Going with the Flow: Understanding How Users Continuously Manage Incoming Email

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ABSTRACT

Although we use email for a variety of activities including communications and task management, our understanding of how incoming email is managed (*email flow*), is limited. We conducted a series of day-long field observations to investigate email flow, uncovering three distinct strategies people use to continuously manage incoming email. Our field study suggests that monitoring and management of incoming email flow can be supported by providing contextual presentation of the email Inbox.

Author Keywords

Email, awareness, ethnography

ACM Classification Keywords

H5.2. Information interfaces and presentation (e.g., HCI): Evaluation/methodology, User-centered design.

INTRODUCTION

We currently have a very rich, high-level understanding of how email fits into work practices of office workers [2,4,7,8]. Recently, researchers have undertaken efforts to understand how users manage and prioritize email at a more granular level [1,5]. Venolia et al. identified five activities that characterize email use (Flow, Triage, Task Management, Archive, Retrieve), of which we are interested in the Flow activity: *how users continuously manage incoming email as it arrives to their inboxes* [7].

The triage activity occurs when users process and decide what to do with unhandled email after an extended period of inactivity [5]. The flow activity is distinct from triage because flow refers to the *ongoing, continuous* process of email management [6]. While the triage activity may comprise the majority of email use when users can only periodically handle email (e.g. on "meeting day"), users

often handle email in an ongoing fashion—for example, during prolonged periods of workstation activity. Our interest is in understanding how to better support email activities under this common latter scenario.

Utilizing full-day in-situ observations of four email users (who receive over 50 emails a day), we identified three distinct strategies users employed to monitor and manage their message flow.

- *Glance*, where users quickly peek at their inbox to maintain an *awareness of the rate of incoming email*.
- *Scan*, where users quickly view senders and subjects of new messages in the inbox to *decide whether to take action*.
- *Revisit,* where users *re-examine deferred messages* using a task or issue-centric approach.

Our users reported that email volume is now so large that pop-up notifications [7] cannot adequately support email flow. As a consequence, they use many strategies to "keep up" with their email during the day. Our study gives an understanding of these high-level strategies for monitoring and managing incoming email, thereby providing insight into how we can better support email activities.

UNDERSTANDING EMAIL FLOW

Handling email is not the "primary task" for most users; instead, it another tool used to accomplish work tasks. While its primary use remains communication and coordination, users also use email for task management [2]. Because users receive email communication that is often task relevant or time critical, they maintain an awareness of their inboxes even when processing email is not the primary task. Yet how do users continuously maintain an awareness of, manage, and make sense of incoming email? When do users decide to move from awareness to action on an email? When users are limited by time, how do they decide what emails to read and leave behind? In short, *how do users manage the flow of incoming email when they do not want to "do email?"*

To tackle these questions, we chose an ethnographic approach [4], using full-day in-situ observations of information workers (people dependent on email for their work). This approach is a departure from prior work, and deserves some explanation. A common approach email

Name	Characteristics
Flora	• University administrative office worker • Accessible to students and faculty • Inbox is open all day (no folders)
Larry	• Lead program manager at large software firm • Entire day "in meetings or doing email, sometimes both—doing email in meetings" • Inbox open all day (PC, laptop), and checks email on SmartPhone
Owen	• Head IT administrator at software firm • Manages team of four, delegating tasks by email • Inbox open all day (Windows PC, Linux PC), and checks email on Blackberry
Will	• University research lab manager • IT troubleshooting, inventory control • Inbox open all day (laptop)

Table 3. Descriptions of our participants

research has been to use some combination of one-hour in-situ interviews [1,5], self-report surveys [1,7], and one-time offline inbox analysis [8]. For example, in [4], interviews conducted at the start of the user's day explored triage behaviour. Yet, this approach isolates email activity from the broader work context; since we were interested in the *ongoing* activity of email management, we required longer term observation. Researchers have also made use of questionnaires, but this approach assumes that users are retrospectively cognizant of their low-level email activities. This level of introspection would likely capture "doing email" behaviour, but not our primary focus: email monitoring behaviour. Finally, inbox analysis, where researchers analyze an inbox offline would fail to capture the dynamics of users' interactions with their email clients.

Our workplace shadowing approach complements these prior approaches, allowing us to record and identify distinct patterns of email use as they vary through the day [4]. While our presence in the office may have influenced our participants' behaviour, we do not believe our presence systematically affected email related actions. As detailed later, participants reported the investigators did not affect the general flow of activity.

Day-Long In-Situ Observational Methodology
Our aim was to gain an understanding of email use with the intuition that a single user will exhibit different email monitoring strategies throughout the day to manage the flow of incoming email. To investigate this question, we conducted an ethnographic study consisting of day-long in-situ observations of four information workers.

Each observation session began with a 20 minute interview to collect general demographic information and descriptions of job function. A single investigator would then position himself behind the user with a view of the workstation and work surface. Detailed minute-by-minute field notes were taken to build a picture of the user's email usage, and any relevant work tasks that seemed to trigger email reading or

generation. We limited asking clarification questions, such as, "Why did you read that email first?" to once an hour. At the end of the day, users were given a questionnaire to assess their perceptions of their email use and the study.

Participants
We recruited four participants from both industry and academia (one female, three male) using email broadcasts. Our participants, summarized in Table 3, came from a variety of job functions, but all used email as a tool to manage incoming communication, receiving over 50 emails each. To provide anonymity while referring to our participants, we will use gender-appropriate pseudonyms.

RESULTS: THREE STRATEGIES TO HANDLE FLOW
Our participants reported that an investigator's presence did not noticeably affect their work day (questionnaire results). While our participants may have simply been trying to "help" us, our observations of their work habits suggest we did not affect their email behaviour.

We shadowed all participants' email activity for the entirety of a workday, save for a brief time when Larry went to the restroom with his SmartPhone. All of our participants keep their email inboxes open all day: for example, Owen uses two adjacent computers simultaneously, keeping an inbox open on both in case he is using one.

While participants did not exhibit identical behaviours, similar patterns emerged in how our participants' strategies for handling email flow. We used a multi-pass, open coding methodology to analyze our field notes [3] to understand the email activities of our users in the context of their work. This analysis revealed three different strategies, summarized in Table 2. We report on these strategies here, and emphasize that while we discuss each style as a distinct category, users transition between the styles fluidly. Our results are promising initial steps and support further study, but we caution this list is not exhaustive; for example, some users occasionally close their email inbox, yet none of our participants did so.

Glance: Lightweight awareness of incoming email rate
Users *glance* at their email inbox to maintain an awareness of the volume of mail that has arrived. This interaction

Type	Characteristics & Goals
Glance	• Brief and opportunistic during primary task • *What is the rate of my incoming email? (I care about:* # of unread mail in my inbox)
Scan	• Short break to gain richer awareness of email inbox • *Is there email to be handled immediately? (I care about:* who sent me this and what is it about)
Revisit	• Handling overflow emails (deferred emails) • *It is now time to handle email that I earlier decided should be handled later. (I care about:* what task or person is this email related to, and how old is it)

Table 2. Summary of email flow handling strategies

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lasts for less than a full second (i.e. <1s). We see this style of use when users are in the middle of doing something else. Since users only took action if there was a surprising amount of email, we believe the primary purpose for a *glance* is to maintain a sense of incoming email rate.

G*lances* are a cursory form of email use, and were observed to take place opportunistically during the flow of other tasks. Because they are so brief, they unlikely provide more than minimal awareness of the inbox. At best, they provide a sense for *how much email is in my inbox*, and perhaps iconic memory for words.

11:21 am: Flora is working on a paper task. As she reaches for the "Sign Here" sticky notes, she glances at her email client, which has been left open and visible. The email client has 7 unread messages. Flora mutters "Holy smokes," and stops working on her paper task to scan through her inbox.

Glances are brief enough that they likely do not provide an exact count of unread emails, but we suspect that users can use *glances* to gain some information about the *rate* of incoming email. Incoming email rate is important because sudden fluctuations are often associated with "emergencies."

11:30 am: Larry's inbox suddenly "hiccups," scrolling down with 10 new unread emails. Within 5 seconds, Larry minimizes his current window, and opens up the newest email, which is an issue that needed to be resolved within the hour.

If users *glance* at the email inbox to maintain awareness of incoming email rate, then per-email notifications are inadequate. Regardless, users will sometimes initiate email-related activities based on a *glance*. The main transition from a *glance* is to a *scan* of the inbox.

Scan: Finding things to deal with immediately

Users *scan* their inbox in search of important, newly arrived emails. These *scans* occur after the user has completed another work task, or when the user takes a break from a work task. When *scanning* their inboxes, users primarily attend to the author and subjects of emails, actively searching for important emails, either expected or unexpected. In our sample of participants, *scans* were brief, user-initiated "interruptions" from the primary work task, lasting no more than 5s-30s. Users take action if an important email had arrived, or if there was more email in the inbox than they had expected; otherwise, our participants simply returned to their primary task.

3:21 am: Earlier in the afternoon, Flora spoke with Bill, who was to prepare a document for her. She expected him to have it complete since she is otherwise blocked on a task. In the meantime, she has been working on another spreadsheet task. Flora looks bored, and suddenly decides to check her inbox to see whether Bill has sent her the email. Flora remembers later, "Sometimes, when I'm

waiting for someone to send me something, I don't really notice anyone else—I was just looking to see if they've sent it, because usually it's important."

3:35 am: Flora checks her email by bringing up her email window. This time, Bill's email has arrived. Flora immediately opens up the email, and deals with it.

The characterizing property of a *scan* is that users perform a cursory search of their inbox with the purpose of finding new emails with things to be dealt with immediately. Users are interested in two aspects of each new email: *who sent me this piece of email,* and *what is this email about*. Efficiency counts when scanning since *scans* occur during extremely short breaks in the primary task; thus, users seemed to focus in on the sender and subject. In only a minority of cases, participants would briefly skim an email in the preview pane. In a few of these cases, our participants even marked an email "unread" to deal with in a later *revisit* pass. This border between "read" and "unread" emails seemed to limit *scans*. When scrolling, users would not scroll beyond any email that had been "read," since presumably, these would be emails already dealt with.

Scans are distinct from *glances*: scans are longer in duration, and are explicitly used to identify new, important emails that need to be dealt with immediately. *Glances* sometimes transition to *scans* (when there is an unexpected fluctuation in the incoming email rate). Interestingly, *glances* sometimes transitioned into *triages*. This transition occurred when a *scan* identified many items that needed to be dealt with immediately. If many items from this scan were dealt with in succession, then users seemed to transition into a *triage*-like mode, completing an entire pass on unread mail.

Revisit: Taking care of the overflow

Users engage in the *revisit* activity to manage *overflow emails*: emails that have been deferred for later action. While our users were generally good at keeping up in real-time with their incoming email stream, we observed many emails from past days having been flagged for later action (marked unread, left in the inbox, explicitly "flagged" through the client, being left opened on the desktop, or even having a half-written reply either opened or saved in the "Drafts" folder). Alternatively, Flora reported that she used "mental notes" to remember incomplete tasks.

In some sense, these overflow emails have already been dealt with: they were *deferred*, meaning that users are returning to these emails. Larry reports, "Even if I have no emails from today, if I have [emails from previous days], I still feel behind on my email." We emphasize that the "deferred" nature of the email does not imply an importance level: emails can be deferred for several reasons: from being important (and requiring careful examination) or not important (and therefore not deserving time immediately), to being long and informational [8].

The revisit activity is characterized by three features: first, users engage in revisit activities only when the majority of emails from "today" have been dealt with; second, the activity is often "task" or "issue" oriented, and finally, since users actually skim the content of some emails, this activity takes longer than the other activities.

Users have a variety of strategies to deal with overflow email. For example, users re-mark emails as unread, or flag them as important for visual cuing. Flora relies on her memory to remind her of important deferred email.

2:15 pm: Flora has just completed all of visible work tasks, and nothing now appears to be pressing. She returns to her inbox, sorting by sender, then by date. Later, she recalls: "I knew what I was looking for—it was something that I'd left undone yesterday." Upon finding the email (dated several days earlier), she begins another work task, involving a phone call and a reply to the original email.

Other users triangulated higher level "issues" or "tasks" by continually switching between different views of email: grouping by sender, grouping by subject, and grouping by date.

3:16 pm: Larry is done with his "today" email (a few remaining unread emails are deferred). He groups his inbox by sender, and finds one particular sender. Finding a subject line, he groups the emails by subject, double clicking on the most recent email in that thread. Satisfied this issue is resolved, Larry deletes the entire email thread. Larry groups again by sender, and scrolls back to the original sender, and is satisfied there are no more emails from that sender. Larry later recalls, "By reading the newest one, I don't have to read each email in the thread."

When users hit task boundaries, or finish all tasks they have deemed important (for example, all the email from today), they move onto emails that have been deferred. These tasks appear as lists in various forms: task list, bug tracker, etc. Like these other lists, users *revisit* their email inbox to decide what to do next, since *overflow* emails are equivalent to deferred tasks on a task list.

12:30 pm: Michael got a request this morning on his Blackberry to setup an intranet website. He had deferred it since he could not handle the request earlier, but now has the time to action on the request.

The *revisit* activity is distinct from the retrieve activity from [6] because *revisit* deals with deferred emails that may contain tasks, whereas the retrieve activity refers to archived emails—emails that have been stored or "handled." The *revisit* activity is more closely tied with handling email flow, whereas the retrieve activity refers to a larger picture of email use. Similarly, *revisit* is distinct from triage since triage deals with unhandled mail [5]; in contrast, *revisit* is for handling deferred mail—implying that there was a previous action to *decide* that this email was an overflow email, and would be handled again later.

CONCLUSIONS AND FUTURE WORK

Our interest is in how information workers continuously monitor and manage the stream of email that arrives in their inbox through a workday. From our field study, we observed three types of behaviours characterizing how users manage ongoing email flow: Glance, Scan and Revisit. Current support for supporting email flow include both audio and visual notifications, yet our participants stated that the notifications were no longer useful—likely because they must deal with an increasing barrage of daily emails. Because a user's mindset changes through the day, their desired awareness of the email inbox varies fluidly. For example, glances may be best supported via an ambient peripheral display since the interest is in the amount of unread mail. Similarly, scans may be best supported by a view that shows only new, "today" email that has not been deferred. Finally, revisits would be best supported via task-centric, threaded inbox views.

In the next phase of work, we will validate these styles of email use with more objective measures including eye tracking, application logs, and field studies of more participants [6]. For instance, we know some users deliberately close their email clients for periods of time—how do these results generalize to those users? As we better understand the email flow activity, we can better design email clients to help users manage the ongoing barrage of incoming email.

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