Mail2Tag: Efficient Targeting of News in an Organization

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ABSTRACT
Transferring information and news across the many boundaries found in a networked knowledge economy remains a challenge for work organizations. From field interviews studying news sharing in organizations we find that news proliferates through and within organizational boundaries along social networks, with people filtering for each other and according to their roles in the organization. We find that people actively target information at the perceived right people, but this is a hurried and incomplete assessment that arises frequently. We report here on a novel email-based news sharing system called Mail2Tag that uses tagging keywords as email addresses. We present the unique features supporting lightweight collaboration that extends the observed practices of news sharing in the enterprise. We conclude by considering how we can foster collective intelligence in an organization by making lightweight adaptations to current tools and information sharing practices.

Author Keywords
Social media, tagging, news, diffusion of innovation.

ACM Classification Keywords
H.5.3 Group and Organization Interfaces.

INTRODUCTION
In our knowledge economy, enterprises’ competitiveness often depend on the efficiency in which important news travels to the right people at the right times. Knowledge workers depend now heavily on communication channels both inside and outside the enterprise to be kept up to date on the most important information, such as the latest news on competitors, memos on human resources, status of business proposals, and the progress of workflows. The efficiency of news spread in an organization determines not just how the organization might absorb and make sense of the information, but also how it might decide to respond and react.

Organizations are under pressure to respond with efficient knowledge transfer practices amongst the many overlapping networks connecting stakeholders inside and outside the different interrelated organizations [15]. For example, one study of how email impacts an organization showed that one piece of email may create an organizational footprint that is 30 times larger [16]. How can organizations better respond to the complex social and technical situation involved in staying current in their areas of business?

News in general is about the communication of current events, where the timeliness of the information is key. These events may span many topics of interest, which for example have evolved into the format of the modern newspaper and news feed. For the enterprise, ‘timeliness’ might not necessarily be limited to just up-to-the-minute, ‘breaking’ news. For example, in the study we are about to report, one interviewee said: “It’s about the leading edge of something. Staying current in a professional sense, I go through bouts of finding information. And I share it”.

For the purposes of this study, we take a broad view of news by considering information that is ‘new to a company’, i.e., happenings from the outside, not known inside in a way that the organization can act upon it. This may constitute keeping up with information for ‘knowing what’ is happening and ‘knowing how’ to do things in the current business climate [15].

In this paper, we are interested both in understanding how individuals utilize various communication methods to channel news to others within the organization, and also how we might improve news dissemination. Having formed a model of the actors and incentives of a news-sharing network we introduced a novel email-based system. Observing that email is a sender-controlled medium, and that fear of information overload is an oft-cited modulator of information sharing, we ask what would happen if we provided a supplementary email channel that lacked the social contract that “every email received must be read”.

In the next section we discuss related work. We then report on interviews we undertook about news diffusion within one organization and consider these findings in relation to similar interviews conducted in other organizations. In
response to these findings we then introduce a novel email-based news sharing system called Mail2Tag designed with the observed practices in mind and report the initial usage of the system. We conclude with some discussion of how the system might affect the playing field of news sharing within an organization.

RELATED WORK
Three directions of research are particularly relevant to news propagation at work: (1) news dissemination in networks, (2) information brokerage in groups, and (3) email as habitat and other information sharing tools.

News Dissemination in Networks
Online news media has been assuming an emerging role in information production and consumption [19]. There have been a large number of studies that look at the flow of information on the web in many different contexts. For example, there have been studies on how news affects stock markets by showing statistical correlations between news events and stock return and volatilities [22]. However, these studies do not typically seek to understand the manner of information propagation.

In research more specific to the mechanics involved with news sharing, diffusion-based models have been applied to describe news dynamics in the blogosphere [14]. These studies were based on research on diffusion of innovation models [14]. Similarly, contagion models have been applied to news feeds in Facebook [25]. These inquiries do not specifically look at the flow of information through a proprietary boundary found in an enterprise.

Other research on knowledge diffusion looked at how information is disseminated in gaming communities [11]. The focus in this research is primarily on peer-to-peer teaching of one feature of the gaming system (i.e., how-to knowledge about teleporting in the game world).

Viral marketing is also a kind of information diffusion. Leskovec et. al. [17] have studied the dynamics of recommendation diffusion through analysis of millions of recommendations in a shopping network. They found for example that “on average recommendations are not very effective at inducing purchases and do not spread very far”. This analysis then goes on to find circumstances in which viral marketing can take place.

A large body of literature surrounds the issue of news flow in organizations, including information seeking, organizational memory, and expertise location. For example, more specific to organizational information flow, sociological research shows that there is greater homogeneity of information within groups of people than between groups of people [5]. Further, individual assume the role of bridging between distinct groups of people. These ‘brokers’ have access to a more diverse set of ideas and information, and thus come to play a critical role in propagation in general, and thus we might expect the same for news.

Information Brokerage in Groups
For news routing in an organization, a task for an organization’s network is ‘who should know about this’? Allen [2] in a study of information seeking practices of engineers discusses the role of people brokering the flow of information from outside (gatekeepers). He mentions the psychological costs of looking to others when seeking information.

One way to make information brokerage more efficient is the construction of knowledge bases. Ackerman [1] in reporting on Answer Garden investigated the role of a technology designed to make recorded knowledge retrievable and by making individuals with knowledge accessible. When a gap in the retrieved knowledge is seen, the system will route (usually via email) the unanswered question to an expert within the social network of the organization. Field studies highlighted issues status and reputation in peoples asking for and giving information (e.g., not wanting to impose on experts and wanting good perception of one’s own expertise). For efficient question and answering, expertise recommendation [e.g., 23] seeks to find who knows what.

Public displays of news have also become a shared resource to organizations [6, 24]. In such systems, people in the community make news public through a new communication channel (i.e., the public display) as a way to reduce the overload on channels of communication. It should also be noted in these systems that adoption of the new technology was greatly facilitated by creating an email access point for the news display; namely, people could email news ‘to the wall’.

Email as habitat and Other Information Sharing Tools
From the tool perspective, email has become the important way in which information travels within an enterprise [9]. Email’s original intent has evolved from an asynchronous communication medium, and has become a primary tool of business, where work gets received, delegate, and many other uses. And this is happening despite its known issues of overload and information management [7, 12]. Commercial efforts in knowledge management have positioned email for contributing to persistent web-based discussion threads at work [13]. This includes recent web offerings in this area (www.ccbetty.com). Group formation support in email is supported by email distribution lists services such as www.tgethr.com.

Email has also been looked at in terms of group awareness [3], where short daily status emails not only contribute easing the demands of task reporting, but also provide a benefit to group task awareness in small groups. Given the prevalence of email, we wonder what is its role in the efficient propagation of news at work?
We also see move to social software in the workplace with blogs [10, 19], wikis [8], and, of most relevance to us, the sharing of Web links in social bookmarking systems [20]. Recent studies indicate that within organizational settings we are seeing varying and generally low participation rates in social media [4], despite benefits of shared expertise and learning gains [21].

Research questions
With respect to news at work, what roles, tools, and practices might we expect in the brokering of news? Here we are concerned with situations where organizations are exposed to an ongoing stream of daily events? While it is known that ‘brokers’ serve a role of selection and synthesis across groups around high value information, and facilitate shorter paths in degrees of separation [5], does the brokerage scale up for potentially high volume, unknown quality streams of information where explicit brokering may be quickly overloaded? And given an observed manner of propagation through a company’s boundaries, what technical approaches would be compatible with or feasibly augment or even replace the practices observed?

INTERVIEW STUDY
Organizational Setting
We selected one organization for in-depth study that allowed complete access to staff and support services, namely our own company, the Palo Alto Research Center in Palo Alto, California, USA. Further, this is the site of initial deployment of the Mail2Tag system. The company is an established research organization, having approximately 200 staff members in one location. Most employees belong to an approximately 5- to 10-person group (we will call this a ‘team’ in this paper) organized into 4 larger multi-team groups. Each employee has an office, generally located near the rest of his or her group.

The company uses wikis for project and group knowledge repositories. The project wikis typically receive brief but intense activity (e.g., collecting web links on a topic), and then lapse into occasional use. Group wikis are updated infrequently, usually when there is organizational change (e.g., new projects and people). External blogs on topic areas promoted by the company are encouraged. Internal blogs receive infrequent use for general information sharing on topics of wide interest. Microblogging (e.g., Yammer.com) was tried early, but did not persist.

Participants
Participants were chosen from a range of positions and tenure with the company (Table 1), including staff members involved in the primary business production, service people in support of the staff members (e.g., marketing, administrators, staff services), managers, and executive level managers.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Years in Company</th>
<th>Gender</th>
<th>Role</th>
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<tbody>
<tr>
<td>P01</td>
<td>5</td>
<td>F</td>
<td>Service</td>
</tr>
<tr>
<td>P02</td>
<td>3</td>
<td>M</td>
<td>Staff</td>
</tr>
<tr>
<td>P03</td>
<td>9</td>
<td>M</td>
<td>Staff</td>
</tr>
<tr>
<td>P04</td>
<td>29</td>
<td>M</td>
<td>Senior Staff</td>
</tr>
<tr>
<td>P05</td>
<td>19</td>
<td>F</td>
<td>Service</td>
</tr>
<tr>
<td>P06</td>
<td>30</td>
<td>F</td>
<td>Service</td>
</tr>
<tr>
<td>P07</td>
<td>6</td>
<td>M</td>
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</tr>
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<td>P08</td>
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<td>F</td>
<td>Intern</td>
</tr>
<tr>
<td>P09</td>
<td>0.8</td>
<td>M</td>
<td>Staff</td>
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<tr>
<td>P10</td>
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<td>F</td>
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</tr>
<tr>
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<tr>
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<td>0.3</td>
<td>F</td>
<td>Exec</td>
</tr>
</tbody>
</table>

Table 1. Participants were selected from different positions and years with the company.

Interview Procedure
Sixteen interviews were conducted in peoples’ offices, starting with a critical incident style interview on the most recent news events received, and then followed by explicit probing to elicit different ways in which news arrives, frequency of such news, and who was involved. Two basic questions were asked:

• How do people send you news?
• How do you send news to others?

Interviews took a minimum of 30 minutes and a maximum of one hour, allowing participants to talk as long as they wished. Participants were allowed access to their information resources online as well as offline during the interview as needed.

We also conducted an artifact probe for a subset of these interviews in which people were given 12 URLs as example news around their area of work and asked to whom, if anyone, they would pass that information. We selected the URLs as possibly relevant to the participants by using company blogs and mailing lists.

Analysis Procedure
All interviews were coded for mention of: means of news transmission, reported frequency of news (hourly daily, weekly, monthly, rarely), and who was involved (in team, in company but not team, and external parties).

We counted the various ways people reported receiving and transmitting news. We computed summary statistics on these codes to gain a picture of how news travels. Reported means of news transmission were direct person-person email, email through a mailing list, face-to-face, social media such as Twitter and blogs, telephone, physical messaging such as postal mail, remote conferencing, instant messaging, finding things out via activity logs, and reporting news in a wiki.
STUDY FINDINGS

We find three major ways the company responds to getting receiving and transmitting news:

- Email is indeed the channel and medium of choice for news;
- News follows peoples’ social/work networks, and there is a strong effort to pass along only news seen as relevant to others; and
- People structure their news networks to get news conveyed in short paths of only the ‘necessary, but sufficient’ recipients.

We will now discuss these findings in detail below.

Finding 1: How news travels

Although we find that news arrives and is diffused by many channels, with different levels of timeliness and audience, the primary means of communication is email (either directly or via company mailing lists) and face-to-face conversations in offices, hallways, and at lunch (Figure 1, top).

There is some penetration of news innovations in terms of social media use (e.g., Twitter, blogs, and LinkedIn). In general people have more ways of getting news than giving, with the bulk of information in daily and weekly cycles (Figure 1, bottom right).

While a decent amount of news comes from other team members or others in the company, subjects take in news form external sources as well (Figure 1, bottom left).

We next look deeper into the different combinations of medium, source, and frequency of delivery by which people reported receiving news (Figure 2). For example, we aggregate all the news a person reports as coming from an external email mailing list delivered on a weekly basis. In this accounting, we find that overall there are more channels in use for getting news than giving it.

Staff and managers members tend to have more more ways for getting news than people in service roles. There are a few special service roles that are more involved with giving information than getting it (e.g., health related information).

Finding 2: Filtering in the Network

From the interviews, we find that the news communication channels afford different tuning and consumption behavior. People use those affordances, for example, by knowing the audience of a given channel and adjusting the communication accordingly:

P03, “...sent me a story in the sense of ‘have you seen that link’? That was by Skype. It [the conversation] was triggered by the opportunity that we were both online. With this particular person it is relatively rare. I shot him a Skype message, so he picked up”

Figure 1. People report news from many sources, each being accessed with different frequencies.
P03 further discusses the etiquette of the channel: "we are on very good terms. I think if the relation was more distant then there would be more [expectation] of reply, whereas if you ... know each other [very well], if [the conversation] can flow [without such replies]".

We see people filtering of news streams for their peers as a part of their ongoing conversations at work. The filtering includes quality assessments, time investment appropriate for relaying the news, uniqueness of the news:

P02, "I have to read it [news related email] to find out if it is unique enough. I do try to filter if it is worth forwarding. There is a huge quality assessment thing, because I would hate clogging peoples’ streams. I would probably send it to people who are actually engaged in a conversation of this type ".

P04, also on evaluating the fit: "How many people have got time to read, to evaluate, to say [that] this [article] is really above ‘clip’? Can I send out an article I haven’t read yet because I think it is interesting, or do I have to read it before I think it is good enough to pass along? How do you share the work of evaluating the articles and making sure the really important ones come along”.

P03, on deliberating the transmission of news: "This resonates with the ideas [that we] have been discussing. I would probably forward that to [name] … if I have time. I probably would not do that now. Forwarding it, I would like to give it another 5 minutes of time, to not just blindly forward stuff. So I would probably let that sit around, flagged in my head a bit as interesting towards [name], and if I have a quiet five minutes I would look at it again”.

P06, on how everyone is overwhelmed, “I am much more selective than I used to be because I am confident the people I am communicating with have all the same set of things that I have and are overwhelmed by the output of all the same things”;

Further, not only did people filter for others as a matter of practice, they expected others to do so for them:

P03, "All is biased by what I would expect. If you send me something I would expect that you probably would have thought [about] why you sent [it to] me”.

Managers in particular reflect on the communications needs in their areas of responsibility:

P04, "If you are a manager, you really need to decide what things are of relevance in things coming up for the group. It is interesting, because everyone wants to pay attention to things coming down from above. I always had conflicting signals – oh here is this thing coming down: is it for a reason or is it some particular news? Is there a message beyond the article itself?”

P11, "I believe that news about parent company and finances is damaging to technical people... hearing about ups and downs and balance sheets distracts me from enjoying my day to day activities”.

Finding 3: Tuning the Network

People structure their news networks to get news conveyed in ‘necessary, but sufficient’ ways. They do this by structuring the channel so that it produces quality news, finding ways to avoid unnecessary communication, or setting up shortest paths.

As one interviewee describes about who to follow in Twitter: "I went through [lots of] phases. Imagine a spiral. I could overhear conversations and pick up derivative connections. Then it got to be a little overwhelming so I went and winnowed those down... and again. The people you follow dictate the information you get. And there were three factors. One is how informative or interesting they were to my
People also arrange news delivery to be readily accessible or ‘in the path’ of themselves or others.

P09, on how others position news for them: “[This news was] on Facebook, being posted in a place where they know I might read it by an ex-colleague”.

P12, on prompting others to give news: “I have found that in our [part of the company], people are reluctant to give news. So I have a prompt on my calendar every Wednesday to target - I know these 5 things have happened, I want those 5 people to mention it. I'll send email every week say "would you mind mentioning this at our lab meeting". Because it adds a lot of color and interest. But people don’t seem to come forth on their own.”

And finally, roles evolve in the organization so that certain people act as ‘receptor sites’ for news information, and provide a conduit into selected colleagues.

P05, on an ex-coworker becoming a receptor: “I share [parent company] news when I go down the hill to visit the co-workers from a previous group. We talk about the employees we used to work with and what they are doing now. And the business groups in [the parent company]”.

P07, on people taking on a brokering role: “We have our external ‘scopers’. [Name] is one of these very unusual people who finds it interesting to peruse catalogs of components and products, He will send us links, if something comes up in a meeting. He also goes to a lot of these trade shows and talks to companies... write up trip reports and send out links, and distribute some papers and materials they found at conferences.

P11, on brokering of news about a targeted organization: “[One person] has taken on the role of being the primary medium for news about [a government agency], and if somebody scratches their toe, we’ll get an email to keep us informed about it. And it is very interesting because personnel changes are very important to know about and they are not advertised well”.

P12, on the role of being the group memory source: “A fair amount of what I do is remembering who we’ve talked to in the last 3 years, and reconnecting with them and engaging on a topic. A lot of it derives from [the fact that] I keep all my email, historical, and archive it. And I am pretty facile in searching ‘who was that we talked to 3 years ago?’”

Through these various processes aimed at people’s own news consumption and delivery to others, we can see that the distribution network built up over time is a parsimonious one, meant to convey value quickly and in line with how work gets done. People seem to try to optimize their behavior given the tools and sources of information available to them.

### Looking Outside the Company

We also conducted telephone interviews outside the above organization using the same questions. The purpose of this limited additional inquiry is to better illustrate the constraints of a study involving only one organization, and suggest ways to broaden future investigation. While it would be impossible to interview across the full range of external work settings, we sought out situations that would likely be more extreme in news practices.

<table>
<thead>
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<th>Gender</th>
<th>Role</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>PX1</td>
<td>M</td>
<td>Production Manager</td>
<td>Parent company</td>
</tr>
<tr>
<td>PX2</td>
<td>F</td>
<td>Production Staff</td>
<td>Parent company</td>
</tr>
<tr>
<td>PX3</td>
<td>M</td>
<td>Sales Manager</td>
<td>Parent company</td>
</tr>
<tr>
<td>PX4</td>
<td>F</td>
<td>Sales Engineer</td>
<td>Non-competitor technology provider</td>
</tr>
</tbody>
</table>

### Table 2. Participants for external interviews were selected from different organizations more and less news oriented.

Table 2 summarizes the subjects in this follow-on study. We selected a manager and staff worker from a document production oriented workplace in the parent company. These workers focus on producing proposals. The rationale being that such focused work might have much more constrained uses of news than our target study group.

Looking at the other extreme, P16’s interview above suggested that sales organizations use news not only in guiding their actions but also for aiding conversations with customers. We thus contacted a sales manager within a customer-facing group in the parent company and a sales engineer from a large technology software and solutions provider in a different business area.

Interviews with the Production workers (PX1 and PX2) show that organizations can be much more news adverse than our study organization. In this case there is one sanctioned curator of news (PX2), who is the only person to receive news from external sources. This curation is filtered into a Wiki and web-based document repository, freeing up others from news gathering and allowing them to focus on the production of proposals. There are fewer daily channels...
of news, mainly face-to-face and instant messaging, with most information flow to other parts of the company on a monthly or rarer basis. Direct email is discouraged and the curator is responsible for keeping up with relevant mailing lists. Policies about what sources of information can be used in production are in place and followed.

Conversely, customer facing groups like sales are very news accepting. They use more news from more channels, and more things are considered news. They use news to improve conversation flow and impression management with customers. In this case, everyone is a receptor site and routinely share current information with each other based on similar work networks observed in our main study. In each case, email was explicitly cited as the dominant form of communication of news.

While this study is limited, we see how both the main study and the additional data gathered here suggest a range of organizational responses to news. Some are more accepting and others are more adverse.

DESIGN IMPLICATIONS
We have found a relatively mature practice of relying on the communication channels most commonly used at work, such as email and face-to-face. News not only travel along social networks in the organization, but also there is a strong effort in passing along news that known to be relevant. People are conservative in their choices. Moreover, people tune their social network to ensure they receive the appropriate news.

![Figure 3. The Mail2Tag architecture allows incorporation of information sharing without modification to existing email clients.](image_url)

![Figure 4. Each user has a personal Web view for interacting with the system.](image_url)

We take from our findings above the following requirements for systems aimed at work news propagation:

1. Integrate into the email habitat to maximize chances of adoption;
2. Facilitate also putting news receivers in control. While email has its advantages, it is in some sense a sender-controlled system;
3. Allow targeting to continue but increase the chance of serendipitous but relevant connections in a way that keeps the social paths for news short and efficient;
4. Enhance the ability to target news to others without overloading email further;

5. Allow the emergence of shared interest spaces.

We now describe a novel news sharing system where people use tagging keywords as email addresses. The system attempts to address these design implications.

**SYSTEM DESIGN AND IMPLEMENTATION**

We built a web-based system for news sharing, called Mail2Tag, which integrates closely with email. Users mainly interact with Mail2Tag through email, both to share news through the system and to receive it. There is also a web interface for browsing and searching contributed content, for revisiting news or consuming news in pull-oriented fashion if desired. Here we describe the architecture of Mail2Tag with reference to the flow diagram in Figure 3.

**Taking advantage of news targeting**

We designed the system to piggyback on the normal targeting behavior we saw in the interview study. The system provides opportunities for contributing to the organization's collective knowledge while in the normal flow of email.

When sending an email, if the user thinks it may be interesting to others in the organization, they can add one or more “sharing tags” (Figure 3, A). These are simply email addresses with a distinct domain, such as share.parc.com. The tag is placed before the ‘@’ symbol in the email address giving the form ‘CHI@share.parc.com’ for the tag ‘CHI’. Anyone who is following a given tag will have an opportunity to see the message at some point, most likely in a digest email (Figure 3, C), which they receive at an interval of their choosing. Additional tags can also be added to any item later through the website.

This provides a level of indirection between people in an organization but with much lighter-weight setup costs than with mailing list software, for example. The simple act of addressing a tag creates the topic space if it does not already exist. This means that users do not have to think too much about the tags they assign – if they remember one that already exists, great; if not, they can choose the most likely one or two and trust the system and its users to self-organize. This is the lesson from social tagging research.

Of course, it is not necessary to target emails at anyone at all. Simply addressing a tag and no one else in particular is useful if you know there are people in the organization who may be interested (perhaps later) but do not know them well enough to target directly.

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**Encouraging increased information sharing**

We also wanted to enhance targeting by providing users with more opportunities for sharing with colleagues with known interest. To that end we overload the tag namespace with the usernames of all the people in the company (e.g. username@share.parc.com, where ‘username’ is replaced by the email moniker of the intended recipient). Sending email to a “person tag” puts the item in that person’s queue - i.e. in their later digest email.

We hypothesize that this requires less consideration of social consequences than adding a normal email address to the CC field since there is less interruption involved in putting an extra message in somebody's digest than putting an extra email in their inbox. People can also be added as definite recipients later on the website.

**Assisting with news filtering**

It is evident from the interviews that people find it necessary to constantly nurture their set of news filters. We want to put receivers in control of their information diet but assist them where we can. The main way we do that is to learn from the tag associations created by their peers, which give us a strong signal of the users’ topic interest.

A “topic profile” for each user is automatically built by the system over time (Figure 3, B) by examining the emails that are targeted at a user. The intuition is that if I have been targeted by many emails that use the tag ‘Python’ then I am likely to be interested in future emails about ‘Python’. By allowing users to tune the topic profiles, the system provides a self-updating, customizable filter of news.

**Surfacing organizational knowledge**

As an interesting side effect of the tagged email traffic, our system also constitutes an emergent folksonomy of organizational expertise and interest. On the web site (Figure 3, D), each user has a profile page where their posts into the system are shown in a blog-like format (see Figure 4). The profile page also shows emails that have been directed at them and a tag cloud of the associated tags. This tag cloud gives viewers some indication of the user’s interests according to the collective consciousness of the organization.

Recall and discovery are supported by searching and pivot browsing interfaces on the website. Searching for keywords shows relevant emails that have been shared. Clicking on an email leads to related tags, people and other email conversations. This repository, accessible by anyone behind the firewall, also becomes a destination indexed by the standard intranet search tool.

As more and more people of increasing diversity are participating in the system it is already showing promise as a valuable collection of knowledge that might normally be latent in the heads and private inboxes of the organization’s denizens.
DEPLOYMENT

The system first became available for limited use in December 2008 by a small team of users. Invitations for general use were announced in June 2009 and a second release of the system with interface changes and rebranding of the server to its permanent name, share.parc.com occurred in August 2009.

To date deployment shows use of prototype in which 20% of the company has contributed content and 45% have received news through the system. We observe a typical ‘power law’ distribution of social media usage [18] with a few contributors being very active and a long tail of others interacting the system sporadically.

We now describe two actual scenarios of system use that highlight the characteristics of Mail2Tag usage seen to date.

The “Ruby-On-Rails” Group

Mail2Tag supports the accumulation of both people and topics over time, and lets the topic-interest affiliations of people accrete as a course of their normal email traffic. One case in point is the Ruby-on-Rails (ROR) group that has formed around a web software platform of interest in the company. As shown in the table below, the process was started by an initial email query from one interested person to another along their social network at work.

When the message addressing starts to include Mail2Tag, then the group starts to form as shown in Row 2 of Table 3. Over several steps, we see how the conversation evolves to include more people that might be interested in Ruby-on-Rails. The final step shown here references the start of a new thread outside the Mail2Tag system using an older Mailing List server. We are working on ways to naturally integrate with older mailing list software.

We see this in the accumulation of both people and topics over time, and lets the topic-interest affiliations of people accrete as a course of their normal email traffic. One case in point is the Ruby-on-Rails (ROR) group that has formed around a web software platform of interest in the company. As shown in the table below, the process was started by an initial email query from one interested person to another along their social network at work.

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We now describe two actual scenarios of system use that highlight the characteristics of Mail2Tag usage seen to date.

The “Ruby-On-Rails” Group

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<table>
<thead>
<tr>
<th>Addressing in parc.com</th>
<th>ROR group members</th>
<th>Message content</th>
</tr>
</thead>
<tbody>
<tr>
<td>From: L To: R</td>
<td>{empty}</td>
<td>“I wanted to use Ruby on Rails. Have you used it?”</td>
</tr>
<tr>
<td>From: R To: N, CC: L, ROR@share</td>
<td>{L,R,N}</td>
<td>“I’ve never used Rails, sorry. I have a feeling there are some Rails people at [PARC] though. N, have you?”</td>
</tr>
<tr>
<td>From: N To: R CC: P, L, ROR@share</td>
<td>{L,R,N,P}</td>
<td>“Nope, that wasn’t me. I dabbled in Django (the python equivalent). Maybe P knows?”</td>
</tr>
<tr>
<td>From: P To: N CC: R, L, ROR@share</td>
<td>{L,R,N,P}</td>
<td>“I haven’t used RoR myself, but I am interested in learning about it. I’ll forward this to our learning group mailing list.”</td>
</tr>
</tbody>
</table>

Table 3. Mail2Tag groups accumulate along with normal email traffic to become a permanent resource.

**Call-For-Papers (CFP) Emails**

One source of email traffic that is commonly accompanied by an apology for redundancy is the ‘Call for Papers’ (CFP), in which conferences and funding organizations broadcast their interests in topics. One use that has emerged in Mail2Tag is the redirection of this email traffic into the less intrusive communication channel provided by the system (Figure 5).

For example, CFP emails consist of various topics such as cleantech, IUI (Intelligent User Interfaces), Robotics. By browsing through the ‘CFP’ tag, one can get a sense of the research interests around the organization. Librarians of the organization can then compile a master calendar of deadlines. People with specific interests can look under just the relevant topics, with the search function. In this way, Mail2Tag functions as a group memory device.

**DISCUSSION**

In this study of the news sharing in a particular organization we found a relatively mature practice, in which people use email as a habitat for sharing information. While news embedded in email travels along well-oiled social networks within the organization, people are also averse to passing information unless it is deemed clearly relevant. People are naturally conservative in their practice, because they are well aware of the need to combat information overload. They tune their network so that they only receive the most appropriate news for their work.

One major issue that surfaced over and over again is people’s lack of knowledge of others’ interests. This results in inefficiencies in news propagation that have thus far been hard to overcome. While it is known that ‘brokers’ serve a central role in information dissemination [5], we are seeing evidence that for the high volume of news (primarily carried on email), the assessment and dispatch of this unknown quality stream of information does put a burden on explicit brokering. We see this in the very conservative pathways for news traveling being established in response
to the volume. We have thus designed and implemented a news sharing system based on a supplemental addressing of email to a topic-based knowledge structure.

Creation of Topic Space

Given that email is a sender-controlled system (you do not have control over what’s in your inbox), we seek to put news receivers in control. We enable tags to create shared interest spaces that are easily added to by anyone with email access. In a single email, users can both target the news to particular persons (when they are confident these persons would be interested), and to the tag topic space.

This process differs significantly from the use of ‘mailing list’, namely, the explicit address collection of people who then become part of the forwarding path for messages to the list address.

Mail2Tag has been designed to differ from mailing lists in delivery, set-up interaction, and inclusiveness. Mailing lists in general deliver messages immediately to explicit subscriber lists. Some mailing lists provide the ability to receive postings grouped into daily digests but most people are subscribed to receive all mail immediately. Mail2Tag provides only digests and has an adaptive algorithm that sends people digests with a frequency appropriate to their level of engagement with the system. For a sender, this ensures that contributions will not annoy receivers, and hence increases the likelihood of sharing.

Low-effort Setup and Group Formation

Mailing lists require significant overhead to set up in the first place. There is a critical threshold of interest that must be reached before a mailing list is created and then there is the coordination cost of getting the right people subscribed to the mailing list. As a result mailing list software fails to capture the long tail of interest groups within an organization. Mail2Tag requires close to zero effort to start an interest group. Simply adding a new tag to a mail will create the group and add the people who receive the mail to the new group. An indicator that we are capturing the long-tail of interests is that our deployed Mail2Tag system, after 6 months of limited usage, contains over half as many groups as our decades-old mailing-list server.

Finally, to get on a mailing-list you first have to be aware that it exists. Within small groups this is not a problem but it does not foster links across moderate sized organizations very well. Because of the ‘low traffic’ approach of Mail2Tag the system can be promiscuous in subscribing people to tags automatically. One pattern we have seen is a message that happens to include a tag get reply-to-all'd several times, each time with some extra people added as recipients. As the message travels around the organization it "collects" people as it goes. The Mail2Tag system notices this and exploits this distributed knowledge of who is interested in what to "pick up" a set of recipients from around the organization.

CONCLUSION

In this study we have utilized an organization’s collective intelligence to help in the brokerage of relevant information for that organization. We studied the particular news sharing practices of one company, showing how email remains as the main habitat for sharing of news. News travels from outside of the company through main conduits, who broker this information conservatively to others that they are confident would be interested in the information. Receivers try to tune their social network to ensure they receive the right volume and quality of information. However, people’s lack of knowledge of others’ interests remains a significant barrier to efficiency.

The system we developed, called Mail2Tag, enables users to share news using tagging keywords as part of the email address. This helps them target not just people, but also a topic space that is built up through use. Since people gain a topic profile over time, it enables the system to target news to them in an efficient way. This topic space functions as a group memory device, helping to surface expertise in the company. We report on deployment experiences, showing channels of information emerging in the organization.

We intend to further monitor the participation in the system, particularly focusing on how to encourage its use. We are currently working with an organization in the parent company to refine the system for the needs of a different community, and then deploy the system in an external context.

REFERENCES


