Mailing Lists: Why Are They Still Here, What's Wrong With Them, and How Can We Fix Them?

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ABSTRACT
Mailing lists have existed since the early days of email and are still widely used today, even as more sophisticated online forums and social media websites proliferate. The simplicity of mailing lists can be seen as a reason for their endurance, a source of dissatisfaction, and an opportunity for improvement. Using a mixed-method approach, we study two community mailing lists in depth with interviews and surveys, and survey a broader spectrum of 28 lists. We report how members of the different communities use their mailing lists and their goals and desires for them. We explore why members prefer mailing lists to other group communication tools. But we also identify several tensions around mailing list usage that appear to contribute to dissatisfaction with them. We conclude with design implications that explore how to alleviate the tensions that we observe around mailing list usage.

Author Keywords
mailing lists, email, online communities, discussion groups

ACM Classification Keywords
H.5.3. Group and Organization Interfaces: Asynchronous interaction; Web-based interaction

INTRODUCTION
Just four years after the invention of email, the first mailing list, MsgGroup, was created in 1971 to help Arpanet users discuss the idea of using Arpanet for discussion. In the 40 years since, mailing lists have become pervasive, helping communities share information, ask and answer questions, discuss issues, and build ties. More recently, alternative methods of group communication emerged, including discussion forums, Q&A sites, and social networking sites. As other tools gained prominence, some believed that mailing lists would die out and be replaced [13]. But mailing lists continue to be widely used.

Despite ongoing use, lists have changed little from their original design. There have been some modifications and advancements, but generally mailing lists are used much as in the 1970s. While mailing list development stagnated, newer applications and websites have introduced numerous collaborative curation features, including following, tagging, and social moderation. These new systems and their features have been studied extensively in recent years. Email clients have also undergone dramatic changes in the last 40 years, so that now many people access their email in new ways [7].

Given the continued pervasive use of mailing lists, the lack of new development or research surrounding them, and advances in our modern social systems, we believe that a closer study of mailing lists today could reveal significant room for improvement. We consider the following questions:

- What are the problems and limitations of mailing list systems today?
- Why, despite these problems and limitations, do people continue to use mailing lists in the face of modern social media tools?
- How might we address these problems and limitations without ruining what makes mailing lists so attractive?

To gain insight into these questions, we studied the use of two mailing list communities through in-depth interviews. We augmented this qualitative examination with a survey of more members, and we additionally surveyed users from another 28 mailing lists of varying community types. We explored the diversity of goals, expectations, and perceptions among community members subscribed to lists, and how this can leave many users dissatisfied. In more detail,

- We saw significant disagreement over the preferred types, quantity, and tone of email delivered over each list;
- We found that many users muzzled themselves and others posted too much, based on their perception of others' preferences—perceptions that were often wrong;
- In particular, we found that the wide variation in how users handle incoming email influenced their perception of how the list should be used, to the detriment of others; and
- We observed that despite these problems, many users considered the mailing list superior for group communication to both web forums and social media.

Given these findings, we explore a design space for allowing diverse users to *all simultaneously* use the same mailing list in their different preferred ways without negatively impacting users with different preferences. Our results suggest that mailing list users could benefit from *greater flexibility and control* in how they choose their audience and their incoming content, and this might encourage more contributions that the

community finds valuable. We also find a need for *greater transparency and social awareness* within mailing list systems to allow users to better know who their audience is and how their content is received. Our main contribution is an exploration of the current tensions existing within modern mailing list communities and opportunities so as to alleviate those tensions with design.

BACKGROUND AND RELATED WORK

In the 1990s to early 2000s, there was a great deal of excitement over the potential of mailing lists to connect geographically dispersed people in scholarly and professional circles [9]. Studies found that lists allowed highly affective interpersonal interactions [16], encouraged reflection [9], and extended users' social capital [15]. However, even then there were problems, such as complaints about flaming, lurkers, off-topic threads, and information overload [25]. There was also frustration with the need for time-consuming administrative moderation to maintain quality discourse [4].

Some issues with mailing lists in that period simply reflected general problems of email overload [5, 28]. Given the inflexible design of mailing lists, users had no recourse except to unsubscribe when they felt overloaded [25]. Problems were magnified when the messages were deemed nonessential or served a different purpose than regular email, as was often the case for mailing lists [21]. This suggests mailing lists may have exacerbated email overload.

Much has changed since these studies, suggesting we should re-examine mailing lists in light of today's email clients and practices. Popular clients such as Gmail now have features such as threaded conversations and automatic filing and tagging, which may help with interruption fatigue and overload. However, this automatic handling may change the way users access their mailing list email to something more like to a news feed [22] such as on Facebook or Twitter, where users can dip in occasionally to view content [2]. While much research has explored how different email practices may affect the recipients of email, we also consider the perceptions and attitudes of *senders* of email, including how their expectations of how others receive their email can cause tensions within a community.

Since the early 2000s, researchers have also studied the factors that affect activity on group discussion systems, but primarily focusing on social media. Studies have looked at what content users share and why [6, 10], and what they self-censor and why [23, 27, 14]. Research has also looked into the motivations for participation specifically in online groups [20]. Research on Facebook Groups suggests that it is used for information sharing [24] as well as for socialization [19].

We extend this work by bringing attention back to the study of mailing list communities and exploring factors that affect their activity as well as new tensions they face today. Given the lack of recent research on mailing lists and the popularity of new discussion systems today, we ask whether mailing list users would prefer to move to a system outside of email such as social media or a discussion forum, and find a strong bias against doing so, for reasons we will explore below. Finally, we address a gap in the research literature by considering how mailing lists could be improved given their simple design. We reflect how we might incorporate some of the features that have been added to alternative systems in recent years without losing what makes mailing lists valuable.

DATA COLLECTION

We collected both interview and survey data, primarily relying on the qualitative interview data to gain a deeper understanding of the members of the two communities we studied. The surveys, which reached a larger user population and a more diverse set of mailing lists, let us triangulate our interview findings.

Interview Study

We began in May 2014 with in-person interviews of members of two mailing list communities, summarized in Table 1 and characterized in more detail in the next section. Our first mailing list, called DORM, is for members of a 300-person undergraduate dormitory of a mid-sized U.S. university. We interviewed 10 (4 female, 6 male, median age of 22) members, including 8 undergraduates and 2 residential advisors. Our second mailing list, called LAB, is for members, affiliates, and followers of a 1000-person technology research lab in a different mid-sized U.S. university. We interviewed 10 (1 female, 8 male, 1 other, median age of 30) members, including 1 professor, 2 administrators, 2 researchers, 4 graduate students, and 1 former graduate student. Potential interviewees were recruited by emailing the target list, by emailing related mailing lists, and by word-of-mouth. We selected interviewees to reach a diverse set of users in terms of affiliation to the community, length of time in the community, and level of usage, including those who used the list infrequently or were unsubscribed.

Before the interview, we asked interviewees to reflect on their experiences and bring two posts or threads that were memorable in either a good or bad way. We began the interviews by asking users about the posts they brought as well as their inclination or resistance to contributing in those instances. We asked general questions about the mailing list, such as their opinions and participation level. We also had interviewees bring their laptops and demonstrate how they organized their mailing list email within their email client. Finally, we asked users to compare their mailing list with other community discussion systems that they used and to imagine what the list would be like if migrated to such alternative systems.

The interviews were semi-structured, conducted by the first author, and lasted from 20 to 80 minutes. They were recorded then transcribed and coded using standard qualitative coding techniques [17]. We employed a grounded theory approach [3] to allow themes to emerge from the data.

Survey

Using these themes, we built a survey to see whether our interview findings could be confirmed by a larger subset of the two communities and by a more diverse set of mailing list communities. We built a 4 page web survey using SurveyMonkey that had a combination of multiple choice questions,

	Interview	Survey	Subscribed*	Posters**	Membership	Archives	Posts/day***	Moderated
DORM	10	43	541	531	restricted	public	15.75(13.53)	No
LAB	10	108	4,147	708	unrestricted	public	6.45(5.25)	No

Table 1. The two mailing list populations studied in depth. *Number of subscribers at the time the survey was taken in May 2014. **Posters refers to the number of unique contributors in a period of 1 year starting from June 2013 to June 2014. ***Average number of posts per day, followed by standard deviation, in a period of 1 year starting from June 2013 to June 2014.

free-response questions, and 5-point Likert scales. We deployed the survey after interviews concluded. In addition to DORM and LAB, we surveyed 28 other mailing list communities. These communities were found by asking others to publicize the survey to mailing lists they used. We aimed to reach a diverse set of mailing list populations and selected communities of varying sizes and functions.

Our survey investigated users' attitudes towards and perceptions of their mailing list, which is why we relied on self-reported data. We asked users about their strategies for managing their mailing list email and characteristics of the list. We inquired whether they cared about things like missed email, irrelevant content, or high volume. We delved into how users felt about lengthy discussions and what gave them pause when considering posting. Finally, we asked users to rate potential changes to the list, including introducing hypothetical features to the list and moving to alternative systems.

We screened out 74 people who completed the survey in under 4 minutes, completed less than half, or had a variance below 0.5 for answers to Likert scale questions, which had items of reverse valence. Of 415 remaining participants, 43 (37% male, 56% female, median age 21) were from DORM, 108 (67% male, 23% female, median age 27) from LAB, and 264 (33% male, 65% female, median age 21) from other lists. Some chose not to divulge their gender or age. The demographics for DORM and LAB respondents reasonably approximate those of the membership. We did note a slight skew in gender towards more female respondents; however, we were careful to consider this in our analysis.

The total number of subscribers and unique contributors in the last year for DORM and LAB are shown in Table 1. We presume that some email accounts were inactive or were filtered into a spam folder, but expect the number of people actually reading the mailing list is between the two numbers. Thus, we believe the real response rate to be above 5% for both communities. Our recruitment method of emailing the mailing list did not reach people who had left the list previously or did not check their email in time. This presents a non-response bias in our survey data, though we did take care to find and interview people who had left the list or did not check it frequently. We were able to reach these people by inquiring in person to members of both communities. We discuss potential biases in more detail below.

THE MAILING LIST COMMUNITIES

We begin with a deeper look into what the communities that we interviewed and surveyed are like.

The DORM Mailing List

As seen in Figure 1, the DORM mailing list was started in the fall of 2001, with a general increase in volume in the years

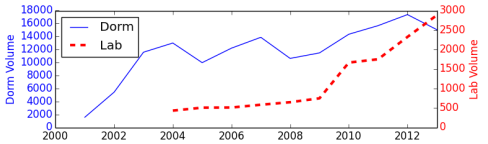

Figure 1. Total number of emails per year for DORM and LAB.

since. The community of DORM is composed of primarily undergraduates and some residential advisors and staff that live together in residential housing. Students are randomly assigned to the community during their first years and stay until they graduate, so they generally know each other by name or face. Students are automatically added to the mailing list upon joining the community and are removed when they leave, though they can unsubscribe anytime. There is a high variance in the daily volume as shown in Table 1 due to the school year cycle. The archives are publicly accessible, which few interviewees realized.

As Table 1 shows, the number of unique posters over the last year from June 2013 is quite close to the latest subscription number, meaning that almost all users posted to the list. However, about 25% of the unique posters only posted once.

Interviewees described the content as comprising mostly publicity for events organized by students for other students, with event announcements appearing several times a day. This activity is so prevalent that students name it "pubbing." This may account for why only about 30% of the posts in the last year were replies. At the time of our study, there were also many posts related to buying and selling items due to seniors about to graduate, highlighting the periodic nature of content due to the school year cycle.

The LAB Mailing List

The LAB mailing list was started in 2004 and has since seen a considerable increase in volume, also shown in Figure 1. The LAB community is composed of mostly current and alumni graduate students and some faculty, research staff, administration, and undergraduates that are members of a technology research institute. Graduate students are automatically added, but the list is open to the public, so affiliates of the lab or interested parties may also be on the list. The volume is generally less than DORM and varies less.

As seen in Table 1, there are over 4,000 subcribers as of May 2014, although only 708 unique people posted in the last year, suggesting that there are many lurkers and dormant accounts on the list. Of the people who did post, 51% only posted once. At the other end, the most frequent poster on the list posted over three times as much as the next most frequent poster. This person was referenced many times by name in

both the interviews and surveys as a polarizing and outspoken list member.

Interviewees described the list as a general-purpose list for the lab, with many job postings, housing listings, event announcements, and occasionally interesting discussions. While some interviewees knew the archives were fully public, only 7% surveyed properly guessed how many people were subscribed to the list. Instead, the median guessed list size on the survey was 500-800 people.

Other Communities

We surveyed 28 other communities that we describe using common bond and identity theory, used previously to describe online communities [20]. According to the theory, identity-based communities are centered on the general community purpose while bond-based ones are centered on the connections between members. We had 17 identity-based communities: 3 sports teams, 9 extracurricular or cultural clubs, and 5 academic groups; and 11 bond-based communities: 6 dorms, 1 sorority, 3 social clubs, and 2 neighborhoods.

TENSIONS WITHIN COMMUNITIES

We begin by examining several important *tensions* that we observed within the mailing list communities we studied. To facilitate our exploration, we categorize the types of mailing list posts into *transactional* (events, sales, etc.) and *interactional* (discussion, humor, etc.) communication. These categories have been used for spoken discourse and found in prior mailing list studies [8]. We acknowledge that not all posts fit easily into one category and that some intended transactional posts become interactional.[1] We report numbers in many cases primarily to describe our survey results but these numbers should be regarded as indicative due to our relatively low response rate.

Tension 1: Desire for Interaction vs. Hesitation to Post

We found that in both communities many interviewees wanted more interactional content on their list. Several in DORM expressed a desire for more discussions about campus-wide and general political and social issues, while many in LAB wanted more discussion of technology.

Breaking down the mailing list content more finely, we asked survey respondents to rate how often certain types of posts occur and also how often they would *like* certain types of posts to occur. In Figure 2, we visualize the difference for DORM and LAB. To validate our survey results, two people were employed to manually tag 100 random emails from May 2014 from each mailing list into one of the 9 categories, given the subject line and body of the email (Cohen's kappa=0.70). After resolving disagreements through discussion, we found that generally people's perceptions of how many emails they received of each category aligned with the normalized frequencies we found, with a few exceptions. For instance, our tagging over-reported the category of "interesting discussions" compared to survey respondents' perceptions. This

[1]For instance, our post to LAB soliciting participants for our survey turned into a multi-week, 70-post discussion on the ethics of using Amazon gift cards as a reward.

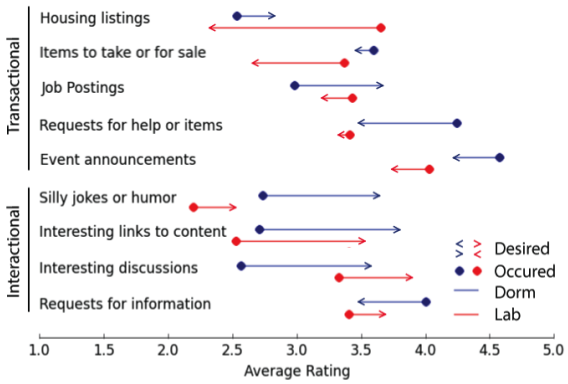

Figure 2. Survey results drawing an arrow starting from the number of times a type of post occurred (circle) and ending at how often users would have liked for it to appear (arrow). Ratings are displayed as averages. Scale is 1–Never, 2–Once a month, 3–Once a week, 4–Once a day, 5–More than once a day.

may be because we could only safely tag all emails that were discussion-related, without knowing the context for whether it was interesting or annoying.

As can be seen from the arrows in Figure 2, we found that the desired occurrence was higher than perceived occurrence for most of the interactional content, while the opposite was true for transactional content. Despite this general desire for more interaction, we found paradoxically that *many users who wanted more discussions did not contribute to them*. One interviewee acknowledged the discrepancy between her actions and desires, saying:

> *I think it is kind of a Catch 22...I want more discussion but I also don't want to put myself out there...* –DORM

We found additional evidence of this in the surveys when we focused only on the respondents who said that wanted more discussion (70% DORM, 32% LAB, 29% other communities). Of the people who wanted more discussion, a majority of them had actually *never* participated in a discussion on the list (70% DORM, 69% LAB, 61% other communities).

Though low levels of posting can be attributed to issues such as social loafing [11], we asked interviewees whether there were times when they wanted to participate in a conversation or had even written a post but did not send it. In these cases, users were *actively interested* in participating but were *deterred* for various reasons. We categorized the reasons that interviewees cited for why they self-censored their posts. Our survey then asked which of these categories gave respondents pause when posting. Though previous research has uncovered some similar deterrences [23, 27], we report them here for greater contextualization and as motivation for some of our later design implications. Below, we discuss a few of the categories that stood out in interviews and surveys.

Spamming Large Audiences: Many interviewees stated that they were worried about spamming a large number of people. This was the most troubling of all the issues for LAB and the other communities that we surveyed except DORM. One interviewee talked about the times he wrote long replies but never sent them, saying:

I'm not sure what it is that I would be losing if I hit that send button but...I felt...I'm just spamming people...and I'm only perpetuating inbox overload to people. –LAB

Misinterpretation: This issue was the most troubling of the issues for DORM survey respondents. Many interviewees from DORM said that they were hesitant to engage in discussions of controversial issues over email for fear of misspeaking and offending someone. This issue may have been more salient for DORM because members live in close proximity and all generally know each other. To them it was difficult to craft a response that they felt would be politically correct and would not be misinterpreted:

Writing an email that is nuanced enough for [DORM] *without pissing people off just like takes so long that it's not worth my time.* –DORM

Heated Arguments: People often expected that joining a discussion might lead to a heated argument they didn't want to get into. Interviewees from DORM and LAB could both name particular people on the list that they felt were "trolls," or people who could be counted on to spark controversy, leading to repetitive arguments. This was the second and third most problematic issue for LAB and DORM respectively.

...A couple times...I would feel like I had something to say and I would write this reply...I would spend a lot of time on it and then think this isn't worth it...it's just going to devolve into an age old argument of the same type that has happened over and over again. –LAB

Appearing stupid: People from both communities were worried that they would be judged for appearing stupid. In LAB, this often translated to being afraid to talk about technical issues, for instance:

One thing that [LAB] *is relatively devoid of is technical questions. You're keenly aware that the way...you'll ask a question signals an ignorance that you're afraid to show in* [Lab] *with such smart people.* –LAB

This was also the second most problematic issue for DORM. One international interviewee said that she was embarrassed about her poor English and chose not to post questions, even when she really wanted help.

Summary: As can be seen, users were deterred from posting due to their inability to predict the effects of their participation on other members. Many users were afraid of spamming others with unwanted discussion, yet a majority of people wanted to see more discussion. In other cases, users were worried about reactions to their posts or provocations from select users. However, most of the interviewees that relayed experiences where they did contribute or asked for help considered the experiences positive. This disconnect between desires and fears suggests that building in *greater social awareness* into the interface could correct some users' unfounded misgivings.

Tension 2: Differences in Type of Content Desired

Though we found that many users were interested in more interactional content on the mailing list, this desire did not hold out for all users. In our interviews, we found that often users even within the same community had different ideas about what their mailing lists should contain. For instance, we learned from the senior student interviewees of DORM that the mailing list used to have more discussions during their sophomore year, because of a certain set of outspoken seniors. As seen in Table 2, interviewees disagreed on whether that was a good thing. Interviewees in LAB also disagreed on the optimum level of interactional content. When it came to more specific categories of email, such as the ones in Figure 2, interviewees also disagreed. Some interviewees were strongly in favor of more lighthearted humor or silliness on the mailing list, while others were strictly against it. As another example, one interviewee spoke about job postings:

	DORM
+	One of my favorite...types, is the sort of intellectual discourse...there was a golden time, where you had the right combination of people, you could get a good...intellectual discussion.
-	I personally am glad that [the discussion is] gone. I think it keeps [DORM] to be much more efficient.
	LAB
+	I sometimes wish there were more meaningful conversations about technology and less about logistics and so on. ...Those things show up a lot in talks but I don't think people discuss them enough.
-	...if I had to pinpoint an ideal level for me, personally, I don't know, maybe 10 to 15 percent less of what [the discussion level] currently is right now, would be great.

Table 2. Interview quotes expressing positive and negative feelings about interactional content on the two mailing lists.

I think people will differ in that evaluation. I'm sure there's lots of people who actually appreciate the job postings and stuff whereas I'm not looking for a job. –LAB

We asked interviewees about how to reconcile the amount of transactional posts they wanted on the list versus the amount of interactional content they wanted. Some users acknowledged the tension between the two functions of the list:

The users of [DORM] *are the types of people that don't really care about spammy stuff in their inbox ...Only upon reflection of what* [DORM] *use to be, do I stop and think like yeah, maybe that spammy stuff kind of pushed out more of that intellectual conversation...* –DORM

In the survey data, when asked if the mailing list should stick to informational posts, a sizeable minority agreed (12% DORM, 20% LAB, 27% other communities). On the flip side, 70% of DORM, 32% of LAB, and 29% of the other communities wished the list would have more discussions. Because these two Likert scale questions were inter-related (Cronbach's alpha = 0.70), we added them together to create an overall *discussion-desired* measure. The average variance within the other communities was 1.95, demonstrating a large spread of preferences. As shown in Figure 3, we also saw that within DORM and LAB, while there is a general trend towards wanting more discussion, there appears to be no one level of discussion ideal for even a large plurality of users. Thus we must be cautious when designing new features that impact the entire community unilaterally, which could hurt an important minority of members, and should instead strive to give users more control of what they get.

Users also had very different ideas about how focused their list content should be. Some interviewees were sensitive to

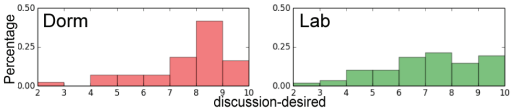

Figure 3. The *discussion-desired* measure, from 2–least desired to 10–most desired, for DORM, LAB, and other communities.

relevancy and stated that they would leave the list if there were an increase in the number of irrelevant emails.

> *...I don't like getting email. Especially when it's not applicable.* –LAB

Other interviewees didn't mind irrelevant content because they wanted to feel more connected to the community and liked knowing about things going on, even if it didn't affect them. Some also appreciated serendipity, or being able to stumble across information they normally wouldn't read:

> *There's always that case that there's an event or something that I'm like, "...This is really cool." I never would have found that, if it wasn't for* [DORM]. *...To reduce those [types of posts] would be probably detrimental to those small instances.* –DORM

Interviewees also disagreed about whether replies to posts should appear on the list. The following two quotes are from different interviewees from LAB:

> *...You might as well just post it [to the list]. If they're not interested they can either skip over it, or quickly skim over it, or whatever.* –LAB

> *I despise it when people hit the reply to all button instead of the reply to button.* –LAB

As we saw, people even in the same community often have different ideas about what type of content should be on the list. This suggests that building in *greater flexibility* to allow users with different preferences to curate their incoming content could alleviate this tension.

Tension 3: Push vs. Pull Access

The last tension we explored is related to how users chose to access their email and how this may have affected their attitudes and actions on the mailing list.

Information access and exchange has often been differentiated as *push* versus *pull*. In push systems, senders actively "push" content to recipients, while in pull systems, senders make content available and recipients "pull" it at their leisure. There are two aspects of push systems that are often expected: recipients receive all messages, and they receive them in real-time. Neither of these expectations hold in pull systems, where recipients can ignore content or read it when they wish.

Traditionally, email is considered a push system while discussion forums and message feeds such as on Facebook, Twitter, or RSS are accessed more like pull systems. But while email *systems* are push-based, some users' email access *practices* have shifted to ways that are more typical of pull-based systems. We find evidence of this shift in users that use automatic filing to divert mailing list email away from their inboxes to separate folders. The difference in behavior of these users versus users within the same community that access their mailing list in a traditional way may lead to tensions.

A Pull Experience via Automatic Filing

A currently popular practice is filtering email into secondary folders that are then accessed less often. Many interviewees said that they had their mailing list email automatically filed into a separate folder. One interviewee, explaining the difference between his interaction with his main inbox and his mailing list folder said:

> *It does change your interaction. It's a lot less urgent. I perceive* [DORM] *as something that's less important. ...I want to check* [DORM] *so I'm going to open it and look at it. ...Whereas with my email inbox it's coming there. I need to check this.* –DORM

Another user had mailing list email come to his main inbox until Gmail began automatically filing it into a Forums tab:

> *Once Gmail made that change...most of my day is spent in the Important Email tab and I rarely look at the Forums tab. ...I think I skim* [LAB] *less not because of a disengagement from the list but just because the email client has suddenly hidden them...* –LAB

For some interviewees, filing the mailing list into a separate folder meant that occasionally they would forget to check it for an extended period. Others said that they purposefully check the folder less often when they are busy.

> *It doesn't feel like I can't keep up perhaps because I don't want to be reading every single email.* –DORM

> *I treat it the same way that I would treat a...water cooler where you walk by and there's some colleagues talking...but you can't spend all day at the water cooler.* –LAB

In our survey, automatic filing was the most popular strategy for DORM and second most popular for all other communities (48% DORM, 17% LAB, 11% others). A majority of automatic filers reported that they didn't mind missing email from the list (68% DORM, 82% LAB, 57% others). A majority also reported that they read email from the list when they felt like it instead of when it arrived (78% DORM, 76% LAB, 60% others). Additionally, many interviewees with this strategy stated that they did not mind irrelevant email or high volume from the mailing list specifically because the email was being filed away.

A Push Experience without Automatic Filing

We observed a different attitude from the users who did not filter their mailing list email separately from their normal email. These users had to go through each mailing list email just like any other email because it was arriving in the same place. One such user noted problems that arose when he neglected to read his mailing list email:

> *...[there's] the risk of missing important mails when I allow many to go unread because the state of being read or unread is less signaling...* –LAB

In our survey, receiving content in the main inbox was the most or second-most popular way of dealing with mailing list email (23% DORM, 58% LAB, 68% others). A sizeable minority of these users stated that they minded missing email from the list (18% DORM, 23% LAB, 33% others). Many also reported that they read email directly when it arrived, as opposed to when they felt like it (35% DORM, 38% LAB,

53% other communities). Interviewees also expressed a willingness to unsubscribe from a mailing list if email became more irrelevant or volume started to increase:

> *[Email] is something that I make an effort to stay on top of. I will unsubscribe from mailing lists if I think it's sending me too much email that's not relevant.* –LAB

Users who do not filter their mailing list may be more sensitive to irrelevant email, making it difficult to maintain a casual relationship to the community or benefit from serendipity.

Comparison

The survey data supported our association of automatic filing with pull-based and of manual handling with push-based behavior. We compared survey respondents with no automatic strategy to those who automatically filed their mailing list. We found that automatic filers were on average 29% more likely to completely miss email from the list and also 11% more likely to not mind missing email from the list. Automatic filers also were 28% more likely to only read mailing list email when they felt like it, not when the email messages arrived. On the other hand, users who had no filing strategy were 10% more likely to read every message from the list.

In the interviews with automatic filers, we found an expectation that others were accessing their email in the same way and would not mind additional email:

> *When...you get emails from someone, it doesn't take you that much time to just get rid of it. I think the people who really don't like spam already filter their* [DORM list]*... In which case my additional email really takes like three seconds of your time.* –DORM

An interviewee who did not have any strategy to differentiate his mailing list email had a very different thought-process when thinking of whether to post to the list:

> *When I'm thinking about sending an email to* [LAB]*, I'm like, "Wow, does every single person related to* [LAB] *really need to get this email?" If that's not the case, I probably wouldn't send it.* –LAB

Our interviews suggest that how people access their list email may impact how they feel about the list as a whole and how they then act as senders on the list. For instance, people who automatically file may assume that emails are not time-consuming and in turn may send more. Conversely, people who read all email from their main inbox may be more careful about posting to others. The differences in attitudes between people with pull-based and push-based approaches to email may thus exacerbate tensions due to different ideas about how much time an email takes up as well as people's tolerance for volume and relevance. This difference suggests that both *greater flexibility* for receivers and *greater social awareness* for senders could be useful in a mailing list system.

REJECTED ALTERNATIVES

Given the tensions that we explored, we now turn to examining some plausible design alternatives that could address them, but that were rejected by many users.

Why not just have more mailing lists?

One way of dealing with different categories of content on the list would be to split the list into multiple lists and allow users to choose to which ones they subscribe. Some interviewees liked this idea while others did not, saying that more lists would add more confusion to their inbox and be difficult to manage. Other interviewees felt that splitting the list would just lead to less discussion, for instance:

> *Ideally it would be nice to have a discussion list...but [people] don't care enough for that to sustain on its own. But if you send it to a broader list that people are reading for more reasons, ...you can occasionally have a discussion that people care about.* –DORM

Finally, other interviewees were not interested in some types of posts but did not want to completely stop getting them due to serendipity, or the off chance that there was something interesting. In the surveys, sizable segments of the communities disliked the idea of splitting the mailing list into different mailing lists (40% DORM, 40% LAB, 33% other communities). Because this design decision would affect the entire community, we must consider these groups, even though they may be a (large) minority.

Why not just move to a different system?

We asked users to rate how often they used different group communication systems, including mailing lists, Facebook Groups, Google+ Communities, subreddits, or discussion forums. We found that after mailing lists, the next most popular tool for group communication was Facebook Groups. When asked about the Facebook Groups they were on, interviewees overall said that there was generally little activity and that they checked them much less frequently than their mailing list emails, even if they checked Facebook several times a day. Some interviewees mentioned that DORM and LAB in fact had Facebook Groups, but that they had low membership and were mostly dormant. When we refer back to Figure 1, we can see that volume has generally gone up over time on both mailing lists even during the growth of Facebook.

We asked users to imagine moving their mailing list to other systems and consider what would change. Overall, interviewees believed that moving the list to Facebook would result in less activity. Some interviewees felt that the Facebook interface had too much content to manage:

> *The design of Facebook is meant to throw as much information at you as possible and to have* [DORM] *on Facebook...you would just silence that.* –DORM

Other interviewees commented that on Facebook people's identities were more tied to their messages because of the proximity of profile images and linked profiles:

> *There's a greater sense of [Facebook] being public...you can see everybody who's on there. It's very visible, very present. Whereas on email, you're sending it into the mystic...you don't see all the faces staring back at you.* –DORM

This may have played into how some interviewees felt that social media was more public than mailing lists. While technically untrue because the mailing list archives are public while a private Facebook Group would not be, interviewees reasoned that archives were harder to access, while it might

be easy to scroll down a group's Facebook page. From the surveys, only a small minority of respondents liked the idea of moving their mailing list to a Facebook Group (5% DORM, 13% LAB, 14% other communities). We found similarly low percentages in favor of moving to a subreddit or a web forum.

We now explore several differences we encountered in how people thought of email versus social media and how this played into their preference for mailing list communication.

Email is Still Considered Work, While Social Media is Play

To many interviewees, email was still considered more professional and more associated with information and productivity than social media. When asked if the mailing list should move to Facebook, one user said:

> *I wouldn't be surprised if people start posting cat videos to this. [Facebook] has been a distraction for most people...When I look at* [LAB]*...I don't see it as a place to post cat videos.* –LAB

From the surveys, a majority of users thought that email was more professional than Facebook (58% DORM, 78% LAB, 54% other communities). In a similar vein, interviewees associated discussion forums like Reddit with procrastination.

One interviewee felt that the discussions that he wanted to see more of would not thrive on Facebook, but they also did not fit in exactly with his perception of email as work:

> *...it leaves the open discourse in an awkward split between personal conversation, Facebook Groups, and the part of email that's not all business-y.* –DORM

While users overall did not mind that group conversations were going into their email (14% DORM, 17% LAB, 13% other communities), our data may be biased in that users who unsubscribed were less likely to respond to our survey. Some interviewees, one of whom had unsubscribed, indicated that discussions in their inbox distracted them from more work-related emails. Related to Tension 1, many interviewees felt that some or more posts on the mailing list were not work-related. Given that the content on mailing list is felt to be sometimes work and sometimes play, that email is considered to be for work, and that social media is considered to be for play, then this suggests that mailing lists could be designed to be something *in between social media and email*.

Email is More Used and More Controllable

Despite the popularity of Facebook, many interviewees mentioned knowing people in the community who were not on Facebook but used email. Several interviewees also stated that they checked their email more often than they checked Facebook, with a majority of the survey respondents agreeing (77% DORM, 74% LAB, 63% other communities).

Another difference between email and social media is that email, using the SMTP standard, is more readily customizable and viewable with many different interfaces. Many interviewees preferred to have the flexibility to set up custom filters, tags, or notifications. One interviewee expressed frustration with Facebook's interface, which is not customizable:

> *You only have the choice [on Facebook Groups]...I want to watch every message...or I don't. If you say yes, then...your cellphone [is] beeping every 5 minutes. If you say no, you're going to miss everything. There's no in between where once a day I can...see what's new.* –LAB

Additionally, all email is *sent* to all recipients due to its push-like system. This may make it more likely for email to be *seen* as well, though this could depend on access methods, as we saw in Tension 3. In contrast, systems like Facebook that employ an opaque algorithm for displaying content make it difficult to even determine who receives what:

> *Facebook plays games with what they show people and so there's no even clear notion of who it is that's seen what you're sending...[Email's] really the only mechanism where it comes with this feeling of it'll get seen.* –LAB

In the survey, a majority said that they enjoyed having the flexibility and power to organize their email the way they wanted (88% DORM, 71% LAB, 62% other communities).

DISCUSSION

Design Implications

Our results suggest that moving to an alternative system is not appealing. Instead, our results inspire us to consider incorporating new features, some of which are common to social media or forum systems, within mailing lists to alleviate the tensions we found.

Coping with Diverse Preferences

As discussed above, members of the same community often disagreed widely on what type and amount of content should be on the list. But splitting the list into two or more lists was rejected. It is therefore essential to consider designs that permit many different sending and receiving preference to coexist. One way to reconcile the tension over type is to allow senders to tag emails with topics and recipients to choose their level of interest in a topic, like the Mail2Tag system [18] did. This way users need not have an all-or-nothing approach to certain content and can adjust their settings over time. Websites such as Reddit and Quora have affordances for tagging and following certain topics.

Turning to the tension over volume, one feature that may benefit users who dislike receiving replies to the list would be to only get the first email of any thread and no replies unless they explicitly follow it. Additionally, for users that appreciate ambient awareness or serendipity but are sensitive to volume, a feature could give them an appropriately-sized *random* subset of emails.

Another popular feature on many social media websites today is upvoting, downvoting, or liking content. This feature allows crowds to collaboratively curate content; this can be used to promote the generally most upvoted content (social moderation) or to target content based on interests (collaborative filtering [12]). A sizeable subset of survey respondents preferred receiving only the most interesting posts from their mailing list (28% DORM, 40% LAB, 32% other communities). This feature can also be used to populate a point system for users to gain good standing in a community and as motivation to answer questions quickly, such as on social Q&A systems [26].

Digests enable users to receive email in a batch size and frequency they specify. Overall, very few survey respondents digested their email, and our digest interviewees complained about missing time-sensitive email and being late to interesting discussions. If we properly identify these emails (e.g. through tagging), we could surface them in real-time and allow "expired" time-related emails to disappear from the server so they do not appear in digests.

More generally, a new mailing list system could choose to sometimes act more like traditional email by sending posts to main inboxes or more like social media by digesting or putting content into a folder, depending on the nature of the content and users' preferences. Importantly, the new features we suggest would apply only to users who care enough to enable them and not to everyone. We must also be cautious with changes if they destroy the "guaranteed delivery" implicit in emails' current push metaphor. This notion that email will be read, while no longer true as we saw in Tension 3, was still an appealing feature of email to many of our interviewees. We can maintain the status quo by pushing all content to a folder but still allow users to have certain messages pulled *to their main inbox* out of that folder, where they are more likely to view the content. In designing a new distribution mechanism, we must also be careful to respect users' desire for control over what they receive. Algorithms for curating feeds may introduce biases and may be difficult for users to comprehend. Thus, schemes with *deterministic* filtering rules may be appealing for users who reject the opaque selection mechanisms provided by many of today's social media tools.

Coping with Audiences

Focusing now on the perceptions and desires of senders as opposed to receivers, we address the issue of how users generally want more interaction but are deterred from posting interactional content. Research has found that users often self-censor because they are interested in their self-presentation [23] and are juggling multiple personas on the same system [27]. In the surveys, some users stated that there were certain people on the list to whom they wished they could avoid posting (27% DORM, 35% LAB, 16% other communities). By allowing users to exclude certain *recipients* from their post or block certain senders as is possible with some social media websites, this issue could potentially be alleviated. These features would need to be designed carefully so that members don't feel completely excluded, and the community maintains its cohesiveness.

Due to the lingering perception that all emails get read, many interviewees also had a fear of spamming large audiences and were deterred from posting. To combat this, we can destroy the notion of guaranteed delivery in these cases only to allow senders to send emails to a subset of the subscribers on the list. From the surveys, a significant portion of respondents said they would be more inclined to post if they could post to a random or targeted subset of the list (30% DORM, 32% LAB, 29% other communities). We could allow the post to slowly propagate through the list of subscribers as it gains likes or views, similarly to how content surfaces on some news feeds. Knowing that an email would only spread widely if many readers approved of it may allay posters' concerns about spamming the list.

For users that are worried about looking stupid or being misinterpreted, we could allow users to send emails to a buddy or trusted group within the list to vet, moderate, or even edit the email before distributing it further. This would also let the system mask the original sender without introducing the well-known problems around fully anonymous posting. This feature could be useful for other social media tools as well.

Greater Need for Transparency

We have uncovered discrepancies between what users think other members want and what they actually want. For instance, we found that users are worried about spamming others and also are reluctant to post discussions, even though users generally wanted more discussion. A similar finding was reported [1] in the context of a news sharing system. Techniques proposed there to make users more aware of others true preferences could also be applied here. For instance, upvotes for the purpose of feedback or knowledge of who actually read the post could let users know how their posts are received. A significant portion of survey respondents thought favorably of adding upvotes or likes (51% DORM, 39% LAB, 30% other communities). We could also let users direct messages only to others who have not received too much email recently, or in some other way, surface the load that emails are imposing on different recipients, in order to reassure them that their emails will not be perceived as spam.

Finally, this study brought up some privacy implications in that most people severely underestimated the number of subscribers to the list. Also, most did not know that the list was public to join or had public archives. These issues need to be made clearer to the users so that they are aware of who their audience may be, even though it may cause some people to self-censor even more. We believe coupling this with some of the other features we have mentioned may mitigate the effect.

Limitations and Future Work

We examined only a student and a research-driven mailing list, and surveyed a convenience sample of other mailing list participants. We did find the survey respondents for *Dorm* and *Lab* matched the demographics of the two primary communities we study but in general, we do not know our non-response bias. Generalization from our data should be done cautiously. Nonetheless, we believe we found some significant groups of mailing list participants who share the perceptions, expectations, and frustrations that we have outlined. In addition, because most of the participants in our interviews and surveys were young enough to have spent many of their formative years using social media, their preference for using mailing lists over social media for group discussion is potentially more interesting than that of a general population.

Many populations were not included in this study—for example, work-related mailing lists. It would be interesting to contrast mailing list usage with regular email and real-time work communications such as Yammer and HipChat. Similarly, we are curious how non-work systems might be enhanced or replaced by a real-time group chat interface, such

as IRC. Several respondents also mentioned using GroupMe for small group discussion, which does for SMS what mailing lists do for email. It would be interesting to study how our findings translate to text messaging and whether GroupMe could then support larger groups.

CONCLUSION

Many people still use mailing lists to communicate within groups. Today, there are many new systems with new features for group communication, but they have not displaced mailing lists. We studied two mailing lists through interviews and surveys and surveyed 28 other mailing lists to understand how and why people use them and uncover important tensions within communities. We found that mailing list users within a single community *disagree on the types of content* the list should have; that despite wanting more discussion, *users self-censor* due to real and imagined concerns; and that *how users access* their mailing list email may alter their attitude towards receiving and posting messages. We also made a case for why simply moving to one of the new systems or building a new system outside of email may not be successful. From the issues we uncovered within current mailing list communities, we formulated design ideas that could be introduced within mailing list systems in order to alleviate the tensions we found.

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