

Email as co-habitat in distributed organisations

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ABSTRACT

Email has now become so ubiquitous that it has surpassed its early role as an asynchronous communication tool. Having contributed to the rise of the distributed organisation, email is being used in diverse ways and for purposes for which it was not intended. It is no longer a technology of individual habitats, but one where members of distributed organisations co-habit. This paper charts the study of email management, from early investigations of personal approaches to handling email overload, through to a review of software applications designed to ameliorate this. It suggests that while email has been appropriated for information and knowledge management, there has been minimal analysis of this beyond the individual. Therefore, it presents a case study of a distributed organisation, detailing the process by which email was leveraged for organisational knowledge through the design of an application that enabled visualisation of email data.

Categories and Subject Descriptors

H5.2. Information interfaces and presentation: user interfaces.

General Terms

Design, Human Factors.

Keywords

Email, distributed organisations, knowledge management, interaction design, interface design, visualisation.

1. INTRODUCTION

Email as a habitat has been proposed in studies of email, this has, however, primarily been concerned with it as an individual habitat [4][5], a place where individual habits and behaviours are performed. This metaphor can be extended to an organisational perspective so that email is understood as a technology of co-habitation. While distributed organisations survive on the flow of information through email, it is not leveraged as a resource in the same way as the Web. As work processes become increasingly distributed, studies of the use of email for knowledge mining have been undertaken. The paper will provide an overview of research in this area.

Following this, the paper will discuss VUE (Visualisation Using Emails), an application that was developed as a collaboration between the Australasian Cooperative Centre for Interaction Design (ACID) and a commercial testbed organisation.

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2. LITERATURE REVIEW

Literature on studies of email fall into two main categories. The first is concerned with management of volume email in "information overload" [11], to the extent that email is now used peri-synchronously, or nearly synchronously [17], rather than just asynchronously. This largely relates, however, to individuals and their approaches to and feelings about email, rather than email's role within an overall organisation and its business relationships. As early as 1996, Whittaker and Sidner [19] noted that "there is little systematic data on its usage and utility as a workplace technology". Although much has since been written about personal strategies for archiving emails and using it to manage tasks in work settings, there is scant research on the larger scale implications of using email to manage and archive knowledge at an organisational level.

The other body of literature complements the first by attempting to address the problems identified in managing email data through the development of software applications that enable alternative forms of information retrieval and visualisation. Such applications have generally similar characteristics in terms of seeking to represent aspects of email interactions that are not as apparent in standard email clients. The various ways in which this is done encompass:

- Visualising patterns of email exchange over time
- Visualising patterns of email exchange between people
- Clustering similar sets of messages
- Clustering people
- Enabling more powerful search and retrieval functions.

A number of case studies have documented the development of such applications. Donath [4] provides an overview of those which primarily visualise but do not allow much interaction or manipulation of the visualisation and/or data, and which are concerned with individual and personal email. An early example is TimeStore, which plotted the messages within an individual's email inbox as dots on a two dimensional grid, with one axis being people and the other, time [20]. Likewise, PostHistory visualises "long-term email exchange rhythms within an interface that is structured through a calendar" [18], concentrating on dyadic communication, that is, email sent between two individuals. In addition, there are the applications which use email to represent an individual's social networks, such as Visual Who [3], PersonalMap [4], ContactMap [12] and Social Network Fragments [18]. These represent an individual's relationships to other people based on email activity, and have been translated for more public uses of email through applications like ConversationMap, which visualises Usenet newsgroup message archives [16] but "in principle, the system can be used just like a conventional news or mail reader [such as] Eudora [or] Netscape Messenger" [15].

Furthermore there are those applications that allow the user a degree of interaction with the visualisation. For example, Themail examines the conversational histories of email correspondence between individuals, looking specifically at the content of messages and how this changes over time. Therefore, it provides both macro and detailed perspectives, allowing the

user to interact with the visualisation in “haystack mode” or “needle mode” respectively [6].

Extending this visualisation work on the contents and patterns of an individual’s email inbox are applications that depict a body of email data, such as eArchivarius, which focuses on making sense of historically significant email archives:

“eArchivarius uses a cluster-based visualisation that depicts messages (or people) as spheres floating in space and positioned in proportion to inter-object similarity” [9]

Likewise, Enronic visualises the email communication that occurred in the organisation, Enron, as a possible way of making sense of the organisation’s demise. Thus, it gives a macro “big picture” view of the organisation mapping relationships between employees by creating a visual display of categories of and connections between emails through a colour grading scale to classify types of sent emails [7].

While both eArchivarius and Enronic analyse email on an organisational scale, the applications assume a static body of email data within a single organisation. Other attempts to consider email’s role in business productivity are IBM’s ReMail application, which aims to reinvent email by designing a prototype for a new mail client [14]; as well as CSIRO’s Cnawen application, “built around an archive of your corporate email...[and] can support position handover, relationship management, legal discovery and more” [2].

The case study below contributes new knowledge to the field by investigating inter-organisational email correspondence, that is, email between organisations rather than individuals. It also seeks to visualise this in the context of a working organisation in which the body of email data is not a static archive but dynamically growing. VUE was developed to assist the organisation and goes beyond the research on visualisation of individual emails by treating email as a source of organisational knowledge that must be pliable.

Pliability refers to “the degree to which interaction feels involving, malleable, and tightly coupled” [10]. In other words, VUE had to offer not just visualisation, but also the possibility of interaction and exploration of the data by the user.

“The use of a digital artefact is characterised as pliable if it feels like a tightly connected loop between eye and hand, between action and response. A pliable interaction is one where the user is drawn into a sense of shaping the digital information with her fingertips.” [10]

The following case study details the human factors taken into consideration when developing an application that is premised upon email as a form of organisational information and knowledge management.

3. CASE STUDY

Company 1 was set up in 2001 when a previous company that had employed all of its directors closed its Sydney office and was going to abandon all the local clients it had supported. Company 1 was established to pick up and fulfil these abandoned contracts. It was envisaged that the company would continue for about three years before its clients would move onto other technologies. Over the years, Company 1 continues to be contracted to support many of these clients as well as further develop their systems. The company had begun with a short-term view of itself that negated the need for a long-term knowledge management strategy.

Company 1 is extremely distributed: all of the seven directors work from home, although all are Sydney-based and there is no physical shopfront for the company. Only one of the directors works full-time for the company, the others are part-time. The client company work-base is airlines and cargo companies. None, bar Qantas, are based in Australia. All correspondence is with the head offices of airlines in their home countries.

The organisation’s “bread and butter” income is support to their clients in the use of software developed by Company 1. Directors are rostered to provide “on-call” support to clients for periods of two weeks. Ninety percent of communication with clients is through email with support requests coming through a central email address. It is the responsibility of the director currently “on-call” to respond in a timely manner. With all staff working from home, however, there is no centralised system for logging support requests and the respective responses given. While Company 1 operates within a highly technical environment, its disparate structure is not amenable to managing and archiving email-based knowledge within the company in a way that allows it to be easily accessed or transferred. Therefore, efficient knowledge management is impacted by the direct relationship between a client and the director who is “on call” at any one time, and the minimal interaction which occurs between the directors.

Knowledge sharing and management, particularly through email, was identified as an area for improvement was within Company 1. Any solution had to address two key questions: How can email be leveraged for knowledge management? What value can be added to a standard email search function?

The design of an application that facilitated better knowledge management within the company had to:

- Compile a history of client email support correspondence from distributed sources
- Allow this historical archive to be accessed in a distributed way
- Enable more sophisticated means of filtering emails than current applications allow.

3.1 VUE (Visualisation Using Emails)

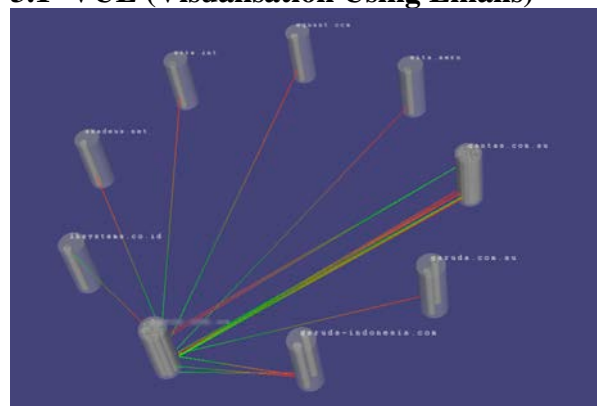


Figure 1. first prototype presented to focus group showing people “clumped” in larger organisational columns according to domain name

The first prototype presented to the company directors can be seen in Figure 1. This shows a macroscopic view of the data and the relationship between the company and its clients, including the people within each client organisation and the volume of emails exchanged. Each organisation was visualised

as a column constituted by smaller columns representing individual staff members, with the height of each column depicting time. Although specific email messages would not be seen in this view, the conceptual design suggests that emails would be ordered within each column from the most recent (at the top) to the oldest (at the bottom).

The relationships between organisations/columns can be seen by lines which plot chains of emails sent and received. Message lines were red at one end, fading to green at the other to indicate that emails were sent (green) from one person and received (red) by another. The pliability of the visualisations in the initial electronic prototypes was restricted to rotation and zooming. Even at such an early stage, it is easy to see how this can be used to gain insight into the email traffic.

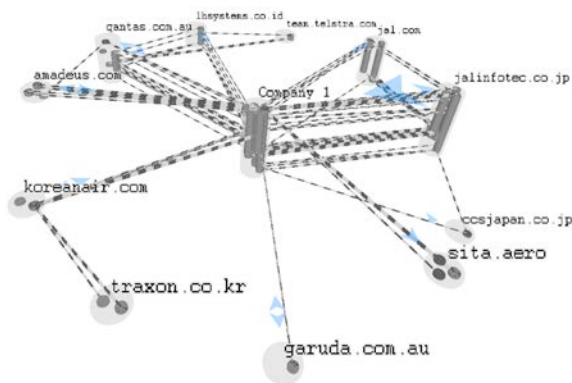


Figure 2. Replacement of static colours with animation to indicate email direction

Changes to the prototype were implemented based on the feedback from the focus group with the Company 1 directors. An additional individual informal interview with the director who identified himself as colour-blind was conducted. The findings, together with some research into the condition [1][13], informed the decision to provide alternative means of displaying the direction of email correspondence. The green and red combination was found to be indiscernible to those with colour blindness. Alternative means such as movement of patterns (see Figure 2) and personalisation of colours (Figure 3) was introduced to allow the user to choose their preferred way to represent email direction. Allowing a choice of colours is deemed accessible for those with colour-blindness [8].

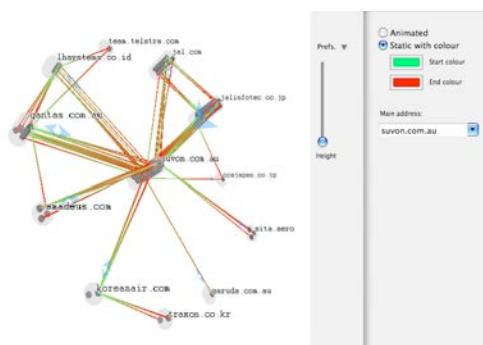


Figure 3. Preferences panel that can be hidden

The background colour was altered as all directors found the blue colour a bad choice. The company was moved to the centre of the circle, given that it was the “common denominator” in all these relationships. Additionally, more visual information was

given. The heights of the columns were adjusted to represent the period of time over which emails were sent: the shorter the column, the shorter the period. Arrow heads proportionate to the number and direction of emails sent in a given direction. For example, an equal number of emails sent and received between two correspondents would have similarly sized arrows, however, where a person is doing most of the sending to another person who is doing most of the receiving, a larger arrow would depict the stronger flow of emails in one direction. These arrows were implemented as many directors argued that seeing the relationship between the company and its clients was necessary to better manage customer relationships.

Given that there were now two possible options for viewing the flow of email correspondence, greater pliability and customisation of VUE was explored. This was implemented as a preferences panel that could be hidden behind the main window. The preferences panel allows the user to choose how they would like the flow of email to be displayed. The user has a choice of colour or animation. If the user opts for the former, they can also nominate the colours used to depict emails sent and received. Users can dictate the organisation they wish to appear in the centre of the visualisation: all domain names contained in the email archive are listed in a dropdown menu. Whichever the user selects as the “main address”, will be shown as the central column in the display.

Furthermore, the user can adjust the height of the columns. As the height of the columns represent the time over which email correspondence occurred, the slide tool enables the user to focus in on a short period. To further assist pliability in the scale of the visualisation, so that the user can easily move between “zooming in” to a microscopic view and “zooming out” to a macroscopic view; a “diameter” slider which allows the user to stretch out the model to make room for a larger number of domains was added. Comparable to the range slider recommended by Heer [7], this enables VUE to display numerous messages and for the visualisation to remain comprehensible to the user. In being able to “zoom in”, that is, to magnify the visualisation, the user can then select particular emails or email threads.

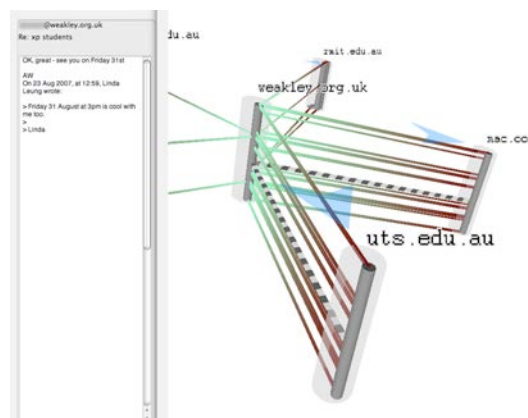


Figure 4. Selected email line displays contents of message in an adjacent window

Once an email line is selected in the main window, it is differentiated by becoming animated (if colour is selected as the preferred way of displaying email directional flow). Conversely, if the email lines are animated, then selecting one will make it coloured. When the selection is made, the contents of the email are displayed in an adjacent window. In Figure 4,

an email is selected which originates from the domain weakley.org.uk and has been sent to two recipients at the domains uts.edu.au and mac.com. The contents of that email are displayed on the left. Thus, the pliability of the application is increased by allowing the user to move from an overall view of a body of email data down to a microscopic view of a specific email message. It concurs with Whittaker and Sidner's notion of viewing by thread which "allows a user to select any message, use that message to access all messages from that conversation, and hence view any message in its conversational context" [19].

4. CONCLUSION

As this case study emerged from the actual needs of a company, the next stage will be to observe and evaluate the process of adoption of VUE within the organisation, and to analyse its use in daily operations of Company 1. This will include an examination of the range of email clients used by Company 1 directors, and the possibilities for tighter integration with VUE in order to understand email for organisational knowledge.

It will also be necessary to look beyond Company 1 to gauge the relevance of VUE to other distributed small to medium-sized organisations which do not have the enterprise systems of big corporations for knowledge management. What is the scalability of VUE to larger organisational contexts? Furthermore, how might the pliability of interaction be extended to cater to a diversity of users (both expert and non-expert) and allow them much more control over the interface?

Through its case study, this paper has illustrated how a small, distributed organisation relies heavily upon email for its communication. As such, it is necessary to move past the preoccupation with individual management of email in work settings (with which research into email has been primarily concerned) to an understanding of the ways that email is used organisationally. Conversely, software applications that provide the kind of powerful visualisations of email that are absent from standard email clients are also focused on the individual. The development of VUE shows how this can be applied at an organisational level to aid the core business of a company. The case study shows there is a compelling argument for leveraging email as a platform for organisational knowledge management.

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