“Best If Used By”: Expiration Dates for Email

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Abstract
We recognize the ephemerality of certain kinds of email received, and propose the use of an expiration date tag to indicate its lifetime. We hypothesize that the use of such a tag will assist personal information management (PIM) by providing users the ability to prune their email archives automatically, and take other actions as appropriate. We situate our proposal of expiration tags within the current PIM literature, focusing on the research problems they may help solve. We conclude with a discussion of how expiration tags can be set, retrieved, and acted upon by mail clients.

Keywords
Personal information management, email, expiration dates, temporal information.

ACM Classification Keywords
H.5.2 Information Interfaces and Presentation: User interfaces – Evaluation/ methodology

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Introduction
The past few years have seen an unprecedented rise in the use of email for communication, collaboration, information management and several other tasks it was not explicitly designed to perform [9, 3]. The cognitive costs associated with the manual filing and pruning of information archives overwhelm many users [9]. Messages vary in relevance, importance, timeliness and attentional requirements. Several strands of research have examined how such properties of email can be computed and used to provide a better user experience [3]. Social network analysis has been used to help triage incoming email as well [4]. The time-sensitive aspects of email have been recognized [6], but research has focused on prospective task management rather than retrospective archive management.

Examples
We conducted a quick and informal analysis of our inboxes and those of colleagues in our research group. We found an incredible variety in how long the information content within email messages found in the inboxes stays valid, useful, or pertinent. Here are some examples:

- **IM-style 1:1 communication.** *(extremely short term)* One-line (or even one-word) messages are often sent in lieu of a phone call: e.g. “Lunch? ”, “Running late to meeting”, “Movie tonight? ”.
- **Awareness notifications.** *(extremely short term)* Several web-based services send notification alerts to users when certain monitoring criteria are met. User action may or may not be solicited or expected. E.g. “bill is due in 2 days”, “X added you

as a friend", "your order was received", "your package has shipped", "free donuts in break room".

- **Project-related communication.** *(short term)* Email related to an ongoing project will soon be outdated after the project is completed. E.g. "Draft 5 attached", "I booked my tickets for Monday".
- **Discussions with archival value.** *(medium term)* E.g. research ideas or conversations related to specific technical problems that may be required later. Although it may be unclear when this information may be needed, it is clearly important to archive it.
- **Affective conversations.** *(long term)* Conversations with significant others or immediate family may be saved for their nostalgic future value.

The different types of emails shown in the previous listing have different implications for how users manage their email. Email clients fail to take into account the distinction among these types of messages, thus lending inadequate support to information management.

Relevant Prior Work

Files have temporal properties; Barreau and Nardi [1] classified files as ephemeral, working, or archived data. Gwizdka [5] proposed the classification of email into four types: prospective, ephemeral, working and retrospective. However, neither of these approaches have led to the development of solutions towards harnessing the time dimension to assist users in information management.

The Keeping Problem and Post-Valued Recall in PIM

Email is no longer just a communication medium; it also serves an archival role. In PIM, the "keeping decision" [8] refers to the choice a user must make about whether a particular information item is worth keeping for potential later lookup. However, when an email is received, it is not immediately clear how long the message will continue to be useful. Post-Valued Recall (PVR) [10] refers to the interest a user may have in recalling information whose value is not recognized until some time after its initial retrieval. Since users cannot decide right away what to do with an email, they let it linger [11]. However, seldom do users go back to these messages to clean them up later.

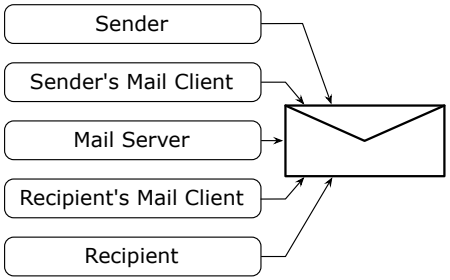
Immediate Filing is not very practical

Email is managed in different ways by different people; Gwizdka suggests [7] that handling incoming information immediately is an ideal case, but it is not practical for several reasons. The cost of a search multiplied by the probability that a particular information may be searched for, is much less than the cost of constantly having to file, tag, and sort email. Filing is a cognitively difficult task; while some users are natural cleaners, others are keepers. The upshot is that email continues to stay in inboxes longer than necessary. There is another problem with immediate filing, as identified by Whittaker and Sidner [11]: once an email is filed away, it is less available to remind the user about that topic (less chance of opportunistic reminding).

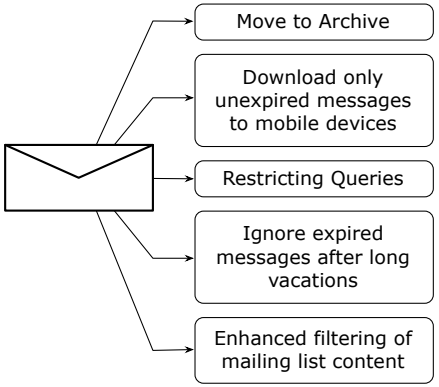
Life archives

As the information haystack grows larger [2], it becomes harder to find the proverbial needle. It is important that non-essential irrelevant information be pruned from an archive as early as possible (though no such decision can ever be taken with 100% accuracy [8].)

Setting an Expiration Tag



Actions taken on Expiration Tags



A Solution: Expiration Date Tags

An Expiration Date Tag is an email header that provides a best estimate of when an email message is projected to be irrelevant to the recipient. It serves as an indication of its time sensitivity — an attribute that is not captured by any existing headers. A complete description of the syntactic aspects of expiration date tags is beyond the scope of this paper. We refer you to a deeper discussion online[1].

Applying an expiration date splits the task of filing emails into two independent subtasks: an expression of intentionality and the performance of the action. A user's intention to file an email can be expressed as soon as a message is received (which is ideal according to Gwizdka [7]). The filing and archiving itself, however, is done at a later time automatically (which avoids the problem of lack of opportunistic reminding noted by Whittaker [11]). In addition, support for expiration dates provides an opportunity for various entities (other than the primary recipient) to apply the tags automatically. Specifically, it supports the management of prospective information in email [6].

Setting Expiration Date Tags

Expiration Dates can be set by several entities, not just the primary user. They could be set:

- By the sender of an email who can make a reasonable assumption of the relevance of her email to the intended recipient; e.g. credit card payment reminders can be automatically set to expire 5 days after the due date.
- By the mail server software that intelligently tags email based on common patterns seen across multiple users (like spam filters do);
- By the recipient's email client, based on heuristics; (say, if a pattern has been observed that emails with certain subject lines are deleted by the user in X days)
- By the recipient's email client, based on a user-defined rule set; ("from:notifications@facebook.com ⇒ expire in 5 days")
- Or explicitly by the recipient in a spring cleaning session.

The simplicity and flexibility of the tag means that any party involved in the transmission of the email can modify/update it. Security concerns about potential tampering by men-in-the-middle may be assuaged by knowing that this is no more vulnerable than the rest of the email.

Acting Upon Expiration Date Tags

An expired email need not (and should not) immediately be deleted if the user does not so desire. It is indicative, not prescriptive. Here are some ways we expect an expiration tag to assist in personal information management:

- An email past its expiration date could be automatically moved from the Inbox to Archived items;
- Expiration tags can be used in complicated searches by restricting a query based on expiration dates (e.g. show all emails that are due to expire in

[1] http://manas.tungare.name/blog/email-should-have-expiration-dates/

the next week);

- Due to resource limitations of mobile devices, typically only the most recent few emails are downloaded and displayed. Incorporating expiration dates into the decision can cause more relevant messages to be shown, while expired messages stay hidden.
- Automatic pruning can be performed during spring cleaning sessions; this provides the user a quick option to delete expired messages permanently without having to deal with each individually.
- Expiration can greatly reduce the deluge of pending email after a vacation. Notices about free donuts and missed meetings can automatically be removed by the system.
- Attaching expiration dates to messages sent to distribution lists provides a new alternative to the four strategies outlined by Mackay in [9].

Future Work

We are building a prototype of a system that can read and write expiration tags. Tags will be applied in two ways: by an IMAP client process that polls and processes a user's inbox, and instrumented email clients (Apple Mail.app, Microsoft Outlook). We look forward to sharing preliminary results within a few months.

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