

Online Social Networks and the Need for New Privacy Research in Information and Communication Technology

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Abstract. New developments on the Internet in the past years have brought up a number of online social networking applications within the so-called Web 2.0 world that experienced phenomenal growth and a tremendous attention in the public. Online social networking services build their business model on the myriad of sensitive personal data given by its users, a fact that is increasingly getting the attention of privacy advocates. After explaining the economic meaning and importance of online social networks to eCommerce in general and reiterating the basic principles of Web 2.0 environments and their enterprise mechanisms in particular, this paper addresses the main privacy risks of Web 2.0 business models with a focus on online social networking sites. It then derives important privacy research questions in online social networks by aligning new privacy approaches specifically to the new dynamics of Web 2.0 applications. The privacy research questions derived are intended to serve as a basis to raise awareness in enterprises and in the research community for the growing need to view and research privacy in the Web 2.0 environment.

1 Introduction

In the last few years, the Internet has seen new developments that not only changed the structure of some of the online business models as we know them but they will also change the way we see and use the World Wide Web in the future. Dale Dougherty coined the term Web 2.0 in 2004 and Tim O'Reilly¹ popularized the term later in 2005 as the “participatory Web” [1]. Compared to Web 1.0 (to apply the same terminology) when the Internet was used as a pure information source for consuming content, the Web 2.0 is now providing users with functionalities to

¹ Both Dale Dougherty and Tim O'Reilly are leading the publishing firm O'Reilly Media Inc.

actively participate and create content. Research and survey data [2-4] as well as anecdotal evidence in the form of newspaper articles or blog entries [5-8] see in these developments both opportunities and risks. This paper addresses one of the risks of Web 2.0 business models which is the potential misuse of personal information in an online social networking application or in short, privacy risk. After explaining the economic meaning and importance of online social networks to eCommerce in general and reiterating the basic principles of Web 2.0 environments and their enterprise mechanisms, important privacy research questions in online social networks are derived by aligning new privacy approaches specifically to the new dynamics of Web 2.0 applications. With the privacy research questions derived from the following discussion, this paper intends to raise awareness in enterprises and in the research community for the growing need to view and research privacy in the Web 2.0 environment differently than before.

2 The economic value of online social networks

Online social networking websites such as MySpace, LinkedIn, Xing or Facebook typically provide applications for users to set up individual profiles, create virtual networks with friends and business partners, share articles, photos and videos, create content such as stories and blog entries, or to share opinions or preferences by giving online votes or setting search tags. Increasing online collaboration, interaction and personalization is the result – something that online advertisers value as the source for more targeted marketing initiatives using sophisticated data mining capabilities.

Major acquisitions of social networking providers by investors in the past two years underpin the potential economic value of these firms. After News Corp. bought the social networking site MySpace for about half a billion US\$ in 2005, Google acquired the video sharing site YouTube for 1.65 billion US\$. Those acquiring firms see the commercial value of social networking sites like MySpace or YouTube not only in their attractive user base, the 18-30-something year olds, but also in their potential influence on online retail growth overall. According to eMarketer Inc., online sales analysis data from last year's holiday shopping season in the U.S. for example supports the increasing commercial importance of social networks, blogs and user preference tags as word-of-mouth buying suggestions for small businesses [9]. Members of social networking sites become more active online buyers in response to preferences and "best of" lists displayed for example for music CDs within their community groups.

The online analyst company Hitwise underpins this trend by the growing percentage of online retail traffic coming directly from social networking sites – 6.2 % in the pre-holiday season in 2006 up from 2% in the same period in 2005. Hitwise sees in this data a clear proof that social networking sites such as Google's YouTube and News Corp.'s MySpace.com have begun displacing portals such as Yahoo Inc. as the new home base for Internet users. Social networking websites have emerged in the US market to become an integral part of web activity for many Internet users – in

September 2006, one in every 20 Internet visits went to one of the top 20 social networks, nearly double the share of visits compared to a year ago [10].

If this trend continues and if the primary purpose of those sites is to collect a large amount of personal data and personal preferences, the influence on a user's privacy is likely to be affected. The following chapters will look at the challenge of assuring security and privacy for personal data on social networking sites and will also identify new research areas to minimize these privacy risks in online social networks.

3 New privacy challenges and risks in Web 2.0

The increasing risk of misuse of personal data processed by online social networking applications is evident from computer science research [2-4] as well from anecdotal evidence in the form of newspaper articles or blog entries [5-8]. One example for the privacy risks users of Web 2.0 services see was expressed by a blogger named Jamais Cascio in October 2006 on the personal site Freds House which dedicates most of its blog topics to mobility, media and ubiquitous life topics. His blog entry reads as follows: "I'm feeling increasingly uneasy about my dependence on Google services. [...] I look around my desktop and I see Google Reader, Google Mail, Google Talk, Google Toolbar, Google Maps, Google Calendar, Google News, Google Analytics, Google Earth, and of course Google Google. [...] I think I need a new Google product to drop into beta. That would be, let's see, *Google Data Privacy*. GDP would allow me to review all of the information that Google retains on me across all services, from all devices, and from all sources. GDP would allow me to determine the maximum data retention period for each of my services. GDP would allow me to selectively opt out of cross-service data mining & correlation, even if it reduced the quality of the services I receive. GDP would allow me to correct any inaccurate data in my profile. And GDP would log and alert me when my data was queried by other services. [...] This is exactly the kind of thing that Google could do, should do, to maintain its "Don't Be Evil" motto, while compiling *better* -- more accurate and more useful -- information."

This blogger has described in length the main functionality that a privacy-enhancing solution in a Web 2.0 environment should provide, namely the self-control of ones personal data. It is clearly understood that more personal data collected, displayed, stored and processed in a decentralized environment and across multiple devices causes all sorts of concerns, one being the feeling to loose control. Risks associated with this situation range from identity theft to online and physical stalking, from embarrassment to price discrimination and blackmailing [11].

Considering the potentially differing interests of the data owner (here meaning the user providing personal data) and the receiving party, a definition of privacy that best describes the challenge to be solved is the following: "Privacy can be defined as an interaction, in which the information rights of different parties collide. The issue is of control over information flow by parties that have different preferences over

information permeability.” [12] In this context, the individual user typically has particular socioeconomic motivations for a certain degree of privacy. According to Gary T. Marx, one of the leading privacy researchers in computer sciences, users may want to be protected from an unwanted intrusion of their time, space and person, they may want to see protection from discrimination or they may want to avoid “type casting” [13]. On the other hand, the provider of an online social network may have the interest to receive as much personal data as possible from an individual, including links to as many other people as possible, in order to increase the value of advertisement to his members. The more personalized the member profiles are, the more targeted and – in consequence – valuable adverts can be.

Looking back at traditional viewpoints on privacy protection in information and communication technology, privacy solutions tried to satisfy the socioeconomic privacy motivations of individuals predominantly through the use of privacy-enhancing technologies and identity management solutions [14]. Whereas those solutions address the user’s anonymity, unlinkability, unobservability, or pseudonymity in form of a “protection and disguising” mode, these solutions may not address new privacy challenges a user faces when he/she openly and willingly displays a whole data set of personal information in form of his/her personal profile for example on a social networking website. In fact, hiding and disguising the personal data in the person’s profile would most likely contradict with the purpose and perceived benefit of providing the personal information in the first place. The traditional privacy viewpoint of privacy protection needs to add solutions for privacy in an open and decentralized environment such as the World Wide Web where the individual may decide on a case-by-case basis if he/she wants to provide a certain set of sensitive information about themselves and who should be allowed to access this piece of information or not.

Considering the general failure of the Web to satisfy requirements such as privacy protection, a balanced approach to intellectual property rights, and basic security and access control needs [15], additional privacy research in computer sciences will need to address solutions within the new “participatory Web”. Personal data is at the core of any online social network service’s business model. That is why especially for this kind of application, privacy researchers need to go into more depth, looking at privacy safeguarding measures along the whole data processing life cycle, addressing the control and accountability of that data especially at the use end [16].

3 Privacy Research to Address the Web 2.0 Reality

Tim O’Reilly has defined the Web 2.0 as a “[...] platform, spanning all connected devices; Web 2.0 applications are those that make the most of the intrinsic advantages of that platform: delivering software as a continually-updated service that gets better the more people use it, consuming and remixing data from multiple sources, including individual users, while providing their own data and services in a form that allows remixing by others, creating network effects through an

‘architecture of participation’, and going beyond the page metaphor of Web 1.0 to deliver rich user experiences.” [17]. In such an environment of decentralized systems and infrastructures that enable the quick and efficient development of systems, it is difficult to implement control features such as traditional security or privacy measures. Nevertheless, the rapid growth of Web 2.0 services is a reality and security and privacy research needs to adapt to it.

In order to derive relevant and specific privacy research questions in the new Web 2.0 environment, it is helpful to use the four principles and enterprise mechanisms of ‘Wikinomics’ [18], defined by Don Tapscott and Anthony D. Williams. These principles describe the relevant dynamics at work in the Web 2.0 and using them here enables a better conceptualization of resulting privacy challenges and privacy research questions. While matching the principles of ‘Wikinomics’ and the respective enterprise mechanism in this paper, the author has focused on the situation for an online social networking application and has not viewed different scenarios for example at video sharing sites or services that provide search and tagging functions. The case scenario of an online social networking service was identified earlier in this paper as being extremely vulnerable to privacy risks due to the nature of its business model dealing with personal data.

The principle of ‘Wikinomics’ are (1) Openness, (2) Peering, (3) Sharing and (4) Acting globally. Each of those principles motivate specific economic mechanisms within enterprises providing Web 2.0 services and each principle can be related to specific privacy approaches discussed or recommended in current research papers as shown in the following table.

Table 1. Relating the principles of ‘Wikinomics’ and described enterprise mechanisms to privacy approaches

Principle	Enterprise Mechanism	Privacy Approach
Openness	Transparency	Accountability of data use
Peering	Marketocracy	Privacy self-control
Sharing	Collaboration	Personal data property rights
Acting globally	Multinational	Non-legal rules and policies

3.1 Evaluating the principles of Wikinomics on their implications for the privacy of users of online social networks:

- (1) Openness: If personal data is exchanged and processed openly in applications that are based on open standards and it is transparent who the involved parties are, privacy safeguarding measures need to address the actual usage end of personal data. The purpose of the personal data being collected becomes more important than the collection itself.

- (2) Peering: The principle of “peering” builds on self-organization by a group of individuals. Applied to the case of an online social network service, individuals and groups of individuals determine the success or failure of the particular site by actively engaging for example in the linking of friends, building interest groups and communities and setting preferences that determine the exponential growth of the site. When thinking of the influence of the individual within a group and aspects of privacy, it is apparent that the individual needs to be provided with a function to exercise self-control over his/her privacy preferences and the determination about who can see and use the displayed personal data.
- (3) Sharing: Sharing in the online social network setting means that the individual willingly wants to share data with others. That means for the service provider that he needs to provide collaborative tools to enable the sharing of data. However, when it comes to sharing sensitive personal data, the individual might be reluctant to share with everyone and for any purpose. For this reason, privacy safeguarding measures need to attach a certain “copyright” to the personal data set. Lessons from digital rights management might be useful to address this requirement.
- (4) Acting globally: And finally the principle of “acting globally” brings up a range of issues when looking at privacy challenges in online social networks. Without legal boundaries of Web applications and even in some cases without any cultural boundaries and rules, it is a tremendous operational challenge that service providers face. How can rules for privacy aspects be set by each individual and how can they be enforced automatically? Legal and public policy regulations alone certainly cannot solve privacy challenges within those applications. Technology and privacy standards in the future may help to work on a common ground. Progress in the area of the semantic web may also have some answers to privacy challenges in online social networks that are largely related to the specific context and usage.

The following table attempts to give a brief overview of some of the privacy research questions that can be derived from the preceding discussion. The list of privacy research questions does not claim to be complete and, at this point in time, simply has the intention to raise awareness in enterprises and in the research community for the growing need to view and research privacy in the Web 2.0 environment. In fact, it can be expected that interested readers and privacy experts can immediately add additional questions and topics to this list which should fulfil the underlying purpose of this paper to initiate discussions and thought processes around the topic.

Besides the economic, social and legal questions around privacy protection in the Web 2.0 environment and particularly with online social networks, detailed technical research can be extended towards using semantic web languages, DRM technology and technology standardization to assure the privacy of individuals on the Web and the protection of personally identifiable information from misuse.

Table 2. Deriving privacy research questions in the context of online social networks

Principle	Privacy Approach	Privacy Research Questions
Openness	Accountability of data use	<ul style="list-style-type: none"> • Which value do users see in a purpose limitation of their personal data? • How do user groups and their behavioural patterns differ in open vs. closed online communities in relation to the type and extent of public display of their identity? • How can context-based data usage be integrated in existing Semantic Web concepts?
Peering	Privacy self-control	<ul style="list-style-type: none"> • How do group dynamics influence the attitude towards privacy? • Can we use existing literature on social network theory to explain aspects of trust and intimacy in online networking? • What is the commercial benefit of peer networks to eCommerce? • Would privacy self-control features in an online social networking site be perceived as a benefit and used as a solution to privacy concerns?
Sharing	Personal data property rights	<ul style="list-style-type: none"> • What kinds of gratification and cost models can show the value of sharing sensitive personal data with specific individuals or groups? • How can DRM technology be used by an individual for protecting his/her personal data from unauthorized access, copying, usage, or transfer?
Acting globally	Non-legal rules and policies	<ul style="list-style-type: none"> • What set of rules would users of online social networks see as essential to protect their privacy? • How can those personal, non-legal rules be converted into automated policies and attached to the personal data sets? (sticky policies concept) • Is it possible to derive general rule sets on privacy by studying different user groups attitudes toward privacy in different cultures and in different contexts or technology environments? • How can privacy standardization help to automate a privacy policy-aware Web?

4 Conclusion

The growing economic value of online social networking sites in particular and Web 2.0 applications in general brings about new security and privacy risks that have not been adequately addressed by software developers, researchers and privacy advocates so far. Privacy risks as identity theft, online or physical stalking, personal embarrassment, price discrimination or blackmailing differ widely among individuals and depend on the specific context. In the case of using online social networking services, the dominant approach to collect sensitive personal data at the outset makes it necessary to rethink traditional privacy approaches that were directed mainly at the protection and disguise of the user's identity information in the past. New privacy approaches need to direct their efforts to privacy safeguarding requirements that the individual user can set by him/herself, having functionalities for self-control and protection mechanisms for the proper usage, purpose limitation and accountability of the data at stake.

Research questions derived from the exercise of linking privacy approaches directly to the principles and enterprise mechanisms of Web 2.0 environments have shown that the pre-eminent goal for privacy research is likely to shift from anonymity and unlinkability type of solutions to privacy safeguarding measures that attach context and purpose limitation to the personally identifiable data itself. Whereas specific research in this area needs to validate the need for new privacy approaches as described here, it can surely be concluded that the growth of online social networks and the systems that get developed around them need to get a strong attention from the research community and from enterprises trying to understand the privacy requirements of their customers.

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