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Final Degree Project

Research project: Retrospective on decentralized / federated social media and analysis of its weak presence

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Abstract

Social media has become a staple of daily life playing a mayor role in the lives of millions. However, its ecosystem is highly centralized around a reduced number of platforms that trap their users. Over the years, alternative platforms, specifications and protocols have emerged, proposing a decentralized and federated approach to social media. Therefore, two main objectives were set for this project. On the one hand, I contextualized the current situation (both for centralized and decentralized technologies) and the process that has led to it. On the other hand, I studied the various reasons that force users to stay in the big centralized platforms, and the factors that prevent their migration towards federated alternatives. Finally, I tried to determine which of them are the most determinant and offered possible solutions.

Keywords: federated social media, continuance intention, digital ethnography, FoMO, privacy

To the memory of my mother (may she rest in peace).

I did it mom.

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Chapter 1

Introduction

Social media has become a crucial part of our daily lives. Whether it is for leisure, work, communication with closed ones or even for discussing politics, the role that social media plays in the society of the 21st century cannot be overlooked. Much of the socialization done nowadays, and at an increasing rate, occurs in the realm of Facebook, Twitter, Instagram, TikTok and many other platforms. It has been even more clear with the COVID-19 pandemic, which has forced many people to make use of these platforms as their only contact with their loved ones. Social media is here to stay and it needs to be properly understood so that the world we live in can be understood.

Finding a precise definition of ”social media” is a challenging endeavour, due to the vague nature of the concept itself. It presents the same difficulties as concepts such as “culture” or “liberty”, it is reasonably easy to casually exemplify the term, but the very moment a concrete definition is proposed, the limits of what can be catalogued using that term become vague. Instagram, Facebook or Twitter can obviously be classified as social media platforms, but why is that the case? Does not the same core principles (users interacting among themselves and socializing via the platform) apply to YouTube, Telegram or even traditional internet forums? Giving a *categorical* definition is worth an study of its own. For the purposes of this manuscript we will use a *folkloric* definition (suitable for the *volk*, the people, the general public):

> Social media represent a set of communication practices that can typically be described as ‘many-to-many.’ In contrast to broadcast media, consumers are typically also producers. In contrast to in-person communication, audiences are often ambiguous or underspecified.

The current social media landscape is dominated by platforms owned by big, even enormous, corporations with an strictly closed technology and with almost no opportunity for interoperability between them. The control over the medium that millions of people use to express themselves is in the hands of these companies, serving their private interests. Their tight control over this ecosystem, and its implications, is becoming a public concern, that has even reached the highest authorities in governments around the

world.

However, an alternative exists: decentralized (or more specifically, federated) social media. Understanding the principle of federation is simple, providing an example of a federated system (that could arguably be labeled as social media) almost universal among internet users, that is, email. Email is a public standard, available for anyone to implement and deploy, maintaining interoperability between service providers, so that the communication is transparent for users. A person using an account hosted at Gmail can communicate with people using Outlook, Yahoo or even a home made email server. The technology is the same, without barriers between providers, whether they are corporations, organizations or individuals.

These technologies are not only completely mature (as noted further in the document), but already standardized, and with a quality and usability matching that of centralized alternatives. Users concerned with privacy issues, with the use of their personal data and with cases of "censorship", wanting to a escape from an space controlled by a technological oligopoly, probably will find federated platforms quite compelling. Nonetheless, their userbase is still small, and their presence is still residual in the public sphere. The natural question to ask is why. Why is the establishment of federated social media so scarce, given its technological maturity and the opportunities it offers in terms of privacy, digital sovereignty and freedom of expression? Why are users "trapped" in centralized platforms which generate increasing discontent?

This project will try to answer these questions, a fresh topic for which no prior research has been found, taking an approach uncommon in current literature: investigate the perspective of users, whether they are concerned about the problem of centralized social media and the reasons that they might have for not opting for federated alternatives.

Chapter 2

State of the art

This chapter offers an overview of the necessary information to understand the problem of federated social media. Initially, a historical and technological retrospective is presented, to clarify the current state of social media in general, and its federated side in particular, and how it came to be. Then, I make an analysis of the available literature to try to understand the factors that might be retaining users in centralized social media. Finally, I will provide an explanation of why is in these platform's interest to trap their users, by summarizing the main points of the critical literature towards social media.

2.1 Historical and technological retrospective

It is fair to say that social media is far older than the name *social media* itself. Technologies with a functionality surprisingly similar to today's platforms have existed for a long time, even though their userbase was specially small and restricted. Three perfect examples to be considered in this realm of *social media before social media* are BBS, UseNet and IRC [BM19].

A *Bulletin Board System* (BBS for short) is an almost literal translation of a physical bulletin board into the virtual space, on which users post different kinds of contents for others to see and download. It predates the modern web, with the first instance of a BBS launching in 1978 [Gi18]. It made use of telephone lines to establish communication between devices, and displayed text based interfaces. Users would connect to one of these sites, on which they would be able to read news, upload and download data or exchange messages, using either the board itself or external email services. I many ways, it offered much of the features of modern forums, allowing the formation of groups and communities around these sites.

Users Network, commonly known as UseNet, was a pre-web system of connected computers on which the users could post "articles", grouping themselves into newschannels to interact with people with similar interests. It was born at the University of North Carolina in 1980, orginally as an alternative to ARPANET, and it was based on a multitude

of independent servers, communicating between themselves [Sr]. Users post plain text articles in one or more channels, and those could propagate across the network. Other users can then reply to those articles, creating threads, in a similar way to current day forums [HH98].

IRC stands for *Internet Relay Chat*. As the name itself suggests, it is a service that allows users to send instant messages to each other online. Originally created in 1988 by Jarkko Oikarinen [Oi], it is still used up until this day. It follows a client-server model, with users connecting to a certain server using a client program on their computers, accessing a channel to talk to each other. These channels serve as nodes, on which communities are created by users interested in certain topics, in order to have conversations and interact. Even though it has lost a considerable portion of active users, it is currently used in several circles[1], retaining an important number of followers [St]

All of these platforms shared some common features:

- They were based on open, publicly available protocols and standards.
- They were not owned by anybody.
- Anyone, individual or institution, could host these services in their own infrastructure

In the early 2000s, new platforms emerged, seeking to monetize the social media model. This is the beginning of the era of centralized social media, marked by the birth of MySpace (2003), Facebook (2004) and Twitter (2006), with the first one no longer active. MySpace and Facebook follow a *macroblogging* style, allowing users to post long and meditated posts, while Twitter is a *microblogging* site, with small posts of just a few hundred characters and a focus on quick interaction. Old social media required an important level of expertise with technology, making them not usable for most people. These platforms, by contrast, had a much lower entry level, while offering the same affordances; e.g., posting content, interacting with other users, following their activities, etc.; with a completely different set of technologies. They also inherited some problems already present in old social media, namely *flame wars*, harassment or debates about anonymity and pseudo-anonymity.

The exponential adoption of these platforms meant an ever increasing centralization of web activity around them. The World Wide Web Consortium (W3C) raised the issue already in 2009 [Ye09], as centralized social media was creating an ecosystem of walled gardens, "closed" from the rest of the web as result of their use of proprietary and closed technologies, instead of the open standards available. This results in users having little to no control over their data, with almost no possibility of porting it across platforms. They are also forced to accept policies that generally involve the use of their personal data for targeted advertisement, which an important number of users may find uncomfortable. Moreover, it limits the possibilities of developers to create new and interesting technologies making use of the social graph of social media, as they are restricted to a small set of functions provided by the site's API. To solve this, several proposals are made in [Ye09], involving different standards and open technologies to

[1] A good example is `libera.chat` (former `freenode.net`, widely used by the free software community.

decentralize social media. However, those proposals have not stood the test of time. Instead, technological alternatives emerged from the community itself.

Even though BBS, UseNet and IRC can be seen as the conceptual precedent of federated social media, its technological origin can be traced down to RSS [So20] and Atom [hG07] feeds. This XML based specifications were used by webmasters to openly share the activity of their site. An example of the content of an RSS file can be found in listing 2.1 Users could simply download these files to see the activity of the site, regardless of the nature of its content (as the creator had to figure out how to represent it with the RSS/Atom specification). With the help of programs known as "aggregators", users were able to have a feed, very similar to a modern Facebook wall or Twitter timeline, of independent sites. Both the technology and the concept will be inherited by future projects.

```
<?xml version="1.0" encoding="UTF-8" ?>
<rss version="2.0">
<channel>
    <title>RSS Title</title>
    <description>
        This is an example of an RSS feed
    </description>
    <link>http://www.example.com/main.html</link>
    <copyright>
        2020 Example.com All rights reserved
    </copyright>
    <lastBuildDate>
        Mon, 06 Sep 2010 00:01:00 +0000
    </lastBuildDate>
    <pubDate>Sun, 06 Sep 2009 16:20:00 +0000</pubDate>
    <ttl>1800</ttl>

    <item>
        <title>Example entry</title>
        <description>
            Here is some text containing an interesting description.
        </description>
        <link>http://www.example.com/blog/post/1</link>
        <guid isPermaLink="false">
            7bd204c6-1655-4c27-aeee-53f933c5395f
        </guid>
        <pubDate>Sun, 06 Sep 2009 16:20:00 +0000</pubDate>
    </item>

</channel>
</rss>
```

Listing 2.1: Example of an RSS file

In November 2007, the first attempt to create an open specification for social media platforms emerged: Open Social [Go07], a project developed by Google and MySpace. It was a software specification, designed as a series of APIs, to create independent social media sites, which would be ultimately interoperable. It was eventually fused with other projects on the W3C on 2014 [Ja14]. Although it ultimately did not succeed, due to the lack of adoption from other sites outside MySpace, it was an important milestone for

future projects, as a result of both its scale and ambition.

The next step was the launch of Identi.ca [St17], a microblogging site, similar to Twitter, that was later renamed to StatusNet. Created by Evan Prodromou, it eventually gained interoperability capabilities with other sites implementing the OStatus standard [W3]. Based upon the principles of RSS and Atom, it makes use of several technologies to bring about a minimal specification for distributed status updates. Among the several pieces of software part of OStatus, two of them stand out:

- The **PubSubHubbub** protocol.
- The **ActivityStreams** specification

The first piece of software, PubSubHubbub (currently known simply as WebSub) is an open and decentralized public/subscribe protocol. Every operation is performed by means of the HTTP protocol, managing the topic through URIs. According to the W3C specification [PG18]:

> WebSub provides a common mechanism for communication between publishers of any kind of Web content and their subscribers, based on HTTP web hooks. Subscription requests are relayed through hubs, which validate and verify the request. Hubs then distribute new and updated content to subscribers when it becomes available. WebSub was previously known as PubSubHubbub.

On the other hand, ActivityStreams is the name given to an specification [PS17] based on JSON-LD (part of the semantic web stack). It is centered around the concept of "activity", a semantic description of an action, intended to be represented in a human-friendly fashion, while still be easily interpreted by machines. In listing 2.2 we can see the an example of a tweet, represented as an ActivityStreams message.

```
"object": {
  "id": "https://twitter.com/sanchezcastejon/status/5751826452324352",
  "type": "Note",
  "published": "2010-11-19T11:38:00Z",
  "attributedTo": "https://twitter.com/sanchezcastejon",
  "inReplyTo": "",
  "content": "<p>Ser malos! Buenas noches colegas</p>",
  "to": "https://www.w3.org/ns/activitystreams#Public"
}
```

Listing 2.2: Example of an activity

By means of these two tools, social media sites could easily communicate actions performed by the users (expressed by means of activities in the ActivityStrams specification), transmitted between sites using the PubSubHubbub protocol. In other words, they could "speak" a common language using a common mean of communication.

Regardless of these advances, Evan Promodoru created a new Activity Streams engine known as pump.io [KSJ18], in 2011. It was a remarkable advancement compared to OStatus, as it simplified and improved various design aspects. It would serve as the main groundwork for the specifications in use up to this day.

At the same time, in 2013, StatusNet merged with another decentralized and open social media platform, GNU Social [Le14][2], setting the precedent for the future *Fediverse* [St17] (which will be shortly explained).

Shortly after OStatus made its debut, another federated social media platform emerged: Diaspora [Fo]. Even though it was developed independently, it has stood the test of time. At the moment of this writing it still in use, having been released more than a decade ago (in 2010). For a long time, it was the most accessible and user friendly Facebook's alternative for macroblogging, with a clear and comprehensive user interface that can be seen in figure2.1. Even though it is technically a federated social media site, it uses its own federation protocol [**disaporaProtocol**], narrowing its interoperability capacities.

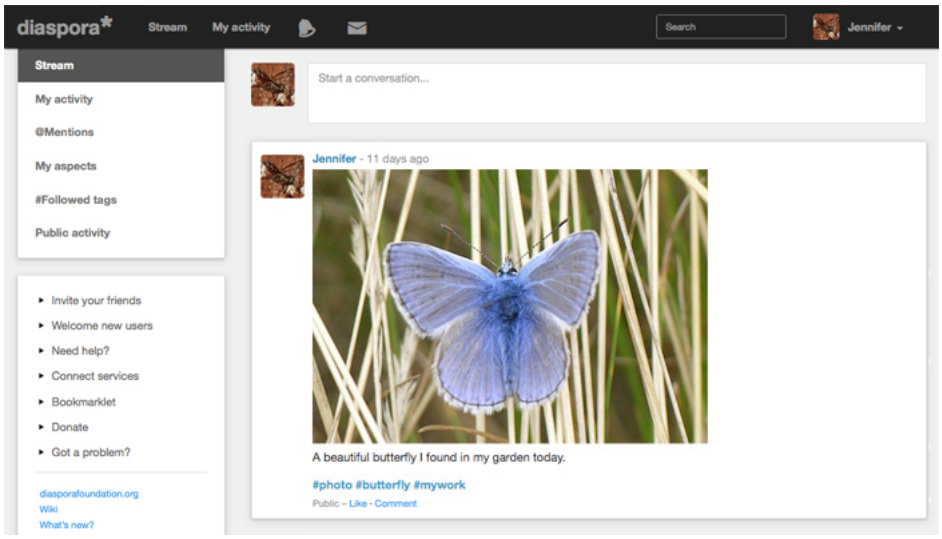

Figure 2.1: Example of a user's profile in Diaspora[3]

By 2014, Promodoru and other developers and experts created The Social Web Working Group at the W3C [W314] (discontinued in 2018 and substituted by the Social Web Incubator Community Group). They took the critical lessons learned from OStatus and the improvements of pump.io, to work on a refined and more suitable standard: **ActivityPub**, launched in 2018.

According to the ActivityPub specification [WT18]:

> The ActivityPub protocol is a decentralized social networking protocol based upon the [ActivityStreams] 2.0 data format. It provides a client to server API for creating, updating and deleting content, as well as a federated server to server API for delivering notifications and content.

[2]GNU Social was originally just a series of plugins for StatusNet. As time progressed, the decission was made to merge the projects and unify efforts.

[3]Source: https://diasporafoundation.org/

Two layers are provided:

- Server to server federation protocol: allowing different platforms to share information among themselves.
- Client to server protocol: allowing users with accounts on said platforms to communicate using the protocol.

The communication is performed using ActivityStreams as the main vocabulary, with every user (or "actor"), being given an inbox and outbox to communicate with the outside. A graphical representation of the basic flow of ActivityPub can be seen in figure 2.2.

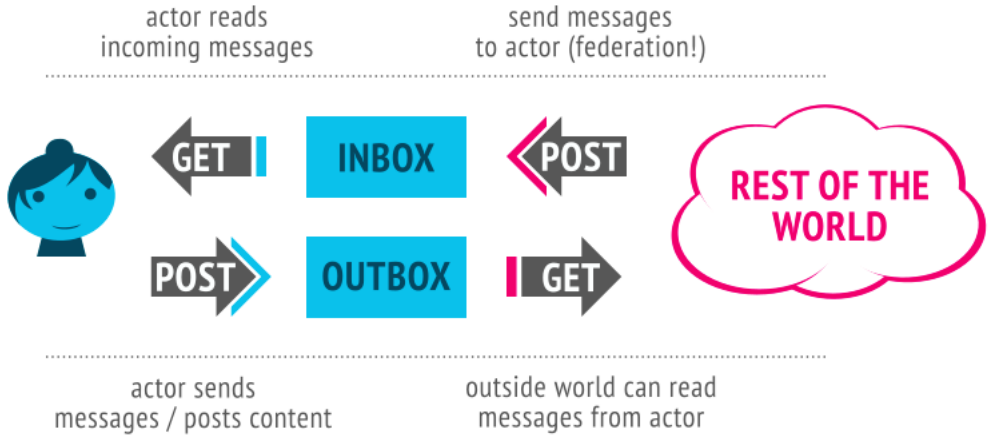

Figure 2.2: Basic scheme of ActivityPub's flow[4]

Using these technologies, various federated social media platforms have emerged, making up what has come to be known as *The Fediverse*. This is the name given to a network of social media sites which are interoperable with one another via these systems [Fe]. Sometimes a distinction is drawn between the sites, according to the protocols they use [Ti17]: the Fediverse *proper* is said to be composed of the sites using ActivityPub, while the ones that make use of the diaspora protocol are referred as The Federation. However, important efforts are currently present to reach higher levels of interoperability in the future.

To sum up, social media has existed long before the Web was even born. Companies interested in the monetization of social media successfully created platforms, based on closed technologies, that offered the same affordances to the general public. They have generated an ecosystem of walled gardens, with important implications for the Web and its users. This, in turn, has led to the development of a variety of alternative technological solutions, improved and refined over time, that have been ultimately endorsed by

[4]Source: https://www.w3.org

the W3C itself. The culmination of this process has resulted in the birth of social media platforms that implement a federated model, based on open and standarized technologies, while maintaining a familiarity and usability that perfectly matches those of their centralized counterparts. They provide the same principles we pointed out for BBS, UseNet and IRC, but with technologies and features suitable for the common user of the 21st century. If one lesson is to be extracted from this section, it should be that **the technical problem is already solved. Federated social media alternatives are not only a reality in terms of functionality and usability, but have even been already standardized.**

2.2 Continuance intention

Having seen that the original social media platforms (the social media before ”social media”) were based on open technologies, available for anyone to use and deploy; and considering that at this moment there are available alternatives that meet the technological needs of today’s users in almost all aspects, it is necessary to ask the question: why are users still using centralized platforms? In specialized literature, this phenomenon is studied under the name of *continuance intention*.

The term *continuance intention* comes originally from consumer behaviour literature in marketing, studying the intention of consumers to continue to use a certain product or service. Studies in this area try to unfold the main factors that may explain why customers do (or do not) continue to use said product or service, which is a crucial piece of information for any business trying to make a profit.

The first instance of this term being applied to Information Systems is found in [Bh01]. It was concluded by the study that past-acceptance usefulness (usefulness that users perceive in having adopted a certain system) , and specially user satisfaction, were key factors in the continuance intention of information systems. It is crucial to note that the model used to perform further analysis in [Bh01] comes originally from marketing literature, which will ultimately condition the lenses through which social media is studied: as a product to be sold at any cost. Although this may not seem as something inherently negative, its implications are deep, and further covered in section 2.3.

However, it was not until 2011 that this theory was applied to social media, as the sites had recently appeared and consolidated themselves. In [BB11], the authors tried to study the phenomenon in Twitter. They applied the ideas of [Bh01] to a social media platform, reiterating the importance of both the value the users perceive in the use of Twitter and the satisfaction they obtained from using it. In addition, they linked continuance intention to a new interesting factor: the platform’s size; i.e., the more users a platform has, the more it is able to retain its userbase.

Similar results are seen in [BAA15], this time regarding Facebook. They tried to find a connection between continuance intention and several factors, such as perceived usefulness, ease of use, enjoyment and different subjective norms (more details provided further in the text). Enjoyment and usefulness were again linked to continuance intention, with an special focus on the former, as social media is a mainly hedonic medium,

with a focus on entertaining the user.

Apart from this two already known factors, two others were identified: the ease of use of the system (expected, to some extent) and subjective norms. The latter refers to the impact that social pressure may have on a user deciding to continue to use a social media platform or not. For example, if a large part of your friends, family or associates are using a particular platform, it will pressure you not to leave, so you will not lose contact with them. Similarly to the conclusions reached by [BB11] with Twitter, whether other people are using the social media platform seems to be an strong determinant on continuance intention.

The role that enjoyment and satisfaction play in continuance intention has been made clear. An interesting take in this regard can be found in [Ba18]. This paper tried to deepen into the hedonic side of social media, studying the discrepancy between the gratification that is sought (that is expected before actually using the system) and the gratification that is ultimately obtained (after the system has been adopted). Consistently with previous research, it was concluded that continuance intention would be increased if the gratification obtained exceeded the gratification sought by the user. According to the authors: "[...] users feel strong satisfaction when they perceived having met friends, family, or other like-minded people or when they talked about their problems and got advice from others more than they expected to while using social networking sites". Here we see a link between one of the most important aspects regarding CI so far, satisfaction, and the human part of social media. This might explain the importance of the social media platform's size, as the more users it has, the more likely a newcomer will find their friends, family and other like-minded people.

The relationship between human interaction and satisfaction is also exposed in [LL11]. This time, the main focus was the relationship between *extrinsic* and *intrinsic* motivation (whether an action is performed because of how useful it will be for an end or because of the action itself), and if the increase in the number of users and features would add value to the site. Enjoyment was again the main factor in continuance intention, and again the number of peers in the platform reinforced that enjoyment. This concept is sometimes referred as *network externalities*, and its impact on enjoyment in social media was further reinforced in [ZL12] and [Ba16]. There is enough evidence to say that the interaction with other people is the center of satisfaction for social media users, and that interaction is favored by a userbase as large as possible.

One interesting piece of literature [MA15] dived into the differences among age cohorts. Users were divided into *digital natives* and *digital immigrants*. According to the authors, generational differences play a role in the continuance intention for social media, as digital natives and digital immigrants perceive the social media platform (Twitter in this case) in different ways. Digital natives see social media as something for leisure, and therefore the conclusions about user satisfaction mainly apply to them, and so thus the social pressure previously discussed. Digital immigrants, on the other side, mainly view the site as something to be used for professional reasons. As a result, their continuance intention is more influenced by the usefulness they may perceive on the social media platform.

Even though these findings were important, as noted by [LW17], much of theses studies were themselves based on research for Information Systems that might not have so much in common with social media (like online banking or e-commerce). The main reason for this is that it was the only literature available at the moment, as social media had become a mass phenomenon in recent years. Even though they are all Information Systems, social media has some unique characteristics. For example, the idea of perception of value from users is clear in an online banking app (as it is ultimately a tool to perform a set of tasks). On the other hand, a social media site is an completely hedonistic environment, on which the idea of *value* responds to a not so utilitarian definition. This does not invalidate previous research. Instead, its results must be analyzed with care, as they are derived from initial works on Information Systems that might not directly translate to social media. Consequently, the authors of [LW17] take a new approach, comparing different models and finding good results with self-determination theory (SDT) and net-valance models (NVM). SDT tries to understand the motivation that lead a person to behave in a certain way, and NVM analyzes the difference between the benefits and the risks of a given action. According to their results, the authors believe that the extent to which the user feels connected with others when first entering the social media platform might influence the decision of whether to continue using the site. Besides, they highlight the importance of allowing users to show their skills and competence in the platform, keeping the functionalities easy to use[5].

One study with strong similarities with this paper is [XC18]. It explored what its authors called *cyber migration* across social media, that is, the reasons users may have to switch between social media platforms. Even though it looked promising, the results of the study were inconclusive. The authors did not managed to find an exact indicator or factor that might explain *cyber migration*, and therefore there is no work for us to follow.

It is important to note the work by [MLT11], which already in 2011 studied the impact of privacy concerns in continuance intention for social media. They proposed a *privacy calculus*, to explain the mental process performed by users when studying the trade offs between the benefits of using a social media platform and their concerns with sharing their personal data online. They ultimately concluded that, even though the process of the *privacy calculus* is present in users, the impact of its outcome had little impact on their continuance intention. This conclusion is further reinforced by [Br20], which made use of ethnographic techniques to address privacy issues with Facebook users after the Cambridge Analytica scandal[6]. Interviewees seemed to be aware, to different extents, about the misuse of their personal data by Facebook. However, none of them left the platform. Among the reasons given for not doing so, the most prevalent and probably the one that made the ultimate difference was that Facebook had become a tool to stay in touch with their contacts (specially after a displacement due to work or studies). The main lessons that can be learned are that, on one hand, users have

[5] E.g., Constructing a Linkedin profile or a Facebook wall as complete as possible, with all the elements and additions the platform provides.

[6] The consulting company Cambridge-Analytica harvested the personal information of millions of Facebook users, without seeking any type of consent. That data was later used to try to influence the 2016 US presidential election.

various levels of awareness regarding the use (or misuse) of their personal information and the data they produce while using the platform; on the other hand, that does not seem to negatively affect their continuance intention, as users are "forced" to stay in the platform to keep in contact with closed ones.

This idea has a name, *fear of missing out* (FoMO), that is, the natural worry that others might be having fun, sharing information or any other gratifying experience when we are not present. It was one of the main focuses of [YLL15]. Their results reinforced the importance of the FoMO in the continuance intention of social media users, which seems to be in line with the works previously covered. It is important to note that, in their practical implications, the authors advice managers of social media platforms to "sustain and promote the FoMO of users".

To sum up, we have been able to identify several factors that influence the continuance intention of users. The two main ones are the perceived usefulness and the perceived value[7]. The former is strongly influenced by the interactions with other users, which imply the advantage of an ever increasing userbase. This is specially notable among digital natives. Privacy concerns does not seem to strongly affect continuance intention. This might be a result of the FoMO being a determinant factor that leaves privacy out of the equation.

The common feature present in all these works is a matter of perspective: the question being answered is not *what factors prevent people from quitting social media*, but *what factors allow you make users continue to use social media*. Even though at first it may seem as the same problem, the lenses used to make the analysis are just the opposite. **The practical implications that almost all these authors ultimately include in their respective works are pieces of advice to developers, managers and/or owners of social media platforms on how to retain users**.

2.3 Critical literature

Critical views on social media are not new, even though they remained marginal for the first decade of the 21st century. Already in 1994 it is possible to find a piece of advice on the *commodification* of users' activities on the Internet [hu94]. Data that users generate during their online lives becomes a commodity to be sold. Instead of 20 yards of linen turning into a coat to be paid for, information about the user is aggregated into profiles that will be sold to corporate clients, interested in understanding the behaviour of their potential customers. The reasons for this development can be found in [An02], as user surveillance was increasingly seen as advantageous for a better management of production, distribution and consumption.

Indeed, the issue of *surveillance* is one of the tenets of social media critics. According to that kind of criticism, what these platforms do is no longer mere data gathering, but actual surveillance of their users with all the implications. According to [El04]:

[7]The former refers to how beneficial the platform might be for a certain use, while the latter indicates whether it is perceived as desirable of valuable.

> The term surveillance does not adequately capture the multiplicity of processes that request data by surveying and monitoring consumers and also by automatically collecting, storing, and cross-referencing consumers' personal information with a complex array of other market data (such as production, distribution, and sales data). Nor does the term surveillance alone seem to capture the social significance of requiring the divulgence of personal information as a precondition for using new information and communication technologies.

This view on the economic model of social media is one of the main points of [Fu21], who goes further into its practical implications. Fuchs devotes two chapters to the cases of Facebook and Twitter and they serve as a perfect introduction to the main schools of social media critique:

- In the case of Facebook, it centers around the economic side of the argument, the use of private data as raw material, creating a revenue stream based on the increasing surveillance of users.
- As for Twitter, the focus turns to the social implications of the model, and its impacts on politics, considering how the commodification of communication renders it meaningless, as the only aim is to increase the production of data.

The process we have described, by which users' data and content eventually becomes monetised commodities, is often considered an economic system that has been labelled as *surveillance capitalism* [Zu19]: "A new economic order that claims human experience as free raw material for hidden commercial practices of extraction, prediction, and sales". Users become essentially laborers, whose "work" generates a new type of commodity, personal data. Profit is gained through the profiling of users in a constant process of surveillance. The maximization of profits require the improvement of the commodity in both quantity and quality, deriving in an ever increasing level of surveillance, with the inversely proportional reduction in user's privacy.

As any other economic model, surveillance capitalism has its own set of externalities which, in this case, corresponds to the effects the it has on society and its functioning. Since communication and interaction have become mere raw materials, the meaning, sender and recipient of the message become meaningless and the only aim of the platforms is to increase the information flow. Because of that, the interaction between communication technologies operating under free market forces is usually labeled as *communicative capitalism*, which ultimately, albeit maybe unintentionally, reinforces the *status quo* while it tampers with any attempt of change [De05].

Needless to say, analysing the economic dynamics of social media platforms and their influence on society is an extremely wide field and the aim of this section is not to cover it on its entirety, but to provide the basic concepts to build a framework for my critique. Therefore, if we must extract one single lesson it should be this: **the economic model of centralized and privately owned social media platforms is the main reason to retain their users at any cost which, in turn, has deep implications for both social media users and society at large**.

Chapter 3

Methodology

Professionals in STEM, specially software engineers, tend to see all problems as technical challenges. The *if you build it, they will come* motto encapsulates well this idea. According to that belief if users of centralized social media platforms were offered an alternative with the same features and without any of the inconveniences they would drop the commercial platforms to migrate to the alternative ones. However, as we have seen in section 2.1, the technology already exists, it is completely functional and it has even been standardized. And, still, the users are not quitting Twitter, Facebook, and so on. In other words, we are not facing a technological problem but a social one. Because of that, we need to analyze the human side of this problem to understand its roots, and possible ways to face it and try to get users out of their walled gardens into open and decentralized social media. This work aims to attain that understanding and, to that end, it has been needed to borrow some tools from social sciences. Specifically, I have resorted to ethnography to try to shed some light into this matter.

3.1 Digital ethnography

Before taking any further steps, it is necessary to answer the most basic question, what is ethnography? Ethnography comes from the Greek words *ethnos* (εθνος, meaning "people" or "nation") and *grapho* (γραφω, meaning "to write"). According to [De18]: "examining the behaviour of the participants in a certain specific social situation and also understanding their interpretation of such behaviour". In this case, the behaviour to be examined is that of social media users, and their view on the matter. By doing so, it may be possible to determine the factors retaining them in centralized platforms, why they are not migrating towards federated alternatives.

3.2 Theoretical background

The first step to perform this study is to learn how to perform an ethnographic research in the context of a digital medium. To that end, various works on ethnography in digital contexts were consulted.

The author of [Ma13] was specially concerned about how classic ethnographic fieldwork can be translated into a digital context, or more precisely, what would be the approach taken by Malinowski[1]. It advises participation in the media being explored, trying to interact with those being studied. For other techniques traditionally applied, like interviews or fieldnotes, it does not provide a direct answer. Instead, several questions are proposed that should invite professional ethnographers to meditate on how to adapt those techniques into social media.

Similar issues are raised in [Sa04], this time providing a practical example of an ethnographic study being performed through social media. The communities that were the object of the research were Israeli support groups on the Internet. Three different methods were used (both online and offline): online observation, offline (in person) interviews and the analysis of different types of documents (press articles, online newspapers or different databases).

Another practical example can be found in [Mu08], which tries to give directives on how to perform ethnographic research in various digital contexts. Not only social media, but also blogs or email (which could, to some extent, be classified as social media). He performed a study using MySpace, investigating the participants' profiles, their activity on the site and the content they had posted. Despite providing good results, the author raises the issue of ethical behaviour towards online users, as there is a strong debate on whether something posted online can be considered of public domain. The author recommends seeking permission first, as user may not wish to be analyzed as part of a research project.

All these works certainly give interesting points regarding digital ethnography. They provide good examples of how an ethnographic study on social media should look like, and give interesting insights on the special characteristics of digital research. Nonetheless, a more in depth guide is still needed. One that describes the general process of ethnography to someone new in the field, while at the same time explaining how it applies to the context of social media.

The best work found suitable for that purpose was [Bo12]. This book offers a quick and understandable overview of the ethnographic process, taking into consideration the particularities of virtual worlds, and how to overcome the possible challenges that may arise. Among other topics, it covers the design and preparation of the research, how to observe the participants in their virtual environment, how to perform interviews and collect data and ultimately how to analyze and present results, including ethical recommendations.

[1] Famous anthropologist of polish origin, considered to be the father of ethnography. His name is used as a stylistic element to ask "how this pioneer in our profession may try to deal with this new field?". It would be the same as saying "what would Hamilton do?" in software engineering.

It is important to note the meaning of the phrase *virtual worlds* in this book refers mainly to massive online multiplayer games. Even though it may seem like two completely disconnected realms, the truth is that these *virtual worlds* can be perfectly classified as social media according to the definition given in the introduction: after all, they provide tools for the interaction of massive amounts of users, not only through the game itself, but through chats, forums or even other social platforms (such as video conferencing services). Therefore, almost all the methods and recommendations given in the book perfectly apply to my study, and I used them appropriately.

Taking into consideration all this information, it is possible to extract some key issues. We can point out three main lines of approaching digital ethnography: participation in the platforms themselves, interviews with users, and large scale data gathering. The later of the three was covered by an online questionnaire, described in depth in section 3.4.3.

Participation in the community can be considered solved too, as I have been an avid social media user for years, having also a deep interest in federated alternatives. On the one hand, this provides both an *emic* [2] and *etic*[3] perspective [Bu90]. On the other hand, this may introduce a bias in the study, specially in the interaction with users; i.e., I might condition participants with my own views during interviews, depending on how I present the questions. There is no silver bullet for this problem, other than acknowledging its existence and trying to maintain the necessary perspective on the corresponding part of the process.

Finally, interviews with users are the most promising piece of methodology for the purposes of the paper. They provide a direct contact with participants, allowing them to elaborate on their perception on the problem, and the researcher to discover new insights that may have not been even considered previously. Generally, if a person whats to know more about someone, the best option is to directly ask that someone. The final considerations and the structure that was be followed (plus some ethical concerns) will be discussed in the following sections.

3.3 Interviews

Interviews with social media users were the main way to perform the ethnographic study. They followed a semi-structured style, that is, a preliminary set of questions was prepared in advance, but the interview was not bounded to them. The questions were open enough for participants to elaborate on their answers and, should an interesting topic arise during the interview, further questions were devised by the interviewer to deepen in it. This way, even though I prepared a framework for the conversation to take place, interviewees were allowed to provide unforeseeable information. As for the pool size, I set the target at 10 participants, which may seem as a modest figure, but is in line with similar studies, such as [Sa04] and [Br20], and is feasible taking into account that the only available interviewer is the author of this work.

[2] Point of view of the participants of the phenomena being studied.

[3] Point of view of the external researcher, performing the analysis (not to be confused with *ethic*.

Based on the development of social media explained in section 2.1, I first tried to target three types of users: people using centralized social media platforms (e.g., Twitter, Instagram, or TikTok), users of decentralized social media platforms (such as Diaspora, Mastodon, or PixelFed), and users of *old* social media (typically IRC, BBS and UseNet). The initial questions for each group will vary according to their characteristics and the type of information sought in each case.

As centralized social media users were considered to be the easiest to find and contact, I decided to interview 4 subjects in this category. Ideally, both active users (people who produce content and have relatively continuous interactions within the site) and passive users (people who mostly use the platform to be up to date on the activity of others) were to be recruited. Taking into consideration the factors presented in 2.2, the initial set of questions was:

1. What is, in general, your use of social media? What platforms do you use?
2. Are you happy with those platforms? Do you have complaints about how they operate? Enumerate some *pros* and *cons*.
3. Have you ever considered quitting those platforms? Which are your reasons?
4. What do you think is retaining you?
5. What is your view on the following reflections:
    - 5.1. Communicative capitalism: social media platforms are said to encourage ideals of inclusion and participation, and by doing so, they "trap" users in entertainment and content production networks, where any message is legitimate as long as it contributes towards generating further interaction, although the content, authorship and audience remain irrelevant to the companies controlling the platforms.
    - 5.2. Surveillance capitalism: Exploitation of interactions in social networking sites as a source of data to build behaviour prediction models, offered to business clients interested in knowing the behaviours of users and non users.
    - 5.3. "If you are not the client, you are the product".
    - 5.4. (They will be shown the cartoon in figure 3.1).

The labels *communicative capitalism* and *surveillance capitalism* were to be omitted when asking question 5 to the interviewees; that is, just the definitions were to be read to avoid any possible bias as a result of ideology [4].

In the case of users of federated social media, I just considered 2 initial participants, as finding suitable subjects was not expected to be as easy as with users of centralized platforms. With regard to this category of user I wanted to look into the possible reasons that made them drop centralized platforms, and the differences that they could

[4] It was assumed that an explicit mention of the word capitalism could trigger different kinds of bias when answering the succeeding questions in the interview.

[5] Source: https://geekandpoke.typepad.com

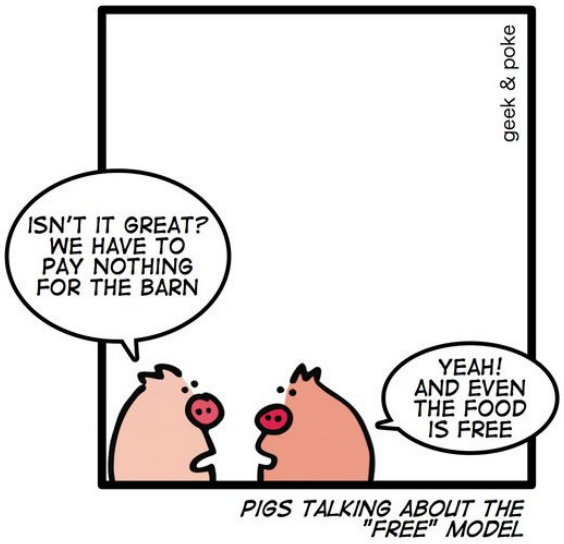

Figure 3.1: Satire cartoon titled *The "Free" Model*[5]

have noticed in their federated counterparts. To that end, the following questions were prepared:

1. Do you think you have left something behind? What is it?
2. What was the hardest to abandon?
3. What made you quit centralized social media?
4. What differences have you noticed with centralized social media?
5. Do you feel more *free* now? On what sense?

The last of the three initial user categories to interview was that of users of *traditional* social media. With that term I am referring to former (or current, if possible) users of IRC, BBS and UseNet, which, as stated before, can be considered a form of social media from the early Internet. As a result of the niche nature of these platforms, I decided to limit those interviews to 2 users. For this kind of users the initial set of questions was the following:

1. What differences do you see between old and modern social media platforms?
2. Do you think they were better, worst or equal? Regarding what?
3. Did you feel more "free", less "trapped", in those platforms? In what sense?
4. Did you appreciate, back then, severe problems in the community? What kind of

problems?

The aforementioned user groups allocate for 8 potential participants. The other 2 interview slots were reserved for *instance* administrators[6]. Going back to our comparison with email, gmail.com, uniovi.es or pm.me are all instances of the same platforms (electronic mail) that host users which are able to communicate with one another in a transparent fashion using interfaces that provide the same affordances (e.g., addresses; lists of contacts; sending, receiving, replying and forwarding messages; using attachments, etc.) This is a key point of federated social media, the possibility of hosting the service for any individual or group. However, this independence brings difficult challenges, as maintaining a service of any kind open to the Internet for almost anyone to use is costly not only in economic terms but also in terms of effort. The authors of [Bo12] pointed out the importance of studying the physical side of virtual worlds. In the case of massive online videogames, this may involve going to cyber-cafes on which people play. When meditating on the possible equivalent for this study, I realized that the people maintaining the services are also part of the ecosystem, and therefore their views and considerations should also be accounted for. The following questions will try to address the issue:

1. What is your routine as an administrator?
2. How does moderation work?
3. How is copyright managed?
4. How is the instance funded?

The interviews were performed using Jitsi[7] (a free and open source video conferencing software) which runs on the browser, with no installation or registration required. This software also allows us to record the interview, and an automatic transcription was generated using Microsoft Stream[8] automated subtitle generation. The resulting text was be then corrected and formatted for easy reference.

All participants were previously informed of the purpose of the interviews, and how the information they provided was to be used, so that they were able to give an informed consent. They are not identifiable in any way, as pseudonyms are used along this work and it does not include the transcriptions of the interviews. Should it be necessary to quote one of the participants on any topic, the text has been adequately rephrased so that it cannot be linked to them in any way. Only the author of this work has access to both the transcriptions and the recordings and these materials will be deleted once the study is concluded.

[6] The name *instance* refers to a particular site on which a federated social media platform is provided.
[7] Available at: https://meet.jit.si/
[8] Available at: https://web.microsoftstream.com/

3.4 Online surveys

The world wide web allowed for new and interesting approaches to the way on which traditional research was conducted. This was also true for surveys, which in its analogical form were a costly and time-consuming activity, involving numerous repetitive and dreary tasks. The digital age brought in the possibility of online surveying, which offered a considerable range of advantages: ease of recruitment of participants, reduction of costs, an increase in sample sizes, easier processes for data manipulation, or making people formerly unreachable part of the studies.

However,this new approach towards surveys also presents several limitations. Online surveys do not offer the same level of control to the researchers. While in traditional methodologies, experiments are performed in the laboratory, under the conditions previously set by the surveyors, online surveys' lack of control, in the worst scenario, can even lead to sabotage, as virtually anyone can take an online survey. What is more, this and other drawbacks, have raised some concerns among researchers about the quality of data reported by Internet users, and whether it represents what is supposed to represent.

We will examine what the specialized literature has to say about the validity of online questionnaires, possible measures to take for protection against fraud, and present the final survey that was carried out.

3.4.1 Validity of online surveys

Trying to understand whether web-based surveys were at least as good as traditional surveys in psychology, the authors of [Go04] compared both methods. They analyzed six common misconceptions (at least at the time it was published, 2004) about the Internet: Internet samples are not diverse enough, Internet samples come from socially maladjusted people (social rejects), results depend strongly on how the survey is presented, non serious responses are common, the anonymity of the Internet makes answers non reliable, and findings from online surveys are inconsistent with the ones from traditional surveys. Their comparison showed that these believes were indeed misconceptions (probably more nowadays), as Internet results were as good as their traditional counterparts regarding diversity and quality. However, they are not considered really representative of the general population (neither are traditional surveys), even though the large sample sizes the Internet provides may mitigate this, at least in absolute numbers[9]. Similar comparisons in psychology have been studied in [Bi04], with a quick overview of the capabilities of the Internet regarding surveying. In their analysis they found some new problems that arise with the (at the time) new medium, that need to be addressed (for more info on how I addressed them in this research please see section 3.4.2). Despite these difficulties, the authors of [Bi04] ultimately consider that the advantages (mainly in costs, convenience for surveyors and for those been surveyed, and sample sizes) outweighs the disadvantages.

[9]The authors exemplify this with an Internet survey that got a 2.3% of Latino participants. In absolute numbers, that meant a higher amount of Latino participants than several traditional studies combined. However, considering that a non representative sample becomes better with a bigger N is within the realm of argument.

This optimism is not shared in [DN10]. The authors expressed their concerns regarding various risks with online surveys, most of them ultimately related to Internet samples being unrepresentative of the general population. Three studies are cited, performed by public administrations from the United States, to illustrate these issues, as they failed to represent the general public opinion with online surveys, compared to traditional ones. Despite these drawbacks, the conclusions reached in [Go04] still apply. The reason for the failure of those three studies was not the medium through which they were conducted (the Internet), but the target audience (the general population). In addition, they are compared to large scale surveys performed by public administrations with enough resources and methods to conduct them effectively. Online surveys perform similarly to traditional surveys when limited to the realm of scientific studies in academic journals.

It is also noted in [Bi04] that traditional and online methodologies can be combined in different ways. For example, recruiting participants via the Internet that will then be surveyed in controlled conditions. That was the approach taken by [RP12], on which researchers made use of Facebook's Ad program in order to recruit participants for a study regarding smoking and other substance use among young adults. The use of Facebook as a recruitment tool was considered a success, as far as costs and results was concerned. However, this vision was not shared by researchers in [Wi13]. Their combination of online recruiting and offline surveying was not successful. They strongly advised against this practice, and recommended being consistent on the medium for the survey.

In recent years, online surveying has been professionalized, with the emergence of *crowdsourcing* platforms. These sites offer pools of paid participants to perform certain simple tasks, allowing researchers to focus in their study rather than the recruiting and surveying process. Among the most popular currently we find Amazon's MTurk, which is deeply analyzed in [GP17]. According to their research, there are substantial gains in terms of costs, efficiency and flexibility when using MTurk, as it streamlines the processes already discussed (recruitment, payment, selection, submission of responses, etc.). Some recommendations are also given, such as practicing ethical behaviour with participants, paying fair wages, diversifying samples and mitigating risks related to self-selection (such as limiting initial description of tasks or indirectly assessing whether the participant belongs to the target population). Their points generally coincide with those expressed in [SCP17]. This last study also raises the issue of reproducibility and good science practices, which has been becoming a growing concern in recent years, not only with online surveys. Those authors argue that, even though large availability of pools may mitigate the effect of the *replication crisis* (as other researchers could easily replicate the experiment with a similar sample from the same platform), researchers should use these platforms with moderation, as they are based on a not so high number of low skilled workers that perform simple tasks for a living.

Considering all this information, it is possible to reach some conclusions. The general consensus is that online surveying is a method at least as good as traditional surveying. Issues do exist in regard with representation of general populations, even though the same problems also arise in traditional methodologies, and therefore we do not have the capacity to try to solve them effectively. Although professional platforms for online

surveys (such as MTurk) are currently available, it is not feasible to use them in the current research due to the lack of any kind of financial backing. Even though the results of the survey might present some limitations, that will be properly discussed further in the text, and taking into consideration that the study will not be limited to it, it is worth to try to elaborate an small survey and distribute it online, trying to shed some light on the issue of federated social media.

3.4.2 Defense mechanisms against fraud

As we have covered previously, despite the validity of online surveying if used for the correct purposes, there are still threats that need to be accounted for. The main one is fraud, the possible appearance of malicious and dishonest answers for the purpose of sabotaging the study, either for pure vandalism or other reasons. I consulted specialized literature on the matter to find the more suitable defenses. However, most of the works checked present one or more of the following problems:

- Complex statistical techniques are applied to try to correct the data, which would be too cumbersome for the goals of this survey.
- They are based on the technical features of professional platforms, which we have already discarded.
- They are addressing payed surveys, which motivate fraud for the purpose of economic gain. In my case I'm not offering an economic incentive so this kind of fraud would be of a lesser concern.

Possible solutions proposed in [BS18] and [DMC19] fall in the first category of problems noted before. They propose various statistical techniques to mitigate the possible issues of data quality. In the case of [DMC19], this involved the training of an algorithm that would automatically detect low quality responses, based on the results of previous surveys and various pieces of data about participants (such as response times). As for [BS18], the authors proposed the use of various indices to detect problematic response sets, considering factors such as consistency, uncommon responses, repetition of long pieces of texts and external factors (like response times). The scale of my study is far smaller, trying just to offer some clarifications on the use of federated social media. We do not have a set of prefixed hypotheses, neither we know exactly the type of people the survey is supposed to target. Therefore, this approach will be too costly in both terms of time and effort.

A more technical and practical overview is offered by [WKC19]. The problem addressed was the participation of non-US individuals in surveys that were supposed to be taken by people from the US. They proposed the use of the R statistical software to detect IP addresses outside of the USA in studies performed using MTurk. This was also proposed in [St20], but its effectiveness was labeled as moderate. Regardless of how effective it might be, it is only doable thanks to the features of specialized platforms such as MTurk, which we have already discarded.

Finally, as we stated before, fraud seems to become an important problem when the study involves some kind of economic compensation. The authors of [Po20] and [Te15]

are ultimately forced to find suitable defenses against fraudsters, as they will be attracted by the possibility of earning money illegitimately. Our study will not involve any kind of pay, leaving only vandalism as a possible motivator of fraud.

However, fraud is not limited to human actors, as it may also come from bots. This was the main topic in [Hi20], on which techniques are proposed to deter, detect and remediate the effects of bots in online questionnaires. The majority of platforms are capable of detecting and preventing bots from "taking" surveys quite effectively. The detection of responses by bots require more work by the researchers, either through open questions (which make a machine easily distinguishable from a human) or *paradata* checks (almost equal response times and similar strings across different submissions), methods are also recommended in [WKC19]. Finally, techniques for remediating the effects of bots are still being developed. Nonetheless, it is advised to take action *while* data is still being collected, to avoid worst results.

After analyzing the possibilities we have just presented, it is necessary to consider the particular characteristics of this study to determine possible actions to be taken. Neither is there an economic incentive for fraudsters to target our survey, nor is any controversial topic covered, that might be subject to important acts of vandalism. The possible benefits of implementing the defenses previously discussed is not worth its costs. That still leaves the issue of bots. Most major online tools (such as those offered by Google or Microsoft) implement effective protection against bots, which should be enough to prevent any major problem. As the number of submissions is not expected to be specially high, manual revision should be sufficient to account for the possible dishonest responses that may appear.

3.4.3 Final questionnaire

Having studied whether online surveys are a suitable medium for this research, and having assessed the possible threats (and how to prevent and deal with them), the next reasonable question to be asked would be *what can we try to look into with the online questionnaire?*.

Considering the knowledge we have so far about the kind of people that might use (or even know about) federated social media, the main topic we will try to clarify is if there are any distinctive characteristics in the people that know and use federated social media, that may be limiting the spreading of the use of this platforms. This includes age, technological background, community affiliations and privacy concerns. To this end, the following set of questions has been developed, trying to maintain the questionnaire as a whole as compact as possible:

1. How often do you use social media
    - Never
    - A few times a year
    - A fiew times a month
    - A fiew times a week

- Almost every day
- Almost constantly (I do not disconnect)

2. Which social media platforms do you use?
   - Facebook
   - Twitter
   - Instagram
   - Snapchat
   - Linkedin
   - WahtsApp
   - Telegram
   - YouTube
   - TikTok
   - Discord
   - Others
3. Please, add any other social media platforms you use and which were not included in the previous question
4. Select the main uses you make of social media
   - Connect with people I do not know personally
   - Connect with family/friends
   - Share videos or photos
   - Share and discuss news or ideas
   - Discover and share contents (news, opinions or ideas)
   - Post my own content or ideas
   - Share information about interests and hobbies with similar people
   - Communicate anonymously
   - Professional profile (not Linkedin)
   - Looking for work
   - Looking for a sentimental partner
   - Share content or material from other people
   - Work
   - Other uses

5. Please, provide here details about other uses you make of social media
6. Which is your gender
    - Female
    - Male
    - I prefer not to answer
7. How old are you
8. How expert you consider yourself with computers (from 1 being “nothing at all” to 10 being almost a professional)
9. How aware you are about your privacy and digital rights (from 1 being absolute indifferent to 10 being “strongly concerned”)
10. Do you identify yourself with some “community” (political, LGTB, hobbies, etc.)?
11. Please, tell us the communities you consider yourself part of
12. Have you heard about decentralized/federated social media?

    12.1. Do you use any of them?

    - Yes

    12.1.1. Please, tell us which of these platforms you use

    – Mastodon
    – PeerTube
    – Diaspora
    – GNU Social
    – Funkwhale
    – Friendica
    – Hubzilla
    – Pleroma
    – PixelFed
    – Other

    12.1.2. If you have checked ”Other” tell us which other decentralized/federated social media platforms you use

    12.1.3. How satisfied you are with the platforms you use (from 1 being “totally disappointed” to 10 “fully satisfied”)

    12.1.4. Have you quit traditional social media platforms?

  - Yes
  - No

12.1.5. Could you explain your reasons?

- No

12.1.1. Why?

  - I do not think I gain anything
  - I do not find them viable for me
  - They are too complex for me
  - They have the same problems as commercial/centralized platforms
  - Other

12.1.2. Which are your other other reasons for not using decentralized/federated social media platforms?

12.1.3. Would you consider migrating to platforms with the same functionality but managed by the communities using them?

12.1.4. Why?

The platform chosen to perform the survey was Microsoft Forms [10], part of the Office 365 suite offered by the University of Oviedo to staff and students. It was then shared both through centralized (WhatsApp, Telegram, Twitter and Instagram) and federated (Mastodon and email lists) social media platforms, with the collaboration of institutions and colleagues. As an example, the message posted on Mastodon can be seen in figure 3.2.

[10] Available at https://forms.office.com

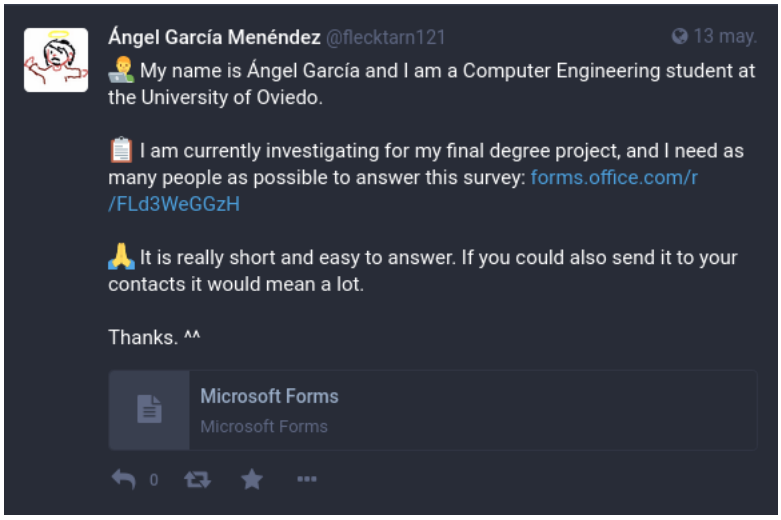

Figure 3.2: Message posted on the federated micro-blogging site Mastodon, asking for users to take the survey.

Chapter 4

Results

4.1 Interviews

This section contains summaries of the interviews that were carried out for the ethnographic study. Instead of a literal transcriptions, the content of the interviews are narrated to provide a more cohesive and agile reading. To maintain the anonymity of the participants, each one will be given a pseudonym[1]. The quotes included have been adequately rephrased to respect the privacy of participants but preserving the original intent.

4.1.1 Users of "old" social media

The two subjects corresponding to this group will be referred as Rafael and Gerardo. The two of them are men currently working in the IT industry, having used IRC, BBS and UseNet in the past. In the case of Rafael, he continues to use IRC as a working tool.

When questioned about differences between those traditional platforms and current centralized social media, they pointed out two key aspects: people used those platforms for a purpose (not just as a pastime) and their asynchronicity (i.e., instant responses were not available much less expected by users).

Rafael recalled being the "weird kid" as he entered the Internet just for hobby, while the rest of people used it (specially old social media) as a tool for a purpose. That was the case for Gerardo and BBS. He was a radio ham, and used BBSs to interact with other hobbyists when he was in need of hardware. According to them, all of that changed with the massification of the Internet in general, and centralized social media in particular. People (including Rafael and Gerardo) now get online, not because they want to do something in particular, but just to see what has been going on.

[1] Taken from the authors of the Generation of'27.

The other factor, the lack of instant response, can be highly attributed to technological limitations. According to Gerardo:

> Nowadays being waiting for the bus and texting a friend saying "I'm on my way" is an absolutely mundane situation. With IRC, you had to sit down, turn on a computer, and reserve the telephone line to connect and talk. You had to plan in advance when you were going to be online in order to have a meeting.

This discrepancy is something that Rafael has observed at work. Many of his younger colleagues have issues with the asynchronous nature of emails. He has even received emails with just one single word, "Hey!", as if they were chatting on Facebook. He credits this behaviour to the conditions of modern social media, which "require" engagement and the constant interaction between users.

This last detail, in the eyes of Rafael, is partially responsible for the issues with users' behaviour in current centralized social media. Both Gerardo and him agree that behaviours such as trolling, hate speech or harassment, were also present in old platforms, and the main change has been in scale and visibility. Centralization, and the active promotion of participation make current social media platforms the perfect breeding ground for public flame wars and destructive discussions.

However, Gerardo sees an improvement in current platforms when it comes to moderation. Even though anyone could host an instance of, for example, IRC, that was something that in the early 2000s was not affordable for most people. There were just a handful of servers available, on which you were subject to the whim of administrators, who might be fair or not. By comparison, the moderation processes taking place on Twitter and Facebook are seen as something more institutionalized and serious, with all its problems and malfunctions, of course.

> Yes, there is more censorship now than then, but that is also the case for the damage that can be inflicted. Insulting someone in a chatroom is not the same as insulting that person "publicly" on Twitter. Censorship must be adapted accordingly to the scale of the problem.

Going back to Rafael, one of the most interesting topics that arose during the conversation was that of *netiquette*, the sets of rules to promote good behaviour in online communities. When asked to explain further, he argued that it was a phenomenon strongly linked to the poor usability of those technologies.

> The barrier, the thin line separating user and machine was very thin. There were no beautiful GUIs, the tools were clunky, and you had to be careful when using them. Things like "answer below the email, not above" or "respond inline to allow others to understand the conversation" were unavoidable because of technological limitations.

He also linked the decline of *netiquette* with the change on the reasons for people to go online. When you had a precise purpose to interact on the Internet, it was in your interest to have good and productive conversations. Making yourself understandable in digital communications is challenging, and when that incentive was no more and people

began to casually talk online, *netiquette* began to disappear. He noted nonetheless that it was not completely dead. According to him, the concept of not referencing a toxic post directly on Twitter, but to instead use an screenshot to prevent the algorithm from promoting the original post, is indeed a form of *netiquette*.

Gerardo had a more optimistic view regarding the increase in the number of Internet users and the role of modern and centralized social media. According to him, it has democratized content creation, as virtually anyone can now reach large audiences. Besides, it has allowed people finding communities that make them feel that "their thing" is less weird. He provides some examples, such as a Lord of The Rings fan, a radio ham like himself or even people with health problems that do not have support groups near them, that can now connect with similar people online. Finally, people can remain in touch more easily. Gerardo himself is now more up to date with his family matters than he ever was. These were things that IRC, BBS and UseNet could not provide, despite the good memories he has of them.

4.1.2 Users of centralized social media

As aforementioned, four people were contacted for being interviewed: two women, Concha and María, and two men, León and Damaso. Concha is a young adult, with a higher education degree in social sciences, while María is still in her teens, attending high school. Both León and Dámaso are between 20 and 25 years old and both hold university degrees, the former in History and the latter in Computer Science.

We will begin with Concha because there is something that makes her stand out from the rest of interviewees of this group: she has quit social media almost completely and uses social media platforms strictly for professional purposes; namely, sharing her creative contents online, which includes photographs, music and video.

I asked her to explain her reasons for leaving. Her answer was centered around the concept of boredom. She began to perceive social media content as too cyclical, constantly receiving the same updates with minor changes. Content that was purportedly "fresh" but, in the end, was the same week after week and, on top of that, had no meaningful impact on her daily life. As for the factors that were retaining her:

> They [social media platforms] have very interactive formats, really stimulant for people with depression like myself. Having something like Twitter or Instagram, with "new" things appearing, on which there is some sort of movement, in the form of retweets or likes, makes you feel as if something was actually happening. The breaking point came when I got into meditation. I was incapable of clearing my mind, thinking of everything I had seen on Facebook or Instagram. I then decided that was it.

This was for the most part in line with her opinions of social media in general. She considers it to be a form of *operant conditioning* based on rewards that eventually creates addiction[2]. In her opinion, the main culprit is not the design, but the use that people

[2]The word "addiction" was the one used by Josefina, and has been maintained. Nonetheless, there is disagreement in the Psychology community on whether this should be referred as *addiction* or *problematic*

make of social media platforms. Nonetheless, she does not discard the role that the design of the platforms play; arguing that it cannot be considered neutral, as it creates a feedback loop between users and technology.

León and Dámaso's point of view were less harsh. They are both really active on their Twitter accounts, along with a more subtle presence in Instagram. When questioned about their general perception about social media, it was mostly positive, with some critiques regarding certain functionalities. It is worth to note that both were perfectly aware that social media platforms are, to some extent, designed to retain users and keep them online as much as possible. León exemplified this with the "rapid feedback" and the "ease of participation" in Twitter conversations. Dámaso was not sure of whether that is an intentional feature of Twitter or just the result of how it is used, but he does believe that the constant flow of notifications is devised to make people return to the platform.

Both of them have considered decreasing their use of social media, specially Twitter, because of the large amount of time they devote to the site. However, neither Dámaso, nor León were keen on the idea of quitting altogether. Social media is the main source from which Dámaso gets informed about news and events, while León has formed personal bonds with other users. For them, leaving would imply somewhat of a trade-off that, at the moment, they do not seem willing to make.

Dámaso made an interesting comparison between Twitter and Facebook. Although Twitter discussions seem more partisan to him, he perceives the structure of closed groups in Facebook as more dangerous: according to him, there is less diversity, almost like an echo chamber. Twitter seems more suitable for people that like arguing with others, while Facebook attracts users that like to reaffirm and strength their positions. Because of that, he could see why some terrorist organizations used Facebook as a recruiting tool.

León constantly comments on politics on his Twitter account. He does not believe that social media has contributed to make politics more partisan. When I told him about data gathering and his opinion about it, this was his answer:

> There is no special difference between data that can be gathered from my Twitter or Instagram account and my purchases at the grocery store. In both cases it would be used to study consumption patterns, what is bought more often, when it is bought, and so on. If I have to worry about that in social media, I would have to do so in the supermarket or when I attend football matches.

María, as noted before, is the youngest of the four, still a teenager. She has profiles in Instagram and TikTok. She perceives social media as very superficial. Not as much as saying that people *lie* about themselves, but in the sense that the image they are projecting does not necessarily mirrors reality. This is specially true for *influencers*, whose activities she defines as "propaganda", aiming at making money.

consumption.

I proposed her an hypothetical situation on which she cannot use any kind of social media, including messaging apps, and asked her if she would feel uncomfortable. The answer was a straight "no". I found that surprising, so I asked her to elaborate more on it:

> When I attend summer camps, I have my mobile phone taken away. If I was the only one without it, I might feel left out, wanting to know what is everyone up to. But, as all of us have it taken away, I don't mind, since you eventually find other ways to keep up with people.

When they were read the definitions and reflections of section 4.1[3], all participants agree to some extent. The strongest opinion was that of Concha, who told me that the only thing she still had to do was to "hack her phone" to eliminate everything related to Google. León and Dámaso had more moderate visions. They do agree that there is corporate interest behind social media, and that they need user participation as much as possible to generate revenue. However, that knowledge do not deter them from using those platforms because it is just the way those companies make money. María has the softest opinion, not really being bothered by the practices described to her. He does comment on how publicity in social media adapt depending on recent searches or conversations.

Finally, none of the four interviewees had heard about federated social media. After being explained what it was, three of them (Concha, León and Dámaso) showed some interest, while María did not seem to really care. That interest did not translate into an intention of trying out those platforms. The reason for Concha was quite straightforward:

> I will give you an example: a monitor. LG is a private company that makes monitors, but using one from an ecological worker cooperative for eight straight hours will have the same bad effect on my eyes. Its a matter on how humans work, how we react to external stimulus. We ultimately perceive our experience of the world through social media.

As for Damaso an León, their refusal was more in line with maintaining their already existing contact networks. León has found some sort of community that he would find too challenging to abandon, and Dámaso wants to be in platforms with as much users as possible, as he likes to argue with different types of people.

4.1.3 Users of federated social media

I contacted two individuals, Josefina and Jorge, that had successfully abandoned centralized social media in favor of federated alternatives. Both of them currently work on the IT industry, and have strong opinions on digital sovereignty and privacy. This was the main reason behind Jorge's adoption these platforms. Josefina, on the contrary, began to use them out of curiosity, as she was really interested in their technological aspects.

[3] *Communicative capitalism*, *surveillance capitalism*, *if you are not the client, you are the product* and the cartoon in figure 3.1

The question about whether they felt as having left something behind triggered an interesting reflection from Jorge:

> It is [following people in social media] a quite weird form of relation. It is not really a relation, you just see what they post and think "oh, they are doing that" or "they are in that place". You do not talk to those people, you do not really know them. If you really want to know someone, you need to reach out to them, regardless of the platform.

Jorge is convinced that the general fear of not being up to date with people is an artificial feeling when it comes to social media, as you are not really interacting in any meaningful way. Therefore, as he was not really a content creator of any kind, simply following the activities of other users, he did not feel any void when he left centralized platforms.

Josefina's experience was pretty similar. Her only issue was the smaller number of animal rights groups in federated social media, mainly as a result of the smaller number of users. She also mentioned that she compensated the lack of information she used to obtain from centralized platforms either by consuming traditional media, such as radio or newspapers, or via accounts that republish that content in federated sites.

The concept of "community" was one that arose in both conversations. People in federated social media, does not only use them to randomly check what is going on, but they seem to actively pursue the creation of communities focused on specific topics. Jorge, for example, created an account in a Mastodon instance devoted to free and open source software. He had never been the type of person that meet others online. However, in that instance he found people discussing something he is interested on and knows about, and he decided to chat with people he does not really know.

Josefina noted in a couple of occasions the lack of diversity that she felt in federated platforms:

> This is my perception, I have no statistical evidence to support it. I think the prevalent user model is that of a man, with a technical background, between 20 and 40 years old, with a particular interest on avoiding possible censorship from the corporate owners of centralized social media platforms.

It is important to note that Jorge no longer uses social media, including federated platforms. It was not a meditated decision. He simply uninstalled the application from his mobile phone to check it less frequently, and he never returned. I asked him if he felt that it was that easy because of the platform, or as a result of the particular use he made of it. He attributed it to the latter. Nonetheless, he did noticed that these platforms tend to take design decisions in the opposite direction of their centralized counterparts. He gave me several examples, including the absence of the infinite scroll or the removal of the post metrics (i.e., number of likes or number of times it has been shared), aimed at making the relationship with social media some healthier.

This opinion was supported by Josefina. However, she does believe both centralized and federated platforms have the same potential for creating addiction, and users should

be, to some extent, responsible for the use they made of the tool. She did point out that the two models are not at the same level on this, as Twitter, Facebook and similar companies make decisions that actively encourage that behaviour.

Finally, I asked them about their opinions on the future of federated social media. On the short term, Jorge is very pessimistic, because of the central role that centralized platforms play in our society. He has some sort of hope in the long-term, as privacy will increasingly became a public issue and people will gain awareness, as it happened with smoking or recycling. He thinks that the popular reaction towards WhatsApp's change of its privacy terms is a good example of this, as the system the companies have created is starting to show some cracks. Josefina, on the other side, made an interesting prediction. She thinks that platforms that are currently centralized will ultimately adopt open standards and move into a federated model. However, that will not be a victory, as they will probably try to change the current federated social media landscape to fit their purposes, and it would be necessary to fight that back to keep what has been created.

4.1.4 Instance administrators

Finally, I interviewed two instance administrators, Ernestina and Vicente. Ernestina is the maintainer of a community of users across multiple platforms, under the same domain name, and Vicente is part of a students association committed to free software. They were contacted because of their role as system administrators of Mastodon instances, even though they are knowledgeable about other platforms.

They share a similar routine in their roles as managers of their respective instances. Ernestina checks for possible issues almost every day, and Vicente two or three times a week. Apart from sporadic updates, the server requires some in depth maintenance, including disk usage or data cleaning. Ernestina mentioned the existence of a service known as `masto.host`, which could be defined as "Mastodon as a service". It is offered by a professional system administrator, who sets everything up and takes care of all the technical aspects, allowing virtually anyone to have an instance. However, she does note that `masto.host` is the only service of its kind currently available, which is causing some sort of centralization, which she does not like. She hopes that more professionals will eventually offer similar services.

Neither of them pay for the maintenance themselves. The economic cost of the services that Ernestina offers (all of them self hosted) is assumed by a third person. The case of Vicente was more particular:

> We are a university association, and thus we are given both an office in campus and some retired equipment from laboratory classrooms. The instances of the services we offer are running on those computers, which are connected to the institutional network in the office. Technically, the university if paying for everything, although indirectly.

Vicente's instance is too small to provide active moderation, due to the lack of users willing to undertake the effort. The tools are already present in the platform, and are effective in important instances were users volunteer to perform moderation tasks.

Ernestina and the team that helps her maintain her services do have a process for moderation. In the case of small issues, like spam, it is generally quickly solved by the moderators themselves. When it comes to things like actual harassment, they meet up either via chat or videoconferencing. They have a checklist, based on their past experiences, to address the severity of the situation. Depending on the outcome of the deliberation, the user may get muted, banned or even have all their data deleted.

In addition, federated platforms offer the possibility to block entire instances, preventing users from having interaction with them. Even though Ernestina and Vicente try to limit this as much as possible to allow their users to access as much content and people as they desire, each of them has an important reason to use this feature. Vicente's association is linked to a public university, and therefore they block instances dedicated to problematic content (such as pornography). Ernestina's services are hosted in Germany, where there is a law banning harassment on the Internet, forcing her to block "problematic" instances. There are public lists of these sites, elaborated by a group of administrators, which is constantly updated and maintained to protect against these communities. A *cordon sanitaire* of sorts.

Ernestina herself and her instance were involved in an important case of harassment and trolling. As she recalled it:

> A person named X began to harass our users. Instead of reporting him to us, they reported him to his own instance by mistake, using quite a strong language. X tried to portrait us as the harassers, and even a photo of myself began to circulate. We managed to explain the situation to other administrators, via private chat and email lists, as otherwise my instance might had gotten blocked by everybody else.

When they receive copyright claims, they two follow a similar procedure. They provide a public email address through which they are contacted by legal representatives of the copyright holder, asking for a certain piece of content to be taken down. They then make the necessary checks to be sure that the claim is legitimate, and if it is, the content is removed. However, at least in the case of Vicente's instance, it is not literally removed. It is just blocked to the outside world, so the original uploader can still have access to it. Ernestina is aware that, if she is presented with a really complicated problem it might be necessary to hire a proper lawyer. Thankfully, she has still not been in such circumstances.

4.2 Questionnaire results

The questionnaire described on section 3.4.3 got 459 responses. Five of them were considered obvious cases of either fraud or vandalism, and were discarded accordingly, leaving a total of 454 valid submissions. This section will merely provide an overview of the results. A proper analysis of them is provided in section 5.

The questionnaire had an acceptable level of diversity in terms of gender, and it covered a substantial amount of age groups. 52.94% of users identified as male, 44% as female

and 3.05% preferred not to answer. The most common age group was that of young adults, from 20 to 35 years old, representing a 54.4% of the total number of participants, followed by a 27.89% of middle-aged people (36 to 50 years old). The rest of the respondents were a modest 9.37% of adults older than 50 and younger than 65, and a tiny presence of teenagers (5.23% below 20) and elders (2.18% above 65).

The questionnaire results show a clear trend towards a regular use of social media. A vast majority of participants uses it almost every day (59.91%) or constantly (30.4%). A handful of them only entered social media weekly (6.61%), while monthly and yearly uses were marginal (1.54% and 1.1% participants, respectively). Only 0.44% of people said they never use social media.

A 72.91% of participants selected "Connect with family and friends" as their main use of social media platforms. The next two main uses were "Discover and share contents" and "Share videos or photos", selected by 67.18% and 49.78% of participants respectively. The rest of options were, in descending order of total selections: "Share and discuss news or ideas" (31.28%), "Share information about interests or hobbies with similar people" (30.84%), "Post my own content or ideas" (26.21%), "Connect with people I do not know personally" (24.7%), "Share content or material from others" (19.16%), "Work" (17.18%), "Looking for work" (12.11%), "Professional profile (not Linkedin)" (10.13%), "Communicate anonymously" (5.73%) and "Looking for a sentimental partner" (1.98%).

With regards to the use of centralized platforms, the most popular one was WhatsApp, with 74.23% of participants using it. YouTube and Instagram were selected almost the same percentage of times, 62.11% and 61.89%. Twitter ranked fourth, with 55.73% of responses, and Facebook got just 37.89%. LinkedIn was marked 33.92% of times and Telegram 24.67%. Finally we have TikTok (14.76%), Discord (11.01%), Reddit (10.79%), SnapChat (1.19%) and Twitch (2.86%).

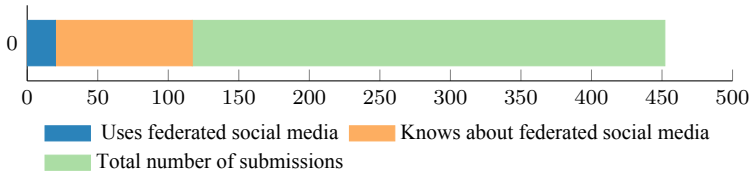

Figure 4.1: Number of participants that know and use federated social media, compared to the total number of participants

The most important piece of information this questionnaire was meant to provide, how many people knew and/or used federated social media, is shown in figure 4.1. Out of the 454 users that answered the survey, 117 (25.77%) had some knowledge about the existence of federated social media, and 20 (4.41%) actually used those platforms.

Another goal of the questionnaire was to try to identify possible factors conditioning the knowledge and adoption of federated social media. To that end, questions about the sense of belonging to a community, perceived knowledge about computers and

	LGBT	Hobbies	FLOSS	Political	Others
Knows about federated social media	5	5	5	6	3
Uses federated social media	4	0	3	2	2
Identifies with a community	11	11	5	14	5

Table 4.1: Knowledge and use of federated social media among participants who identify with a community

perceived awareness about digital rights and privacy were included. All those factors are adequately compared with the knowledge and use of federated social media, to try to address whether a relation does or does not exist.

Only 46 participants identified themselves with some community, a number much smaller than what I was expecting. A detailed view of the communities they identified with, and whether they claimed to know and use federated social media is offered in table 4.1. As participants were free to write down the communities they identified with, these have been grouped in five different categories: the LGBT collective, hobbies (including gaming, sports and other activities), FLOSS (Free and Open Source Software), politics (regardless of exact affiliation) and others (communities which were either too specific or mentioned by very few people).

Every person who took the questionnaire was asked to indicate their perceived level of computer expertise. There is a notable presence of users that consider their level to be professional, and with a general trend towards a technical profile. The exact distribution of participants in this regard is shown in figure 4.2. The number of participants from each group who knows and uses federated social media is also shown in the chart, to reveal a possible relation between those traits.

This same approach was taken in figure 4.2. This time, participants gave themselves a punctuation in terms of their concern about privacy and digital rights. Even though more than half of respondents ranked above 5, the results are more evenly distributed than the previous case.

Finally, users that knew about federated social media, but did not use them, were asked about their reasons. Figure 4.4 shows the distribution of the responses. Please note that respondents were allowed to enter a custom answer if they did not find any of the provided options suitable. Most of those submissions corresponded to variations on the lack of enough users, content or known peers in the platforms. Hence, all those different reasons were all grouped under the topic of "Not enough users", as all of those concerns ultimately respond to a small user base.

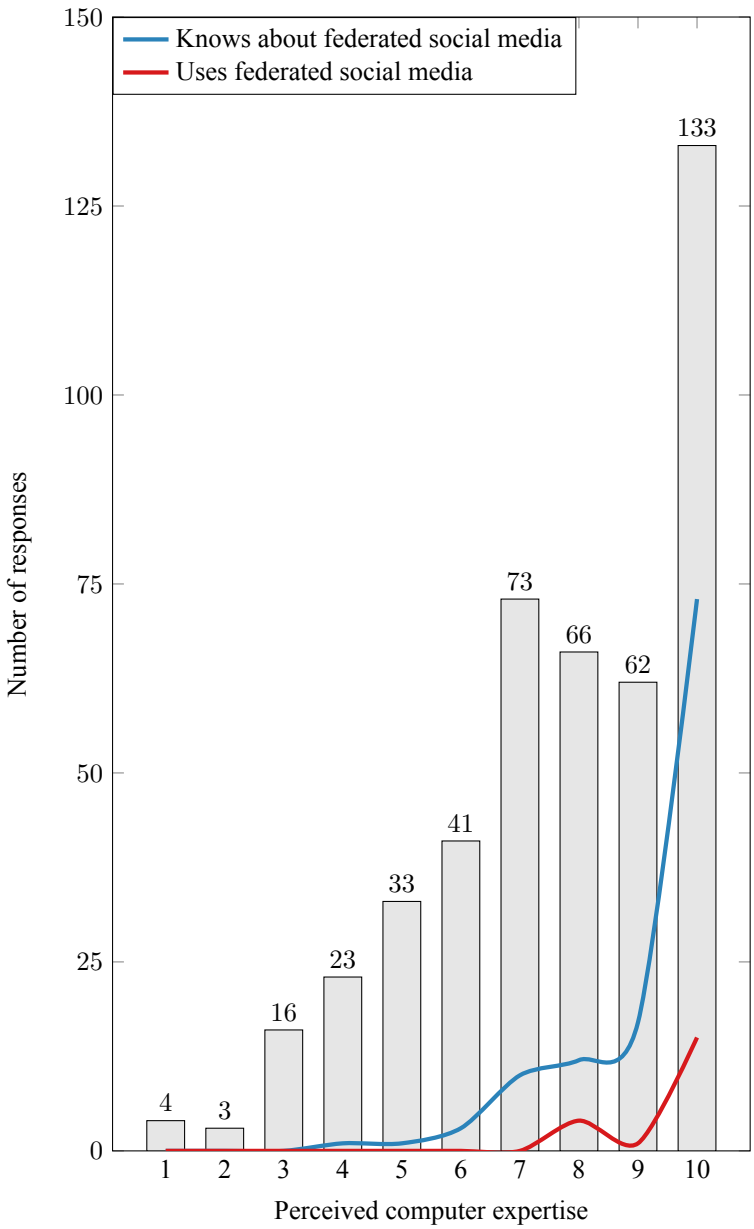

Figure 4.2: Number of users grouped by perceived computer expertise, with the correspondent knowledge and use of federated social media

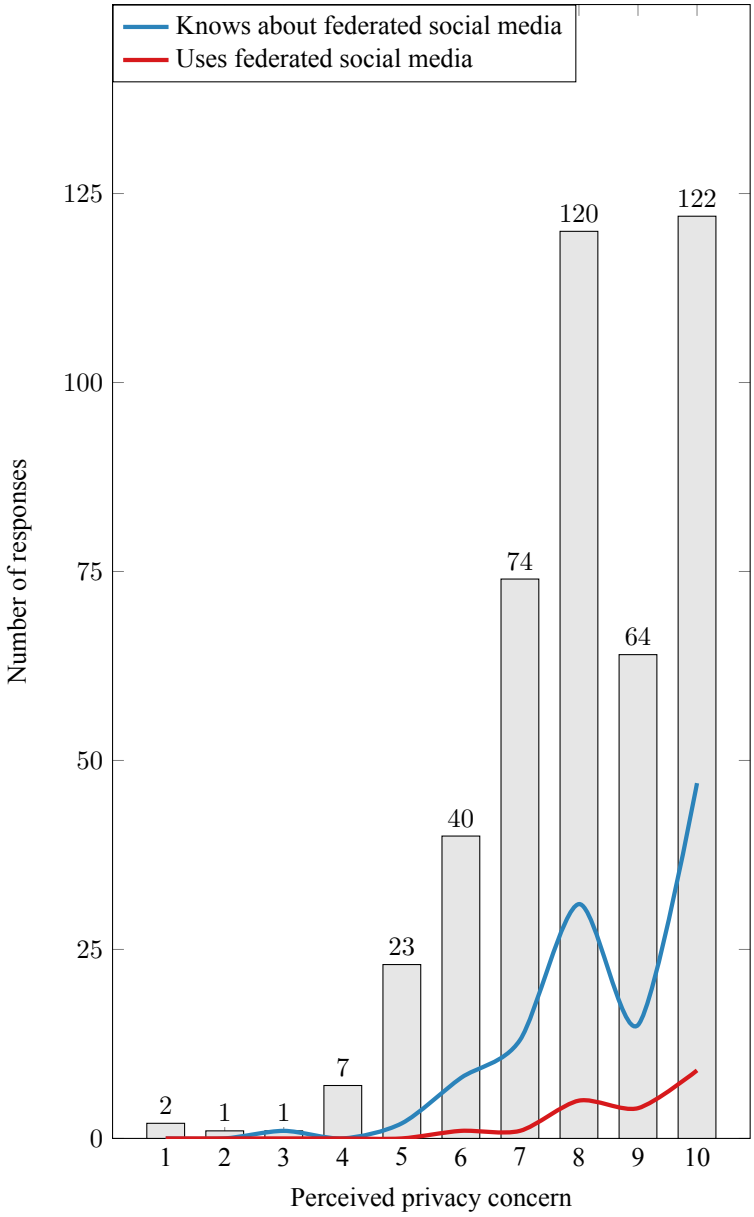

Figure 4.3: Number of users grouped by perceived privacy concern, with the correspondent knowledge and use of federated social media

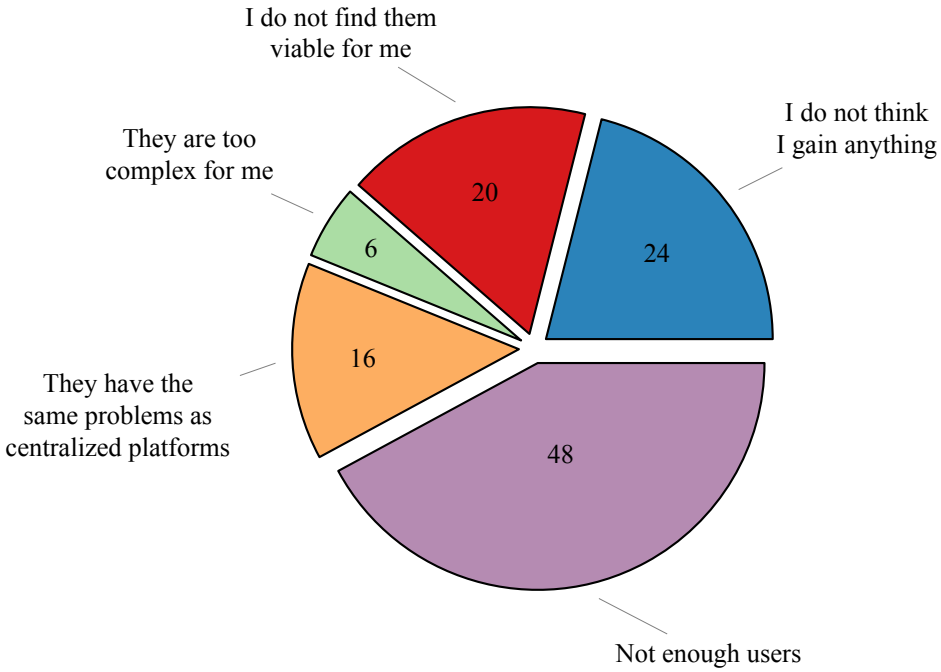

Figure 4.4: Reasons given by participants for not endorsing federated social media

Chapter 5

Discussions and conclusions

Up to this point I have presented a problem of interest, namely, the lack of traction of decentralized federated social media in comparison to commercial centralized platforms; the theoretical background to frame and contextualize the problem and the need for better understanding it; the methodology that has been followed to collect data from real user about their use of both commercial and decentralized social media platforms; and the results obtained with the different instruments used to collect that data (i.e., interviews and questionnaires). Therefore, the last step to conclude this work is to analyze those results to reach some conclusions. However, instead of jumping straightforward to that phase it is important to address the possible limitations of my study. Only then can a proper discussion of the results be provided which will lead to a set of conclusions and both the theoretical and practical implications of this work in relation to the possible ways to improve the chances of adoption of decentralized federated social media by users at large.

5.1 Limitations

The results reported herein should be considered in the light of some limitations. First of all, only 10 participants were recruited for the interviews, most of them are Spanish and hold higher education degrees. In that regard, the sample is relatively small and not highly representative of the population at large although it probably exhibits some of the biases from social media users (i.e., relatively young and well educated). As for the questionnaire, it was mainly circulated through channels linked, to some extent, to the world of computing and information technologies, both in its academic and professional variants. Nevertheless, this does not invalidate the results that have been presented, which still retain their value.

Firstly, when the interviews were designed, special care was put to avoid issues or topics that may be restricted to specific subsets of the population at large, covering instead realities that can be considered common to any social media user. Even though

some details may vary, the crucial pieces of information that have been extracted can be considered common to any user, regardless of nationality or socioeconomic status.

Secondly, it was already stated in section 3.4.1 that research surveys almost never mirror the general population. Because of that, this is a common issue in many fields of research, and rather than invalidating the study it simply requires us to consider the proper contextualization of the results of the survey. Therefore, they cannot be considered as representative of the general population, but a snapshot of certain segment of it, a piece of a bigger puzzle that is being constructed in the project as a whole that is reasonably similar to the user bases of many social media platforms.

Taking that in consideration, future work on this area will not have to start from scratch (in part, thanks to our results); instead, they will be able to propose a more specific set of hypothesis from the very onset, and target the suitable segment of the population specifically, hopefully with more resources than the ones available for this research project.

5.2 Discussion of results

Having already presented the results in chapter 4, it is possible to combine the information from both the questionnaire and the interviews to extract a few lessons of interest.

Going online for a certain purpose (e.g., hobbies, politics, support, etc.) and not as a mere past time seems to have been a defining feature of old social media. A desire to go back to that kind of ecosystem might explain the push for the creation of dedicated communities in federated platforms, a distinctive characteristic that both Josefina and Jorge commented on. However, this is at odds with the results at table 4.1, which does not seem to support the idea of a special relation between community affiliation and federated social media adoption. This, however, could be explained by the very low number of responses to the questionnaire from users of federated social media. Hence, what can be stated with the available evidence is that belonging to a community does not seem to strongly condition the transition from centralized to federated social media.

Gerardo gave a good retrospective on the evolution of moderation, and how it became even more necessary with the increase in size of social media user bases. Moderation is not only taken into account in federated social media but it is to some extent organized and ”professionalized” as far as the voluntary labour permits. Teams of moderators try to be fair on their decisions and create processes to optimize and perfect their tasks, such as in Ernestina’s instance. In contrast to old social media, where moderation was scarce and usually arbitrary, and centralized platforms, with opaque and unclear proceedings, administrators of federated platforms try to provide their users with a transparent and coherent moderation process.

Among all the motives given against the endorsement of federated social media from people already aware of its existence, the most prevalent by far was that of the lack of a critical mass of users, clearly shown in figure 4.4. Furthermore, interviewees that were aware of the practices of mainstream social media, who mostly agreed with the criticism

and reflections presented to them, and showed a genuine interest when explained what federated social media is, were ultimately hesitant towards the idea of migrating, fearful of losing the "social circles" they had created in those platforms. This, in turn, is related to one of the factors that determine continuance intention in commercial social media platforms, FoMO, the fear of missing out. Even though this clearly shows that the *fear* is real, the testimony of participants whore are no longer using social media seems to put into question whether people are really *missing out* something when they quit a platform. Concha, Jorge and María's accounts might indicate that they are not, at least for users that do not actively participate in the platform, but instead opt for a more passive and content-consuming attitude.

The data I have gathered apparently confirms the opinion of Josefina about the prevalence of users with some technical background in federated social media. In the chart on figure 4.2 it is easy to spot a trend. As the level of computer expertise increases, so does the percentage of users that know and use federated platforms. Among the participants ranking 7, 13.7% know about federated social media and none of them use it. In those ranking 8, knowledge increases to 18.18% and usage to 6.06%. In level 9, despite the new increase in knowledge (27.42%) the usage drops to 1.61%. Finally, among those who consider their computing skills to be equivalent to that of a professional (10) almost half of them, 54.89%, are aware of the existence of decentralized federated platforms, while just 11.29% actually use them. Hence, running into federated social media appears to be more probable among those who have strong interest in technology, being still much under the radar for the average Internet user.

With regards to privacy and digital rights awareness and use of federated social media there is no clear correlation. It was initially hypothesized that privacy concerns might be a crucial factor to determine whether a user may discover federated social media and, most importantly, whether they would migrate to any those platforms from their commercial centralized counterparts. According to that suspicion, those people deeply worried about their digital sovereignty should overcome all hesitations and take the step to migrate. However, the collected data does not allow us to make such a strong claim. Namely, for levels 7, 8, 9 and 10 of privacy concern; 17.57%, 25.83%, 23.44% and 38.52% of respondents are aware of the existence of federated social media; and 1.35%, 4.17%, 6.25% and 7.38% of them made use of it. It is true that it does appear to play some role in the decision, considering the parallel increase of digital rights awareness, knowledge and adoption of federated social media but it would be a huge leap to link digital rights awareness and intention to drop commercial centralized social media.

Finally, there is one topic unforeseen by this author but which appeared during the interviews and that deserves to be addressed; namely, the so-called "addiction to social media". It is generally assumed in critical literature that problematic consumption of social media is the result of various techniques and efforts from designers and managers of the platforms, directed at the maximization of user's continuance intention, and therefore to increase the profitability of the platform. Nonetheless, two participants argued that, such a problem was not unique to commercial social media platforms. They consider that although it could be actively encouraged by design in centralized social media such problematic consumption could perfectly appear in their federated counter-

parts. This raises an interesting question, that should be looked into, as it may change the perspective through which problematic consumption of social media is analyzed. Is problematic consumption of social media the result of how the platforms are deigned, or is it a characteristic of social media itself?

5.3 Conclusions

Going back to the initial research question, why is the presence of federated social media so weak? The main reason is that most people do not know that federated social media exists. You cannot consider the trade-offs of something whose existence you are not even aware of. The findings of this study indicates that it remains a topic mostly restricted to tech-savvy circles, not having become yet common knowledge among average social media users.

That still leaves out the issue of the people that, for one reason or another, have met federated social media platforms and still decide to remain in centralized platforms. We have seen in section 2.2 that factors and techniques to retain users are well-known and thoroughly applied by managers of centralized sites. Nevertheless, from the perspective of the user, the largest barrier preventing migration from one kind of platforms to the other is the small user base of federated social media. That perception of lack of critical mass triggers the FoMO, creating a vicious circle on which federated social media are discarded because of its lack users, which in turns prevents such platforms from increasing their user bases. Because of that even if individual users are exposed to the critiques we have noted in section 2.3, and presented with an available alternative, as I did with some interviewees, they are still hesitant to abandon the environment where they feel ”their” people are present.

In spite of this, that idea of missing out something may be way more artificial than generally thought, and not really meaningful in the long run for most users. After all, this small study shows that those participants that have quit social media claim they do not feel as if they were missing out anything of importance. Should this extent be confirmed, the breakup of the *status quo* that centralized social media has created might not be so difficult to overcome.

Offering a prediction on the future of federated social media is no easy task. Taking an optimistic perspective the findings allow us to draft two possible scenarios.

In one scenario, the transition is a slow and progressive process because society would become increasingly aware of the implications of centralized social media and cracks would begin to appear with ongoing systematic privacy violations, making *communicative capitalism* unsustainable in the long run. That process of ”awakening” would mean that the adoption would be gradual at first, with users overcoming their FoMO until federated sites become dominant. To some extent, it could be a transition process similar to the adoption of recycling practices by the society at large. Even though there was enough evidence supporting the necessity for recycling decades ago, it was not until recently that the general public became aware of the issue and that recycling has become a common habit.

The second scenario involves a more dramatic transition. Should a tipping point be reached, such as a sudden the collapse of one of the big centralized platforms, or some phenomenon causing an important loss of users overnight[1], the effects of the FoMO might turn in favor of federated social media. Users will seek a functioning and familiar platform that provides the same features and affordances. As more and more people migrate, the rest will feel the need to follow them, not wanting to miss out the contents and relations with those that have migrated. What is more, due to interoperability, that may also open the gates to migrate not to just one platform but to many other sites in the Fediverse, as users can interact across different platforms.

Regardless of the eventual turnout, federated social media advocates, managers and developers still have a difficult task ahead. Even though they have managed to create a technological ecosystem that could perfectly meet the needs of most users, they still have to convince them to make the change. In other words, even if you build it, they might not come by themselves.

5.4 Implications

As far as I am concerned, this project is among the first in the School of Computer Engineering to study federated social media. In addition, it takes an ethnographic approach, focusing on the social aspects of users, rather than merely proposing new technological solutions. In my humble opinion, future software engineers should consider that neither all problems have a technical solution, nor all problems with technology have a technological origin. I do hope that this project would encourage future works, not only related to federated social media, but taken a less technical and more human approach.

I commented in section 2.2 how continuance intention literature often offered recommendations for centralized social media platforms on how to retain their users. I will try to do the equivalent for the case of the federated sphere, drafting some guidelines on how to proceed in the near future.

The first step is crystal clear: there needs to be an important effort to make federated social media known to the common folk, in the form of campaigns and publicity efforts. As these platforms cannot count on the financial backing of big corporations, that effort should be undertaken instead by individual activists, organizations of various kinds and the diverse communities that are already well established in the Fediverse.

Users need to be explained how they are subject to a variety of psychological and marketing techniques (outlined in section 2.2) to increase their engagement within the platform, in addition to the implications for individual users and the society at large of the centralized social media model, described in section 2.3. This should not be expected to be an instant success, but instead be considered as a long term investment. If users understand what is going on in centralized social media, they are more likely to eventually migrate, when their personal situation allows them to. Even though overcoming

[1] There exists a recent precedent of something like this happening. When Donald Trump was banned from Twitter after the 2020 US presidential election, a substantial amount of his supporters quit the platform in favor of other sites, like Parler or Gab.

their fear of missing out will be one the biggest obstacles, it has already being shown that it may not be such a crucial phenomenon as we use to believe.

Finally, it would be needed to go further than merely acknowledging the problems of centralized social media and the existence of a feasible alternative. Making an educational effort is also fundamental, explaining the advantages of the federated technologies, where they come from, their goals as a project and how they might be the solution to create better social media.

This advice is not intended to be a silver bullet for the problem of the weak presence of federated social media; it is just a general guideline based on the data collected during this research project in the hope of making the title of this work outdated in the near future.

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