Exploring Email Triage: Challenges and Opportunities

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ABSTRACT

Despite the centrality of email in the daily routines of knowledge workers, fundamental aspects of its usage are still poorly understood. We are particularly interested in understanding one aspect of email management, *email triage*, the process of going through unhandled email and deciding what to do with them. In this paper we investigate the email triage behavior by presenting interview and survey results that characterize user behavior and needs. The results highlight current challenges and enhance our understanding of how the triage process can be more effectively supported.

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1 INTRODUCTION

Email usage has significantly evolved beyond *communication* to encompass other areas like *task management*, *archiving*, etc. [10, 17]. Despite people's reliance on email, especially in work settings, fundamental aspects of its usage are still not well understood.

Email *triage* is the process of going through unhandled email and deciding what to do with it. This paper looks at an important aspect of email management, namely how people triage their messages and what support is needed to design the next-generation of email clients to empower users to better triage large volumes of emails. In fact, the high volume of emails has prompted users to engage in email triage, where users must quickly decide which messages to read and how to act. Triage is important for *task management* and *productivity* as it is one of the main activities to deal with Email Overload [7, 14]. Similar to *search*, the triage process requires the user to go through a list of emails and judge their utility. While in search the goal is usually finding a single item matching the user's query, in triage, the user is making a decision about every email as she comes across it. When messages are opened and handled, they are usually classified as whether they require a reply (immediate or postponed [6]), and whether they should be filed outside the inbox, deleted or left in the inbox [2, 9, 11, 17].

Email triage can quickly become a serious problem for users as the number of unhandled emails grows.[1] This problem arises because existing email clients do not provide users with an effective means for performing email triage. In this paper, we shed more light on how people handle email triage. We perform a qualitative study with face-to-face interviews and a survey to better understand how people triage their emails. In addition to understanding the process of triage, we study strategies people use for triage, challenges facing them and opportunities for improving email clients or building intelligent assistant capabilities to better support email triage.

Previous work studied several aspects of email including email usage, overload and triage. Siu et al. [13] studied email use in the context of everyday work practices. Venolia et al. [14] identified five major activities surrounding how people use email. In particular, they highlighted two activities: keeping up with the flow of incoming messages and triaging existing messages. Dabbish et al. [6] showed that people defer responding to 37% of messages that need a reply. Previous work also studied a variety of factors that made an email important [14]. Dabbish et al [6] studied how users make decisions about triaging their emails, finding that factors such as social information predicted a user's action on a message. Following up on "social importance of emails" several systems have extracted different social features (e.g. known contacts, relationship between sender and recipients, sent to user directly vs distribution lists, etc.) and suggested to re-order messages based on such features [18].

Neustaedter et al. [11] studied triage patterns and found people either use a single pass or multiple passes to triage their emails. Balter [1] found that the majority of participants in their study scanned the inbox an average of 2.3 times before selecting a message to read. Past research (e.g. [4, 8]) has also shown people employ a variety of strategies to ensure important information is not missed, messages that require a response are handled as quickly as possible and tasks, associated with these messages, are carried out efficiently.

We build on this existing body of knowledge by providing insights on how people interlace email triage and management with their day-to-day work processes.

2 STUDY METHODOLOGY

Our study of email triage took place in two stages. First, we conducted a series of contextual interviews with fifteen information workers (4 females) in a large US-based technology company. Second, we distributed a survey to different mailing lists within this company and collected 91 responses (response rate: 9.1%, completion rate: 97.8%). These respondents were distributed across a wide age range, ranging from under 20 to more than 60, and 37% of them

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[1] Whittaker and Sidner [17] coined the term "email overload" to describe the problem of people struggling to keep up with the rate of incoming messages.

were females. Participants in both stages ranged in their job roles from product managers and software developers to sales people and administrative assistants. All participants used Microsoft Outlook on a daily basis while some of them used other email clients as well.

2.1 Interview

Interviews were scheduled for 30 minutes in the participant's office where they had access to their mailbox. Part of the interview was conducted as a contextual inquiry, where the participants were asked to look through their mailbox and share some information about any emails that they had triaged on the day of interview and *had to leave for later to deal with* and contrast them with the ones they acted on immediately.[2] We were mostly interested in learning about the emails, the senders, whether they were handled immediately or left for later and how and when they were handled.

For the remainder of the interview, the participants were asked a variety of questions, such as how many emails they receive daily, what kind of email management strategies do they usually employ (e.g. whether they use folders, maintain a clean inbox, have many unread emails), how frequently they need to attend to their mailbox to go through their emails and how this process looks like.

Interviews were all transcribed and analyzed using open coding and affinity diagramming. Several main themes were identified that combine different aspects of triage activity, namely: *How*, *Why* and *When* does triage happen? The first theme is concerned with the characteristics of a triage session (How), while the second theme looks at the external factors that motivates triage (Why) and the frequency of triage sessions (When) for an individual.

2.2 Survey

Inspired by the insights from the interviews we designed a survey to first, verify the discovered trends with a larger audience and second, collect statistics on different email management and triage activities. Responses from survey participants were analyzed to identify common email management and triage characteristics. As in the interview, respondents came from a diverse set of roles. Multi-tasking on different projects was a common trend among them, with 54% working on at least 3 projects and the majority have been working at this company for more than 5 years (55%).

3 CHARACTERIZING TRIAGE

Using our interview and survey data we observed two broad themes regarding the triage process: (a) session-level triage strategies and (b) message-level decision making process for triage.

3.1 Triage strategies

In our survey, we revisited some of the questions from Neustaedter et al.'s study [11], conducted in 2005, including "Do people triage email sequentially or by priority"; "Do people triage email with a single pass or with multiple passes?"; "In each of these strategies, which emails are handled first?". Similar to Neustaedter et al., we found that more users tend to triage emails sequentially than by priority (48% vs 41%), contrasting with 30% and 19% figures reported in [11]. Additionally, we observed that slightly over half of our survey respondents use a multi-pass approach for triaging their messages while 46% perform a single pass only. While this observation is in line with the multi-pass strategy dominating the single-pass strategy reported by [11] (47% versus 17%), we find the difference more marginal in our data.

Finally, we also observe that users tend to handle emails that are easy to delete or archive first (corresponding to 46% of all responses), followed by emails that are important to one's work (28%) and email from important senders (20%). Looking more closely at the follow-up passes during a multi-pass triage, we observe a shift in the types of messages that get higher priorities starting from emails that are important to one's work (36%), followed by emails from important senders and emails that are easy to delete or archive (28% each).

> "in my first pass I try to get rid of things that don't require a response or aren't relevant to my project; second pass is everything that does require a response or further reading; it's either a reply I can write right now and then archive it or it is something that requires me to go do something in the world and come back to it."[P13]

3.2 Decision Making Process

We identified three steps the user goes through to decide how to handle an email: prioritization, deferral and strategy to facilitate revisiting.

Prioritization. During a triage session, users need a fast way to identify messages that require an action from their side (e.g. need a response) from messages that can safely be archived or deleted without negatively impacting their work. Previous work on email suggests that individuals prioritize some messages for attention over others when scanning their inbox [1, 13–15].

During our interviews we noticed that participants take into account different factors to make decisions about each message. They reported that the decision making process happens quickly and on the fly and it is highly subjective and requires the full context of an individual:

> "It does matter who is on the email or who sent it. And I guess that calculus just happens quickly or subconsciously when you are going through your emails. And then there is the other piece that if there is a specific ask to you. e.g. Hey …, what are your thoughts on this?"[P11]

Most of our participants mentioned different strategies they use to be able to quickly identify the emails that are more likely to require their attention: setting rules to highlight emails with their names mentioned [P4, P11], using conditional formatting to be able to distinguish between emails that have multiple recipients versus emails that are sent to them only [P2, P4, P9], the emails on which they appear on the To line versus the CC line [P4], etc.

Deferral. Once the user decides whether the message needs her attention or not, she has to decide whether to take an immediate action or defer dealing with the email [3, 9]. During a Triage session, users commonly defer emails until later to manage overflow [12, 13]. Previous work [12] has discussed several factors that impact the decision of whether the message is deferred including: time or effort needed, urgency, sender and workload.

In our interviews, we found that if handling an email is easy or quick, the importance or the relevance of the email to one's work,

[2] The participants were asked not to share any confidential information and use general terms to describe the content of those emails.

or the prominence of the sender has very little impact on choosing to defer the email to a later time:

> " When I get emails from my students I can answer quickly. Because there are no strategic considerations! If I don't know the answer I still reply quickly and say I need to think about it." [P10]

Similarly in our survey, the most salient factors that led to handling emails right away were: "email is asking a question that I immediately know the answer to" (87.7%) followed by the "urgency of the email" (86%). "The organizational rank of the sender" and "handling the email right away requires less time and effort than leaving it for later and setting reminders to go back to it" were reported as the next two factors by 52.6% and 51% of respondents respectively. An interesting observation is the trade-off between the cost of deferring emails for a later time and the cost of handling an email right away that often leads to context switching and interruptions to the main task or activity at hand:

> "Emails that I'm able to handle right away, I make sure that I do. It would be much more of a mental load if I leave them for later and then I have to track them and remember to go back to them." [P4]

To better understand deferral decisions, we asked our survey respondents how much time they think was needed to handle their deferred email. Responses indicate that more than 75% of deferred messages needed less than 30 minutes to be handled; with 27% needing less than 15 minutes. This finding suggests that individuals are willing to incur the cost of leaving emails for later in order to save on the cost of interruption to their current task at hand as soon as handling the message cannot be done instantly.

Strategies to Facilitate Revisiting. If the user decides to defer dealing with the message, she may opt to take an action to facilitate getting back to it. Previous work has found that how messages are managed is inextricably linked to how users expect to be able to find them in the future [5, 16]. In fact, two main types of email management strategies were identified [10, 17]: *preparatory organization* and *opportunistic management*. While in the former approach the user deliberately creates manual folder structures or tags that anticipate the context of retrieval, the latter approach shifts the burden to the time of retrieval. Similarly, during triage, a user can engage in a preparatory process- ranging from flagging or marking emails as unread to creating tasks and ToDo items in calendars, planners or other tools. On the contrary, the user may rely on an opportunistic approach to handle messages once more time or information is available. Both of these approaches have important productivity implication since preparatory strategies are costly to perform, whereas, relying on opportunistic approaches might lead the user to re-triage the messages again to remember about the intended action or whether or not they can be handled at this time. Our survey data indicates that only 18% of respondents stated that they did not need to use a preparatory strategy to track their pending items and revisit to take care of them at a later time. Among the other group, 32% marked pending emails as unread, 18% flagged them and 2% moved them to a specific folder. The remaining 30% described a mixed strategy including leaving it open in a separate tab, setting a task, reminder or a to-do item in the email client or an external tool, keeping it in inbox (for those that frequently clean up their inbox), assigning a category or relying on memory.

4 TRIAGE CONTEXT

Past research [11, 14] suggests that triage is primarily performed when people arrive at work first thing in the morning, return from a meeting or receive an important email. Alongside these findings, our interviews also indicate that different contextual factors influence the frequency of triage sessions in a day and whether or not people use dedicated sessions to triage their emails.

> "obviously when I first get into work there's the initial what's in my inbox? and then some things I'll just leave for a couple of hours if it's not urgent. [...] some things might get pushed to lunchtime but generally by lunchtime I've looked at all the mails and tried to action on them" [P5]

We also note the close ties between flow and triage activities, as reported by Siu et al. [13]. To elaborate, while some users dedicate some time at the beginning or the end of the day to triaging their emails, the majority of interactions with email in the middle of the day are part of what Venolia et al. [14] labels as *flow*.

> "I come in in the morning and I clean up my inbox. And then throughout the day I see if there are important things to handle. Then after lunch I review things again so I can stay caught up. And then I go to that mode that if something is very important I deal with it now.And then I do the check again when I get home at night."[P3]

We find that a better understanding of the factors motivating triage activities can provide insights to explain how frequently users interlace email triage with their day-to-day ongoing work processes. We can classify these motivating factors into two main themes: (1) Task management and (2) Emotional aspects of Triage.

Task Management. Siu et al [13] proposed a model of *situated email interaction* which describes the majority of these email interactions in terms of a user's short-term attention and task management objectives. In fact, since timely email management is often task critical, users maintain an awareness of their inbox even when processing email is not the primary activity [14]. Similarly, in our interviews the need to triage emails was mainly motivated by the need for effective task management. Most participants mentioned different types of tasks, related to their roles, that come in through emails, and directly impact their work.

> "[my email management strategy is] a little bit of everything. Being a Product Manager, makes email a lot of what I do. And I have to be very organized and on top of things. I have folders for my projects. I leave things in inbox as indication of I still need to deal with them."[P4]

The prominence of triage for task management highlights *deferral* as a particularly salient aspect of process. Alongside our interview data, our survey responses indicate that deferral is indeed common, with 77% of respondents had at least 1 deferred email on the day they responded to the survey, 75% of respondents mentioned they defer at least 1 email every day, among them 44% deferred at least 5 emails every day. As well, we found that 75% of deferred emails required the user to perform some task, which highlights the role of task management as an external factor motivating triage and rationalizes commonality of deferral.

Emotional Aspects of Triage. While email is increasingly used for task management, the fundamental messaging metaphor of most email clients is not optimized for this purpose [2]. Email users clearly feel overwhelmed and daunted by the time it takes to deal with all the work coming in through this medium [17]. As well, the accumulation of messages in the inbox is identified as a key cause of stress and of the sense of *overload* [9].

The literature on email management and inbox triage suggests that the sense of e-mail overload is a subjective reaction by users to increases in inbox size, number of unread messages, and response times. As the messages accumulate, users' perception that they can effectively handle the message load is diminished.

Our interview data suggest that users' email management strategies, the frequency of triage sessions and how emails are handled during triage are in part a means to cope with the sense of overload and maintaining one's desired state of inbox. We note that the feelings of being overloaded or stressed is even more intensified for individuals who collaborate across different timezones:

> "It's very stressful when I wake up in the morning. Because Europe is 8-9 hours ahead and they have done a lot of work and they were asking questions and sending emails. Which is different from when I'm in the same time zone, where the flow is more continuous over the day."[P10]

Another related motivating factor for triage activity is maintaining a consistent email management persona. Users were traditionally categorized based on their email management strategies and how frequently they filed emails [10, 17]. Fisher et al. [8] presented some quantitative results on email overload and proposed to categorize users based on their sensibilities towards email organization and how they *feel* about it. Our survey data suggests that the individuals can associate themselves with a common email management strategy, and that these management personas are somewhat equally distributed with 34% self-identify as "pilers, I don't really use folders"; 43% as "0-inbox, I tend to move messages away from the Inbox" and 23% as "0-unread, I normally don't have many unread messages in my Inbox".

> "Somehow I'm programmed to achieve inbox zero and with too many emails coming in that's a lot of stress." [P6];

We note that the users that self-identify as 0-inboxers or 0-unreads (as opposed to pilers) [9], do strive to dedicate more time to triage their emails and maintain their sense of "being organized" with their mailbox as perceived by them. This in turn helps with coping with the feelings of 'being overloaded' or stress [16].

5 DISCUSSION AND DESIGN IMPLICATIONS

Our study of email triage revisited some of the prior findings regarding session-based triage strategies, while providing more insights about how emails are handled during these triage sessions and what factors impact the frequency and time of these sessions.

With respect to *Triage Strategies*, similar to Neustaedter et al. [11], we find that more people triage emails sequentially than by priority, that a multi-pass strategy is more common than a single pass and that the first pass is mostly used to handle emails that are easy to delete or archive. As well, during a triage session, a user needs to go through a decision making process to identify (a) messages that require an action, (b) whether a message can be dealt with right away or deferred to a later time and (c) whether a preparatory strategy can facilitate revisiting a deferred message.

Prior work [12] has identified the main factors affecting the decision to defer acting on an email; such as the time and effort needed to handle a message, the user's workload and the urgency of the message were the most prominent. Our survey and interview data indicates that, among these factors, *effort* is the most salient one (corresponding to 88% of the cases where an email was handled immediately based on our survey data). In fact, for emails that are *easy* to handle, the importance of emails to one's work or the importance of sender, are not really impacting the deferral decision.

A very interesting observation during our interviews, which was later confirmed by our survey data, was the trade-off between **(a) Deferral Cost**, that is, deferring an email which minimizes the interruption to one's work but then adds a "tracking cost" to ensure timely handling of the email at a later time, versus **(b) Interruption Cost**, that is, handling an email right away which often requires "context switching" to eliminate the "tracking cost". While both of these decisions have major productivity consequences, our survey data indicates the threshold for eliminating (b) while incurring (a) is as low as "email needs less than 30 minutes to be handled". That is for all those emails where users preferred to incur the "deferral and tracking cost", 75% needed less than 30 minutes to handle and 27% needed less than 15 minutes to handle. That is, any email with expected effort exceeding 30 minutes is relatively likely to be differed, which may explain the commonality of deferral among the majority (71%) of our survey respondents. This highlights the potential for features that allow users to handle their deferred emails better in email clients and intelligent assitants.

We identified both preparatory and opportunistic strategies for revisiting and handling the messages that are deferred during triage. More work is needed to quantify whether or not preparatory strategies result in any gain in productivity and the efficiency of managing pending tasks. Nevertheless, we observe that users do utilize different preparatory strategies to manage their emails for effective task management as well as a means to cope with the sense of overload. In particular, our survey data shows that only 18% of respondents expressed no need for preparatory strategies.

Finally, our survey data shows that users are able to associate themselves with different email management persona (e.g. piler versus 0-inbox) and these persona (that can be learned by tracing users action logs) correspond to different frequencies of dedicated triage sessions throughout the day. We argue that the next generation of email clients can use these signals to infer when the user is in triage mode and hence need support with annotating, scheduling or flagging emails to ensure a timely and convenient handling of deferred emails.

6 CONCLUSION

In this work, through contextual interviews and a survey, we sought to understand how people interlace email triage and management with their day-to-day work processes, what strategies are employed to ensure tasks are handled efficiently, interruptions to other tasks are minimized and important information is not missed. We also identified the main challenges that are encountered during triage activities which can critically affect productivity at the work place. Our findings suggest that individuals actively engage in a complex decision making process while utilizing a mix of preparatory and opportunistic strategies to facilitate task management and as a coping mechanism to deal with the feelings of being overloaded or stressed. One promising implication for the next generation of email clients is using *mixed initiative* approaches that provide the right kind of balance, that is, sufficiently automated to reduce the cost of preparatory email management strategies, while preserving an essential level of interaction between the users and their emails.

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