Social Networking Phenomenon – Facebook's challenges in the Changing World

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Abstract

Facebook strongly influences its users to make personal information public over the last few years. The idea behind such a practice is that marketers and developers can reach-out to the users by means of better and targeted products/services. But some users, privacy groups and politicians have protested this strong influence with lawsuits and official investigations

Our project examines how the current technology behind Facebook affects the users' privacy and studies its impacts. The introduction covers the rise of Web 2.0, brief histories of web evolution and web technology, and the birth of Facebook. We then analyze Facebook's technology shift and its users' behavior. We also analyze the strengths, weaknesses, opportunities and threats of Facebook by means of a SWOT analysis.

The main focus of our project is the privacy impacts of Facebook. In order to study the privacy impacts, we analyze the different innovations that evolved in Facebook and how they contribute for privacy and security issues in their own way. We also analyze the business model and global impact of Facebook, and elaborate on how these changes may affect Facebook's acceptance by its users and customers. The global impacts cover the micro and macro aspects of Facebook in social, political, business and economic forms.

We closely examine the privacy issues of Facebook through a survey; we collate the results and analyze them to draw inferences. We surveyed 164 people of different age brackets and gender, to analyze how Facebook's privacy issues impact them. Based on our survey results, we propose solutions and list the recommendations which may aid Facebook to overcome its privacy and security issues. We discuss the challenges that Facebook will face in order to grow the user base and conclude with suggestions about what Facebook can ensure in the future to retain its status as the world's most popular social network.

1 Orientation

Facebook is the leading social network with 800 millions of users; half of its members use the service every day and a considerable number of people are signing up each day. Users are not only interested by its powerful function of social network connectivity, but are also attracted by the new features and applications, that enhance their current experiences of communications and entertainment.

Facebook's innovative applications have not only attracted users but also enterprises which aim at marketing products/ services. While these applications can provide a big range of ways for advertisers to engage more with their customers, users are being pushed to share far more about their life histories and interests, and could face loss of privacy in actions involved with unwarranted access to their private data.

To have a better understanding of Facebook's privacy and security issues, and how these may affect Facebook's acceptance by its users and customers, we examined the technology and different innovations behind Facebook and their possible impacts on users' privacy. We also collected information from Facebook's users covering topics such as: sharing of personal information, level of comfort managing their privacy on Facebook, trust on the network, and reactions in case of privacy violations. From the literature reviewed, the data collected and the analysis realized, we propose a set of solutions and recommendations and present our conclusions.

2 Brief History of Social Media and Web 2.0

2.1 The Rise of Web 2.0

After the dot.com bubble burst in fall of 2001, a revolution brought forth changes that shifted towards the dawn of web 2.0. The concept of Web 2.0 was a discussion session between O'Reilly and MediaLive International and brought forth a revolutionized web platform. The potential of Web 2.0 was significantly innovative compared to web 1.0 because of its astounding potentials that it introduced to the World Wide Web. Web

was not only used through PC browsers but also evolved with combination of inter-connectivity with multiple mobile and electronic devices [30]. Web 2.0 implemented new technology with the capability of Graphic User Interface (GUI), rich content media, interactive applets and website. The web 2.0 innovations introduced a mix of technologies with growing potentials of the web 2.0 evolution. These immense changes that transitioned into web 2.0 continued to flourish into combination of mashed web 2.0 technologies that mutated into what is known as Social Media [29].

2.2 Social Media

Social Media uses Web 2.0 technologies or Mash-Ups, defined as combining various web tools to create one application, to bring social experiences to audiences of all types [23].

2.2.1 Blogs

One type of popular social media is called a Blog, derived from the original two words of WEB LOG. A blog gives users the capability to post entries and visitors viewing the blog can comment on the posting. Businesses, clients, and common bloggers alike were able to publish and share journals, experiences, and other writings to a widespread audience [36].

Blogs can range from the form of formatted text-only input to more complex forms such as video, audio, or photos. Microblogging is another form of a blog, but works by throwing short feeds for quick access so viewers can see updates in a timely manner.

2.2.2 Content Communities

Content communities are similar to the Social Networking sites in that network profiles are created allowing users to share content, such as documents, journals,

applications, videos, or audio, allowing other users to connect and communicate with one another. The main difference is that content communities focus on a particular topic or subject rather than a being a place where anything can be discussed or shared like Social Networking sites. The site is usually based on a common hobby, genre, or media type. One example is a site that brings together people who share an interest in photography. Users can share the photos they took with their cameras or suggest tips on how to effectively take shots at a scene [23].

2.2.3 Forums and Discussion Boards

Forums and discussion boards have been around before the emergence of Web 2.0 technologies in that discussions were through e-mail. With Web 2.0, forums typically function as blogs and social networking sites, but is driven on the concept of users constantly starting a topic and people who are interested in that particular subject has the opportunity to comment or share their thoughts about the topic in discussion. While forums focus on a particular subject, general forums also exist where a multitude of subjects can be incorporated [29].

2.2.4 Social Networking

Another type of popular social media is called *Social Networking*. This social media's main feature is to have network profiles created and configured to fit the personal image of a user, and from there, the user can connect to other profiles belonging to friends, family, or a particular type of group. Connected users can share content and updates as well communicate with each other through posts and messages [37].

Social Medium such as blogs, social networks, content communities, and forums, have revolutionized web experiences to a whole new level, bringing possibilities that were not imaginable during the web 1.0 era. Social Medium continues to grow and new techniques are evolving along with technology. With web 2.0 and social media, it has practically become possible to instantly reach out and engage worldwide audiences, bring

interaction and voices in masses. Social Media has changed web concept of static communications into dynamic real time communication that is vital in growth towards the digital world. With the growing future of social media, a new world of business and professions will innovatively continue to grow.

Web 2.0 technologies combined together brought upon social media and revolutionized how Internet is being used. Understanding the start of web 2.0 and social media provides clarity on how Facebook infiltrated into web. Facebook web applet has taken multiple social media tools and web 2.0 technologies incorporated together which has transformed it into one of the world's most successful social networking web application and social networking site.

3 SWOT Analysis of Facebook

We examined the strengths, weaknesses, opportunities and threats of Facebook by means of a SWOT analysis.

3.1 Strengths

- Wide audience and the number of increasing users
- Better user interface than its competitors MySpace and Orkut
- Current Global Market Leader
- Corporate Business Partners

3.2 Weaknesses

- Constant change to page design
- Liabilities regarding bugs and problems that users face when operating the website
- Lack of ability to customize page

- Facebook mainly focuses on commercialization of the website. They have a lot of smear campaign pages which promotes them by making the user click the 'like' button to access the page information and to get updates. People who are unaware of where it is leading to, tend to 'like' them and fall prey for hackers. Facebook is not having a good screening system to stop these malware currently.
- PR Blunders of Facebook - It was reported that Facebook paid a top PR firm to spread anti-Google stories across the media and to encourage various outlets to examine allegations that the Mountain View Company was violating user privacy [10].

3.3 Opportunities

- If Facebook overcomes its privacy and security issues, it has a wide spectrum of opportunities to continue being the major player in the current social networking websites
- There are untapped opportunities for game developers
- Advertising impact will be an opportunistic approach in reaching target markets globally

3.4 Threats

- Privacy and security issues
- Phishing and spamming
- The other new entrants into the industry such as Google+ and Unthink can also be considered as threats [34].

3.5 Facebook's Main Competitors

Google +

- One of the main features of this new service from Google, which might attract users, is its integration with the other Google services.

- Google also managed to implement a better friends' group manager. Google understood the users need to communicate and interact with their friends in different ways, based on their background: family, social or work.
- Google+ announces itself to be better than Facebook regarding chat.
- Google+ seems to overcome Facebook in terms of personal information management. Google is different and seem to be more mature in managing personal information. This is a winning attitude [24].

Unthink

- A social network brands itself as "anti-Facebook" and expects to attract users dissatisfied with Facebook policies. Unthink is a social network that bills itself as an "emancipation platform" for people who want to be social online, but are frustrated by privacy policies, advertising and unexpected updates that keep them trying to find new ways to protect their information [31].
- The site's profile design also puts privacy at the forefront. Whereas Facebook automatically makes certain information on new profiles public, Unthink profiles will be private by default, viewable only by the account owner until the privacy settings get manually adjusted in a different way. In this social network, users can create three different profiles — each with their own photo and personal information — that serve as customized public faces to friends and family, brands and professional contacts.

4 Problem Definition

Facebook's features are planned in order to attract the attention of current and new users, however privacy is one of the major concerns, and could make the difference between their success and failure.

The privacy issues related with Facebook's features could cause discomfort and loss of trust on the network, and could push users, followed by advertisers, to move to other social networks where these concerns could be better handled or do not even exist.

In order to avoid this situation, more attention should be paid on different ways to protect the user information in Facebook. When people share more information about themselves, there is a greater privacy risk and currently, Facebook offers options to control their profile privacy but some more need to be reinforced and designed.

5 Analysis of the Problem

Facebook is one of the leading social networking sites that has grown to more than 800 million users and has more than 50% of active users [12]. In order to lead in the social networking industry, Facebook's security and privacy issues can be lethal to its business.

As a leading social networking site, Facebook users are regularly targeted with unethical hacking, cracking, Trojan viruses, spyware, phishing attacks that regularly attempt in compromising user accounts and passwords. Facebook users are also facing security and privacy threats from 3rd party applications, malicious links, and cached cookies that cause vulnerability on user´s accounts [21].

Facebook users are constantly facing privacy and security issues. Leaving these issues unsolved can impact Facebook's popularity and can lead to potential dangers to both users and the business of Facebook. Facebook has faced numerous privacy and security issues from identity theft, defamation, advertisement issues, misleading campaign and trolling that has lead personal and business users to exterminate their accounts.

Facebook's security and privacy is already a concern for many users, which has a direct impact on its reputation. With privacy and security issues posing serious threats, if there is a decrease in the number of active users and the network traffic, it will have a serious impact on the Facebook organization because Facebook business relies upon its users; members who regularly use Facebook provide direct web traffic.

Facebook is currently ranked as 2nd most visited site in world [2]. Facebook is using its high web traffic to provide space and credits for business and organizations in terms of advertisements and marketing. Being the 2nd global ranking site in the world is very attractive in terms of global marketing impressions and advertisement opportunities to businesses and organizations. With the increasing security and privacy concerns, users may lose trust and this will prevent members from returning and using Facebook. Having angry users can also impact Facebook's reputation and trust.

Internet users are able to share and communicate globally and anonymously. With the tools of Web 2.0 and Social Media, users are vehement. Angry and upset users can communicate their frustration, complaints, and share their experiences through the Internet. Having niches culture of angry anti-Facebook users can have a negative impact on Facebook, because vehement angry users will voice their experiences to prevent future users and potential prospects [26].

With the loss of member's trust on security and privacy, including personal users and corporate users there will be a significant reduction in web traffic. This will impact advertiser's and marketer's decision on using Facebook's services. Security and privacy issues can also prevent advertisers and marketers on using Facebook's business services. Security and privacy has already impacted on various major organization withdrawals from using Facebook's advertising and marketing services. Vodafone, Virgin Media, Halifax, AA, and Prudential's are six major British firms that suffered with Facebook's Security issues [4].

Facebook's revenue primarily comes from advertisements; in 2011 Facebook is estimated to generate $4.27 billion in revenue where $3.8 billion will be coming from advertisements. This can conclude that 88% of Facebook's revenues come from advertisements [35]. Advertisement plays an important role in terms of attracting businesses and organizations to utilize Facebook's services. Organizations and businesses tend to use Facebook because of its high web traffic, impression, and exposure to massive audiences.

Facebook's popularity is massive and growing. The more it grows the more security and privacy issues its users will be facing. Facebook relies upon prospective users and active users to keep it alive. Privacy and security violations can impair Facebook's users to continue using its services and can also lead vehement angry users influencing Facebook's identity and reputation. When Facebook's users diminish, it will also limit Facebook's web traffic. Less traffic will reduce impression and influence businesses and organizations in selecting Facebook's advertisement and marketing services. Security and privacy can impact business and organization decisions on whether to continue using Facebook. It may also prevent them from choosing Facebook as a means for advertisement and marketing.

6 Literature Search

Acquisti and Gross [1] examined how Facebook's users with different demographics behave differently. They found that a minority of Facebook's users are unaware with their actual exposure and visibility of their information on Facebook. This relation let the readers know that individual's privacy concern is a weak predictor to their network because in reality Facebook's users who join the network are likely to reveal a great amount of personal information. Their survey found that a majority of respondents who share massive information in Facebook are undergraduates. They also use logic regression to measure Facebook's membership characteristic and privacy attitude to Facebook.

Jone and Soltren [20] examined the serious flaw in Facebook system is privacy features. They found that 80% of freshmen who attend orientation at MIT University share a significant amount of personal information on Facebook. They construct the threat model to analyze or address all possible categories of privacy failure. Security, commercial data mining, database reverse-engineer, password interception, incomplete access control, university surveillance, disclosure to advertisers, lack of user control of information are main categories that lead to privacy failure. Four universities were surveyed in their study.

They found that Facebook is undermined by three principal factors:

- Users disclose too much.
- Facebook does not take adequate steps to protect user privacy.
- Third parties are actively seeking out end-user information using Facebook**.**

7 Innovations in Facebook and Privacy Implications

As a leading social media, Facebook involves different innovations — product innovations, incremental innovations, open innovations and process innovations to name a few. All these innovations involve privacy implications in their own ways.

7.1 Product Innovation

Through the rise of web 2.0, Mark Zuckerberg a sophomore who attended Harvard University wrote a program that was called Facemash, a web application that was used for basic information and photo-sharing over the net. This innovative creation has led a revolutionary change to what is now called Facebook.

Facebook in simple terms is a social networking web application, a virtual product that allows users to post and share information and rich content media files. The product innovations in Facebook are the products that are being used through the Facebook interface and the social networking services.

Other than photo viewing and sharing, Facebook includes various functionalities in their web applets. Facebook provides much functionality in order to provide a rich pleasant user experience. The collection of Facebook's functions, products, and services include:

- Wall post
- Friends List
- Chat

- Video
- Status updates
- Notification
- News feed
- Message and inbox
- Poke
- News feed
- Voice chat
- Usernames
- Short URL
- Events
- Marketplace
- Places
- Networks and groups

Facebook's products were progressively added throughout the years. Facebook uses new functionalities and their continuous updates provide new web experiences to its users. Having new functionalities and changes is important for Facebook in order to maintain its current users and to attract new users.

The growing users and functionalities pose serious security threats. Similar to its progressive releases, Facebook fixes its privacy and security in a progressive manner. To quote an example, the step that Facebook took in product security was to fix the security issue in photo viewing and sharing. The photo lingering in the earlier version of Facebook caused security and privacy issues which allowed users to download and save other user's shared photos. Facebook realized the threat and changed the photo viewing and sharing as view only. This was done by using web development scripts and technologies that prevented user from dragging or saving images, but still allowed users to browse through the image gallery.

7.2 Incremental Innovation

The birth of Facebook by itself is an incremental innovation. Emergence of MySpace and Facebook were different takes on the same concept: Who can I connect with?

MySpace opened its doors to everyone from the beginning. There were originally no restrictions about who could make a MySpace profile. However, MySpace got very cluttered, unorganized and difficult to weave through real people and "alts" or people posing as fake personas. Facebook took this concept, but originally was open to only college students (or people with an .edu e-mail address). This small, or incremental innovation allowed Facebook to remain a more polished and respectable site. Once Facebook established its reputation, it opened its doors to the general Internet community. This put them in a very good position to take over the social networking market, doing nothing but small, incremental changes.

Facebook attracts the attention of new and current users by incrementally innovating its features. To name a few, the various features of Facebook such as Chat, Deals, Easter Eggs, 'Like' option, messages, inbox, networking groups, news feed, photos and notifications were innovated incrementally.

With respect to improving its features and usability, Facebook has always followed incremental innovations. It has encountered many privacy concerns ever since it opened to everyone on September 26, 2006. It has tried to address many privacy issues incrementally but not all. To name a few Facebook discontinued its Beacon feature; added privacy controls and streamlined its privacy settings with respect to News Feed and Mini-Feed, provided the ability to voluntarily terminate accounts and fixed the cross-site scripting issues. But Facebook is yet to address many of the privacy issues [32].

7.3 Open Innovation

Facebook has decided to hold "Open Graph Technology Days" in major cities. During these Open Graph Technology Days, there will be: keynote talks on the value of Open Graph to developers, an overview of the Open Graph protocol, sessions focusing on games, mobile, and the new marketing APIs, a Q&A session with the Facebook developer team, and office hours where developers can get one-on-one time with Facebook engineers [8]. This encourages other companies to create and develop innovative uses for Facebook users. It seems Facebook is encouraging commercial competition and marketing of its products through open innovation sessions. It is loosening its grip on internal control of its products. This allows more leverage for other companies to have external control.

Facebook is attracting new users by developing new applications that are attractive to them. It is opening their platform to other developers, so that new uses and applications are possible. This is an example of open innovation. Facebook maintains current users by using incremental innovation. The changes they make are very small, so the users will not become frustrated or lost. Facebook applications are interesting enough for users to come back time after time.

Facebook has decided to keep key personal information private; everything not defined as General Information. This includes users' biographies, birthdays, sexual preference, religious and political views, photo albums, your own posts, and wall postings [9].

7.4 Process Innovation

Users who regularly use the Facebook applet are familiar with the interface and the visible design and are able to navigate through it. On seeing Facebook through browser, users would only see the apparent and do not think any deeper. We never really

consider what the back end of Facebook is and if someone asks a non-technical user how Facebook is being run, a simple answer may be “its magic!”

The processes running behind Facebook are more complex than just magic. When implementing Facebook’s applet on the site, Facebook did one amazing job in the construction of a state of the art server infrastructure. Apart from the hardware being used, looking deeper into heart of Facebook, and what is really making Facebook work can be simply be compiled as a sequence of inputs and outputs of binary 1’s and 0’s, or in another words, Facebook is running massive programming codes, databases, and software.

Facebook lives on a server, hosted under APACHE webserver. The webserver is hosting and storing massive amounts of web development source codes including PHP. PHP is one of the primary server-side scripting languages that are run behind Facebook, implementing the PHP framework together with MYSQL allows the users from the front end to access, store, and retrieve information in MYSQL. Of course, this can include security vulnerability with poor encryption. MYSQL act as a cataloguing database, which is driven by scripting languages such as a PHP. Facebook did great job innovating a dynamic storing and retrieving process. Using PHP and MYSQL really works in Facebook, but that is only speaking in a sense of a single database catalogue. How is Facebook able to manage it when it involves millions of database catalogues from millions of users?

In order to answer that question, Facebook responded with Cassandra a database management system. Cassandra manages massive amount of database catalogues. Facebook uses Scribe that records sequences of massive amounts of connection and transmission logs made throughout the server. Logs are also useful tools to identify the history of connections and monitoring security in Facebook.

By implementing Cassandra, Facebook innovated their process of technology and operation efficiently by mining millions of database catalogues that stores user

information, logs allowing process information and instruction to circulate through the network server infrastructure [14].

In addition, some researchers blame Facebook for not taking serious measures on their security issues because Facebook did not block third parties or outside social networks accessing Facebook's users' privacy data. Most researchers feel that the Facebook's immune System should be improved further because it only blocks 20 percent of the accounts that are being used by other social networks like Socialbot [15].

Detecting and blocking the fake accounts can be one of the biggest challenges for Facebook, because the real threat comes from the other Socialbot network or from malicious hackers. Some researchers indicated that if someone has more friends on Facebook, it is more likely that they accepted a friend request from Socialbot. Part of the process innovation starts with a problem. According to Jeffrey Baumgartner, process innovation in a business context is a structured action that is remarkably easy to implement. Once the problems get implemented or changed, it is likely to end with profit [3].

In order to resolve the security issues, Facebook spent $41,000 over 21 day program to discover or develop the security loophole bug. One of Facebook's security researchers got a reward for $7,000 for fixing six serious bugs found on Facebook. The minimum amount paid for a bug is $500, up to a maximum of $5000 for the most serious loopholes. The maximum bounty has already been paid once in order to vet its code and run "bug-a-thons" to hunt out mistakes. Facebook regularly receives reports about glitches from independent security researchers [5].

8 Business Model of Facebook

Facebook's business model is based principally on the number of active users of the platform, advertising, and credits. All these factors interact to provide revenues to Facebook.

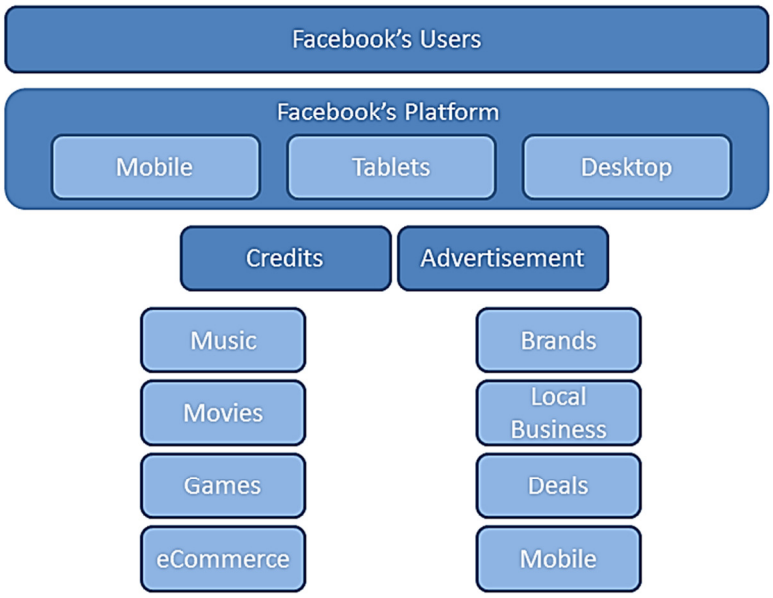


Figure 1. Facebook's Business Model Diagram. Source: Simplyzesty.com [17]

8.1 Facebook's Users

Facebook filled a need that most of the people didn't know they even have, new productivity and communication, for free. Before Facebook many other social networks offered to their users the possibility of meeting new people and to express themselves. Instead Facebook was created to bring to the web already existing social communities. Facebook provided a valuable service: it did not create a community which never existed before; rather it provided an important information and communication service to a pre-existing offline networks. This made people feel comfortable enough to disclose information that they normally wouldn't post on the Internet.

For users, Facebook's core service is completely free and ad-supported. Facebook users are not its customers. Customers of Facebook are companies looking for advertisement.

8.2 Facebook Platform and Applications

The Facebook's Platform provides a set of Application Programming Interfaces (API) and tools which enable third-party developers to integrate with Facebook through programs on user's profiles, or thought external websites and devices [33].

In 2007 Facebook was opened to program developers wanting to run applications on the social network. Developers were allowed, without restrictions, to offer their programs to Facebook's users free of charge, or for a reasonable price. Facebook never controlled developers' revenue on their products, attracting many developers to the network.

Each application potentially added more value and features to Facebook. From 85 applications and 65 developers partners initially, Facebook passed to 24000 applications and 400000 developers and entrepreneurs, within the first few months of its initial launch.

According to Facebook statistics [12], there are more than 7 million applications and websites integrated on the site, which were provided by more than one million associated developers and entrepreneurs.

8.3 Facebook's Credits

Facebook Credits are a virtual currency that can be used to buy virtual goods, such as virtual pets, valentine roses, cards, chocolates, in all applications and games on the Facebook platform. Credits are available when users access to games and apps on desktop or mobile devices.

Facebook's credits are becoming a more relevant part of the developer platform, being the exclusive virtual currency for all Facebook's applications. Users can buy credits directly from the Games Dashboards or from Facebook platform through payment methods such as: credit cards, PayPal, mobile phones, and other.

8.4 Advertising

The popularity of Facebook has attracted many enterprisers looking at the social network as a perfect place to advertise their products and services to specific markets.

According to Nielsen, it is expected that a variety of industries may increase the budget for online advertisements than for any other type of media [25]. By the end of 2011, it is expected that Facebook's U.S. advertising revenue will give a 17.7 percent share of the market for graphical display ads that appear on websites, which include banner ads, video ads and Web page sponsorships [26].

Advertisers using Facebook can decide between paying per clicks (CPC), or per one thousand impressions (CPM). With the model CPC, advertisers pay Facebook when the ad is clicked, and the traffic is directed to the advertiser's website, with the CPM model they pay on the basis of what it costs to show the ad to one thousand viewers.

8.4.1 Demographic Targeting and User's tracking

Facebook offers its advertisers the advantage of directing their announcements to specific audiences. Advertisers can target their potential customers based on specific criteria, such as: location, language, education, work, age, gender, birthday, relationship status, likes and interests, connections, and friends of connections [13]. Thus, the more Facebook can learn about people's lives and interests, the better positioned it will be to target advertising at them and to persuade companies to use it to market their products.

Additionally Facebook also uses online tracking to increase the relevancy of its ads. Online tracking, which is also used by other popular websites, particularly Google, AOL, and Microsoft, to track users' online activity and deliver ads relevant to that activity, allows Facebook to enhance advertising revenue streams [16].

Facebook's implementation of Social Ads and tracking may hurt its goodwill and reputation with users, but it is easy to see why these products were conceived and

implemented, and why Facebook has resisted modifying them to accommodate user concerns. Although Facebook has been highly successful from a raw membership numbers point-of-view, turning its membership numbers into profits is a challenge that depends on advertising.

9 Conceptual Model

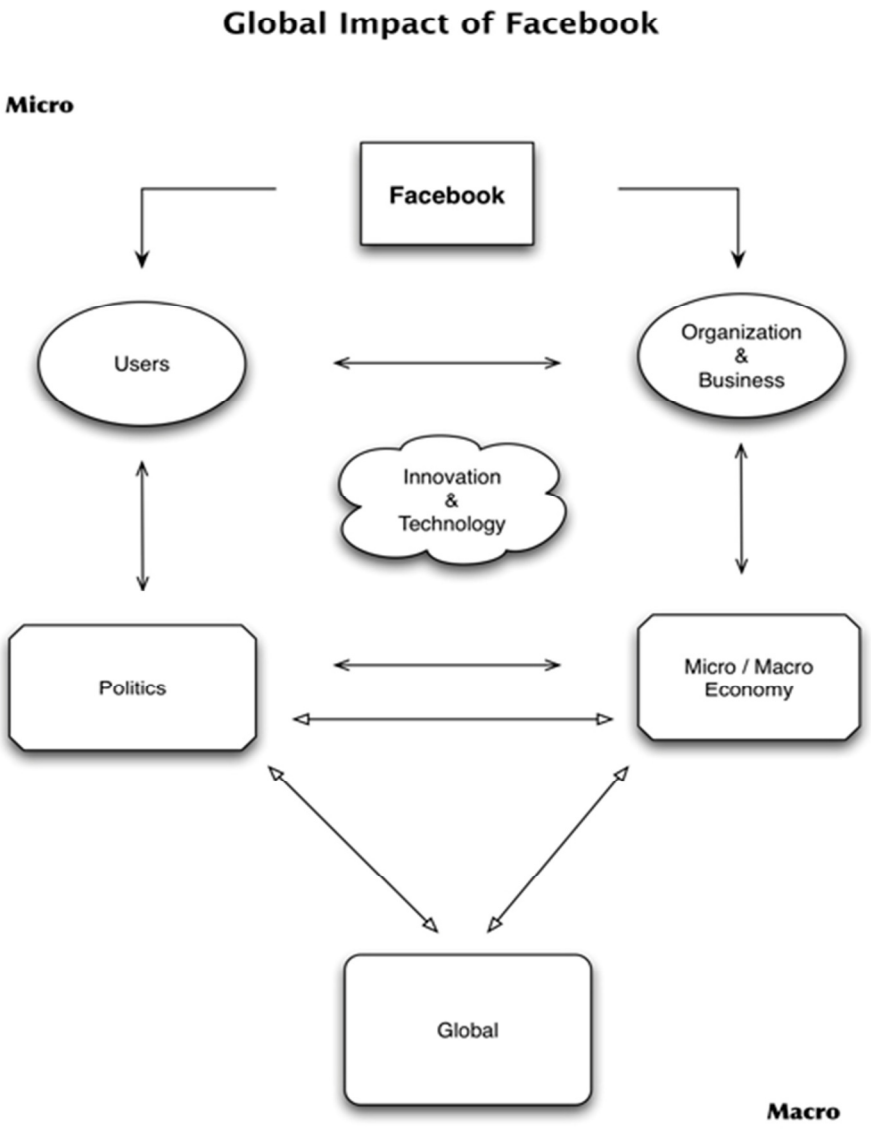


Figure 2. Conceptual Model

9.1 Central Perspective

Technologies and Innovations are constantly changing as dynamic variables. New technologies constantly change and new products are introduced, upgraded, and revolutionized into the market. Due to the ever-changing dynamics of technology, technology and innovation has become central to users, organizations, politics, and the global economy [7].

Facebook has been incrementally innovating its applications and new developments are constantly under development. Facebook first started with their function of a wall post and users account, and has now incorporated functions such as video calling, interactive games, multimedia sharing, and additional social media tools. The incremental changes are represented in the central technology and innovation of Facebook's product innovation and incremental innovation.

Through the changes and upgrades of Facebook, a reactive response is reflected through the users and organization using the Facebook social applet. Users are quickly adapting to the new functions and organizations are re-evaluating their business strategies through Facebook's new features. To quote an example of how incremental and technological innovations have critically impacted Facebook's success, we can consider the "Like" feature. This feature spread the popularity of Facebook virally and become an internal trend and external trend. The Like feature gained popularity and has been added into media sharing sites, business products web pages, blogs and individual websites [28].

With the incremental features of Facebook, businesses and organizations have shifted their marketing focus towards Facebook as a means of Social Media Marketing taking advantage of Facebook's reputation and massive online exposure as a digital media marketing strategy. Businesses and organizations can utilize the many features of Facebook and connect with their audiences using rich media contents, news releases, and product and services advertisement via Facebook. This is not only common for

businesses and organizations but also for athletes, musicians, performers, actors, great figures, and politicians. In 2008, it was a major hit for Barack Obama when the political campaigns were done through the features of Facebook and social media. Obama's campaign utilized Facebook as an effective approach to connect potential voters and as a means of strategic exposure and communication with massive audiences [29].

Understanding how businesses, organizations, individuals, groups, and politicians are using Facebook as a means of marketing, communication, and advertisement has been possible through the incremental and product innovations of Facebook. The technologies behind Facebook are critical for the birth and survival of Facebook. Technologies server, network, Internet, computers, and computer science are running through loops of innovation and technologies, and so the technology running behind Facebook and understanding of the back end of Facebook also needs to be considered.

Facebook is a social media applet, which is live on the Internet behind a Domain Name Server and an immense hosting server. Therefore, the product of Facebook cannot only be presented through a front-end perspective because in order to have a front-end, it requires a back-end; front-end cannot exist without a back-end. Database technology, SQL technology, computer science technology, server and networking technology are scopes of Facebook. Viewing the technology being used in Facebook, implementing a data mining technology is necessary in order to store user's profile, analytics, permissions, business intelligence, and generated information from Facebook. It requires state of the art servers, coolers, massive generative power, and complex information and networking infrastructure. In a project management perspective, all the technologies running behind Facebook are critical for the project scope of the product. Without the innovation of communication, electrical, networking, cooling, and storage technology the user interface and social applet of Facebook cannot be operable [18].

Each element of front-end and back-end of Facebook is central to technology and innovation that greatly effects and contributes to the users, clients, and the businesses of Facebook. The impact of Facebook can be seen as a system, both the technology and

innovation behind Facebook, the social media application and the users are all inter-connected elements of the Facebook system. The combination of results, services, products, and impacts that are the outputs of Facebook reflect and represent the behavior of the Facebook system.

9.2 An Overall Perspective of Facebook's Global Impact

The technology and innovation is not only the driving force behind Facebook but also the driving forces behind users and organizations. Users and Organizations are depending on the technology and innovation, because all of those aspects are interconnected with one another. Therefore a user cannot access Facebook without the growing technological innovations through PC, network, Internet, and mobile technology.

Facebook success grows from having users who use it for communication and this becomes a natural form of marketing for Facebook. If Facebook does not have users who are active, Facebook cannot exist because users are the driving force behind Facebook in the same way as advertisements for Google.

Facebook is receiving traffic from users and therefore has strong impressions through Internet traffic. This immense web traffic is apparent for businesses, and organizations are taking advantage of Facebook as its strategic business approach. Business and Organizations can now run business through Facebook as an application implemented within Facebook. These applications generate revenue from users who use the application. An example would be application such as "Restaurant City" and "Café World" where users can buy credits for their characters and virtual products for game play. In the application "Restaurant City;" a game where players are the owners and managers of a virtual restaurant, players can exchange cash for credit in the game and buy additional virtual ingredient for their restaurant or virtual clothes for their character. Businesses and Organizations are also using Facebook to publicize their products and services [27]. Allowing advertisements through the business profile or paying Facebook

for an advertisement spot aiming towards potential clients where the advertisement is shown on the far right side of the page when users are browsing.

Facebook's popularity has grown internationally and has become a globally widespread social media application. The social media tools of Facebook are available for open communication where the security settings are open for the public to view or as a private setting where communication and information is shared between selected members, friends, family and acquaintances only. The use of Facebook has caused such a vast international impact not only in form of social experience but has escalated as a form of political revolt. An exceptional example of the influence of Facebook through political and economic influence is seen in the "Facebook Revolution" that has stirred a revolution in Tunisia and Egypt. Political protestors using Social Media as a means to communicate have led to massive revolt and protests in Tunisia and Egypt. The Egypt protest of January 25, 2011, a revolutionist group was started on Facebook that had grown up to 80,000 members who were preparing to protest [19].

On a micro scale, Facebook serves individual users and business organizations. Users are the driving force behind Facebook and they affect businesses, organizations, politics and economy. Users are seen as potential customers and clients for businesses and organizations. Businesses and Organizations are using Facebook for advertisements. Facebook applications are generating revenues from users. Politicians and campaigning has evolved through the use of Social Media and Political candidates from both local and national perspectives are adapting the uses of Facebook.

Businesses and organizations play a role through a micro perspective economy. Businesses are receiving revenues from customers and from marketing through potential customers both through social media and non-social media approaches. Politicians and Businesses are contributing to both a micro level economy and macro level economy. Users are also affecting politics and economy through a large scale seen in Tunisia and Egypt revolution. Users are influencing political campaign and business through reputation and information that are being circulating from the use of Facebook.

On a macro level, Politics and businesses have a great impact on global economic perspective. Businesses are influential towards micro level economy by providing products and services and by providing jobs in community or in a state. Numerous businesses combined into a single perspective are influential on a national level economy. Its result is included in nation's statistical rate of employment and in perspective of nation's wealth and tax revenue. This is a similar perspective where a single user may have minor influence in business and politics, but massive user groups or organizations lead to a massive impact on national or international politics and economy.

Figure 2 has an interconnection that represents an overview of the impacts of Facebook from both micro level perspective and a macro level perspective. This figure presents a bottom down impact, but can also be presented as a bottom up impact, because both macro level politics and economy affects the micro level as well. The global impact is only made possible because of the driving forces of technology and innovations.

10 Data Gathering and Statistical Analysis

In order to examine how Facebook's privacy and security issues may affect its acceptance, we conducted a survey to collect information from Facebook's users.

10.1 Discussion of the Survey

The Survey was focused on getting user inputs on privacy and security issues in Facebook, including topics such as: sharing of personal information, data protection, level of comfort managing their privacy on Facebook, trust on the network, and reactions in case of privacy violations.

10.2 Research Sample

We had 164 participants in this research, 98.2 % of them were current Facebook users. They were divided into seven groups according to the age range. Most of the

participants were in the age range of 26 to 34 years. Table 1 shows the composition of the groups.

Focus Group	Age	Number of Participants		
		Male	Female	Total
Group 1	13 - 17	10	11	21
Group 2	18 - 25	18	28	46
Group 3	26 - 34	40	27	67
Group 4	35 - 44	8	6	14
Group 5	45 - 54	5	6	11
Group 6	55 - 64	3	-	3
Group 7	Older than 64	2	-	2

Table 1. Participants of the Survey.

10.3 Analysis and discussion

10.3.1 Privacy Concerns for Using Facebook

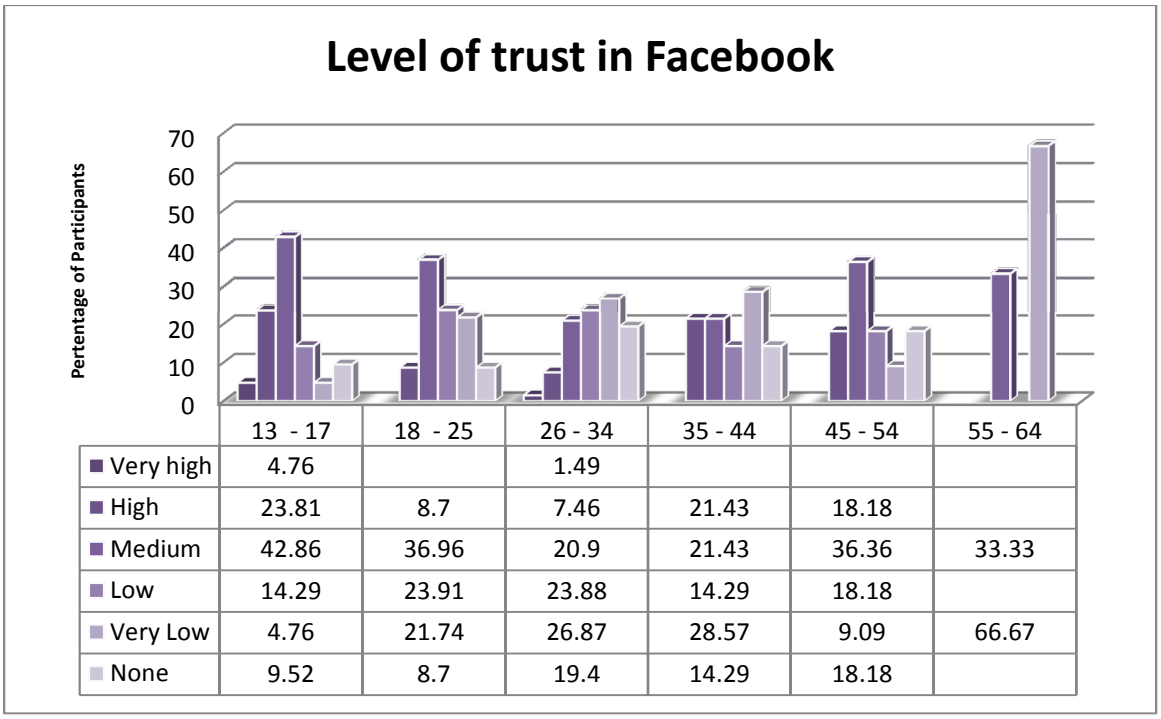
According to our research, many participants, Group 2 (67.39 %), Group 3 (74.63 %), Group 5 (72.73 %), Group 6 (100 %), tend to be aware about their privacy when they use Facebook. However, 62% of the Facebook's users in the focus group with ages between 13 and 17, and 64.29% of those with ages between 35 and 44, admit that Facebook's privacy has not influenced them for the use of the social network.

Most of the participants prefer to share their personal information only with their friends/family lists, Group 1 (100 %), Group 2 (84.78 %), Group 3 (71.64 %), Group 4 (78.67 %), Group 5 (54.55%), Group 6 (66.67%). 19.51% of the total base of participants do not wish to share their personal information in the social media, and just 2.44% consider fine sharing their personal information with everyone.

10.3.2 Personal data Protection and level of trust in Facebook

Just 21.47% of the participants consider their personal and private data in Facebook is highly or very highly protected. 43.56% consider their data moderately protected, 30.67 % consider it low or very low protected, and 4.29% think there is no protection at all.

The above situation has a direct relationship with the level of trust on Facebook about the no distribution of user's private data. Just 12.81% of all the participants have a high or very high level of trust in Facebook on this matter, and 30.49% have a medium level of trust. 42.68% said to have a low or very low level of trust, and 14.02% admit that they do not trust Facebook in this aspect. Figure 3 details the opinion of the participants in each of the focus groups. Participants between 13 and 17 year old, expressed to have the highest level of trust in Facebook for not distributing their private information to public.



	13 - 17	18 - 25	26 - 34	35 - 44	45 - 54	55 - 64
Very high	4.76		1.49			
High	23.81	8.7	7.46	21.43	18.18	
Medium	42.86	36.96	20.9	21.43	36.36	33.33
Low	14.29	23.91	23.88	14.29	18.18	
Very Low	4.76	21.74	26.87	28.57	9.09	66.67
None	9.52	8.7	19.4	14.29	18.18	

Figure 3. Level of trust in Facebook for not distributing the private data.

10.3.3 Managing Facebook's Privacy Settings

Participants also expressed their level of comfort managing their privacy in Facebook. 32.32% of them felt that they knew the basics of privacy and security settings, 20.12 % considered to know enough to be safe and secure, 16.46 % said to have good knowledge, and 3.05% very good knowledge. 19.51% of the participants expressed to know very little about Facebook´s privacy settings and policies, and 8.54% admitted to have no idea on this matter.

Eventually 28.7% of the participants said to have a high or very high level of comfort managing Facebook's privacy features, 42.86% consider to have a moderate level of comfort, while 28.57% admitted to have a low, very low level of comfort, or not comfortable at all on this aspect. Participants between 13 and 17 years old expressed to have the highest level of comfort managing their privacy in the social media, followed by participants between 18 and 25 years old.

10.3.4 Privacy Violations on Facebook

According to our research, Facebook's users feel that unsolicited use of personal information for advertisement purposes wound their privacy. They consider that the uses of cookies and other features for tracking user activities, searches based on visual profiles and social plug-ins, pictures tagging, are serious violations of privacy currently in Facebook. Figure 4 details the opinion of the participants according to each focus group.

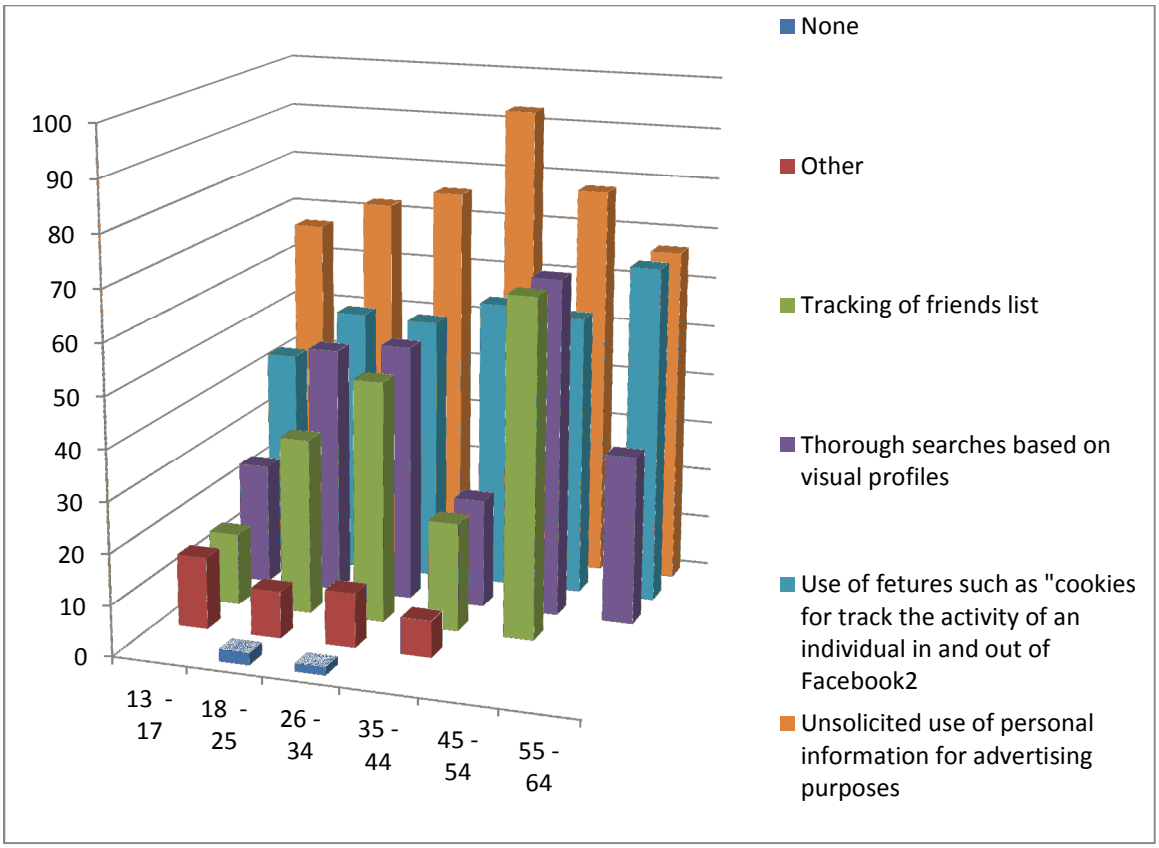
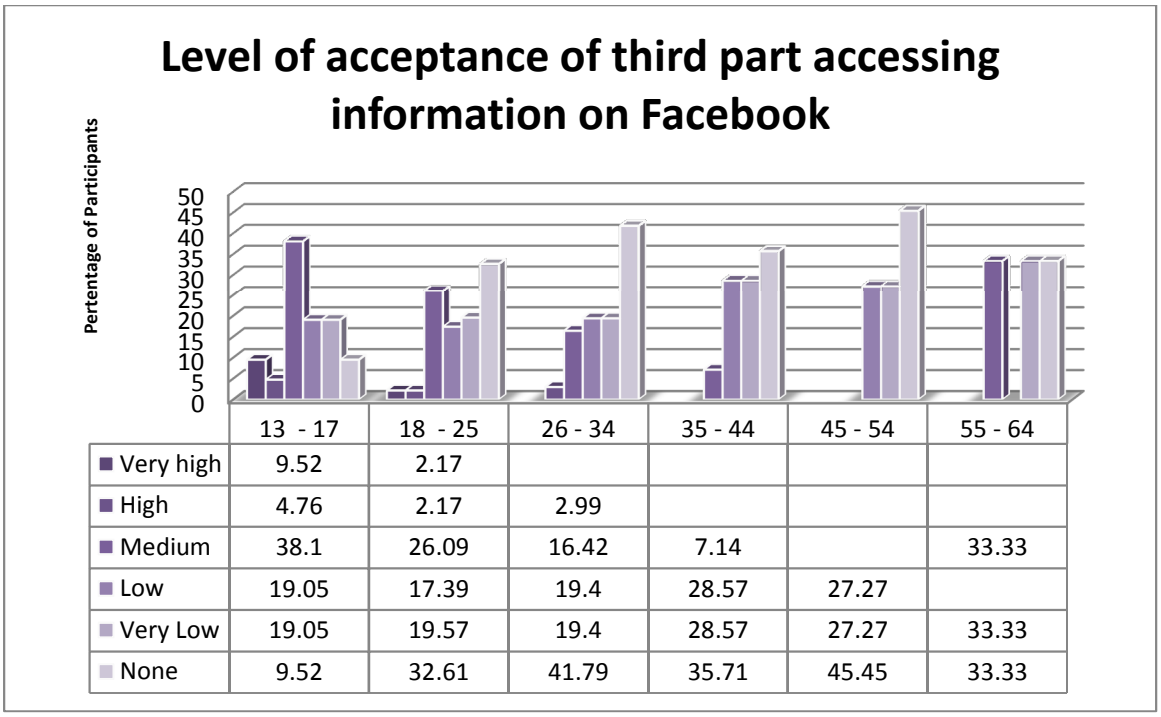


Figure 4. Facebook's users inputs about privacy violations.

10.3.5 Acceptance of Third Party Organizations accessing Personal Information on Facebook

In relation with the above situation, many participants expressed to have no level (34.76%) or very low level (20.73%) of acceptance to third party organizations when it comes to accessing their personal information. Participants of groups 1 and 2 are more likely to accept the access to their personal information by third party organizations that may include government or commercial entities. Figure 5 details the opinion of the participants.



	13 - 17	18 - 25	26 - 34	35 - 44	45 - 54	55 - 64
Very high	9.52	2.17				
High	4.76	2.17	2.99			
Medium	38.1	26.09	16.42	7.14		33.33
Low	19.05	17.39	19.4	28.57	27.27	
Very Low	19.05	19.57	19.4	28.57	27.27	33.33
None	9.52	32.61	41.79	35.71	45.45	33.33

Figure 5. Level of acceptance for third party accesses

10.3.6 Reactions to Privacy Violations on Facebook

Given a choice of changing the privacy settings (or) deleting their accounts in case of unwarranted access to personal or private data, 42.07% of people would change their privacy settings if possible, 16.46% would deactivate their Facebook accounts temporarily, and 33.54% of people would delete their Facebook accounts permanently, and 7.93% of them would open a new one. Additionally, users expressed that in case of perceiving privacy violations; they would try to delete as much of significant personal information as possible from Facebook, or would only upload minimum information about themselves.

Due to safety and privacy issues 51.85 % of the participants have thought about deleting Facebook account at least once, and 1.85 % of people have already deleted their Facebook accounts. However, most of the participants between 13 and 17 (61.90 %) have never considered deleting their Facebook accounts.

No significant opinion difference was found between male and female participants in terms of the privacy and security issues of Facebook discussed in the survey and documented results.

More details of all questions and answers of this survey are consolidated in the appendix of this document.

11 Solutions and Recommendations

Currently Facebook account can be used on several third-party websites and applications. There are many social implications due to the unintended data sharing revealing too much personal details. According to our survey, we have found out that one of the main concerns for Facebook's users is the access of third parties to their personal information or data. To overcome this privacy issues related to third party accesses, one possible solution is to implement temporary authorization systems inside the original Facebook system that can have the specific data to be shared as part of temporary authorization. The user can then use that token and input it in 3rd party sites. This way the user will know in definite terms what data will flow out of his/her Facebook account, instead of generic access. This may avoid possible data sharing threats.

Facebook has a lot of work to do on its privacy controls. In some cases, the new "frictionless sharing" features of Facebook can make it so that even when users are logged out of Facebook, their browser will still track every page they visit and send data back to Facebook. "Even if they are logged out, Facebook still knows and can track every page you visit. The only solution is to delete every Facebook cookie in their browser, or to use a separate browser for Facebook interactions [22]."

Facebook consistently approaches innovation and privacy changes with a do-it-first-and-then-see-what-happens attitude, which enrages those who feel, it should ask permission first. Recently, Facebook also introduced the facial recognition feature,

without notifying the users. Security specialists are saying that such a system might help associating photos with email addresses.

It is innovating in an area--the fine line between public and private--that has always freaked people out. It is allowing people to communicate and share information in ways they never have before. It is making decisions that affect hundreds of millions of people. And it is trying to stay a step ahead of competitors that would like nothing better than to see it get scared and conservative and thus leave itself open to getting knocked off.

Given this reality, Facebook could take one of two approaches:

- **It could always ask permission first** — methodically testing changes, asking users what they want, and not doing anything users haven't explicitly approved of in advance.
- **It could keep doing what it has always done: Make changes first and then see what happens.**

The first approach would unquestionably produce smoother peaks and valleys for Facebook's PR. It would also likely be vastly worse for the company's business. If Facebook were to radically change its approach to innovation, meanwhile, seeking prior approval for every change it makes, its innovation would slow to a crawl.

Facebook's approach to innovation is aggressive, in other words, but it's the smart one. It's the same one Microsoft had in the two decades in which it dominated computing and built one of the world's most powerful and valuable businesses [6].

12 Conclusion

In order to continue to be the most appealing social media for users and advertisers, user claims and concerns must be highly considered. The large volume of

users that Facebook has is not necessarily synonymous with user's full compliance. Some Facebook users have more actively expressed their dissatisfaction with the way Facebook handles their privacy. Initiatives such as Europe versus Facebook [11], have led campaigns to boycott Facebook in Europe, and have taken governmental agencies, such as The Irish Data Protection Commission, to conduct a privacy audit of Facebook's activities outside the United States and Canada after complaints to the Irish commissioner and the U.S. Federal Trade Commission. The groups raised concerns over Facebook's "frictionless sharing" of reading, listening and viewing activity as well as the use of cookies to track users' browsing. If these concerns are not well addressed Facebook could also face more reactions from users who worry about the social network capacity to monitor everything going on in their lives. Facebook definitely need to work on addressing its privacy and security issues in order to survive this tight market and its competitors.

Also revenue generation models may saturate at some point. In contrast, Google's various services will attract users to multiple services using both ad-based and some subscription-based services that can be made available to users. On Facebook, the only source is ad-based on the user-content which again runs the risk of having privacy issues, as the targeted ads may need some user data.

In the future, Facebook must expand to provide multiple services at varied QoS (quality of service) - having some subscription based revenue. For example, film, TV show streaming, file hosting, group discussion/activity like Webex etc. In short, "diversification and differentiation" of the product services at multiple QoSs is a must to survive this tight market.

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