Investigate/Requirements Report

Team13 Email Avengers

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Nov 08, 2022
TECHIN 521

Introduction

A small amount of energy is spent when an email is sent from one device to another. Before reaching your screen, the average email travels 15,000 kilometers, using a lot of power in data centers and computers to send, filter, and store each message[4]. The energy consumed is minuscule, but about 333 billion emails are sent daily, which adds up[1]. An email's carbon emission can vary dramatically from 0.3gms to 50gms of Carbon[2]. According to a survey by Talos intelligence, 84.8% of all emails sent are irrelevant and not essential [3]. By practicing proper email habits, we can avoid such emails, through which we can stop about 29.6 million metric tons of CO2 emissions[1].

Receiving spam emails can occur for a variety of reasons. The cause can be as simple as entering your email in a website that you are using only once to a data breach at a company that has access to your data[5].

1) Design Question

How can we make it easy for students and professors in universities in the United States to manage their mailboxes so that their digital carbon footprint can be reduced?

2) Research Question

User Research Questions

- How much do people understand about the carbon emission of email?
- What are some current habits of users in keeping their inboxes clean?
- How frequently do people check and manage email? How much time do people need to spend checking emails every day?
- Why are people not unsubscribing or deleting irrelevant emails from their inboxes?
- What are the TOP 3 types of information people find most necessary to deliver via email?

Business Questions

- Who is willing to put financial support for this project, the state government? Businesses? NGOs?
- Which companies will benefit from this project? What is the potential profit model of this project？

- Which direction of the solution will require the least amount of investment: retrofitting the energy generated by the use of electronic devices, retrofitting the way emails are delivered, or retrofitting the network infrastructure?

Technology Questions

- What are the features implemented by email service providers to identify unnecessary emails?
- Is it possible to develop an emailing system or a platform that enables users to maintain their inbox to get the least amount of emails?
- Is there a way to optimize an email in the current system so that it consumes the least amount of energy?

Our question is exploring the dilemma of mailbox data explosion in digital assets in the information age. Raising people's awareness about using mailboxes in a low-carbon way and cleaning and managing their mailboxes on time are the most reasonable strategies. We need not only secondary data research but also research and data collection through on-site observation and questionnaires.

Research & Insight Summary

1) Secondary Research

Users and Methodology

We set out to study the state of email use among Americans, especially among the school and work population. We wanted to understand the overall picture of email sending, how much carbon emissions are generated overall, how much carbon is emitted by an individual, what are the main sources, and what people's habits are in operating email. In addition, we want to find current solutions and gaps in this problem.

Insights and Analysis

- The total carbon emission caused due to emails in 2021 is about 34.90 million metric tons of CO_2e[1].

- There are 4037 email users in 2020 worldwide.
- In 2019, the number of monthly U.S. internet users is projected to grow to 251.8 million monthly users.
- There are mailbox management apps like Zendesk, Hiver, Sendinblue, Sanebox, Front, and LiveAgent[9].
- We found current solutions to the problems which are spam blockers like Robo Shield, Truecaller, Nomorobo Robocall Blocking, RoboKiller, Spam Scanner, and so on[10].

2) Field Research

Users and Methodology

After secondary research and discussions with teaching assistants, we found that the user groups which are made up of university students and teachers are still broad. There are some differences between the use habits of teachers and students. Specifically, teachers and faculty staff send more mass messages than students, which is one of the major reasons for the carbon footprint of email. However, we are not going to focus on this one issue, but rather on the more widespread problem of incoming emails. In addition, for first-hand research, we need to track and observe users. It is more convenient to observe students than teachers. Because our topic requires us to track the user for a long duration of time, e.g. throughout one day. It's not convenient for us to keep track of a teacher's day. We can conduct fixed-time observation, but it does not necessarily lead to valid conclusions because people tend to use email in a fragmented manner.

So our target users are students attending universities in the US, including undergraduates, master's students, and Ph.D. students. They tend to use email frequently because there is a lot of information that needs to be communicated and email is a very convenient way to do that. We have observed some user’s usage behavior at home and in the classroom, and also have tracked user’s email usage habits throughout the day. We have asked the participants in our study to not check their email for one day before they checked it while we were observing. Due to the above constraints we were able to conduct observation only on 6 participants.

Insights and Analysis

(The blue part of the insight is more important and is the basis of our questionnaire.)

- People rarely unsubscribe the unwanted promotional emails, they are left in the inbox and the user is not bothered that he will still receive it in the future.
- Some email services are more frequently used than others like Gmail is the most used one. The user interface of the email service provider has some impact on the cleanliness of the user's inbox.
- Emails are more easily deleted on smartphones than on laptops (especially on Gmail).
- People spend less time reading emails on their phones than on their computers. Laptop: Information filtering and sorting take up most of the time a user spends on an email application, and the time spent looking at the content of the email is not the majority. Phone: No need to filter, read directly.
- People are used to reading emails in work and school scenarios
- Everyone basically checks their emails once in the morning or in the morning before they start their work.
- People receive more than 10 emails every day, and more than half of them are not necessary.
- Most people have 2-3 email addresses. There are many mailboxes with duplicate messages.
- UW and LinkedIn-related emails take more browsing time than other emails. People tend to read all of them in case of missing anything important.
- People rarely delete emails, even if they don't intend to open and read them.
- People have a large number of unread emails in their inbox, mostly 1000+. However, they seldom use email management assistants.
- Some people manage their emails by starring important ones and labeling different kinds of emails.
- Some people will archive their emails, but they are rarely likely to read them again.
- If there is a link in the email, they will choose to open the link in a new window. Viewing mailboxes will open many new web windows.
- Some people delete emails and don't go to the trash to confirm the deletion again.

3) Survey

Users and Methodology

Our questionnaire consists of 3 main parts. The first part confirms whether the insights obtained in the field research hold true in the larger population, and explores the motivation behind them. The second part asks questions that cannot be observed through field research but may have an impact on the design solution. The third part checks whether the user is aware of the impact of an email on the environment.

We published the questionnaire using Google form and distributed the link to the questionnaire through multiple channels, including WeChat group chat, WhatsApp group chat, and individually to university students with red packets. Finally, we received 35 valid responses and analyzed the questionnaire through google sheets.

Insights and Analysis

- Users mainly use smartphones and laptops to check email, with an average of 43% for smartphones and 41% for laptops.
- In terms of deleting emails and organizing mailboxes, the percentage of users who primarily use smartphones and computers is 45.7% for both. 8.6% used both devices to manage their mailboxes with similar frequency. No one uses a tablet to organize mailboxes.
- The main factors that determine whether a user wants to delete an email or not are the time and effort required to do so. Interestingly, six users filled in other options, saying annoying reminders, red dots, and convenient gesture interactions on their phones as stronger drivers.
- 22.9% of users always delete emails. 42.9% of users delete emails sometimes, and 25.7% of users rarely or never delete emails.
- The main reasons why people are reluctant to delete emails are the time (34.3%) and hassle (31.4%) involved in doing so.
- Unsubscribe spams:
    - 45.7% of users rarely or never unsubscribe.
    - 31.4% of users usually unsubscribe.
    - 22.9% of users unsubscribe very frequently.

- The main reasons why users don't unsubscribe from emails are time and whether he/she can find the unsubscribe button.
    - 42.9% of users know how to unsubscribe, but think it is time-consuming.
    - 34.3% of users cannot find a way to unsubscribe the spam sometimes.
- Gmail is the most used mailbox.
    - 85.7% use Gmail.
    - 31.4% use Outlook.
    - 25.7% use QQmail.
    - 6% use iCloud Mail.
    - 5% use Yeah Mail (163, 126)
- Over half of users never manage mailboxes.
    - 54.3% of users never used any method to manage the mailbox.
    - 22.9% of users use labels to sort and fill.
    - 20% of users use the integrated mailbox manager.
- People are poorly aware of the carbon emissions generated by mail.
    - 0% of users are extremely familiar with the footprint generated by email.
    - 37.2% of users are somewhat or very familiar.
    - 62.9% of users are not familiar with or have no idea at all.

4) Triangulated Insights [Secondary research, Field study, Survey]

User Experience

- People are almost equally willing to use mailboxes on smartphones and on laptops. With more time on smartphones when going out, and more time on laptops when they are using computers.
    - Users mainly use smartphones and laptops to check email, with an average of 43% for smartphones and 41% for laptops.
    - In terms of deleting emails and organizing mailboxes, the percentage of users who primarily use smartphones and computers is 45.7% for both.
    - People spend less time reading emails on their phones than on their computers (at home and in the classroom).

- People are more eager to read and clean emails on their phones because they have more notifications, richer visual hints, easier access, and simpler interaction.
    - Annoying reminders, red dots, and convenient gesture interactions on their phones as strong drivers to check and delete emails.
    - Emails are more easily deleted on smartphones than on laptops (especially on Gmail).
    - The main factors that determine whether a user wants to delete an email or not are the time and effort required to do so.
    - The main reasons why people are reluctant to delete emails are the time (34.3%) and hassle (31.4%) involved in doing so.
- Most people do not have a habit of unsubscribing emails because the interaction is not simple enough.
    - People rarely unsubscribe the unwanted promotion emails, they just skip them and keep them continuously sent.
    - Over half of users never manage mailboxes.
- Gmail is the most used provider in the US, and people find it easy to manage mailboxes.
    - Some email services are more frequently used than others like Gmail is the most used one. The user interface of the email service provider has some impact on the cleanliness of the user's inbox.
    - 85.7% use Gmail.
- People are poorly aware of the carbon emissions generated by mail.
    - The carbon footprint of an email may vary from 0.3gms to 50 gms of CO_2e.
    - 62.9% of users are not familiar with or have no idea at all.

Business

- The market for mailbox cleaning assistance is large.
    - A whopping 29.6 million metric tons of CO_2e are generated by emails that are either spam or unimportant to the user and may be ignored. Almost 85% of emails fall into one of these categories.
    - There are 4037 email users in 2020 worldwide.
    - In 2019, the number of monthly U.S. internet users is projected to grow to 251.8 million monthly users.
- People do not often manage their mailboxes though they do think it is needed.
    - Over half of users never manage mailboxes.

        - 54.3% of users never used any method to manage the mailbox.
        - 22.9% of users use labels to sort and fill.
    - The main reasons why people are reluctant to delete emails are the time (34.3%) and hassle (31.4%) involved in doing so.
    - People have a large number of unread emails in their inboxes, mostly 1000+. However, they seldom use email management assistants.
- There are existing solutions for mailbox cleaning assistants but are rarely used.
    - 20% of users use the integrated mailbox manager.
    - There are mailbox management apps like Zendesk, Hiver, Sendinblue, Sanebox, Front, and LiveAgent[9].
    - There are spam blockers like Robo Shield, Truecaller, Nomorobo Robocall Blocking, RoboKiller, Spam Scanner, and so on[10].

Technology

- The convenience of interaction plays an important role in the willingness to delete spam.
    - Emails are more easily deleted on smartphones than on laptops.
    - 42.9% of users know how to unsubscribe, but think it is time-consuming.
    - 34.3% of users cannot find a way to unsubscribe from spam.

Stakeholders & System Components

1) Scope of Stakeholders

Internal Stakeholders	External stakeholders
Email Service Providers ● Investors ● Administrators ● Executives ● Employees	Technical Support Providers
	Energy Suppliers
	U.S. & Washington Government
	Marketing & Advertising Agencies
	Users of University
	Universities in the U.S.
	Competitive Companies

2) Composition of Stakeholders

Core Stakeholders	Email Users in University	Students, Faculties
Primary Stakeholders	Universities in the U.S.A	
	Email Service Providers	Google, Apple, Microsoft…
	Email Service Purchasers	Bank, Hospital, Companies…
Secondary Stakeholders	Technical Support Providers	Internet providers(AT&T、Verizon、Spectrum…), browser providers(safari, chrome…), data server
	Energy Suppliers	Electricity
	U.S. & Washington Government	Legal, Information Security Department
	Email Marketing Platforms	Advertising Agencies

3) Priority Analysis and System

The main reason behind the cleanliness of an inbox is the user themselves. The email service providers and the organization the user works with are also significant. Through the research questionnaire, we found a strong correlation between the source of emails and how users manage their inbox. Familiar email sources for users, such as schools, banks, shopping sites, etc., become more important and relevant stakeholders. Besides, we understood that the energy consumed by processing, sending and receiving emails is taken care of by the email service provider and cannot be changed. This may give us referenceable information for our design direction and design priorities.

We had several design opportunities to start with these stakeholders. The product we will design needs to meet not only the users' needs but also the primary stakeholders' requirements.

Core Users & Customers

1) Intended Users

Our intended users are students and professors of universities who are currently living in the United States. They use mailboxes frequently to receive and send information. The demographic and behavioral characteristics include

Sub Segment 1: University Students

- Demographic and Behavioral Characteristics:

University students are mainly concentrated between the ages of 18 and 30, with low earnings, but full of interest in new things, information, goods, and services. They browse a very large variety of websites and subscribe to services, so they receive a lot of emails every day. They are always willing to reach for more information and broaden the possibilities of life. They live busy lives, so the time they are willing to spend on managing their mailboxes is limited, and managing their mailboxes brings limited returns.

- Population:

  There were approximately 18.99 million college students in the U.S. in 2020[6]. In November 2021, approximately 95 percent of internet users aged between 25 and 44 years in the United States used emails[8]. Assuming that all the university students in the US are internet users, which can be true because lessons today rely so much on the internet, the population of email users in US universities can be 18.99 million * 95% = 18.0405 million. Based on the survey, assuming the penetration rate of using the mailbox management assistant can be 50%, then the population of target students reaches 18.0405 million * 50% = 9 million.

Sub Segment 2: Faculty

- Demographic and Behavioral Characteristics:

  Professors typically use mailboxes more frequently than students. They have a higher level of professional maturity and need to receive, process, and send more emails at work. With more important emails in their mailboxes, they get more returns in managing mailboxes.

- Population:

  There were 1.5 million faculty in 2020[7]. Assuming that 90% of faculty use email, the population reaches 1.5million * 90% = 1.35 million. Assuming that 50% of them are willing to use the mailbox management assistant, then the population of the target faculty is 1.35 million * 50% = 0.675 million.

Prioritised set of design requirements

1) High Priority

[User Experience] The solution needs to support people to delete emails with simple interaction and solid visual cues.

Justification: According to the results of the questionnaire, the reason why people prefer to delete emails on cell phones than on computers is that it is much easier to delete emails interactively. The operation can be done with a swipe of the finger. In addition, cell phones have distinct visual reminders, such as pop-ups and red dots, to urge people. This shows that the user's mind has been cultivated and matured, and the design needs to match the gestures people are accustomed to.

[Technology] The solution needs to support personalized automatic unsubscribes from advertising and promotional emails without manual operation.

Justification: Through the research, we found that many people do not habitually unsubscribe from emails. They will skip and ignore them when browsing. The recurrence of this behavior has expressed the user's intention that people do not want to go through complicated links to unsubscribe, so it is better to have some ways to support automatic unsubscribing.

[User Experience] The solution needs to shorten the link and time to delete emails.

Justification: Through observation, we found that the link for users to delete an email entirely is long, requiring many button presses and repeated confirmation of content. We also learned through the questionnaire that the main reasons why people are reluctant to delete emails are because of time and trouble, accounting for 34.3% and 31.4%, respectively.

2) Medium Priority

[User Experience] Solution needs to help users build up the habit of managing emails and provide ideas and methods to manage emails.

Justification: Through the questionnaire research, we found that more than half of the users never manage their mailboxes, which includes deleting emails and unsubscribing from advertising emails. This phenomenon exists because users do not understand the importance and methods of managing emails, so we need to provide them with complete information in a more direct way.

[Business] The solution needs to emphasize more university scenarios and combine them with university-related attributes.

Justification: There are already a lot of existing mailbox management products, and our users are targeting universities, so we should combine the user journey and habits of universities to design. Through research, we found that users often read emails in class and study.

[User Experience] The solution should support users to manage multiple mailbox accounts simultaneously.

Justification: Most users have 2-4 accounts, and even some have more than five accounts, so there is a great need to manage multiple accounts simultaneously without switching. This is a very popular feature among the leading email service providers.

[Business] The solutions need to support the major email service providers and conform to the product usage habits of the major providers.

Justification: We found that Gmail is the most used provider in the US. 85.7% of people in the questionnaire use Gmail. To make our solution reach more people, we need to support some mainstream products such as Gmail. The questionnaire shows that people think the user interface of Gmail is amicable for managing mailboxes. Developing user habits and mindset is difficult, so we can follow some of the logic of existing products to make them easier to understand and operate and reduce learning costs.

[Business] Solution can raise awareness about the carbon emission generated by emails.

Justification: Through the questionnaire research, we found that 62.9% of users are completely unaware and almost unaware of the impact of emails on carbon emissions and the environment. It is reasonable to assume that people dislike cleaning and managing their mailboxes because they are unaware of their impact. Products should not only have good functions to make people use them easily but also need to take some social responsibility. Suppose the product can play a role in spreading the influence of attaching importance to carbon emissions. In that case, firstly, the government has some favorable tax reduction policies and tax exemptions for environmental protection enterprises. Secondly, it can also generate a better reputation and influence.

[Technology] Solution needs to support multi-device interaction, especially the need to keep cell phones operational.

Justification: Through research and observation, we found that Emails are more easily deleted on smartphones than on laptops. But most of the time, people read emails. They still use computers, so the solution needs to support multi-device interaction.

[User Experience] The solution should have gamification and rewards to enhance the appeal.

Justification: Our primary core users are university students and faculty, mainly students. The solution should match the interests of the users. The style of application that students like is mostly gamification and entertainment. Although mailbox is a professional application, it can also have some simple and fun interactions to raise people's awareness of low carbon and ensure their motivation to keep using it continuously.

[User Experience] The solution should use more obvious labels to categorize emails visually.

Justification: 22.9% of users use labels to sort and fill. Not many people use labels at the moment, and the current labels are not evident and less dimensional, so most people don't use them and won't use them.

3) Low Priority

[User Experience] The solution should be an ongoing engagement.

Justification: Managing email and reducing carbon emissions is an ongoing process. Research has revealed that the student population tends to stop using the software after a while.

[User Experience] The solution helps users quickly filter emails and locate important content.

Justification: The research found that students spend a lot of time filtering emails and tend to read all emails to prevent missing important information, but this takes a lot of their time and makes them irritated.

[User Experience] The solution needs to support regular email cleaning and space freeing, even freezing accounts and blocking emails.

Justification: Currently, there are a large number of email accounts around the world, including those that are used exceptionally infrequently and those that are entirely inactive. These accounts are also constantly receiving all kinds of advertising emails, causing a lot of wasted

resources. Most people have 2-4 email addresses, and there are many email accounts with duplicate messages that people are aware of but unwilling to deal with and delete on time.

[Technology] The solution needs to integrate several functions to meet the tasks of mailbox cleaning and email management.

Justification: Few users currently use email management assistants to manage emails. 54.3% of users never used any method to manage the mailbox. Because each plug-in or application can only support a single function, they need to install many plug-ins to meet different purposes, and the operation of this process is troublesome. Many users also do not have time to understand and learn the various plug-ins and applications that may need to be actively matched to users.

Redefined Design Question

Revised Design Question:

How can we promote and make it easy for students and faculty in universities in the United States to delete and unsubscribe from irrelevant and/or unwanted emails so that we can minimize the carbon emission of their inbox.

Justification for Change:

The most effective way to reduce the number of spam emails we receive is by unsubscribing and deleting them. A significant majority of people are unaware of how emails affect the environment. As a result, we decided to add the term encourage to increase people's awareness and used deleting and unsubscribing to specify how users can manage their email.

Appendices 0 Reference

1 - https://todaytesting.com/environmental-impact-spam/
2-https://www.bbc.com/future/article/20200305-why-your-internet-habits-are-not-as-clean-as-you-think#:~:text=Perhaps%20unsurprisingly%2C%20the%20footprint%20of,University%20who%20researches%20carbon%20footprints

3 - https://talosintelligence.com/reputation_center/email_rep?free=#spam-ip-senders

4- https://theecobahn.com/ideas/edm-carbon-footprint-sustainable-email-marketing/
5-https://www.azcentral.com/story/money/business/tech/2015/07/15/why-you-get-spam-email/30215637/
6-https://www.statista.com/statistics/183995/us-college-enrollment-and-projections-in-public-and-private-institutions/

7-https://nces.ed.gov/programs/coe/indicator/csc/postsecondary-faculty

8-https://market.us/statistics/internet/email-users/

9-https://www.zendesk.hk/service/ticketing-system/email-management-software/#georedirect

10-https://www.comparitech.com/identity-theft-protection/best-spam-call-blocker-iphone/

Appendices 1 Field Research Plan

Student

Q1. What is the overall design question your study is intended to address?

How can we make it easy for students and teachers in universities in the United States to manage and maintain their emails so that its digital carbon footprint can be reduced?

Q2. What is the data that supports your design question?

- The carbon footprint of an email may vary from 0.3gms to 50 gms of CO2e.
- Every day about 333 billion emails are sent which adds up collectively.
- The total carbon emission caused due to emails in 2021 is about 34.90 million metric tons of CO2e.
- A whopping 29.6 million metric tons of CO2e are generated by emails that are either spam or unimportant to the user and may be ignored. Almost 85% of emails fall into one of these categories.

Q3. What are the field research questions that will help you learn more about your design question? Identify <u>all relevant</u> areas of focus (Focal Points) (of the 10 listed in Baxter et. al, pg 390) and write 2 or 3 questions or statements you would like to learn about in your field observations. Reference our lecture slide examples.

Overall experience

- How are students and professors currently using their email?
- What is causing them to send and receive unnecessary emails?
- What is the user currently doing to the spam emails they are receiving on a day-to-day basis?

Q4. Who are the target stakeholders that play a key role in this problem? This group of people will be the target audience for the direction of your solution. What are the characteristics of this target audience? and Why are you focusing on this group? Your solution will be targeted at this audience.

The key stakeholders are teachers and students in universities. We focus on students because they are born in the age of the internet and use emails to receive a lot of information. Additionally, their inboxes are constantly stuffed with pointless emails. We focus on university professors because they send and receive a lot of emails every day. An email is a common form of communication between students and teachers.

Q5. Do you need to gain permission to observe your chosen people/activity/environment? If so, how will you gain permission to conduct your field study?

Since we want to learn about people's email habits, we must obtain permission from those who will be taking part in our research observation. The participants must fully comprehend why we are observing them.

After orally agreeing to take part in our experiment, we will ask the participants to sign a consent form, and we intend to preserve a copy for ourselves as verification.

We will reach out to people at the university and recruit participants through our personal networks.

Q6. What ethical considerations might come into play during your field study? Reference Courage and Baxter Chapter 3 for details.

We will ensure that the data we obtain from the user will always be confidential. We will make sure the user completely understands that this is our top priority. We won't be using the user's name to support the evidence we have obtained from the research and will only be stating a generic fact that was observed throughout the research.

Q7. What is your overall logic for conducting each of the three observation sessions?

- **Where will you do the observation?**
    - We will observe professors/staff from UW and students while they are browsing emails. For professors, we will ask them about the time they mainly spend on sending and receiving emails. Then we'll go to their office to observe.
    - For students, since their time browsing email is really dispersive, we will follow our close friends for 1 day long, and observe their email use habits whenever they open the email.
- **For how long?**
    - For professors, the observation will last 30-45 minutes.
    - For students, we will need the student's co-operation till they are done with checking their email in a day and will observe them while they are using their email.

Q8. How do you plan to collect data?

Each team member goes on observation with an individual. The observation requires us to be pretty close to the user, so we need to limit the number of observing people to reduce staring pressure for the user.

In the process of observing, we will record the whole process, so that the other teammate can review and observe.

Members will bring cameras, notebooks, and pens to the observing sites.

If possible, we will ask for permission to observe the inbox of the user. We want more data about the number of emails in each tab(e.g. unread emails, social emails, promotion emails, important emails….)

Appendices 2 Field Observation Execution Document

1. **Purpose**

The purpose is to learn about how student users use email and what are the main factors causing energy consumption.

2. **Observation Scenarios**
   a. Laboratory
      a) Description: Two students are asked to check their email box (remained unopened for a whole day) in front of us.
      b) Observation Scope: all the emails, PC mainly
      c) Time: 12:30pm-2:00pm, Oct 23.
      d) Location: GIX
      e) Owner: Hrithik, Kelly
   b. Home
      a) Description: Two students will be followed for a whole day. Their behavior will be observed whenever they open the email. This scenario exists because it is a more natural circumstance. Behaviors may be different from the laboratory setting.
      b) Observation Scope: PC & phone
      c) Time: Oct 23, 24
      d) Location: Arras Apartment
      e) Owner: Evie
   c. On Class
      a) Description: Two students will be observed whenever they open the email. This scenario exists because class is a busy situation, so users are more likely to ignore unimportant emails, highlighting the most needed features.
      b) Observation Scope: PC mainly
      c) Time: Oct 25
      d) Location: GIX classroom
      e) Owner: Kelly

3. **Laboratory Observation Instructions**
   a) Procedures
      i. Before Observation: We print informed consent, set the recording camera.
      ii. The participants sign informed consent.
      iii. We explain what to do to the participants. (Ask how many emails they have, and let them check all the emails sequentially in front of us.)
      iv. Let the participants start recording the screen and open their email box. We take down some information.
      v. The participants check their email, while we make observation and take notes.

vi. After checking, we ask the participants about their backstage information.

b) Something important to observe:

i. How many email addresses do they have? How many of them are frequently used?
ii. How many emails are received one day?
iii. How many different types of email there are? (unread, total, promotion, social, …)
iv. Which types of email are checked, which are ignored?
v. What's the time duration in checking each kind of email?
vi. What's the operating routine in the email page?
vii. What do they do with the unimportant email?
viii. What engines do they use to check email? Or APPs?
ix. Do they use email management software?
x. What's the usage time (front stage & back stage) of the email applications?

Appendices 3 Field Research Notes

Ke Wang

Oct 24, 2022,

Due to the fact that people don't check email for a long time, so I observed 3 participants in 3 fields and their time add up to 40+ minutes.

Field 1

- Start time: 1:30 pm, Oct 23, 2022,
- End time: 1:50 pm, Oct 23, 2022,
- Location: GIX meeting room
- Participant: a male Chinese student
- Notes:

He mainly uses 2 email addresses and checked them sequentially.

He checked the email on the laptop and browsed the content of the emails pretty fast. He spent only seconds browsing from the top to the bottom and knew whether it is important. If it is important, he slowed down and read again. If it is not important, he returned to the inbox home page.

The most emails he paid attention to was LinkedIn emails, as he is looking for an internship. He reads every LinkedIn email seriously to avoid missing anything important.

When he clicked the link in the email, he went to another website and spent some time on it.

He receives around 10 emails a day.

The emails he received are mostly about information, such as the job alert from LinkedIn,

events information from UW, and alerts from MSTI Teams.

He starred the emails that were thought to be important.

He deleted very few emails, although he spent only seconds on many remained emails.

His emotion didn't change in the whole process, keeping his eyes on the screen.

He saw the title and the content of an email in the inbox home page and determines whether to see it in details. For advertisements, he just skipped.

He had more than 1000 unread promotion emails and more than 60 unread social emails in Gmail. However, he didn't check them, just leaving them unread.No email managing application was used.

Field 2

- Start time: 3:00 pm, Oct 24, 2022,
- End time: 3:15 pm, Oct 24, 2022,
- Location: GIX classroom
- Participant: a male Indian student
- Notes:

He has 9 email address and are organized by Gmail as well as Outlook. He checked the two email applications one by one, spending more time on the frequently used ones.

He checked his email on his smartphone, swiping up and down pretty fast.

He saw the title and determined whether it is important. If it is important, he clicked and read the detailed contents.

There are more than 5000 unread emails in his inbox.

He read some emails and ignored the others, not deleting any of them.

He spent more time on the job and school-related emails. For the other emails, he browsed for less than 3 seconds.

If there were intext pictures in the email, his attention was drawn there and more time was spent on reading the email.

If there were intext links in the email, his attention was also drawn. He would read more carefully to seek out what the link is for.

He operated the phone with one hand. His body was in a casual gesture.

He marked some of the unread emails as read but did not delete them.

He didn't unsubscribe anything although he found a lot of emails to be spam.

After checking the inbox main page, he checked the social column.

No email managing application was used.

Field 3

- Start time: all day, Oct 24, 2022,
- End time: all day, Oct 24, 2022,
- Location: Arras Apartment
- Participant: a female Chinese student
- Notes:

When she opened the inbox, she directly opened the first email. After browsing it, she clicked the “next” button on the right top corner, instead of returning to the inbox home page. In this way, she read every email sequentially.

She read carefully about the emails sent by UW and MSTI, clicking all the links on them.

She checks the email sent by Nordstrom Rack. The email was a notification, saying that the purchased goods arrive. Then she opened her phone to check whether she can receive it the next day.

She checked every email at first. But when the frequency of unimportant information was increasing, her patience decreased and she returned to the inbox home page, selecting the email that needed to be browsed carefully.

She left some of the emails unread but did not delete them.

There are more than 1700 unread emails in her inbox.

When she saw an interesting promotion email from Apple Fitness, she clicked the link and went to the official website. From this secondary website, she saw something else interesting and went on to the tertiary website. In this process, the email website wasn’t closed.

When she was walking on the road and saw notifications from Gmail App, she opened the Gmail App, read the email for a few seconds, and returned to the home inbox page.

She browsed the title of the emails and swiped right to archive some of the emails.

During lesson time, she saw notifications of newly arrived emails but did not open the email box.

Wanying Mo

Observation process
Since the time and scenario when people check their emails are uncertain, I chose to observe by shadow-following. I observe when people need to check their emails during the day.

Observation time

10.23

The role of observation
Three students of GIX cohort6, one male and two female, two Chinese and one Indian

Observation

User 1
9:30-9:43 GIX

- He used to check his mailbox in the morning before studying at GIX.
- He has two Gmail email addresses.
- He reads the messages from top to bottom according to their arranged order.
- Every email will be clicked to open and read.
- The length of the email content determines the reading time of each email, and the overall reading speed is relatively fast. Practical information is quickly found by eye scanning and deciding whether to open some attachments and web links.
- Clicking on the open link will reopen a page to open it. Instead of immediately jumping to the web page, it will browse the opened web page together after reading all the unread emails.
- After reading an email, a checkmark will be placed next to the email.
- The primary sources of emails are schools, colleges, companies that deliver internships, banks, and advertisements.
- Among the different types of emails, the ones that stay longer are college and university.
- Ignoring promotion and social, after confirming with the user and finding that he never viewed this part of the message, there were 28 unread messages for advertising and 14 unread messages for social.
- After reading all the unread emails, he will click Delete directly because some of them have been checked and filtered out.
- After deleting emails, he will click trash to confirm again, sometimes, he will delete them in the trash again, but most of the time, you will wait until 30 days mailbox to delete emails in the trash by default.
- About half of the emails in the trash are unread emails.
- The whole process of reading emails is more concentrated; he won't be disturbed by other things and won't click open to see additional messages.
- One-fifth of the capacity of the mailbox is used (2.99GB)
- He doesn't use my cell phone to confirm emails, but sometimes he checks the phone's message notification and confirms it on his computer. He confirmed his mailbox once a day in the morning.

User 2
10:15 Home

- She used to save her emails to read together and would confirm them once in the morning.
- Read the emails in the order in which they are listed.

- Opens every email.
- Read the emails very carefully, and the reading time of each email is not very short.
- There are three mailboxes, namely the 163 and the Gmail mailbox.
- While reading the emails, the mood obviously changes from calm to slightly annoyed. Sometimes she will spit out the number of emails, and sometimes she will be accompanied by some confusion.
- Never pay attention to the social and promotional part of the emails
- After reading all emails, she will click to look at the emails in the Spam.
- Do not delete any emails.

14:25 GIX

- She is doing homework at GIX, and her phone vibrates with an alert message from Gmail.
- She would pick up her phone to confirm the content of the alert message from Amazon and the university.
- She ignored the Amazon email and clicked on the university email.
- After a glance, she just put the phone down

22:35 Home

- In the evening she wanted to check the emails again to see if there was any important information missing, so she opened the mailbox again and took a quick scan of it.
- The main source of emails is the university.

User3

10:30 GIX

- Before opening canvas to search for a course in class, she habitually opens her email inbox.
- She first quickly scans her email inbox for unread emails and doesn't click through each one.
- The primary sources of emails are from universities, collage, and online shopping platforms (Amazon, Walmart, etc.)
- The information you will click to view is mainly from the university.
- Quickly browse the content of mailboxes, and switch to translation software to search for queries when encountering some problems.
- Don't delete the emails she has finished reading.
- Sometimes she will choose the archive button to archive the emails
- After reading emails, she will browse social and promotional emails carefully.
- If the social emails are from University and GIX, she will click to open and read them.
- There are two mailboxes in total, mainly read the Gmail mailbox.
- There are many unread emails in the inbox, and after confirming with the user, she said she would not confirm the previously unread emails either.
- If there is a link in the email, it will be opened in another window, browsed directly, and then returned to the mailbox after browsing.

17:48 Home

- There is a message alert from Gmail. Open the phone mailbox to take a look.
- Through the cell phone background data, we can learn that there are 16 message alerts on her phone daily.

Insight

Scenarios

- People are used to reading emails in work and school scenarios
- Everyone basically checks their emails once in the morning or in the morning before they start their work

Read Email

- People will quickly scan all emails for the first screening.
- People will mainly read emails from universities carefully, even if they are advertisements, they will stay longer.
- People will basically read every email, and will quickly open and close the emails that are not useful.
- Most people don't read promotional and social emails.
- If there is a link in the email, it will choose to open the link in a new window.

Mail Processing

- Most people do not have the habit of deleting emails after reading them.
- Some people delete emails and don't go to the trash to confirm the deletion again.
- Some people will archive their emails, but they are rarely likely to read them again.
- Most people have 2-3 email addresses.

Unreasonable Behavior（Opportunity Points）

- People are not in the habit of deleting emails.
- A lot of advertising and social emails are not read.
- At present, there are few effective messages in mailboxes, so many emails are not clicked to view details when they are glanced at.
- Viewing mailboxes will open many new web windows.
- There are many mailboxes with duplicate messages.
- Information filtering and sorting need to take up part of browsing time, and the actual browsing time of content is not long.

Hrithik Bandaru

First Participant:

The participant is a student of University of Washington.
To check his email, the user launches the Google Chrome browser on his laptop.
First, the user accesses his school email.
To access his inbox, the user logs into Gmail.
He quickly scans all of the unread emails before opening a few of them.

He selects all the un opened email and proceeds to delete them.
He proceeds to delete some of the emails which he opened.
The participant opens his personal email on the browser.
The participant's personal email uses the same email service provider which is Gmail.
Just a few mouse clicks on the user interface are required for the participant to move from his school email to his personal email.
The participant quickly glances over the emails and opens the new ones which he received that day.
He proceeds to select some of the emails which were opened and deletes them. He uses the star option on gmail to mark the some of the emails.
The user says that he deletes all the old and irrelevant email to keep his inbox clean so that he can find the useful ones easily in the future.
Before he closes his email he checks his spam folder.

Second Participant:
To access her email, the participant turns on her Mac.
She opens gmail.com on the Google Chrome browser.
She initially accesses her student email and looks through it.
Before opening emails, she scans their subject lines and utilizes the label option to categorize them.
She categorizes all of the emails into one category or another and deletes some.
The remaining emails in her inbox are deleted.
She opens the categories to open unopened emails.
She reads a few of her promotional emails before opting out of the newsletter.
Then she checks her personal account and continues in the same manner.
She claims that she deletes her emails since she did not want to pay for cloud storage whenever she ran out of memory.
She claims that she primarily uses her phone to check her email and to delete emails because doing so via the Gmail app on a phone is simpler than doing it on a desktop or laptop.

Third Participant:
The participant logs into his email on his Macbook.
He accesses his school email account with Safari.
He scans the just received email and opens a few of them. He opens the spam folder and swiftly scans the contents.
He then does the same when he opens his personal email.
The participant claims that although occasionally, he does not regularly erase emails.
Additionally, he claims that utilizing a laptop or desktop to delete emails is more difficult than quickly swiping through the application on his phone.

Appendices 4 Photos from Field Study

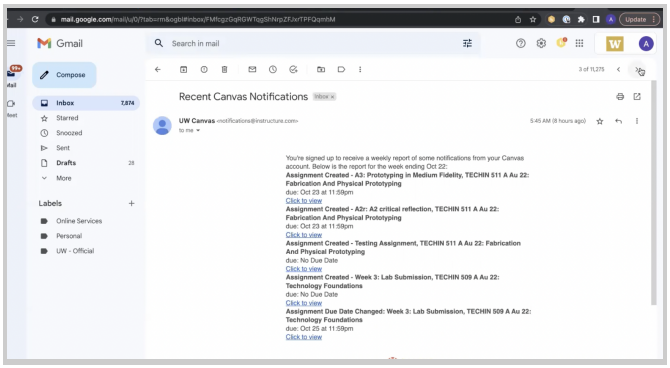


Figure 1. Mailbox with more than 7000 unread emails

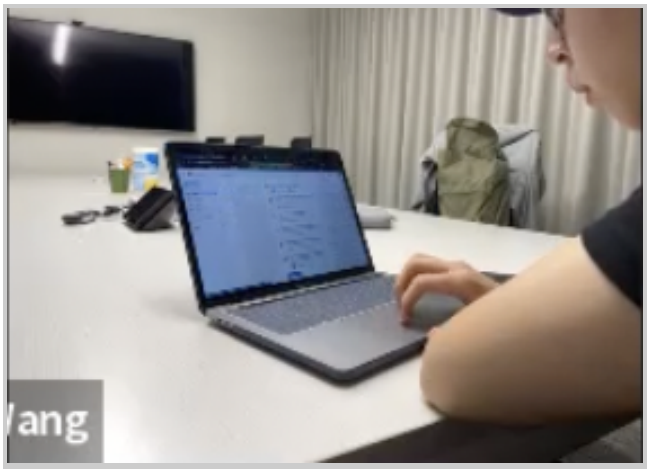


Figure 2. User browsing email

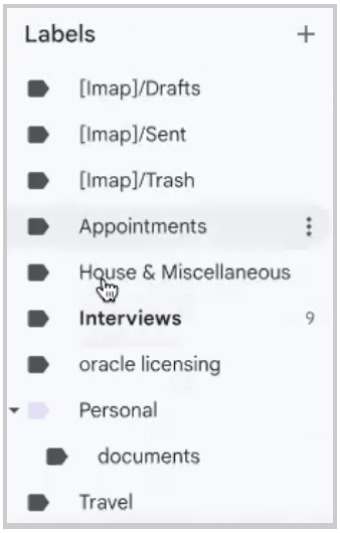
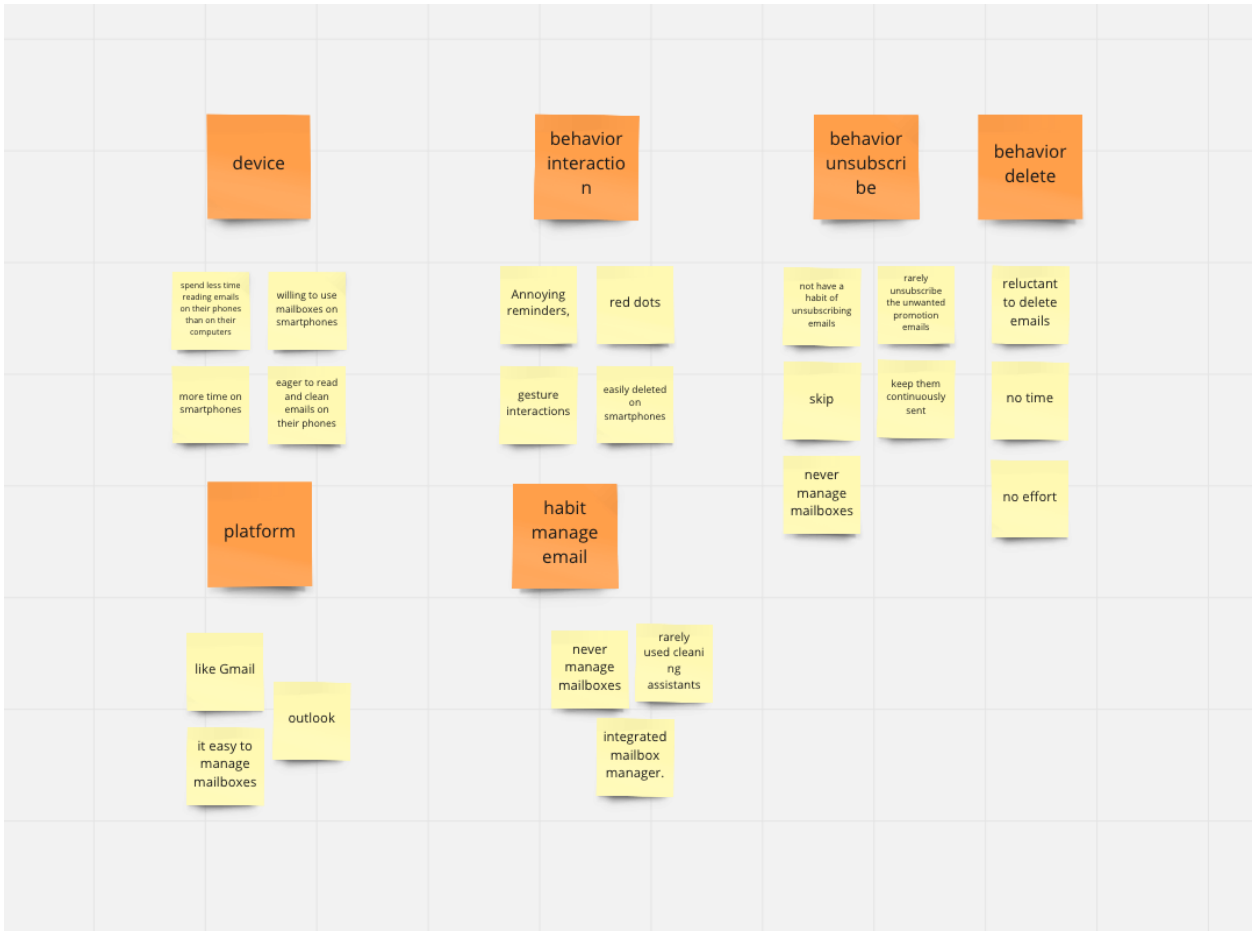


Figure 3. The labels of a well-managed mailbox

Appendices 5 Images from Affinity Analyses



Appendices 6 Survey Questions

[Note: Here is the link to survey questions via Google Forms]
https://forms.gle/3KZ5Gr6Ga1wyJkKLA

Survey on E-mail Usage Habits

1. What is the percentage of the total number of times you use different devices(phone and computer) to access your email on a typical day ?

Mark only one oval per row.

	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
smartphone	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
laptop or PC	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯
tablet	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯

2. Consider your typical email management, choose which device you typically delete or unsubscribe emails from? *

Mark only one oval.

- ◯ Smartphone
- ◯ Laptop computer
- ◯ Tablet computer
- ◯ Similar across devices

3. Why do you delete more unimportant emails on this platform? *

Check all that apply.

- ☐ Because there are less steps in deleting an email.
- ☐ Because my fingers have less range of motion when deleting an email, It is more comfortable.
- ☐ Because it takes less time to delete an email.
- ☐ Because it is easier to find out how to delete an email.
- ☐ Other: _____

4. How often do you delete unimportant emails in your mailbox? *

Mark only one oval.

- ◯ Always
- ◯ Usually
- ◯ Sometimes
- ◯ Rarely
- ◯ Never

5. Why don't you often delete emails in your mailboxes? *

Check all that apply.

- [ ] I don't have enough time.
- [ ] The operation of deleting is troublesome.
- [ ] I want to keep them in case of missing anything important.
- [ ] I keep them for memory.
- [ ] The storage of the mailbox is sufficient, no need for delete.
- [ ] I delete and unsubscribe my email on a daily basis.
- [ ] N/A
- [ ] Other: _____

6. How frequently do you unsubscribe spams (spam is the unwanted email, usually of a commercial nature sent out in bulk)? *

Mark only one oval.

- ◯ Always
- ◯ Usually
- ◯ Sometimes
- ◯ Rarely
- ◯ Never

7. Why don't you often unsubscribe spams? *

Check all that apply.

- [ ] I don't know they can be unsubscribed.
- [ ] I know how to unsubscribe, but it is time consuming.
- [ ] Sometimes I can find a way to unsubscribe, sometimes I can't.
- [ ] I want to keep an eye on the information, though not always necessary.
- [ ] The storage of the mailbox is huge, no need to unsubscribe.
- [ ] I unsubscribe from spam emails all the time.
- [ ] Other: _____

8. Which of the following mailboxes do you use on a day-to-day basis? *

Check all that apply.

- [ ] Gmail
- [ ] QQmail
- [ ] Yahoo!
- [ ] Outlook
- [ ] AOL Mail
- [ ] Zoho Mail
- [ ] iCloud Mail
- [ ] Yeah Mail (163, 126)

9. Which email service provider do you think helps manage your inbox easily?

Mark only one oval per row.

	Gmail	QQmail	Yahoo!	Outlook	AOL Mail	Zoho Mail	iCloud Mail	Yeah Mail
label emails	◯	◯	◯	◯	◯	◯	◯	◯
delete emails	◯	◯	◯	◯	◯	◯	◯	◯
unsubscribe emails	◯	◯	◯	◯	◯	◯	◯	◯

10. Why do you use the above-mentioned email service provider? *

Check all that apply.

- [ ] Easier to Search for emails.
- [ ] Easier to write and send new email.
- [ ] Easier to categorize.
- [ ] Easier to Delete.
- [ ] The overall interaction is more intuitive.
- [ ] Can handle multiple email addresses.
- [ ] The function has a better use guide.
- [ ] Other: _____

11. What methods have you used to manage your mailbox? *

Check all that apply.

- [ ] Install a spam blocking plugin
- [ ] Create mail labels in mailboxes for sorting and filing
- [ ] Using the integrated mailbox manager
- [ ] Never used
- [ ] Other: _____

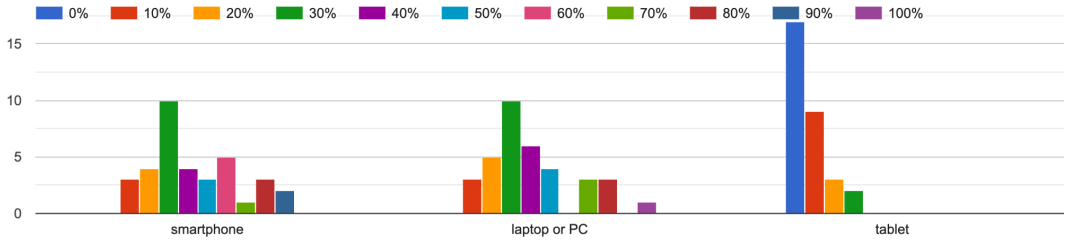
12. How well do you understand the carbon footprint generated by email? *

Mark only one oval.

- ◯ Extremely familiar
- ◯ Very familiar
- ◯ Somewhat familiar
- ◯ Not so familiar
- ◯ No idea

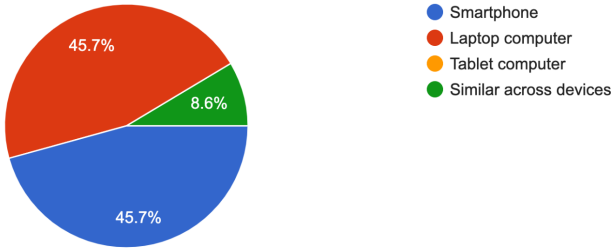
Survey Results

What is the percentage of the total number of times you use different devices(phone and computer) to access your email on a typical day ?



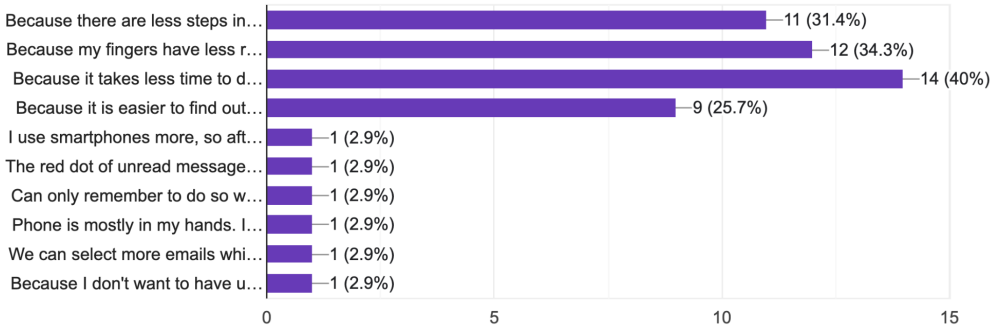
Consider your typical email management, choose which device you typically delete or unsubscribe emails from?

35 responses



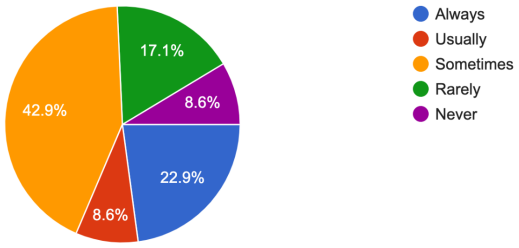
Why do you delete more unimportant emails on this platform?

35 responses



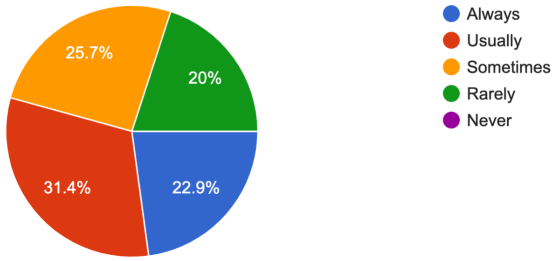
How often do you delete unimportant emails in your mailbox?

35 responses



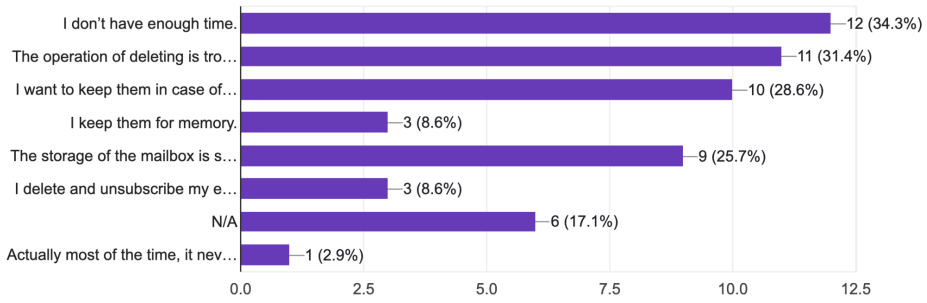
How frequently do you unsubscribe spams (spam is the unwanted email, usually of a commercial nature sent out in bulk)?

35 responses



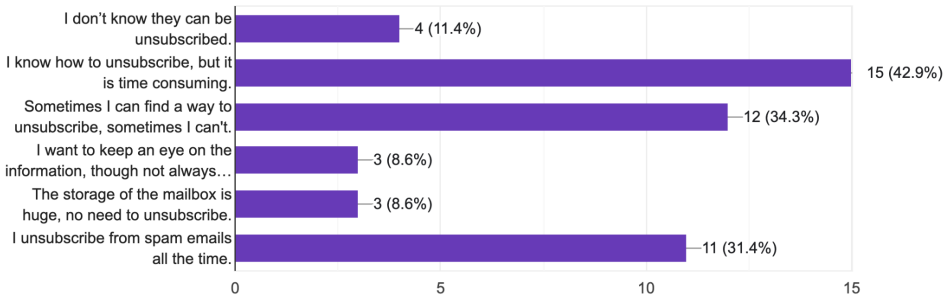
Why don't you often delete emails in your mailboxes?

35 responses



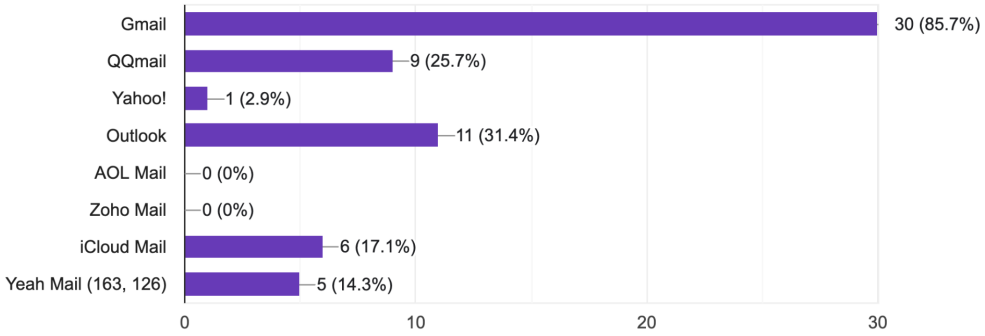
Why don't you often unsubscribe spams?

35 responses

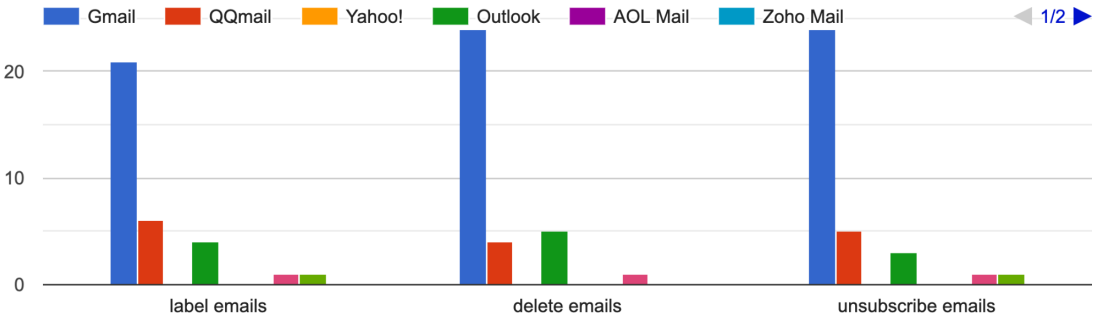


Which of the following mailboxes do you use on a day-to-day basis?

35 responses

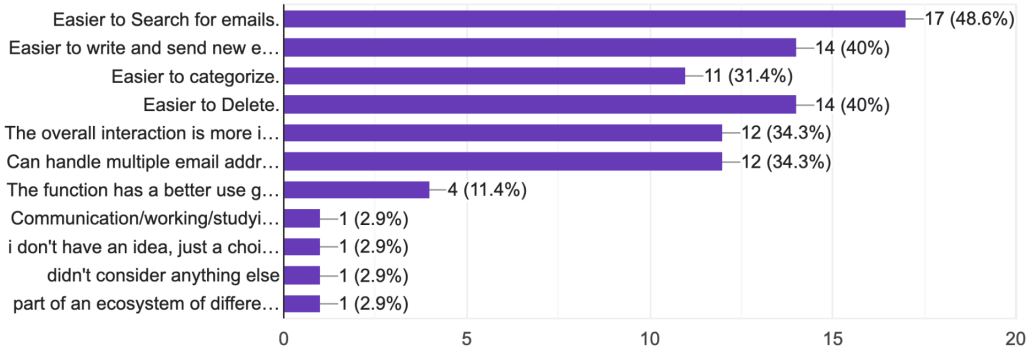


Which email service provider do you think helps manage your inbox easily?



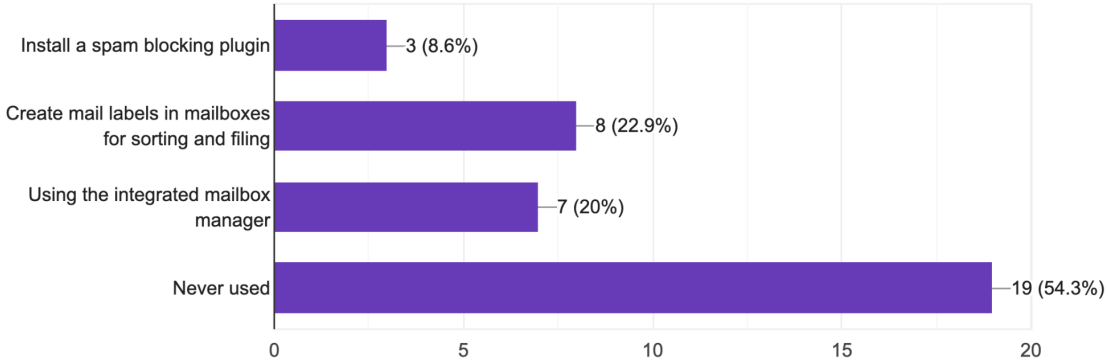
Why do you use the above-mentioned email service provider?

35 responses



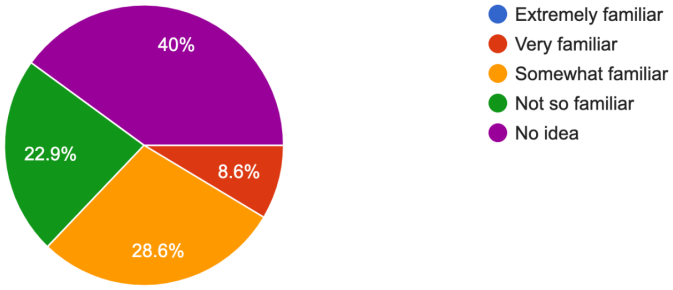
What methods have you used to manage your mailbox?

35 responses



How well do you understand the carbon footprint generated by email?

35 responses



Link to the questionnaire:
https://docs.google.com/forms/d/e/1FAIpQLSeey0JElkn2y1ReBPSQH3P7MCiXyW8gMZKUdkw-Erdhyo35Ig/viewform?usp=sharing