesting leads to the risk of losing content and possible duplication.

- Some nesting seems to be merely a reaction to limited screen height, since users want to keep certain elements visible while they inspect others. Without nesting, some elements would inevitably scroll off the top or bottom of the window at times. Two levels of nesting seem to be adequate to manage screen space for this purpose. The authors suspect that users could easily work with much longer listings of folders than the typical 50 or so that even a large computer monitor can display, since visual scanning of an alphabetically ordered list will likely be faster than mousing and clicking.

Overall, users want immediate access to information, which limits the depth of a useful filing structure.

According to Bälter's theory, many people might improve efficiency by changing their filing structures, but this proposal ignores the long-term legacy effect in actual practice. We found that quite a few folders are redundant items, no longer in use (such as old project folders) and others are simply the result of eventually running out of convenient screen space (such as 'EvenMorePeople' in one person's 'People' folder). Bälter's model ignores the effort that would be required to continually optimize meaningful filing structures, as one's needs, directed by active contacts

and projects, continually change, probably in unforeseeable ways. This may partially explain the correlation between length of email experience and increasing numbers of folders. A realistic model of foldering efficiency should probably therefore take into account how many *active* folders are being used and *how*, not the just total number together with filing time and search time.

The interface can also be a source of headaches for users during filing. Indeed, all of the email clients used by our interviewees enforce an alphabetical ordering of folders, while many users would prefer to re-arrange some folders according to other criteria, such as frequency of access or priority. As a consequence, many of them have developed workarounds, such as naming important folders "AAAA_ImportantProject" so that they will be bumped to the top of the alphabetical list.

Surprisingly, very few users report much use of the search feature of their email client, but, on the contrary, almost all of the respondents say they use the sort feature a lot. Once again, our findings are at odds with Bälter's theoretical assumptions about retrieving messages, in which sorting is not accounted for. The greater popularity of the sort feature seems to be because it is quicker to specify search criteria by clicking on the headings in the email list viewer that represents the sorting parameters. These are date, sender name, subject, size, and may include attachment, priority, and flag. Opening a search tool and typing in criteria is much slower and thus less efficient. Indeed, some of our interviewees have not even explored the search capability of Microsoft Outlook™ (by far the most common mail tool among our interviewees).

Filtering doesn't work for everyone

Most of our users (17 interviewees or 60%) say they don't use filters, several because they simply haven't figured out how to, suggesting that either filters need to be simpler to use, or that they are not that useful. In support of the latter hypothesis, most of them consider that two thirds of their mail volume would be impossible to filter automatically. The 40% of our respondents who do use filters, say they use them mainly only for simple filing, for example grouping messages from distribution lists. This simple kind of filtering approach depends on a foldering scheme that corresponds to unique sender or recipient email addresses that can be matched by the filter. For example, messages from friends and colleagues or from distribution lists are easy to filter into dedicated folders. As a result, users with sender-based filing schemes are thus more easily able to filter a greater proportion of their email. Other users have to make complex decisions that filters cannot, in order to match messages to folders based on organizations, projects and personal interests.

Another problem with filters in Outlook may be that new mail that has been filtered is too easy to miss. Most of our interviewees prefer to have all their new mail in the one place, and we would not be the first to suggest that automatic filters should be offered as an option after reading and not simply applied on receipt as in Outlook and Eudora.

Choice of an email client… Not!

An interesting finding of our study is that, for 38% of our respondents, an email client is not chosen but rather imposed by the organization they work for. Moreover, when given a choice, 10% of our respondents selected an application simply because it was the most used at the time, and another 10% because it was the application they used at a previous employer (possibly also imposed). We found the amount of external pressure (environmental or organizational) exerted on users quite striking: in more than half of the cases, an email client is not chosen on an individual, rational basis, despite the wide variety of clients that are available. This, together with the legacy effects (for example, Outlook email files are incompatible with other mail applications) certainly has serious implications for designers trying to engineer new email clients, hoping to attract individual users on the basis of their features. There is an institutional inertia at work that may very well make such a plan fruitless.

Email as "FTP" and a group information management tool

Even though this came as no surprise to us, we found email is now a central medium for document exchange, with all but one of our respondents using email to exchange files on a regular basis. *Some people sending attachments sometimes go as far as saying that they "FTP the document to someone",* which shows how email and file transfer have now become blurred to the point of confusion.

Still, many email users point to the limitations of the medium for file transfer: there is no version control, attachments clog the inbox, and can be hard to download over dial-up links when working from home... but this doesn't prevent anyone from doing it anyway. The reason is probably, once again, embeddedness. Exchanging documents is not a standalone activity; it is part of a wider context of exchanges aimed at accomplishing tasks. Communications form the context of document exchange; it is therefore natural that documents get included in them, instead of requiring a switch to a different application detached from the flow of communication such as a web-based document management tool.

Document exchange is generally linked to meetings, and occurs before and after them. Many of our respondents send agendas over email (65%) or actions (69%). More formal items, such as minutes, are less used (38%), perhaps because there are few people these days that are interested in the role of taking minutes (a traditionally menial role, which reduces the ability to participate in the discussion). Interestingly, email is now also used as a medium to provide a record or possibly some accountability; 76% of our respondents say they document activity via email. As one of them mentioned, it is important to "maintain a paperless trail".

Email is also a major medium for organizing and scheduling meetings (80% of our respondents use email for these two activities). The integration of calendaring/scheduling features in email such as

Microsoft Outlook™ is generally appreciated. Indeed, many people point to the difficulty of managing schedules in the email channel alone.

If email is used to assign responsibilities to others (for 79% of the respondents) and make decisions (72%), it is much less used for voting on specific issues; only 38% of our interviewees use it to conduct polls. As we analyze in more detail elsewhere (Ducheneaut and Bellotti, forthcoming), this is probably due to the particular nature of the work processes people manage in email; their dynamic and fluid nature makes using formal polls an inadequate decision mechanism.

Factors influencing the use of email as a PIM tool

Our data showed some slight correlations implying that managers tend to receive more messages, have deeper hierarchies, and have a tendency to use filters and the search feature more often than other users. These correlations between status or occupation and quantity and organization strategies, though weak, are consistent with the findings of other researchers in the field.

On the other hand, we found strong correlations between role and two other variables: managers make more use of email to distribute agendas, and they document more of their activity via email. Since managers must formalize more than regular employees, and since they are generally meetings organizers, their email usage seems to reflect these differences from other individuals in an organization.

We did not find that having experience with a particular application influenced email use. But general experience with email is a major factor (even when age and seniority are accounted for). First, it leads to what we called *the addiction effect:* the more experience people have with email, the more frequently people check it, sometimes even during meetings. It also leads to a higher incidence of organizational activities in email, such as organizing meetings and documenting activity. Finally, experienced users are less likely to succumb to organizational pressure over the choice of their application. We already discussed the fact that experienced users tend to use more folders than other users.

The organization and space in which email is used also seems to influence usage. For instance, email is less often used to organize meetings at MediaWorld. This could well be because scheduling in email is awkward and the space at MediaWorld is open-plan, with collaborators clustered together, able to see and talk to one another easily. We often saw people opportunistically ask if others were free as they spotted them passing or stopped by someone's desk. At PARC almost everyone has a private office and so it is harder to catch people when they are around.

Interestingly, though, we noticed that even when collaborators work in plain sight of one another as in MediaWorld's open plan spaces, they do still send each other a good deal of email. So it seems that there are qualities of this medium that make it a preferable mode of communication for some purposes. For example, sending links and electronic copies of documents is impractical in a typical face-to-face encounter.

PARC is the only organization where email is reported to be used during meetings, which is certainly due to the prevalence of laptops in this organization. There was also a much lower incidence of responsibilities assignment, which reflects earlier studies of research/academic environments where collegial relationships are generally the norm. Much less documenting of activity was done at LeadDesign, reflecting the smaller, more informal nature of this young company. There was also a low amount of broadcasting at LeadDesign, which is not surprising since all of its members are gathered in the same room and often see each other pretty much all day long. By contrast, at the two larger organizations (PARC with about 400 people in an 80,000 person international corporation, and MediaWorld with 150 people in two adjacent buildings), broadcasting is very much a norm.

The nature of the organization also influenced the way people organized their email messages in folders. The first-level organizational paradigm at PARC was an organization by project, which seems to correspond quite well to the activities of a researcher. At MediaWorld, content was mostly organized by departments. This reflects the production-oriented nature of this organization, with its clear role distinctions. Messages at LeadDesign were mostly divided between personal and professional content; this probably reflects the blurring of personal and private life that is often observed in small, entrepreneurial structures.

Conclusion

Email is often described as "the killer application of the Internet". Based on our research, we think it is possible to be even more emphatic; *email is a serial-killer application!* It is seriously overloaded and has been co-opted to manage a variety of tasks that it was not originally meant to support. The main reason for this phenomenon is, we think, *embeddedness*. Communication is a central part of organized work. Consequently, as email captures an increasing share of an organization's total communication volume, individuals progressively appropriate their email client as a habitat in which they spend most of their workday. The network effect ensures that this tendency is infectious across a community or organization. Thus, personal information management is then embedded where it is most needed and accessible, that is, in the knowledge workers' new electronic habitat: email.

We think our findings have several implications for anyone interested in building the next-generation email clients:

First, there are definite possibilities for improvements in the user interface. To better support the use of email as a PIM tool, more flexible organization of folders should be supported. Since users mostly work with ephemeral information, a cache of recently accessed items could be useful. The management of to-dos and reminders within

email should be supported; Microsoft Outlook™ on Exchange is an example of a possible approach, but few of its extensive features were used (or even known about) by our interviewees, suggesting that many improvements remain to be made.

Second, since email is a major conduit for document exchange, incorporating some document management features inside the email client would make sense. The tracking of document revisions would certainly be appreciated by users.

Lastly, our research raises an interesting design question; would it be possible to leverage a model of user's roles and organizational environment in the design of email clients? One possible way would be to present a different interface, with different email management options, depending on a user's role. For a manager, scheduling and tracking of activities would be preeminent, while for someone doing collaboration-intensive production work, document or file management would be at the forefront. But these are only tentative examples, and there are certainly other possibilities. Having outlined the changing nature of email and the factors influencing its use, there is now much room left to engineer practical solutions taking them into account.

Breakout Box:

Further Reading

Previous research has foreshadowed some of the observations made here. For further reading around the subject of email and information management, we recommend the following references:

Mackay (1988) was one of the first researchers to observe that email is more than just a communication system, supporting time and task management.

Whittaker and Sidner (1996) describe the role that email plays as a coordination and collaboration tool in an organization and the problems that arise from trying to organize large quantities of incoming messages in a message filing system.

Bellotti & Smith (2000) observed the central role that email plays in personal information management, with users appropriating features of their tools to create embedded mechanisms to manage complexity.

Segal & Kephart (1999) suggest that automatic filters should be offered as an option after reading and not simply applied on receipt.

Mintzberg (1973, 1979) has written extensively on the subject of the nature of managerial work and the structure of organizations. His work lends support to some of the hypotheses we have proposed about differences in observed patterns of email use between managers and other workers, and between organizations.

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About the Authors

Nicolas Ducheneaut is a Ph.D. student at the School of Information Management and Systems (SIMS), University of California, Berkeley. He is currently working as a research associate for Xerox's Palo Alto Research Center (PARC), exploring how electronic communication tools are used in the workplace. His research interests include computer-supported cooperative work, computer-mediated communication, and the social impacts of information technologies in organizations.

Victoria Bellotti is a Senior Research Scientist at Xerox PARC in the Computer Science Laboratory. She received her PhD. in HCI at University College London in 1990 and worked for 5 years at Rank Xerox EuroPARC, Cambridge UK, studying the application of HCI theory to design. She worked in Apple Computer Inc., in the Advanced Technology Group from 1994-97. For the past 7 years she has focused on field studies of work in various settings including design consulting, publishing, teleworking, reading and executive's work practices.

Authors' Address

Nicolas Ducheneaut / Victoria Bellotti
Xerox PARC
3333 Coyote Hill Road
PALO ALTO, CA 94304 - USA

email: duchen@parc.xerox.com
        bellotti@parc.xerox.com
Tel: +1 (650) 812-4000