

# How People Care about Their Personal Data Released on Social Media

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**Abstract**—Content sharing services have become immensely popular on the Web. More than 1 billion people use this kind of services to communicate with friends and exchange all sorts of information. In this new context, privacy guarantees are essential: guarantees about the potential release of data to unintended recipients and the use of user data by the service provider. Although the general public is concerned about privacy questions related to unintended audiences, data usage by service providers is still misunderstood. In order to further explore this level of misunderstanding, this work presents the results of a survey conducted among 900 people with the aim of discovering how people care about the use of their personal data by service providers in terms of social media. From the results, we found that: (i) in general people do not read license terms and do not know very much about service policies, and when presented with these policies people do not agree with them; (ii) a good number of people would support alternative models such as paying for privacy or selling their personal data; and (iii) there are some differences between generations in relation to how they care about their data.

**Keywords**—Privacy; Social Networks; Social Media; Survey

## I. INTRODUCTION

Content sharing services or social media such as social networks are becoming immensely popular by the day. A previous study [1] showed that in 2011 more than 1 billion people used social networks, more than 600 million people used them at least daily, and in general people use more than one social network service. More recently, the most popular social network, Facebook, had 1 billion users per month [2]. In these sites, users view their profiles as a form of self-expression, and share a lot of personal information. In addition, these networks mimic in-person interactions, and people are often willing to reveal many more private details than they would otherwise [3, 4].

In this new context, with people publishing a lot of personal data, privacy requirements are very hard to satisfy.

That being said, there are many possible ways in which the privacy of a social media user's information can be compromised, for instance, accidental data release to unintended recipients and the use of private data for marketing purposes by the social site or by plug-in applications using social site API's, among others.

The second problem is interesting because people are not often aware of it. In their study, Dwyer and Hiltz [5] found that people generally feel that the privacy of their personal information is being protected by social media sites. However, a majority of the most popular social media, such as Facebook, Twitter and Google Services (services such as Google+, YouTube and orkut), expressly declare that the service is allowed to use, share and sell (and much more) user data for marketing or any other kind of purposes [6-8]. This kind of license can be used to track almost everything that users do on the internet, or, in the case of Google terms and services installed on Android smartphones, to track almost everything about the user. And these companies expressly declare that they use these rights mainly for marketing purposes. Some approaches try to hide the information from the service provider, but they have had only limited success and applicability [3, 4, 9].

There is also another problem: third party companies have improper access to user personal data. Felt et al. [10] studied the 150 most popular Facebook applications and found that almost all of them were given wider access to private user data than necessary.

On the other hand, some studies show that users know that their data is valuable. Danezis et al. [11] conducted a study at Cambridge University and concluded that people really value their privacy in a real context, even more so if they have partners, and much more if they know that their data could be used with commercial interest. A year later, Cvrcek et al. [12] extended that study to 1200 people from the EU and the outcome confirmed the Cambridge results. Furthermore, other studies also concluded that people are likely to sell their own

personal data [13, 14].

In this context, we conducted a survey aiming to discover: (a) if people really know about what is being done with their personal data; (b) how people care about their personal data released on social media; (c) what people think about the current model (free cost and no privacy), and their opinion about an alternative model (small cost, privacy guaranteed); and (d) if there are some differences between generations in relation to how they care about their data.

In this study, we surveyed 900 people of all ages and from many countries, especially from Brazil. We mainly found that: (i) people do not read and consequently do not know about the service terms; (ii) people care about their privacy and fear that social applications amass, maintain, analyze and commercialize their data; and (iii) some people would like a new model, such as a data marketplace model, or even pay to guarantee their privacy.

The remainder of this paper is organized as follows: Section 2 presents the research approach, including the planning, data collection and analysis phases. Section 3 presents the survey results and draws comparison with related works. Finally, Section 4 presents the concluding remarks and suggestions for future work.

## II. RESEARCH APPROACH

This survey aims to discover:

*How people care about the use of their personal data by service providers in terms of social media.*

This question derives the following research questions:

*RQ1: Do people know about social network companies' policies?*

*RQ2: Are people satisfied with these policies?*

*RQ3: Do people like a new social network privacy and sharing model, i.e. Data Marketplace?*

*RQ4: Are there differences between generations related to how they care about their data?*

The approach for this research was systematically organized into three phases, presented in this section. In the *first phase*, the goal was to define, evaluate and validate the questionnaire. In the *second phase*, the questionnaire was publicized and the data were collected. In the *third phase*, the data was analyzed and research questions answered. This section presents these steps, and discusses the main threats to the study's validity.

### A. The Questionnaire

The survey questions were created in order to answer the research questions, capture individual behavior, privacy perception and impressions. The first version of the survey was defined and revised by Ph.D. and M.Sc. researchers in computer science, in conjunction with a psychologist. A pilot project was conducted with this survey version using 6 respondents, and a set of non-technical improvements was

made to increase the quality of the survey, such as rewording some questions more clearly, including information about questionnaire objectives and respondents privacy, and adding a statement about the estimated time for answering the questionnaire. In addition, it was included a brief introduction to privacy on social media, in order to align concepts between researchers and respondents.

### 1) The Questions

The final questionnaire is an online form composed of a set of 10 questions, divided into four groups: (i) demographic data which include participant's age and country, as well as the number of social networks (SN's) participating; (ii) awareness about social media privacy models; (iii) impressions about these models; and (iv) opinions over the possibility of a new model. The three demographic questions (age, country and number of SN's) are open, while the other questions are closed with the option of "Other". At the end, the respondent could inform his e-mail to participate in a book raffle. In addition, the questionnaire is bilingual: in English and Portuguese.

### B. Data Collection

In order to reach people who really use internet communication and are already on social media, the survey was published and publicized only online, in late May of 2012, and closed once we had 900 respondents in early August of 2012. The publicizing was mainly on Facebook, Twitter, e-mail groups and instant messenger applications. It was initially publicized in Brazilian channels, as universities lists and groups, some organizations (such as Brazilian Computer Society and *Porto Digital* – the biggest Brazilian Technology Park), and through the authors' social networks, in addition to a *twitter* account with more than 150 thousand followers (@srlm). Moreover, it was sent directly to authors' international contacts and all advertisement asked the respondents to share the questionnaire among their social sites, as a kind of viral advertising.

We used an online service (bit.ly) to track the number of survey clicks and we found that 52% of link clicks (2,348 in total) came from Facebook. As a result, people from 16 countries responded to the questionnaire even though most were from Brazil (95% of respondents). A discussion about the possible bias generated by these sample selection is presented in section 2.4.

### C. Data Analysis

After the data was collected, we began the data analysis in an effort to respond to the research questions. The survey was responded to by people of all ages, from 12 to 69 years old. We classified respondents' age by generation according to the age distribution shown in Fig. 1 [15].

Aiming to respond to the research questions, the questionnaire questions were grouped into three categories:

*RQ1: Do people know about social network companies' policies?*

Questions: *Do you usually read carefully the terms of*

agreement, especially those lines addressing information copyrights? Did you know that while transferring a file or content through a social software you are (in most cases) sharing your file's copyrights with the social media company owners?

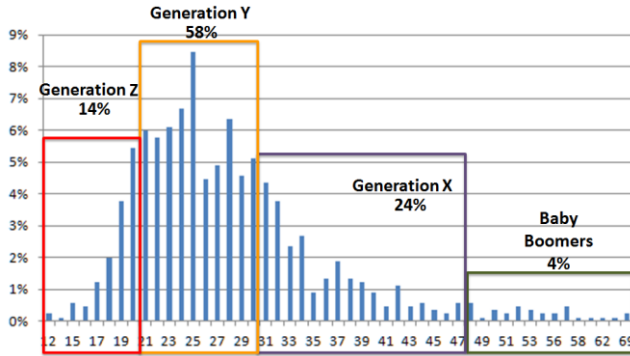


Fig. 1. Respondents' age and generations.

*RQ2: Are people satisfied with these policies?*

Questions: *Do you fear that social applications (such as facebook or twitter) collect, maintain, analyze and commercialize the data you provide? Have you ever considered giving up using some social applications for fear of misuse or commercialization of your personal data?*

*RQ3: Do people like a new social network privacy and sharing model, i.e. Data Marketplace?*

Questions: *What do you think about a marketplace in which the social applications reward you for making use of your personal data? Would you pay for a service that gives you total control over the data that you publish on social applications (beyond application level features such as privacy settings)?*

In order to better analyze RQ3, these two questions were analyzed in conjunction with the other questions, in order to gather evidence about the type of people who are more likely to support a new model. In addition, we analyzed all the questions by generation, trying to discover patterns between the responses and respondents' age.

At the end, in order to answer *RQ4 (Are there differences between generations related to how they care about their data?)*, we performed data crossing between respondents' age and the other questions, trying to identify any patterns.

#### D. Validity

Considering internal validity, whether the experimental design is able to support conclusions on causality or correlations, we adopted a more descriptive analysis, initially analyzing each answer separately and after performing some data crossing. Although it served to achieve some meaningful conclusions, a multivariate statistical analysis would be interesting to determine further relationships.

Considering external validity, as the participants were not randomly chosen, and considering that 95% of respondents are Brazilians, the study cannot be generalized to describe the

world Internet population. However, considering that Brazil has one of the biggest social media population (the second Facebook population with 66M users [16]), to mapping Brazilian's behavior is useful to understand a large portion of internet users.

In addition, we can argue that the viral advertising was successful since we achieved a large portion of population outside authors' social network (mainly technologists from Generation Y and older). For example, we achieved 14% of respondents from Generation Z (12 to 19 years old), similar to 17.9% of Brazilian population from 10 to 19 years old [17].

### III. SURVEY RESULTS

This section presents the analysis of the data collected in the survey, and then discusses the results. First, the overall results are presented, followed by a discussion that focused on data marketplace and payment model, and after that by a discussion that focused on participants' age.

#### A. Overall Results

First of all, we want to answer *RQ1: Do people know about social network companies' policies?* This is a very important question because if people do not know the service's terms, they also do not know what is being done with their data. They do not have a clear sense of rights and obligations, and consequently they do not have a clear mindset about the benefits and harms of the model.

The results presented in Fig. 2 show that people do not know about social media company's policies: 55% of respondents had never read the terms of agreement and copyrights, 39% read them sometimes and only 4% always read the terms. As a direct consequence, the answer to the next question followed a similar pattern, i.e. 54% admitted to not knowing that when they accept the terms and use the services they are sharing their rights with the service provider. Only 37% know about it.

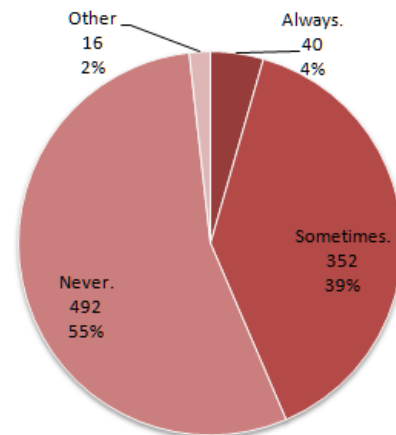


Fig. 2(a). Do you usually read carefully the terms of agreement, especially those lines addressing information copyrights?

This result is worrying, because it shows that people use social media without knowing their rights and obligations, and what is being done (and what can be done) with their data.

This lack of knowledge leads to the concern demonstrated in the responses to RQ2 (*Are people satisfied with these policies?*), as shown in Fig. 3.

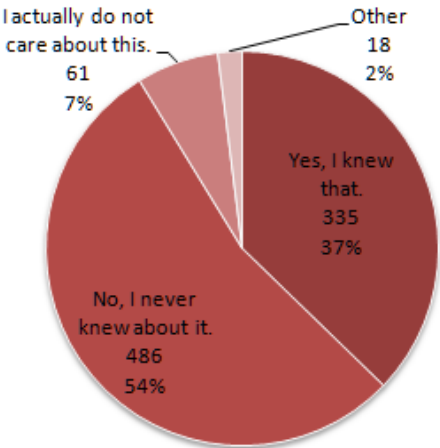


Figure2(b). Did you know that while transferring a file or content through a social software you are (in most cases) sharing your file's copyrights with the social media company?

As to the questions (*“Do you fear that social applications (such as facebook or twitter) collect, maintain, analyze and commercialize the data you provide?”* and *“Have you ever considered giving up using some social applications for fear of misuse or commercialization of your personal data?”*), 83% of participants answered that they do fear the fact that social applications collect, maintain, analyze and commercialize their data. In this group, half of the respondents fearing this behavior answered that even though they fear, they will not do anything about it, while the other half answered that they feel that their actions against it would be useless. On the other hand, only 11% affirmed that they trust the services and 6% opted for the “other” option.

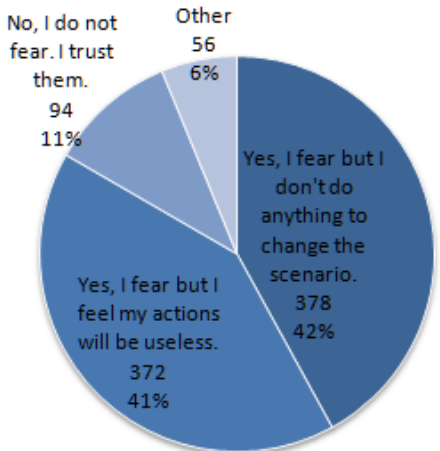


Fig. 3(a). Do you fear that social applications (such as facebook or twitter) collect, maintain, analyze and commercialize the data you provide?

In a similar sense and related to these question, 68% of respondents to the next question affirmed that they had once considered giving up using these applications for fear of misuse or commercialization of their data (more specifically,

27% think about giving up frequently, and 41% think about it but their need for these services is stronger than this preoccupation). On the other hand, 22% said that they do not care about it, or prefer that services analyze their data in order to receive personalized information.

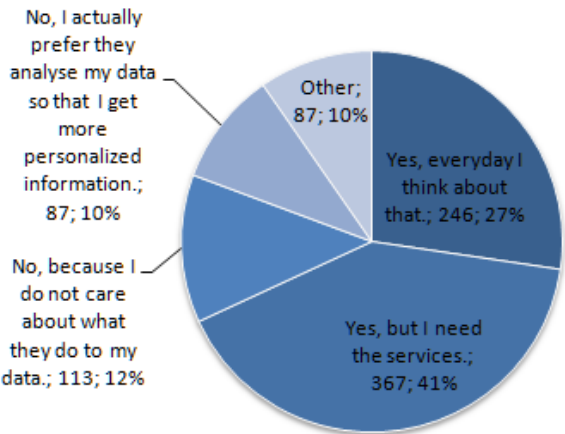


Fig. 3(b). Have you ever considered giving up using some social applications for fear of misuse or commercialization of your personal data?

This result (83% fearing the misuse of their data and 68% thinking about giving up these services) is very interesting because it shows that users do not like the fact that social media services collect, maintain, analyze and commercialize their data. However, this is the business model of the majority of popular social media, who in their terms of services claim that they would do it. Facebook’s terms of service [7], revised on June 8, 2012, explicitly claim that:

*“You own all of the content and information you post on Facebook, and you can control how it is shared through your privacy and application settings. In addition:*

*1 - For content that is covered by intellectual property rights, like photos and videos (IP content), you specifically give us the following permission, subject to your privacy and application settings: you grant us a non-exclusive, transferable, sub-licensable, royalty-free, worldwide license to use any IP content that you post on or in connection with Facebook (IP License).”*

It is clear that, instead of the user owning his/her content, Facebook has a full license to use it. In the same way, Google uses the same strategy, covered by its terms of service, as revised on March 1, 2012 [6]:

*“When you upload or otherwise submit content to our Services, you give Google (and those we work with) a worldwide license to use, host, store, reproduce, modify, create derivative works (such as those resulting from translations, adaptations or other changes we make so that your content works better with our Services), communicate, publish, publicly perform, publicly display and distribute such content.”*

In the same way, Twitter’s terms of service, as revised on June 25, 2012 [8], state that:

*“By submitting, posting or displaying Content on or through the Services, you grant us a worldwide, non-exclusive, royalty-free license (with the right to sublicense) to use, copy, reproduce, process, adapt, modify, publish, transmit, display and distribute such Content in any and all media or distribution methods (now known or later developed).”*

*You agree that this license includes the right for Twitter to provide, promote, and improve the Services and to make Content submitted to or through the Services available to other companies, organizations or individuals who partner with Twitter...”*

From the analysis of previous questions, it is clear that: (i) people do not agree that companies use their data on social media; but (ii) companies use people’s data and are protected by their terms of service; and (iii) due to the fact that people do not read these terms, they are not aware that companies use their data. Thus, we can conclude that the answer to RQ2 (are people satisfied with these policies?) is definitely not.

As to RQ3, on whether people would like a new social network privacy and sharing model, such as a Data Marketplace, 32% answered that it would be the ideal scenario, while 43% did not believe that it can happen, and 20% did not like the idea because such applications would charge people to use their services. The unlikely outcome concerns agreement with previous questions, where almost the same percentage (22%) did not care about usage of their data. On the other hand, considering that it is a disruptive model, a third part of respondents agreeing that it is the ideal scenario can be considered as a good support for the idea. The responses are shown in Fig. 4(a).

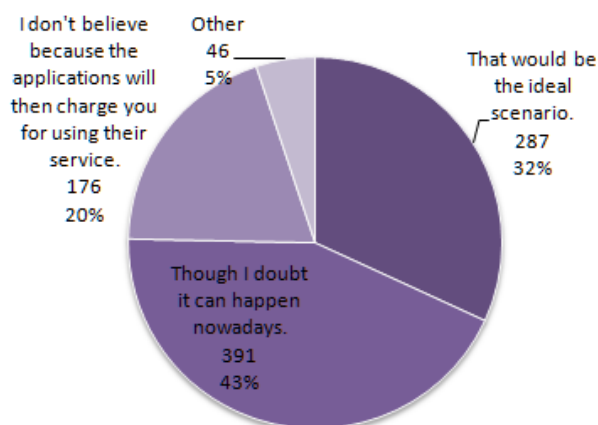


Fig. 4(a). What do you think about a marketplace in which the social applications reward you for making use of your personal data?

In addition, we have a direct question on whether people would pay for a service that guarantees their privacy. Fig. 4(b) shows the responses. We were surprised about the results: 55% of respondents supported the model, and 11% indicated that they would pay for this kind of service regardless of the price. On the other hand, 40% of respondents answered that they would not pay for such a service. This behavior can be explained by the 20% who did not care about usage of their

data, plus a portion of the population that do not price their personal data. Maybe this portion refers to young people. This hypothesis will be explained in the following sections. However, considering that a third of people claimed that this model would be the ideal scenario, and more than half of the people would pay for privacy, we can conclude that people support this new privacy and share model.

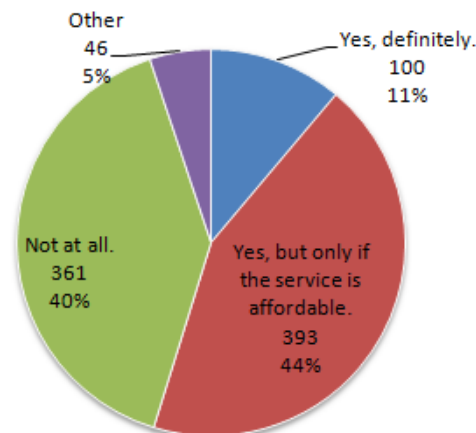


Fig. 4(b). Would you pay for a service that gives you total control over the data that you publish on social applications (beyond application level features such as privacy settings)?

## B. New Privacy Model Results

In order to better analyze and understand the question about the new model (RQ3: do people like a new social network privacy and sharing model, i.e. Data Marketplace?), we performed data crossings between the model and payment questions in terms of the other ones.

When we considered the relationship between the number of accounts on social networks and people who like the marketplace model, there is no significant difference in terms of whether people believe or not that it would be the ideal scenario. Similarly, considering the relationship between the number of accounts on social networks and the specific question on whether people would pay for a service that guarantees their privacy, a pattern could not be found.

Significant differences cannot be found by crossing the answers about data marketplace and payment for privacy. In this scenario, independent of what people may think about the data marketplace model, the difference in percentage between people who would pay for privacy services and those who would not pay is very low: 52% - 57% supporting, and 38% - 44% not supporting.

On the other hand, as expected, people who are not satisfied with the policies and fearing the misuse of their data and/or thinking about giving up using the applications, are keener to pay for a privacy guaranteed service, as shown in Fig. 5 and Fig. 6. These graphs show a particular tendency: a clear majority of people fearing for their data being misused think about giving up using applications, and are keen to pay for privacy. But the situation is just the opposite in relation to people who trust in the applications or who do not care about it or prefer this kind of behavior.



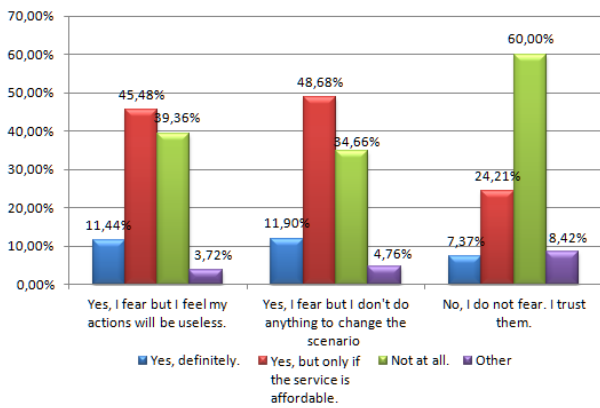


Fig. 5. Fear of data misuse or commercialization X Support privacy payment model.

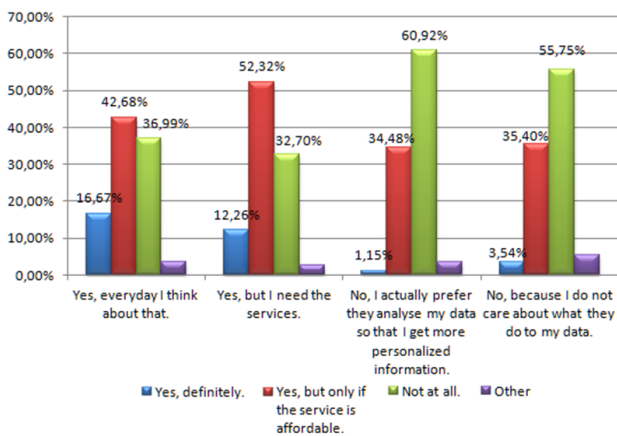


Fig. 6. Give up using applications X Support privacy payment model.

The same behavior can be observed if we compare people who set privacy settings and people who are keen to pay for a privacy guaranteed service: the majority of people who are concerned with privacy configuration are keener to pay for privacy. In opposite, the large majority of people who are not concerned with privacy configuration or who do not care about it are therefore not keen to pay, as shown in Fig. 7.

In addition, the responses show that people who read terms of agreement and copyrights are keener to pay for privacy regardless of the price (22.5%). On the other side, only 9.9% of people who never read terms of agreement are keener to pay.

In order to answer the question *RQ3 (Do people like a new social network privacy and sharing model, i.e. Data Marketplace?)*, considering that a third of people answered that data marketplace model would be the ideal scenario, and more than half of the people would pay for privacy, we already considered that people support this new privacy and share model. In addition, after the detailed analyzes, these findings can be extended. In general, people who know the terms of service are more likely to support the new model. This group also is keener to pay for privacy. In addition, as expected, people more concerned to configure their visibility settings and

who fear about misuse of their data are also more likely to pay for privacy.

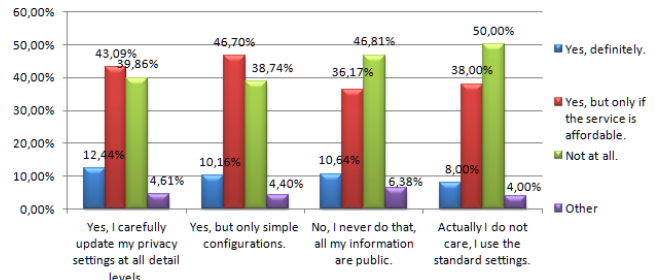


Fig. 7. People who update privacy settings X Support privacy payment model.

### C. Age Results

In order to answer *RQ4 (are there differences between generations related to how they care about their data?)*, we performed data crossing between respondents' age and the other questions, trying to identify any patterns.

The first question is about privacy and visibility settings. The large majority of respondents update privacy and visibility settings (89%). However, Baby Boomers, X and Y generations presented almost the same degree of concern (91.9%, 90.6% and 92.5%), but younger people (Generation Z) presents a significant lower degree: 81.86%.

Considering *RQ1(Do people know about social network companies' policies?)*, we already concluded that people do not read the terms of agreement and copyrights and do not know about social media company's policies. In addition, the results presented in Figures 8 and 9, show that there is a direct relation between respondents' age and the reading and knowledge about terms of service.

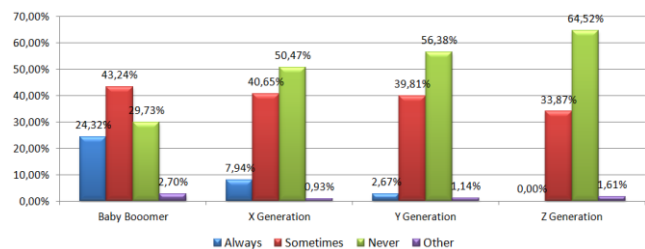


Fig. 8. Do you usually read carefully the terms of agreement, especially those lines addressing information copyrights? X Age.

Fig. 8 shows that baby boomer generation is more concerned to read terms of service, with almost a quarter people always reading them. This number decreases until achieve nobody of Generation Z preoccupied to always read the terms. On the other hand, more than the double of Generation Z had never read the terms, if compared to baby boomers.

In the same sense, the rate of people who know about companies' policy increases as age increases. In the same way, the number of people who do not care about sharing their copyrights decreases as age increases. Thus, we can conclude

that older generations are more preoccupied with the terms of service, and know more about them than younger generations.

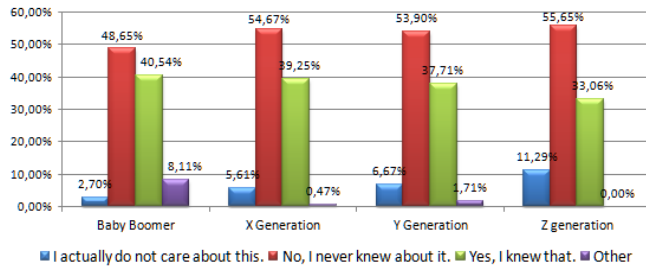


Fig. 9. Did you know that while transferring a file or content through a social software you are (in most cases) sharing your file' copyrights with the social media company owners? X Age.

The answers to the second question *RQ2 (are people satisfied with these policies?)* already showed that people do not like this model, and the majority fear the misuse of their data and think about giving up using those services. However, when crossing this data with age distribution, the same behavior presented in the previous question occurs, as shown in Fig. 10: older generations, Baby boomers and Generation X, are more active in trying to do something: respectively 46% and 54% want to do something but feel that their actions are useless, against 37% and 40% of Y and Z Generation. In the same way, the younger generation is more likely to trust in the services: only 5% of baby boomers trust the applications, whereas more than double (12%) of the Generation Z have the same behavior.

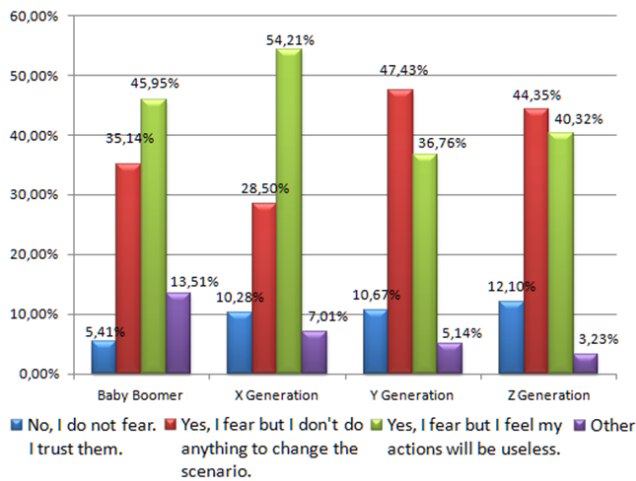


Fig. 10. Fear of data misuse or commercialization X Age.

In relation to people supporting the data marketplace model, answers show dissimilar results. People from Generation X and Y are more likely to agree that this would be the ideal scenario: 37% and 32% respectively, against 24% and 27% of baby boomers and Generation X. In addition, they present the lowest rate of disagreement, 15% and 20%, against 30% and 23% of baby boomers and Generation Z. This behavior can be explained considering that the X and Y generations make up a majority of the economically active population, and are more accustomed to the idea of

commercializing their data, and paying or receiving money for it. In addition, in this group there are managers who could respond to this question not only as a user but also as a company manager who could be interested in buying personal data. In addition, it is important to highlight that baby boomers are the group who are least supportive of this model. The authors suggest that this behavior is due to the disruptive characteristic of this model (receiving money to make personal data available), and is more difficult to be supported by older people.

On the other hand, older people are the most likely to pay for a service that guarantees privacy, independent of the cost (22%). This rate decreases across generations, with only 8% of the Generation Z willing to pay. In addition, baby boomers are the people most likely to pay in general (independent of the cost or only if the service would be affordable): 65% of baby boomers, 50% of Generation X, 57% of Generation Y, and 51% of Generation Z. As a consequence, baby boomers are the people with the least resistance to the payment model (27%), while the Generation Z is the most resistant (46%).

The analysis of these two questions shows that older generations (baby boomers) are more concerned about not exposing their privacy: they are more willing to pay for privacy, but do not like the model to be rewarded with their data. It can be explained because in general older people are more concerned about their reputation, both at work and in their social life. In general, they have already experienced a lot of incidents related to privacy, such as big public scandals like the one involving Bill Clinton and Monica Lewinsky, and minor events related to close friends or work colleagues. Thus, they are more preoccupied with disclosure of private information. In addition, these people in general have a stable financial status; thus, it is not a big problem to pay for privacy, considering the relational cost and benefits. On the other hand, young people have less experience on privacy problems, and do not giving much value to privacy, and are more open to sell their data. In addition, the financial question is important for them: in general they receive allowance from their parents and selling their data would be a way to earn more money. On the other hand, considering the same financial question, they are not keen to spend money on privacy, which is not very important to them.

#### D. Summary of Data Analysis Findings

In this subsection, we summarize the principal findings of the survey.

On the first question *RQ1 (do people know about social network companies' policies?)*, the study showed that people do not know much about the policies, and consequently they do not know that when using these services they are sharing their copyrights with the service provider.

On the second question *RQ2 (Are people satisfied with these policies?)*, the study showed that people are not satisfied, with the majority fearing that social applications could misuse their data and are thinking about giving up using such applications.

On the third question *RQ3 (do people like a new social network privacy and sharing model, i.e. Data Marketplace?)*, the study concluded that some people would support a data marketplace model (32%), and even more people (55%) are willing to pay for a service that guarantees their privacy, especially people who know about companies' terms of agreement, people concerned with the configuration of their visibility settings, and who fear the misuse of their data.

Finally, on the fourth question *RQ4 (are there differences between generations on how they care about their data?)*, the study pointed out some differences, mainly: (i) young people (Generation Z) are less concerned with adjusting their privacy and visibility settings; (ii) older people (baby boomers) have higher rates in terms of reading the terms of service and know more about copyright sharing policies, in contrast to young people who have much lower rates; (iii) although people of all ages fear a misuse of their data, baby boomers are the most concerned ones; (iv) X and Y generations are more keen to support a data marketplace model; and (v) baby boomers are more keen to pay for privacy, whereas the Generation Z are more keen not to pay.

Table 1 summarizes these conclusions. The up arrow means that people from the group support that item and the down arrow means that people do not support that item. Double arrows means that people from that group have a stronger behavior, and the equal sign means that there is no significant difference.

#### IV. CONCLUSIONS

Content sharing services, or social media such as social networks are becoming immensely popular, reaching more than 1 billion users, willing to reveal many more private details than they would otherwise, and needing a new privacy requirement: to avoid the use of private data for marketing purposes by the social site or by plug-ins applications using social site API's.

In this paper, we conducted a survey aiming to discover (a) if people really know about what is being done with their personal data; (b) how people care about their personal data released on social media; (c) what people think about the current model (free cost and no privacy), and their opinion about an alternative model (small cost, privacy guaranteed).

Table 1. Summary of Findings

People behavior:	General	Baby Boomers	X Gen	Y Gen	Z Gen
Adjusts privacy and visibility settings	↑	↑	↑↑	↑↑	↑
Reading terms of agreement	↓	↑	↓	↓	↓↓
Knowing about copyright sharing	↓	↑	↓	↓	↓↓
Fearing data misuse	↑	↑↑	↑	↑	↑
Support data marketplace model	=	=	↑	↑	=
Support payment for privacy	=	↑	=	=	↓

From the results, we mainly found that (i) in general people do not read license terms and consequently do not know very

much about services policies; (ii) people care about their privacy, and fear that social applications collect, maintain, analyze and commercialize their data; (iii) A good number of people would support alternative models such as paying for privacy or selling their personal data, and (iv) and there are some differences between generations in relation to how they care about their data.

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