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Interdependent Privacy on Facebook

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Summary

Acknowledgement

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Chapter 1

Introduction

1.1 Motivation

1.2 Problem Description

1.3 Methodology

Our assignment is divided into parts, where one consists of collecting data from Facebook users regarding their view on Facebook privacy settings, and the other is a theoretical research of how Facebook privacy settings has evolved since the introduction of Facebook. This means that we have used different approaches to be able to retrieve the information desired.

Approach In this section we will describe our approach of collecting data from Facebook users regarding their view on Facebook privacy settings. Facebook is a global social network, so to be able to get more accurate information it is important to reach out to a wide and diverse audience. We decided to use Amazon Mechanical Turk for this purpose. To gather the data, we made a survey for the users to answer. Survey is a common used research method that involves the use of standardized questionnaires or interviews to collect data about people and their preferences, thoughts and behaviours in a systematic manner [3]. Survey, as a research method, has several advantages in comparison to other methods of doing research. Survey is a good method of retrieving unobservable data, like for example peoples attitudes, behaviours, characteristics, preferences, and demographics. Surveys are great when you want to cover a large group of people, like a country, that otherwise would be difficult to observe. With large groups and large amounts of data, surveys allows small effects to be detected, and makes it easy to compare the subgroups that may appear. Survey are in an economically sense cost effective. It is a lot cheaper for a researcher to make and send out a survey than to use other methods like experimental research. Survey as a research method also has some disadvantages. The method is often exposed to biases, like sampling bias, non-response bias, and social desirability bias. Surveys have a reputation for low responses, hence the non-response bias. This was one of the reasons for choosing AMT as a platform for publishing your survey.

We started by creating the survey in Amazon Mechanical Turk (AMT), but learned that the templates provided by AMT was missing some of the features we wished to include, like having several pages with questions. So mainly for design purposes we chose to create our survey in SurveyMonkey. This is easily integrated with AMT and a often used option. Using SurveyMonkey also made it a lot easier to keep track of answers and see summaries. SurveyMonkey has a great and easily understandable user interface, and made it easy to share the survey to other mediums like Facebook, to reach out to a even more diverse and larger audience.

In AMT we set the requirements that the users had to be master-users. This is users that through a good reputation has earned the title And by setting this requirement we rule out unserious users and answers. This will save us a lot of time in the screening process. When a user chooses to take our survey, they first get some information about the purpose and incentive of the survey, and a link to SurveyMonkey to take the survey. When the survey is finished the user receives a code that they have to provide before submitting their HIT in AMT. This is an assurance for us that all users on AMT has finished the survey before they get paid. Throughout the lifetime of our survey we have changed this code, just to make sure that nobody tries to get paid without actually doing the work. When the survey is completed in a serious manner the workers get paid \$1,5. On average, the users spent 13 minutes and 37 seconds to take the survey, this gives an effective hourly rate of \$6,61.

Chapter 2

Related Work

2.1 Social Network Services

A social network service (SNS), is a platform used to establish social networks of different people. These people often share a common interest or activity [4]. Online social networks (OSNs) is a large part of the social network services. From online social networks was first introduced until today, the popularity and complexity has grown drastically, with a hundreds of millions active users [5]. OSNs have a peer-to-peer architecture, and therefore makes it easy for members to initiate communication with whom they want, given that they are also connected to the network. OSNs also enables the possibility for people to easily publish and retrieve information about subjects of interest [6]. The internet has caused the creation of several information sharing systems [7]. Among these systems are the Web and OSNs. As mentioned before, the popularity of OSNs has grown drastically, and have become among the most popular sites on the Web. With this change, there has also been a change in what is centralized and in focus. The Web is to a large extent organized around content, while OSNs on the other hand are organized around users. This change has lead to the importance of understanding user behaviour. You can say that the expansion of OSNs has lead to a shift in how context is exchanged over the Web. End users are no longer just content consumers, but now also required to be content creators and managers [8].

A user is often represented with a profile on OSNs. To obtain a profile the user, in most cases, must register the site. When a user is given a profile, it is normal for the user to provide information about themselves. This information could for example be date of birth, home town, sex, name (or pseudonym) and maybe a profile picture. The social network is formed when users start connecting with each other. The reason for these connections are numerous; real-life friends, real-life acquaintances, colleagues, share an interest/activity or if you are interested in the information contributed by the other user.

Since Facebook was introduced to the public in 2006, it has grown to be the largest online social network (OSN) in the world. The growth of Facebook has made it necessary to

introduce new ways to manage privacy and ensure a secure online environment. The privacy embedded in the program/app etc. is not enough to ensure such an environment, due to the interdependent privacy issues. Your privacy is to a large extent affected by the privacy decision of others.

2.2 The History of Facebook

When Mark Zuckerberg enrolled at Harvard in 2002, he had decided to major in psychology. “I just think people are the most interesting thing—other people,” he said. “What it comes down to, for me, is that people want to do what will make them happy, but in order to understand that, they really have to understand their world and what is going on around them” [9]. He showed an interest and passion to connect people together and create Harvard more open.



Figure 2.1: The Facebook icon as we know it today.

It all started in October 2003 when the Harvard sophomore Mark Zuckerberg and three of his classmates created the web page Facemash. Zuckerberg hacked into the administrative database to extract the ID photos of all the students of the different houses. The web page presented two and two photos creating a “hot or not” game for his fellow students. The votes were counted and created a top-ten list of the cutest people in each house. Within the first hour Facemash had 450 visitors and 22 000 votes. After numerous complaints from professors and fellow students, Harvard administration shut down Zuckerberg’s Internet connection after a few days. Harvard charged Zuckerberg for violating individual privacy, violating privacy and breach of security for stealing the photos. Zuckerberg agreed to take the web page down and got away with just a warning.

After Facemash, Zuckerberg was known around campus as a programming prodigy. Harvard seniors, Tyler and Cameron Winklevoss and Divya Narendra had since 2002 been working on a social networking page, called HarvardConnection. This was a page where students could create a profile, and through that share some personal information and post pictures and share this with large and small communities that one could be part off. They wanted Zuckerberg’s help to finalize their project so that the page could be up and running before they graduated. Zuckerberg agreed to help at the same time as pursuing his own projects. Harvard offers a class directory to all freshmen, this directory is also known as

the "Facebook". This "Facebook" contains a picture of all the students, name, date of birth, home town and high school. The purpose of the "Facebook" was that the freshmen could get to know each other. Harvard's plan was to eventually get this online. Since Harvard had not gotten to it yet, Zuckerberg decided to do the job himself. He wanted to create a page where people signed up and created their own profiles, and in that way could post some personal information about themselves, and have control over what was posted. After ten days of intensive work, Zuckerberg almost finished the site. The site was kept simple and intuitive, and everybody with a Harvard e-mail address could create a profile. The profile consisted of a profile picture, name and some personal information such as taste in books, music, films and favourite quotes. Users could link to their friend's profiles and by using a "poke" button let others know that you have visited their profile. Thefacebook went public February 4, 2004, and to get the word spread they sent it out on the Kirkland house mailing list, that contained over 300 students. It did not take long until the other houses heard and within twenty-four hours, close to fifteen hundred people had registered. "I think it's kind of silly that it would take the university a couple of years to get around to it," he said. "I can do it better than they can, and I can do it in a week." [9]. Later the same year the three founders of HarvardConnection, now called ConnectU, filed a lawsuit against Zuckerberg. Stating that he broke their oral contract, stole their idea, and delayed working on their site to be able to finish his own site, Thefacebook, first. Zuckerberg denied doing anything wrong, and stated that he had proof that he did not steal the idea from the HarvardConnection. Just a few months later Facebook filed a countersuit. Facebook accused ConnectU with defamation. The case went on for years. In 2011 the Winklevoss brothers dropped the lawsuit and accepted a 65 million settlement [10].

There was already similar pages out there, like Friendster and myspace.com. Especially on myspace.com people played roles, giving themselves out to be someone else. Teenage girls pretending to be older and grown men giving themselves out to be young girls. There is nowhere to validate that the person really is who they give themselves out to be. This limits to what extent people post personal information. With Thefacebook.com you had to sign up with a valid Harvard e-mail address, in that way you know that they are actual people, and mostly students. This made it easier to post more personal information like cell-phone number, home address and even sexual orientation. The concern was not about security, but more about wasting time, it became an addictive pleasure.

It didn't take long before Mark Zuckerberg began to receive e-mails from other colleges, requesting to get Thefacebook at their schools. The site was easily scalable, the concern rather laid in how to maintain the intimacy and the clubby appeal. When Thefacebook expanded to the colleges Colombia, Yale and Stanford, students were only able to search and see people from their respective college. Only with permission from a student from another college could you add the person to your friend list. This is a key factor to Facebook's

success. Zuckerberg wanted people to post personal information and create a more open school community.

In June 2004, when the school year was over, Thefacebook had expanded to over forty schools, with 150 000 users. With the rapid expansion, the need for investors and more capacity increased. Zuckerberg moved his base to California and removed the "the" from the name. Thefacebook became just Facebook.

October 2005 Facebook expanded to universities in England, Mexico and Puerto Rico, and in September 2005 a high school version was available [11]. This was a big step for Facebook. All high school members needed an invitation to be able to join. Zuckerberg launched the possibility for all users to see the profiles and send friend request to everyone in the network, the older users had strong objections. College students did not like the idea of high school kids looking at their profiles and being able to befriend them. But with the rapid expansion Facebook was forced to make the site more open and knock down some of the walls dividing the users. Facebook made it possible for employees at different companies like Apple and Microsoft to join the network. At the end of 2005 Facebook was used at over 2000 colleges and at over 25 000 high schools in United states, Canada, Mexico, England, Australia, New Zealand and Ireland.

Up to this point you had to be a student at a college of high school, or employee at a certain company to be able to join the network. After September 2006 everyone over the age of thirteen, with a valid e-mail address, could join. The site was no longer restricted to schools and was now open to the whole world.

By 2009 Facebook had 200 million active users, and was finally getting more users than Myspace, becoming the world's biggest social network [12]. With the release of iPhone in 2007, and the launch of Facebook's mobile application in 2008 a new way of sharing became reality. The mobile application enabled Facebook users to send pictures, status updates and comments in real-time. Facebook introduced the "like" button in 2010, together with the growing application and gaming platform.

The movie "The Social Network" directed by David Fincher and Aaron Sorkin came out in October 2010. It is an american drama movie based on the early days of Facebook's history. The popular movie has received many awards, among them 3 oscars [13].

The Facebook timeline was introduced in December 2011 [14]. The new interface makes the entire history of the users visible, all photos, links, pages you have liked, comments and other things that you have shared on Facebook.

In April 2012 Facebook announces that they are buying the photo sharing application Instagram for \$1 billion . This was the biggest acquisition that Facebook has done [15].

Instagram just finished a great year with the launching of the android application and a huge growth, with more than 30 million users, and more than five million pictures being uploaded every day [16]. Just a month later Facebook goes public, another big step for Facebook. Each stock were sold for \$38 dollars, giving the company a market value of \$104,2 billion dollars, becoming the highest valued company in history. Facebook's market value was almost 4 times higher than Google in 2004 [14].

- Graph search
- Hashtags

2.3 Facebook Privacy

There exists numerous articles and papers written on the development of Facebook privacy, and many researchers have tried to map the human behaviour in regard to Facebook through for example the use of surveys. One of these articles is "Facebook privacy settings; Who cares?" by danah boyd and Eszter Hargittai [17]. The paper addresses a survey conducted on a cohort of 18- and 19-year-olds in 2009 and in 2010. The survey focused on their attitude and practice when it came to Facebook privacy settings. During this period, between 2009 and 2010, Facebook made many changes to their privacy settings. This was a turbulent period in Facebook history, with a lot of attention in media.

The demographics collected in the survey described in the paper by boyd and Hargittai was sex, age, race and ethnicity and parents' highest level of education. The ladder was used as a "measure" for socio-economic status. The demographics showed a diversity in the people taking the survey. The other data collected consisted of information within these topics: "Internet experience", "Use of Facebook", "Engagement in certain activities on social network sites among Facebook users" and "Experience with Facebook's privacy settings". Based on their discussion and conclusion, we have highlighted some of their findings:

1. Majority of young adults using Facebook have to some degree checked their privacy settings. Number of people who had checked increased from 2009 to 2010. One reason for this may have been the media attention Facebook received as mentioned above.
2. How familiar someone is with technology plays a role in how they handle their Facebook privacy settings. The reason for this assumption is withdrawn from the relationship between changing privacy settings and the frequency of Facebook use, as well as Internet skill. Considering the default settings, this is especially important since the least skilled people get more vulnerable when Facebook changes the default privacy settings.
3. Among the majority both genders are equally confident in changing their Facebook privacy settings.

danah boyd and Eszther Hargittai concludes, based on their findings, that experience and Internet skill is important to take into account in regard to how people handle their privacy settings on Facebook. It is incorrect to think that the Facebook users have the same approach to the site. This kind of thinking leaves a part of the users more exposed. It is therefore very important that the people who configure the default privacy settings take these users into consideration. They should be aware of the fact that every user is different and have a different basis of understanding.

Another relevant article on the topic of Facebook privacy settings is "Analyzing Facebook Privacy Settings: User Expectations vs. Reality" [8]. It addresses to what degree the Facebook privacy settings match the expectations of the users. To find information about the users view on the topic, they conducted a survey via Facebook with people recruited from Amazon Mechanical Turk (More information on Amazon Mechanical Turk can be found in section 2.5). They got 200 users who completed the survey. The average values for the users were: 248 friends, 363 uploaded photos, 185 status updates, 66 links, 3 notes, 2 vidoes. Their analysis is centred around two questions, and one of these questions are interesting for us to look at: *"What are the ideal privacy settings desired by users? How close are these to the actual settings that users have?"*

They had some very interesting results on their survey, and these are the ones we wanted to highlight:

1. Facebook privacy settings match the users expectations 37% of the time, and then the settings are not as expected they are almost always more open, and exposes the content to a wider audience than desired.
2. Modified privacy settings match the users expectations only 39% of the time. This implies that even though you are aware of you privacy settings, you can still have problems configuring them correctly and as desired.
3. Nearly half of the content shared by the users are shared with all Facebook users. This was desired 20% of the time.
4. When the privacy settings on photos have been changed by the user, the privacy settings on these photos match the users expectations less than 40% of the time.

As mentioned before there exists much material on the topic of Facebook privacy. We chose to shed light on these two articles, because of the similarities in topic to our paper. Later in our paper we will see if we can draw comparisons between the results in these two articles and our own survey result.

2.4 Interdependent Privacy

In today's society Internet is no longer a privilege, it is a human right. With the evolvement of the online social networks (OSN) the incentive to share personal information has grown drastically. People create profiles at different OSNs and share personal information, pictures and comments with each other. With the enormous data sharing privacy concerns arise. The privacy of an individual users is bound to be affected by the decisions of others, and therefore out of the individuals control. This phenomenon lays the basis for the term *interdependent privacy* [18].

Privacy Roger Clarke defines privacy as *the interest that individuals have in sustaining a 'personal space', free from interference by other people and organisations* [19]. Further Clarke divides privacy into multiple levels; bodily, personal behaviour, information privacy. Bodily privacy is concerned with the integrity of an individual's body, such as blood transfusion without consent, compulsory immunisation and compulsory sterilisation. Personal behaviour privacy relates to all aspects of behaviour, like sexual preferences, and political and religious actions. Information privacy is a collective term including personal communication and privacy of personal data. These include the ability to communicate, using the desired media without being monitored by others, and claim that data about themselves not automatically should be available to others, even when there is data that should be processed by others.

In this article our focus will be on online privacy, the level of privacy and security of personal data published on the internet. For a user the privacy and anonymity is the most important factor in consideration when using online services. It is a hot topic and now more important than ever, especially when the consequences are unforeseen, and the extent of them are often hard to predict. Biczók and China defines online privacy risks with the basis in Clark's privacy definition as described in the list below [18];

- Personal: Potential loss of information about a user and his/hers behavioural data. This can be done by phishing, hacking to steal secure and sensitive user data, like passwords and pin codes.
- Relational: Revelation of how a user relate to and communicate with others. Spyware is an offline application that can obtain a users data without the consent of the user.
- Spatial: Invasion of the virtual space of an online user. An example of this can be unwanted comments and posts on a user's blog or social networking page.

Social networking privacy epic.org/privacy/socialnet

Interdependent privacy In today's interconnected world, we share enormous amounts of data every single day. Protecting personal, relational and spatial privacy of individuals is no longer just dependant of only your individual actions, but increasingly depending on the actions of others [18]. With the continuous growing use of social networks, data sharing has become very easy. We share photos, comments, videos, and links. This increasing data sharing arises the concerns for interdependent privacy.

An example can be if Alice posts and tags a picture of her Facebook friend Bob. Alice finds the picture of Bob funny and sees no problem in posting it. Bob on the other hand, does not share Alice's opinion, he finds the picture embarrassing and inappropriate. Bob wants the picture removed, but by the time Alice comes around to remove it, people have already seen it, and maybe reposted it. Bob's privacy was dependent on what Alice did, and out of his own control.

Sharing information without consent from the users can lead to the emergence of externalities. In economics externalities is defined as the unintended costs or benefits that are imposed on unsuspecting people and that results from economic activity initiated by others [20]. When the effect is beneficial it is considered a positive externality. A negative externality is when the side-effect is negative. Let us relate this to our example with Alice and Bob. When Alice shares the photo without Bob's consent, it might be at benefit for Alice (in personolized experience), but for Bob it will be received as a negative externality, a loss of his online privacy. Another example of interdependent privacy is the Facebook platform for third-party applications (apps). How your privacy depend not only on your actions, but also on the actions of your friends. We will discuss this in more detail below.

(Her skal vi skrive kort om Facebook sin app-plattform)

The article "Third-Party Apps on Facebook: Privacy and the Illusion of Control" was written in the end of 2011 and looks at the privacy threats with the use of third-party apps on Facebook [21]. In this paper the authors look at what information the third-party applications request when you install them, and how easy it is for an application to retrieve more information from a user than what the user initially want to. There has not been done any other studies on this topic before the time this article was written. Their aim is to increase user control of the apps' data control and alert the users when the apps' violate your initial privacy setting. When a user wants to add an application, the application is required to ask for permission to access certain information, like your "basic information", which includes name, profile picture, gender, networks, list of friends and other information that a user has publicly available to everyone. Other permissions that apps frequently ask for is "post to my wall", "send me email" and "access my profile information". You can later go to your settings and change what information you share with the apps. But by this time you may already have shared information that you initially wanted to keep private. As an example say that a user, we call her Alice, would like to keep her birthday private and have stated this in her privacy

settings. Alice then install an app called "Happy Calendar", that let her keep track of friends' birthdays. When installing the app, they asked for permission to access hers and her friends' birthdays in addition to her basic information. Alice allows the app premission, to later find out that "Happy Calendar" has created an album with a calendar image showing the profile pictures to all her friends including herself. This album was posted on her wall and Alice's friends receives notifications about the album. The birthday that Alice initially wanted to keep private is no longer private. The article states that there should be more evident to the user when the app ask for information that is in conflict with the user's privacy settings. In the article two new designs of the approval page are presented and tested. From the tests it was clear that users was not always aware of what they share, and that a more extensive and informative permission-page would be necessary. It is important that the users understand what they are sharing and that apps often ask for information that you do not want others to see.

2.5 Amazon Mechanical Turk

The growth of the Internet have made it easier to conduct studies, surveys and so on. One commonly used technique for conducting these studies and surveys are called *crowdsourcing*. Crowdsourcing is a technique where you outsource a job to a undefined group of people. The beneficial aspects with crowdsourcing is that you are provided access to a large set of people who are willing to do the tasks you want done, for low pay [22].

Amazon Mechanical Turk is a good example of a crowdsourcing site. Amazon Mechanical Turk is a Internet marketplace where human intelligence is utilized to perform various tasks [23]. The people using Mechanical Turk are separated into two groups. You have the *requesters* that post jobs/tasks, and the *workers* who can choose from these jobs/tasks, and execute them for pay [22]. The jobs are posted as HITs (Human Intelligence Tasks). HITs are individual tasks that workers can complete to make money.

The Turk The name "Mechanical Turk" comes from a chess-playing automaton from the late 18th century. The Turk, as it was called, was a construction made to seem like a automatic chess-playing machine. In reality there was a chess-pro inside the machine, that steered the arms of the doll that was on the other side of the chess-board. The Turk was constructed in 1770 by the Austro-Hungarian Wolfgang von Kempelen. The reason for this construction was that von Kempelen wanted to impress the Empress Maria Theresia of Austria. The Turk toured around Europe and in America for decades, without anyone knowing the secret of the machine. The chess-pro that operated the construction played and defeated many, including Benjamin Franklin and Napoleon Bonaparte. Although many suspected that the Turk was steered by a hidden human, the trick was not exposed before 1820. The Turk was ruined in a fire in 1854 [24].

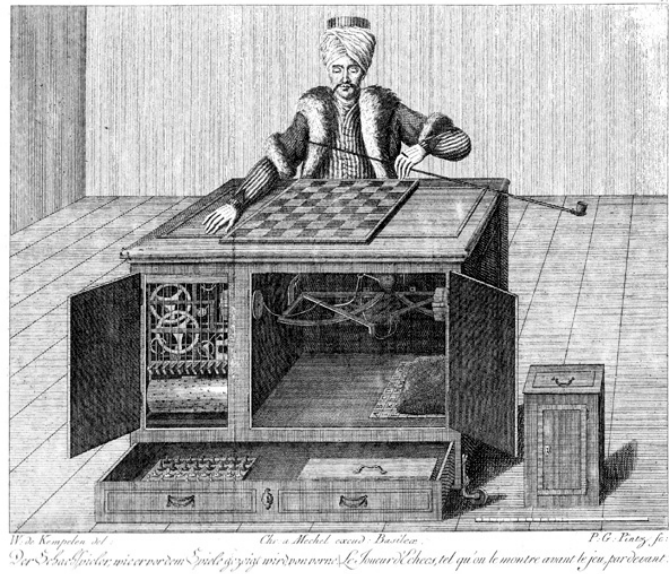


Figure 2.2: Engraving of the Turk. This figure shows the Turk with open doors and the different parts inside of the Turk. Wolfgang von Kempelen may have drawn this picture himself, since he was a talented engraver [24].

Advantages with Amazon Mechanical Turk There are several advantages of using AMT for conducting behavioural research surveys. Amazon Mechanical Turk enables the opportunity to reach out to a wide audience, since it provides access to a large subject pool [22]. When conducting a survey or other research for example in connection with school projects etc., you seldom have access to a large subject pool. Usually you may get your friends to contribute, and maybe some other people going to the same school or a few people living in the same place. The results of this survey or research will most likely be reflected by lack of diversity. If you use Amazon Mechanical Turk instead, you get yet another advantage; subject pool diversity. The workers on Mechanical Turk are spread all over the world, and have different backgrounds. They have different religions, ethnicity, languages, different positions in society (economical), and age. The one last advantage with Mechanical Turk worth mentioning is that you get access to all the aspects mentioned above at a low cost. The workers are willing to take jobs and perform task for relatively low pay [22].

Financial Incentives Some concerns regarding the financial incentives are brought up in connection with Mechanical Turk (MTurk). One question is whether or not lower pay result in lower quality in the work conducted by the workers. It is important to have knowledge about the relationship between how good the workers perform, and the financial incentives given to them [25]. Research done by Horton and Chilton [26] shows that the least amount

of pay a worker is willing to accept for a task on MTurk is \$1.38 per hour, and they refer to this amount as the *reservation wage*.

The article "Analyzing the Amazon Mechanical Turk Marketplace" [27] written by Panagiotis G. Ipeirotis in December 2010 shows that the effective hourly wage on MTurk is \$4.80. This is calculated based on some observations, and also on some assumptions. What they observed was that the median arrival rate was \$1.040 per day, and that the median completion rate was \$1.155 per day. They then assumed that MTurk acts like an M/M/1 queuing system. Based on these observations and assumptions they used basic queuing theory and calculated that a task worth \$1 is completed with an average of 12.5 minutes. Like mentioned earlier, this results in an effective hourly wage of \$4.80.

Winter and Mason [25] conclude that if you increase the pay, the quantity of participants increases, but the quality of the work done does not increase. They think the reason for this is the *anchoring effect*. The anchoring effect describes that it is common for humans to depend too much on the first information given to them when making decisions [28]. In the case Winter and Mason presents: the workers who get more pay, also assume that the work they are about to conduct is more extensive, and therefore do not get more motivated to perform the work.

2.6 SurveyMonkey

SurveyMonkey is the world's leading provider of web-based survey solutions [29]. SurveyMonkey was founded in 1999 by Ryan Finley, and had 15 million users in 2013 [30]. Using SurveyMonkey as a tool you are allowed to create your own survey based on templates. To get started with SurveyMonkey and to create surveys you have to register the site, and choose account type after need. The different account types have different prices. The more expensive, the more is included. There are several features available when using SurveyMonkey [31]. It is easy to create questions, with 15 question types available. You can also add logic to the questions. It is easy to customize the appearance of the survey, with the colors you prefer and so on. Getting responses on the survey is done by sharing an URL, for example on Facebook or in e-mails. When you have gotten answers on your survey, you get the data presented in graphs and charts. You can also export the results in various ways, for example all response data or just individual responses.

Chapter 3

Facebook Privacy

In this chapter we are going to look into what kind of privacy settings that exist on Facebook and the history of Facebook's privacy settings. We will also look at and map how the default privacy settings have evolved over time. In addition to this we will look at some of the features introduced by Facebook over the years, and how these features have effected the privacy on Facebook. Finally we will review some of Mark Zuckerberg's thoughts and comments in regard to Facebook privacy.

3.1 Privacy on Facebook

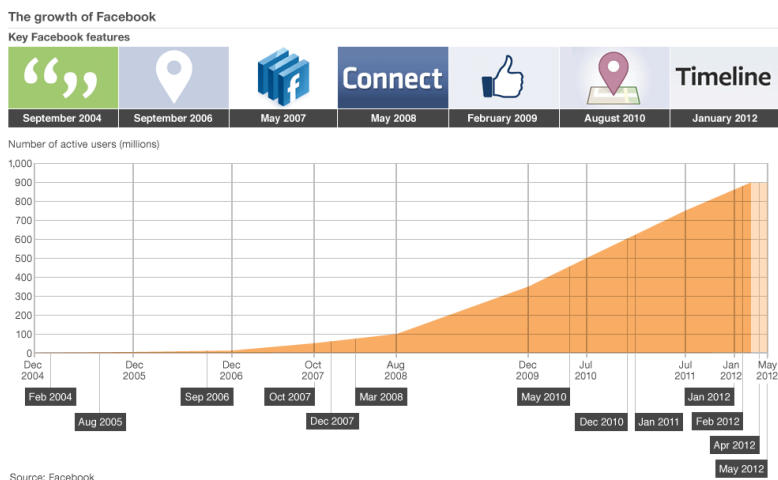


Figure 3.1: The development of Facebook users and introduction of new features. The orange field in the graph shows the increasing number of Facebook users over the years. Key Facebook features are shown over the graph according to when they were introduced [16].

There is no doubt that Facebook has had a remarkable development, both when it comes to number of active users and the development of new features, as shown in Figure 3.1.

Table 3.1: Changes in the default privacy settings on Facebook from 2005 until today. [1, 2]

Year	Default Privacy Settings
2005	Personal information (e.g., name and profile picture) is only visible to specific groups specified in your privacy settings.
2006	The only information displayed in your profile is your school and specified local area.
2007	Name, name of school (network) and profile picture (thumbnail) is available to all Facebook users.
November 2009	Name, profile picture and demographics is available and searchable to the entire Internet. In addition to this, list of friends are visible to all Facebook users.
December 2009	Your name, profile picture, list of friends, pages you are fan of, demographics and likes are available for the entire Internet.
April 2010	The entire Internet can see everything, except wall posts that are limited to friends and photos that are limited to your network.
2011	
2012	
November 2013	The entire Internet can see everything, except posts you've been tagged in on your timeline and others posts on your timeline, which are limited to friends of friends.

Along with new users and new features, there has also been made changes to what kind of privacy settings exists and that are needed.

3.1.1 Facebook Settings

3.2 Default Privacy Settings on Facebook

Facebook has evolved from being a networking site for students attending Harvard to becoming a global phenomenon. Facebook's user interface has gone through several changes over the years, which has brought both joy and frustration to the users. When these changes have been made, there has also been adjustments to the default privacy settings as well [32]. At the beginning, in 2005, when Facebook first was applied outside of Harvard University, the users personal information was only accessible to a users Facebook friends and to people connected to the same network on Facebook [1]. This is far from reality today. We will now look into how the default privacy settings on Facebook has developed over since it was first introduced.

3.2.1 Development of Default Privacy Settings

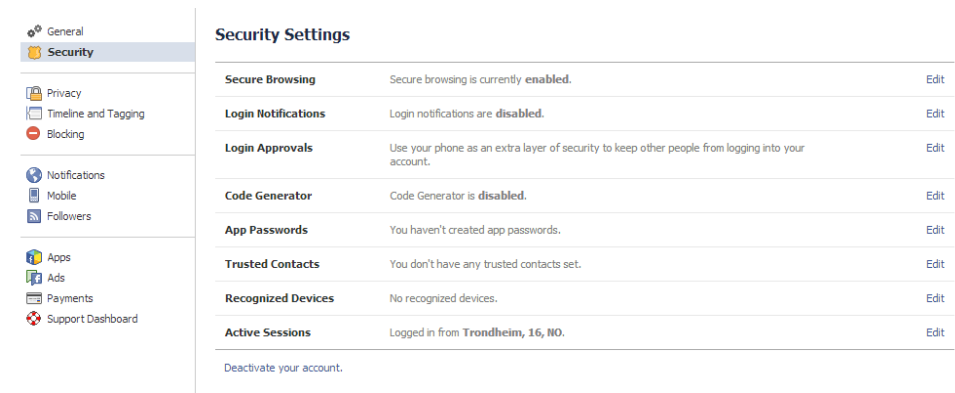
The main changes to the default privacy settings are emphasized in Table 3.1.

Secure browsing became default in July 2013. Since 2011 users have been able to turn on secure browsing. [33]

3.2.2 Default Settings 2013

To examine the default settings on Facebook anno 2013, we created a new Facebook profile, so we could see how the settings were as default. Figure 3.2, Figure 3.3, Figure 3.4 and Figure 3.5 shows the outline of the different settings without any alterations, in other words the default settings.

Figure 3.2 shows how the default security settings look like in November 2013. As we can see from the Figure, secure browsing is enabled by default.



Security Settings		
Secure Browsing	Secure browsing is currently enabled .	Edit
Login Notifications	Login notifications are disabled .	Edit
Login Approvals	Use your phone as an extra layer of security to keep other people from logging into your account.	Edit
Code Generator	Code Generator is disabled .	Edit
App Passwords	You haven't created app passwords.	Edit
Trusted Contacts	You don't have any trusted contacts set.	Edit
Recognized Devices	No recognized devices.	Edit
Active Sessions	Logged in from Trondheim, 16, NO.	Edit
Deactivate your account.		

Figure 3.2: Default security settings on Facebook November 2013. This Figure shows the default security settings on Facebook in November 2013.

Figure 3.3 shows the default privacy settings in November 2013. *"Who can see your future posts?"* is set to *Public*, which means everyone can view you posts. *"Who can send you friend requests?"* is set to *Everyone*. *"Who can look you up using the email address you provided?"* and *"Who can look you up using the phone number you provided?"* is set to *Public*, which means it is easier for people to find you on Facebook if they know you email or phone number. The setting *"Do you want other search engines to link to your timeline?"* is turned *on*. This means that for example if you google a person, the Facebook profile will

<ul style="list-style-type: none"> General Security Privacy Timeline and Tagging Blocking 	<h3>Privacy Settings and Tools</h3>			
<ul style="list-style-type: none"> Notifications Mobile Followers 	Who can see my stuff?	Who can see your future posts?	Public	Edit
		Review all your posts and things you're tagged in		Use Activity Log
		Limit the audience for posts you've shared with friends of friends or Public?		Limit Past Posts
<ul style="list-style-type: none"> Apps Ads Payments Support Dashboard 	Who can contact me?	Who can send you friend requests?	Everyone	Edit
		Whose messages do I want filtered into my Inbox?	Basic Filtering	Edit
	Who can look me up?	Who can look you up using the email address you provided?	Public	Edit
		Who can look you up using the phone number you provided?	Public	Edit
		Do you want other search engines to link to your timeline?	On	Edit

Figure 3.3: Default privacy settings on Facebook November 2013. This Figure shows the default privacy settings on Facebook in November 2013.

<ul style="list-style-type: none"> General Security Privacy Timeline and Tagging Blocking 	<h3>Timeline and Tagging Settings</h3>			
<ul style="list-style-type: none"> Notifications Mobile Followers 	Who can add things to my timeline?	Who can post on your timeline?	Friends	Edit
		Review posts friends tag you in before they appear on your timeline?	Off	Edit
		Review what other people see on your timeline		View As
<ul style="list-style-type: none"> Apps Ads Payments Support Dashboard 	Who can see things on my timeline?	Who can see posts you've been tagged in on your timeline?	Friends of Friends	Edit
		Who can see what others post on your timeline?	Friends of Friends	Edit
		Review tags people add to your own posts before the tags appear on Facebook?	Off	Edit
	How can I manage tags people add and tagging suggestions?	When you're tagged in a post, who do you want to add to the audience if they aren't already in it?	Friends	Edit
		Who sees tag suggestions when photos that look like you are uploaded? (this is not yet available to you)	Unavailable	

Figure 3.4: Default settings for timeline and tagging on Facebook November 2013. This Figure shows the default settings for timeline and tagging on Facebook in November 2013.

appear in the search. To summarize, the privacy settings are *as public as they can get* by default.

Figure 3.4 shows the default settings for timeline and tagging of Facebook in November 2013. "*Who can post on your timeline?*" is set to *Friends*, which means that only Facebook friends can add things to your timeline. "*Review posts friends tag you in before they appear on your timeline?*" is set to *off*. This means when friends tags you in something, it will appear on your timeline before you have had a chance to review it. In most cases this is

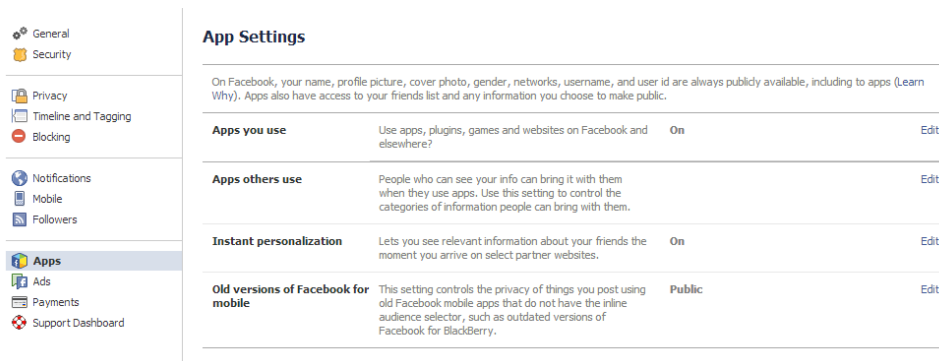


Figure 3.5: Default settings for apps on Facebook November 2013. This Figure shows the default settings for applications on Facebook in November 2013.

probably fine, but it may occur that a Facebook friends tag you in something you would not prefer to have displayed on your timeline. In these cases it would be desirable to have the review-setting turned on. *"Who can see posts you've been tagged in on your timeline?"* and *"Who can see that others post on your timeline?"* is set to *Friends of Friends*. In contrary to those who can post on your timeline, which are friends, friends of friends are able to view the content added to your timeline. If you have many friends on Facebook, and these friends have many friends each, the audience for posts are suddenly extremely large.

Default settings does not preserve privacy It is safe to conclude that the default privacy settings on Facebook anno 2013 is far too public. Unless there are conducted changes to the privacy settings, the timeline will be publicly available, with the exception of posts you've been tagged in and other's posts on your timeline which is "only" visible to friends, and friends of friends.

3.2.3 Default Settings for Teens

Each time a user on Facebook share a status update, the user chooses who the post is visible to, see Figure 3.6. The change you make will remain the same in future posts, unless you decide to change it. Up until today the default audience is set to "public", but for teens between 13-17 years, it has been "friends of friends". On October 16th Facebook announced to change the default setting for teens [34]. Now the initial audience for posts are "friends". Teens can later change this to "public", this was not a option before. Teens are active users of social media, and have want to be heard, either it is political engagement or an opinion on a movie. Further Facebook allows teens to turn on Follow, by doing this their public posts will show up in people's news feeds. Facebook designed these changes to improve the facebook experience for young people. In [34] Facebook also makes it clear that they take the safety

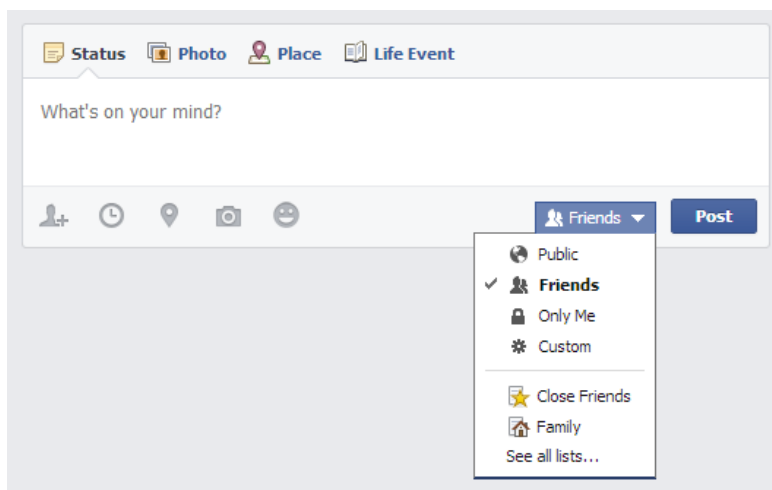


Figure 3.6: Choosing who can see a status update. When posting a new post the user can choose the audience the post will be visible to. This can either be "public", "friends", "only me" or "custom".

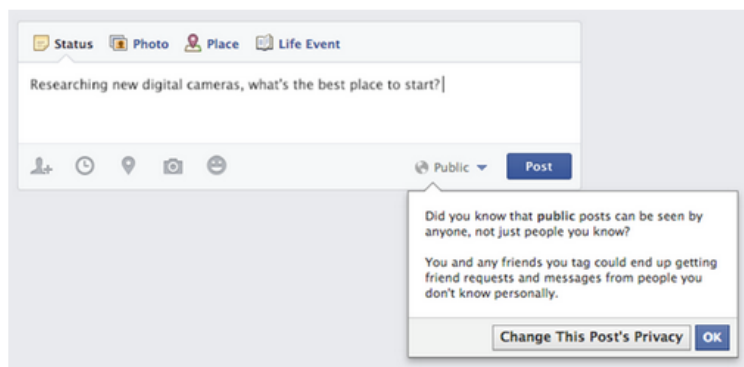


Figure 3.7: The message shown to teens when posting to the public for the first time. After the first time they post to the public the message in Figure 3.8 is shown [34].

of teens very seriously, and therefore have created a more extensive warning message, shown in Figure 3.7. This message appears when a teen changes the audience for their post. If they continue to post to the public, they will get an additional reminder message, as shown in Figure 3.8.

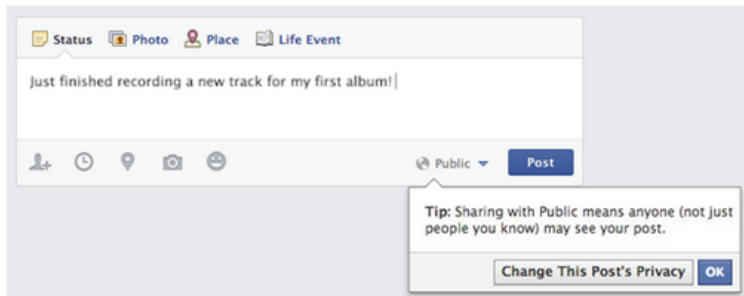


Figure 3.8: The message shown to teens when posting to the public, except for the first time. The first time they post to the public the message in Figure 3.7 is shown [34].

3.3 Facebook Features - Impact on your Privacy

3.3.1 News Feed

"Somehow we missed this point with News Feed and Mini-Feed and we didn't build in the proper privacy controls right away. This was a big mistake on our part, and I'm sorry for it." [12]

3.3.2 Facebook Platform - Apps

3.3.3 Beacon

At the end of 2007 Facebook launched the feature called Beacon. Beacon was created to help users easily share information from other websites with their Facebook friends [35]. Beacon was a key part of the Facebook Ads system. The aim was to connect businesses and users and create a more targeted advertising towards the users.

When Beacon was launched it had 44 partner site, among these are Live Nation, fandango.com, Trip Advisor, STA travel, eBay, the Knot and Zappos.com. According to the Facebook announcement [35] these websites could determine which actions was most relevant and appropriate for a user to share on Facebook. This could be anything from watching a video, a new high score on an online game, posting an item for sale or completing a online purchase. When a user, that is logged on to Facebook, enters a website that is part of Beacon, they will receive a message asking whether they would like to share their actions on Facebook. If a users agrees, the users actions on that page will be shown in their news feed or mini feed and shared with their friends.

Beacon received a lot of attention and privacy concerns. Some websites posted to Facebook without asking the users if they want to share the information first. Beacon is a very short piece of code provided by Facebook. The participating websites implement this

code on the actions that they would like people to share. An example described in [36] is with the blog page TypePad. The user have the opportunity to chose whether Beacon should be turned on or not. When creating a post and publishing it the user receives a small pop-up window in the lower right corner stating that you are now sharing this information with Facebook. The pop-up allow you to answer no, but here you have to be quick, the window is not visible very long. When entering Facebook a message is shown at the top of the users wall. Telling the users that a website have shared information with Facebook. You then have the opportunity to go through and select weather that website is allowed to share at all, to just friends of to the public.

But not all websites have created an option for the users to themselves choose to opt-in. And pushes to Facebook without notifying the users or lets the users select themselves that they want to share it. An much used example of this is a man buying and engagement ring online and the website posts on Facebook. Before the guy have the time to remove it, both friends and family and also the coming fiancée have seen it. So much for the surprise engagement. This is unfortunate for the users, but also for the companies using Beacon, it puts them in a negative light.

Another problem is that Beacon only checked that a user was logged on Facebook. When several people use one computer it could create problems, since Beacon was machine specific. One family member, the mother, could be logged on while her 10 year old son plays an online game, and manages to make a new high score. This high score will then be posted in the newsfeed on the mothers Facebook profile, and shown to the mothers friends. Beacon only checks that there is a valid Facebook cookie on the machine and then pushes the content to that Facebook user, without any validation.

In a blog post, Mark Zuckerberg apologized for the way the feature was created and for the handling of the complaints in hindsight. [37]

3.3.4 Facebook Connect - "Log in with Facebook"

From may 2008 users had the ability to connect and log in to other web pages via Facebook, "log in with Facebook"

3.3.5 Timeline

As mentioned in section 2.2 in Chapter 1, the Facebook timeline was introduced in December 2011 [14]. This feature made the entire history of the users visible: your posts, posts by others, likes, photos, links, pages liked, comments and other things that you have shared on Facebook. The timeline showed much more than the old profile did, and it was far more visual [38]. On the top of your timeline it is room for a big photo. This photo is called a *cover photo*. Cover photos are publicly available, and it is not possible to change the settings for them. You can of course choose which photo you want as your cover photo, or just choose

not to have a photo there at all. When scrolling down your timeline, you'll see photos, posts etc. and different events in your life in order of when they happened in time [38]. You can look at it as the story of your life. You get the opportunity to "go back in time" and fill in the blanks. If you want to emphasize, for example an event or a photo, you can highlight it with a star, or on the other hand, if you want to hide something from the timeline you can also do so.

Privacy concerns regarding Facebook timeline When timeline was introduced many people became overwhelmed by the changes, and felt they lost control over their privacy. When you agreed to start using timeline, you got a certain period of time to review and edit your timeline before making it public. This gave the users the opportunity to clean up their timeline before everyone else could view the content of it. Cleaning up the timeline can be done using something called the "Activity Log" [39], which is shown in Figure 3.9. The activity log is basically a list over everything ever done in connection with you on Facebook, either done by you or by others. The activity log also makes it easy to view and change the audience for the different "activities". If you are an active user of Facebook, reviewing the whole activity log can be very time consuming.

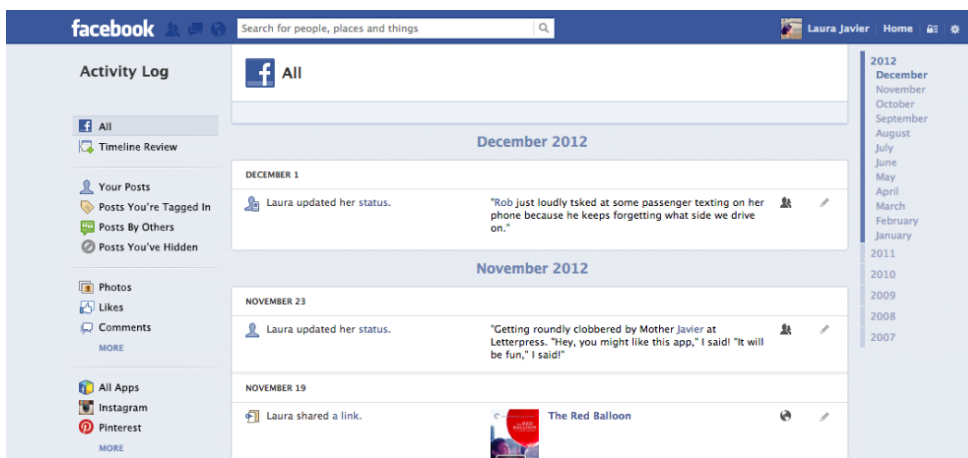


Figure 3.9: Example of an activity log on Facebook. On the left side you see types of content. If you want to view for example "Posts by others" you can do so by clicking on it. To the right you see a list of the years and months. You can click on which year or month you want, and review the activity from that year/month [39]

The introduction of timeline was not in itself a privacy breach since you had, and still have, the opportunity to decide what you want to be visible on it, and what you want to hide. On the other hand, there are people who are extra exposed when Facebook introduced new major changes, like the timeline. Let's refer back to section 2.3 in Chapter 2, where we highlighted

some of the findings from the survey addressed in the paper "Facebook privacy settings; Who cares?" by danah boyd and Eszter Hargittai [17]. boyd and Hargittai concluded their paper, based on their survey and findings, that experience and Internet skill is important to take into account in regard to how people handle their privacy settings on Facebook. Since familiarity with technology plays a role in how people handle their Facebook privacy settings, one can assume that the least skilled people get more exposed when Facebook changes the outline of the default privacy settings. This can be seen in the context with the introduction of the timeline. The least skilled users of Facebook that perhaps do not know how to change their privacy settings, probably was left extra exposed when the timeline was introduced and their timeline may have shown, and may still show, more than they actually would prefer.

There also exists privacy settings connected to your timeline under "Timeline and tagging" in your settings on Facebook. You can regulate who can add things to your timeline, and who can see things on your timeline. Under "Privacy" you can also regulate who can see your future posts.

3.3.6 Graph Search

3.3.7 Facebook Removes Search Privacy Setting

Facebook announced October 11 that they will remove the setting that has made it possible for Facebook's users to hide from the ability to be looked up on the Internet[40]. It was only the users that have not used the setting "who can look up my timeline by name" in December by last year that was affected by the change. Facebook explains the removal of the feature by it being outdated, and that there are several other ways to find a person's time line. They argue that it can be confusing for the user when they try to look up someone and do not find them. Mark Zuckerberg said that a user should do things they want to keep secret.

(sånn jeg ser det så er det jo fult mulig å søke opp hvem som helt på facebook sin egen søkefunksjon, det betyr jo ikke at jeg ønsker å være søkbar på google.

3.4 Zuckerberg's Thoughts

Zuckerberg once said this about Facebook in one of his meetings: "I mean, one way to look at the goal of the site is to increase people's understanding of the world around them, to increase their information supply," he said. "The way you do that best is by having people share as much information as they are comfortable with. The way you make people comfortable is by giving them control over exactly who can see what" [9].

This comment from Zuckerberg brings out his thoughts around the privacy issues. He wants the users of Facebook to be comfortable with sharing information, and give them this confidence by giving them control. In general the privacy settings and restrictions that Facebook has have protected the users. They can easily change the setting and decide who

can see what. Zuckerberg firmly means that you should not post comments or pictures of things you do not want anybody else to see. And if a user does so, the user has to take the blame for it, not Facebook. Zuckerberg was once asked about pictures put on Facebook of students drinking at an East Coast college, which led to some students being expelled. His answer to this question was: "First of all, it's pretty stupid if you put up pictures of you doing drugs on Facebook. I think that that's just sort of the deviant behavior on the very far end of the distribution. I bet that those kids do not post pictures of them doing drugs on Facebook anymore." He added that he meant this was a "pretty shitty way to learn that" [9].

Mark Zuckerberg wrote this in a letter to possible investors [41];

Facebook was not originally created to be a company. It was built to accomplish a social mission - to make the world more open and connected.

People sharing more - even if just with their close friends or families - creates a more open culture and leads to a better understanding of the lives and perspectives of others. We believe that this creates a greater number of stronger relationships between people, and that it helps people get exposed to a greater number of diverse perspectives.

By helping people form these connections, we hope to rewire the way people spread and consume information. We think the world's information infrastructure should resemble the social graph - a network built from the bottom up or peer-to-peer, rather than the monolithic, top-down structure that has existed to date. We also believe that giving people control over what they share is a fundamental principle of this rewiring.

We think a more open and connected world will help create a stronger economy with more authentic businesses that build better products and services.

Skal vi ha med det her? User control became a hot topic already in 2006. There had been reported that sex- offenders was using social networks to pick out their victims. MySpace found out that several teenagers had been assaulted by people they meet at their web page. Facebook also received some negative mention in the press. Numerous times the campus police had to shut down big parties announced on Facebook. In 2005 a student a Fisher college was expelled after posting this comment about the schools police officer "needs to be eliminated" [9].

Chapter 4

Survey

4.1 Constructing the Survey

4.1.1 How and why we chose this design

4.2 Survey Results

4.2.1 Demographics

As mentioned before we distributed our survey on two platforms; Amazon Mechanical Turk (AMT) and Facebook. As you can see in Figure 4.1, the distribution was mainly divided between two countries, the United States of America and Norway. Other countries are also represented; Canada, France, Germany, India, Indonesia, Ireland, Jamaica, Romania, Russia, Serbia and United Kingdom. 77 of the 250 responses were collected through the Facebook link, and out of these 77 people 96% (74 people) are from Norway. 173 of the 250 respondents took the survey via Amazon Mechanical Turk, and out of these people 85,5% (148 people) are from the United States of America.

The majority of the total respondents were female. They accounted for 56,80% of the responses, which is 142 responses. This means that 43,20% of the total respondents were male, with a 108 responses. We saw a difference in the gender distribution from the Facebook link and from AMT. On AMT 38,15% were men, and 56,80% were female. On Facebook 54,55% were male, and 45,55% were female. In other words the majority of respondents on AMT were females, in contrary to Facebook, where the majority of respondents were men. The different gender distributions are shown in the Figure 4.2.

Among the participants the age ranged between 19 and 76. The average age is 31. The average age of the AMT participants (33 years old) are higher than the average age of the Facebook participants (27 years old). When we look at the total income of the household per year and employment status, we find a wide range of variety among the participants. We have several participants in each group of income. Although the majority of the participants

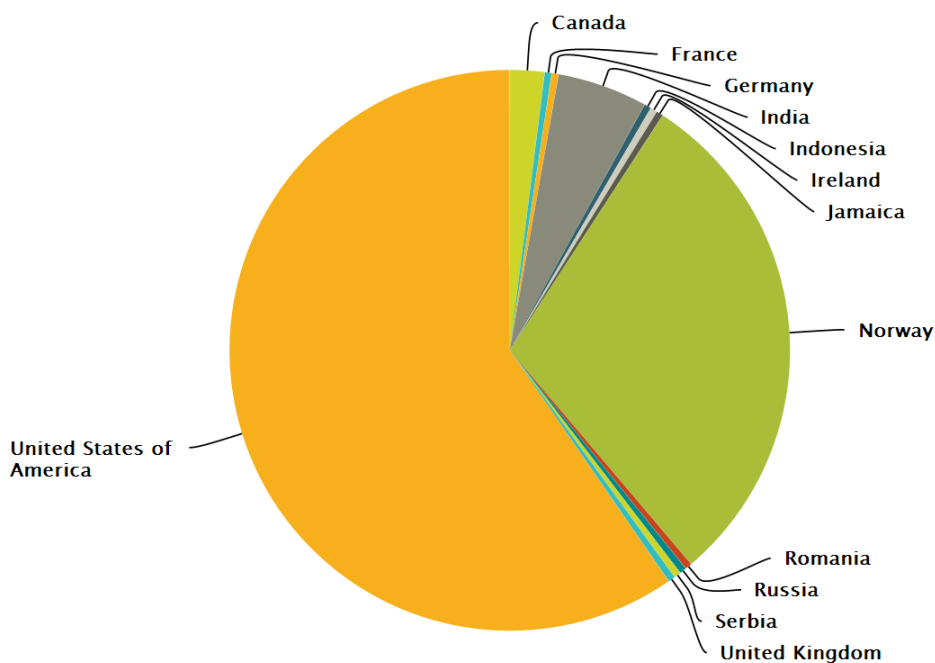


Figure 4.1: Distribution of the participant's country of origin. This graph shows the distribution of the participant's country of origin. Most of the participants are from the United States of America and Norway.

are employed for wages or students, all of the other employment status' are represented. This is consistent with former studies of AMT users [25].

4.2.2 Frequency in Checking Facebook Privacy Settings

Never Checked Facebook Privacy Settings During the Last Year

30 of the people who answered our survey stated that they have never checked their privacy settings during the last year. Even though they have not checked the privacy settings during the last year, most of them have done some changes to their settings before the previous year. The reason for this assumption is that their settings differ from the default settings. The average number of friends for the people who have never checked Facebook privacy settings during the last year is 162, and their average age is 39.

In Figure 4.3 you can see a percentage distribution over Facebook settings among the

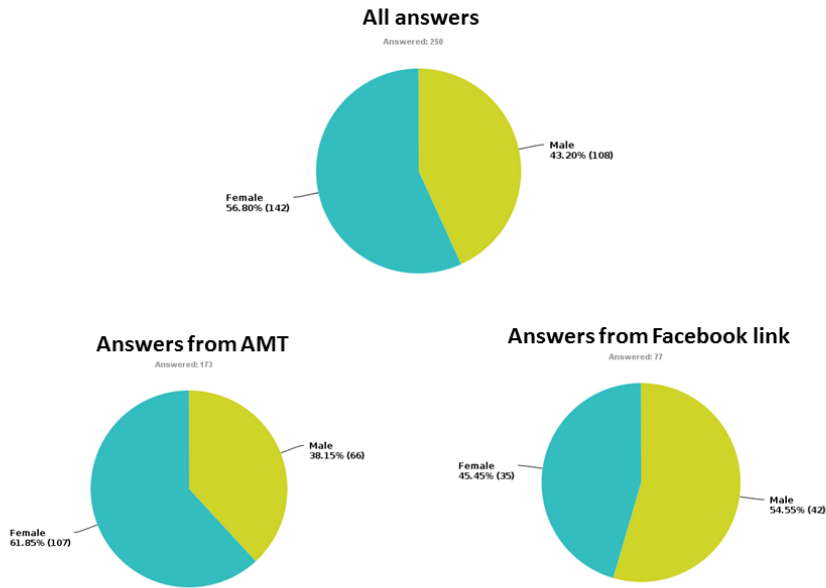


Figure 4.2: Gender distribution. This graph shows the overall gender distribution (on the top), gender distribution from AMT (to the left) and the gender distribution from the Facebook link (to the right).

people who have never checked their Facebook privacy settings during the last year. We have divided them into three categories; "Default", "More secure", and "Less secure". You end up under the category "Default" if your settings is similar to the default settings anno 2013. See section 3.2.2 for more detailed description of the default settings on Facebook. You end up under the "More secure" category if you have changed the default setting to a more secure settings. The "Less secure" is for those who have made changes to their settings which is less secure than the default settings.

The majority of these users are active users, since 67% of them checks their Facebook page at least once a day.

60% of the people who had never checked their Facebook privacy settings during the last year *did not* consider changing their privacy settings after reviewing them. 40% of them wanted to make their privacy settings more private.

Never checked Facebook privacy settings during the last year (30 of 250 people)			
	Default	More secure	Less secure
Who can see your future posts?	36,67 %	63,33 %	
Who can look you up using the email address or phone number provided?	76,67 %	23,33 %	
Do you want other search engines to link to your timeline?	73,33 %	26,67 %	
Who can post to your timeline?	96,67 %	3,33 %	
Review posts friends tag you in before they appear on your timeline.	76,67 %	23,33 %	
Who can see posts you've been tagged in on your timeline?	33,33 %	60,00 %	6,67 %
Who can see what others post on your timeline?	40,00 %	56,66 %	3,33 %
Review tags people add to your own posts before the tags appear on Facebook	86,67 %	13,33 %	
When you are tagged in a post, who do you want to add to the audience if they aren't already in it?	96,67 %	3,33 %	
Are you using secure browsing when using Facebook?	86,67 %		13,33 %
Are you using login notification?	63,33 %	36,67 %	

Figure 4.3: Never checked Facebook privacy settings during the last year. Forklare hva figuren viser.

We have a quote from a 67 year old woman that took our survey (with Ph.D and only 5 Facebook friends) that emphasised many user's unawareness when it comes to different Facebook settings: "Now you have scared me. I am alone and afraid".

Checks Facebook Privacy Settings "Once a month" or "Once a week or more"

48 of the people who answered our survey stated that they check their privacy settings "Once a month" or "Once a week or more". The average number of friends for these people is 416, and their average age is 28,5.

In Figure 4.4 you can see a percentage distribution of what kind of settings the people who check their privacy settings "Once a month" or "Once a week or more" have. We have divided them into the same categories as above; "Default", "More secure", and "Less secure".

85% of the people who checked their Facebook privacy settings "Once a month" or "Once a week or more" during the last year, has checked their Facebook page at least once a day during the last month. This indicates that the majority of those who check their settings frequently are also very active Facebook users.

70,83% of these people did not consider changing privacy settings after reviewing them. 27,08 % wanted to make their privacy settings more private, and 2,08% considered changing

Check Facebook privacy settings "Once a month" or "Once a week or more" (48 of 250 people)			
	Default	More secure	Less secure
Who can see your future posts?	8,33 %	91,67 %	
Who can look you up using the email address or phone number provided?	31,25 %	68,75 %	
Do you want other search engines to link to your timeline?	18,75 %	81,25 %	
Who can post to your timeline?	81,25 %	18,75 %	
Review posts friends tag you in before they appear on your timeline.	33,33 %	66,67 %	
Who can see posts you've been tagged in on your timeline?	12,50 %	81,25 %	6,25 %
Who can see what others post on your timeline?	12,50 %	81,25 %	6,25 %
Review tags people add to your own posts before the tags appear on Facebook	43,75 %	56,25 %	
When you are tagged in a post, who do you want to add to the audience if they aren't already in it?	54,17 %	45,84 %	
Are you using secure browsing when using Facebook?	85,42 %		14,58 %
Are you using login notification?	33,33 %	66,67 %	

Figure 4.4: Checks Facebook privacy settings "Once a month" or "Once a week or more". Forklare figuren mer nøye her

them to more public.

Comparing the ones Who Have Never Checked their Facebook Privacy Settings During the Last Year and the Ones Who Checks "Once a month" or "Once a week or more"

Activity level The majority of both groups checks their Facebook page at least once a day. The percentage is a little bit higher for the people who have checked their privacy settings "Once a month" or "Once a week or more" during the last year. 85% of them checks their Facebook page at least once a day, in contrast to the other group (who have never checked their settings during the last year) with 67% checking their Facebook page at least once a day. This indicates that the ones who have never checked their settings during the last year does not refrain from doing this because they are inactive users. One assumption for this may be that the users are unaware of the settings. 40% of them stated that they wanted to make their settings more private after taking the survey. This backs up the assumption about unawareness.

More secure settings for those who check their settings more often? As Figure 4.3 and Figure 4.4 shows, the people who checks their facebook settings frequently have changed their settings to more secure to a higher degree.

Considered changing settings The percentage of those wanting to make their settings more private is higher for those who have never checked settings during the last year with 40% of the group. Only 27% of the frequent setting-checkers wanted to make their settings more private. None of the people who have never checked their settings during the last year wanted to make their settings more public, unlike the other group (those who check "Once a month" or "Once a week or more") where 2% actually considered changing them to more public. Overall the frequent settings-checkers were more pleased with their settings than the once who had never checked them during the last year. 70% of the frequent settings-checkers did not consider changing their settings after reviewing them. Although the ones who have never checked their settings during the last year have far less secure settings than the other group, 60% of them did not consider changing their settings either.

4.2.3 Interdependent Privacy

Discussion

Conclusion

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