2011

PROFIT VS. PRIVACY – ADVANCED TARGETED ADVERTISING FOR SOCIAL NETWORKS

Christian Kahl
Johann Wolfgang Goethe Universitat Frankfurt am Main, christan.kahl@m-chair.net

Stephen Crane
Hewlett-Packard, Stephen.Crane@hp.com

Markus Tschersich
Goethe University Frankfurt, Markus.Tschersich@mchair.net

Kai Rannenberg
Goethe University Frankfurt, Kai.Rannenberg@mchair.net

PROFIT VS. PRIVACY – ADVANCED TARGETED ADVERTISING FOR SOCIAL NETWORKS

Kahl, Christian, Goethe University Frankfurt, Chair of Mobile Business & Multilateral Security, Grüneburgplatz 1, 60629 Frankfurt am Main, Germany, Christian.Kahl@m-chair.net

Crane, Stephen, Hewlett-Packard Labs, Long Down Avenue, Stoke Gifford, BRISTOL BS34 8QZ UK, Stephen.Crane@hp.com

Tschersich, Markus, Goethe University Frankfurt, Chair of Mobile Business & Multilateral Security, Grüneburgplatz 1, 60629 Frankfurt am Main, Germany, Markus.Tschersich@m-chair.net

Rannenberg, Kai, Goethe University Frankfurt, Chair of Mobile Business & Multilateral Security, Grüneburgplatz 1, 60629 Frankfurt am Main, Germany, Kai.Rannenberg@m-chair.net

Abstract

Online social networks are getting increasingly popular. Their popularity and the availability of personal user information, makes them attractive for advertisers. Hence, social networks are often in tension between the needs of users and advertisers. While users want to keep control over their personal information, advertisers are interested in such information as a basis for targeted advertising campaigns. Mobile technologies allow additional new advertising opportunities, such as location based advertising. For the providers of social networks advertising becomes a critical component of their business model. In this context concerns about privacy and trust become ever more apparent.
In this paper we describe the PICOS project's research into privacy enhancing concepts for social networks and advanced targeted advertising options for social networks. In particular we describe the PICOS community platform architecture including stakeholders, trust model and the concepts it contains to enhance privacy among users. We further outline our approach of advanced targeted advertising and underlying concepts, as well as its prototypical implementation. The approach is based on a combination of targeted advertising and viral marketing. It is integrated within the privacy enhancing concepts included in the architecture. Thereby we aim to consider and balance the interests of the involved stakeholders.

Keywords: Communities, Identity Management, Marketing, Mobile Social Networks, Targeted Advertising, Privacy.

1 INTRODUCTION

Online social networks[1] such as Facebook, MySpace and LinkedIn, provide communication services that support the activities of virtual and real world communities (Nielsen, 2008; Nielsen, 2009; Liesebach and Scherner, 2008). Users spend increasing amounts of work and leisure time in using these services for professional and private collaboration and communication purposes. Furthermore, mobile communication services allow users to participate in their social networks at any time and from (almost) any place. Mobile communication also allows the provision of services that make use of context information (e.g., location, time), thereby enabling a deeper integration of peoples' virtual (mobile) and real world communities (e.g., Foursquare, Loopt, Junaio, match2blue)[2].

1.1 Problem and Motivation

When participating in social networks users leave traces of personal and private information that they might not be aware of. The providers of social networking services need to handle trust and privacy in a manner that meets the participants' needs as well as complies with regulation.

On the other hand, in order to finance or co-finance social networking services, the infrastructure often needs to be open for marketing activities of sponsors/advertisers (Hoegg et al., 2006). Advertising, as a specific marketing activity, is an important mean for social network providers to generate revenues, and is hence an integral part of many providers' business models. However, while classical online display advertising is focused on rather general target groups, and advertising activities in social networks often lack of success (Nielsen, 2009; Linkshare, 2009; IDC, 2008), advertisers look for greater assurance that targeted audiences will be interested in their offerings. Social networks are especially attractive for targeted advertising, as their users provide detailed personal information about themselves (e.g. age, interests, activities).

Users' desire for privacy within social networks on one hand, and the need for advertising in these social networks on the other hand, create a certain tension between the interests of the involved stakeholders. A balance needs to be achieved, between the needs of users for a privacy respecting usage of their data and their interest in relevant advertising information, as well as the interests of the advertisers and finally those of the social network provider (Liesebach, 2008).

1.2 Research Question and Approach

A new approach to identity management in social networking services is needed to meet the stakeholders' different needs. Within the PICOS project[3], we had the goal to develop such a new approach to identity management, for enhancing the trust, privacy and identity management aspects of social networking services, while at the same time enabling 3rd party services including marketing/advertising.

PICOS started with a phase of preliminary activities, including the analysis of related contemporary research and an investigation of the context of communities (e.g., legal, technical and economic aspects) (Schrammel et al., 2008; Kosta and Dumortier, 2008; Liesebach, 2008). In this phase we gathered requirements from different exemplary communities, namely (recreational) anglers, online gamers and taxi drivers, which have shared interests and which benefit from mobility.

Based on their generalised requirements, we have designed a community platform architecture that includes concepts intended to address the gathered requirements, which enable open, privacy-respecting identity and trust management (Crane, 2010). Due to the increasing relevance of marketing and advertising activities for operators of social networks, we focused this aspect in the architecture as well and integrated a component to enable targeted advertising for (mobile) social networks. The

---

1 Also referred to as "social communities". If not stated otherwise, both terms are used synonymously in this paper.

2 www.foursquare.com, www.loopt.com, www.junaio.com, www.match2blue.com

3 The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-2011) under grant agreement n° 215056. http://www.picos-project.eu

developed concepts were implemented as a prototype community platform and community applications, which were subsequently tested in user trials and evaluated concerning trust, privacy, usability, ergonomics and legal issues (Kahl et al., 2010).

This paper reports on the privacy enhancing concepts and the integration of targeted advertising in this context, based on the PICOS community platform architecture. The following section provides first an overview of related work. To face the challenges and problems identified in section 1.2, section 3 briefly introduces the PICOS architecture itself. Sections 4 and 5 focus on the concepts related to privacy, identity management and advertising, included in this architecture. Section 6 concludes and indicates aspects for further research. The actual implementation and the user trial results are not focused in this paper.[4]

2 RELATED WORK

The aspect of privacy in online social networks is discussed intensively in the research area (e.g. Chew et al., 2008; Adu-Oppong et al., 2008; Hiltz and Passerini, 2007), emphasising different aspects. E.g. (Strater and Lipford, 2008) and (Strater and Richter, 2007) identify privacy related concerns and discuss opportunities and strategies to protect ones privacy in (online) social networks. Others, like (Dwyer et al., 2007) focus on more general aspects such as trust and privacy with respect to communications in social networks. However, the work mostly focuses on privacy related issues- There is little work on balancing the different needs of the involved stakeholders, especially in a mobile context.

In a way work has also been done by several research projects such as PRIME[5], PrimeLife[6], PEPERS[7] and DAIDALOS[8]. However, these projects merely focused on different aspects. E.g. PRIME focused on privacy-respecting identity management, but not in the context of (mobile) social networks, while PrimeLife worked on privacy in communities, but not with regard to a specific application domain. Hence, there is little significant work which addresses the focus of PICOS, to enhance identity management in mobile community services in order to consider the diverging needs of stakeholders.

Regarding work in relation to targeted advertising, there are a few publications that focus on aspects of marketing and advertising with regard to social networks. While some rather focus on general aspects, such as business models (e.g., Hoegg et al., 2006; Palmer and Koenig-Lewis, 2009), many focus on the application of viral marketing in the context of communities (e.g., Leskovec et al., 2007; Kempe et al., 2003; Hartline et.al., 2008; Subramani and Rajagopalan, 2003). (Kahl and Albers, 2010) are concerned with a deeper integration of marketing into the communication processes within social networks and provides the basis for the advertising approach described in this paper.

3 PICOS ARCHITECTURE

The PICOS architecture has been designed to satisfy the needs of several stakeholders, and in so doing minimise the tensions around privacy and trust that would otherwise discourage contributions from any or all parties' involvement in the community. The components that provide the functionality are derived from requirements (by stakeholders), principles (e.g. trust models) and concepts (e.g. enhanced identity management) which arise from studies conducted by PICOS (Liesebach, 2008). In contrast to the most other approaches and projects mentioned in the previous section, the PICOS architecture integrates established privacy enhancing concepts (e.g. privacy policies), enhances them and combines them with novel concepts (e.g. privacy advisor) so that they complement each other in one holistic framework. The architecture is further focused on a very specific application context, namely mobile social communities.

[4] For more detailed information on these aspects please refer to (Tschersich, et al. 2011).
[5] www.prime-project.eu
[6] www.primelife.eu
[7] www.pepers.org
[8] www.ist-daidalos.org

3.1 Stakeholders

In situations where personal information is being shared, it is common for the various stakeholders to have different opinions about the use of the data. Advertising gives rise to this situation, when an advertiser finds itself at odds with the values of the other stakeholders. In social networks these stakeholders are:

Members/users: The subject of the personal data

Community/infrastructure providers: A combination of community service and communications provider – in practice, typically the technology provider - which may be the same entity

Community operators: The entity responsible for the operation of the community, including establishing operating policies and administering membership.

3rd parties: E.g. advertisers, regulators, external service providers.

3.2 Topology

PICOS functionality is delivered as a service. Services could be hosted locally, but in the case of PICOS they are hosted centrally (Figure 1). In this client-server topology, clients (e.g. smart phones) process local services but rely on the social network for shared services and for services that are too demanding (in terms of computing and storage resources) for the client to host. Communities that wish to interact with one another, an external advertising agency, or a specialist service provider, are interconnected at the services level. Managing the complex and challenging issue of inter-community trust is the responsibility of the community operator, who acts on behalf of members.

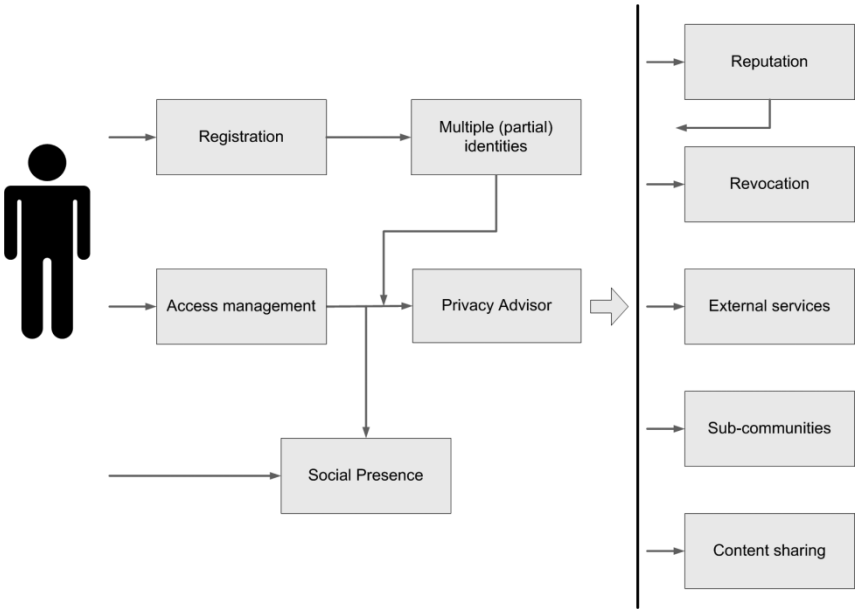

Figure. 1. High-level view of the PICOS architecture

3.3 Trust Model

Community members have differing trust needs (Liesebach, 2008). Some are risk accepting, while others are risk averse. For those members who do worry about the risks of using a community, a range of options are possible, essentially where members take greater or lesser control of the situation according to their personal beliefs. Other members will look for assurances from the community operator. Addressing trust concerns through enhanced isolation is one approach to deal with privacy concerns. In essence, it is a strategy of data minimisation, where only essential information is ever revealed to another party. However, communities primarily exist to share information, a key factor in the choice of trust model for our community platform architecture (Crane, 2008: section 7.5.2). To

deny the community this opportunity would indeed address privacy, but it would also devalue the community experience to such an extent that it may no longer be viable.

The provision of an external connection to a community potentially undermines trust. External interfaces are necessary in open community architectures, and are an important feature for building interrelationship through external services. For example, anonymous interaction with a community operator would require trusted intermediaries and more sophisticated processing capabilities on the client device (Schrammel et al., 2008). It would also mean the community operators know very little about their membership, which could severely limit the range of services that they can offer, and connecting 'like minded' members would be much harder. Whilst these are reasonable measures in terms of privacy, they are at odds with current community goals around 'easily connecting people'[9].

4 PRIVACY ENHANCING CONCEPTS

The PICOS architecture comprises a number of new concepts designed to enhance user privacy. The overall intention is to provide users with tools that help them manage their visibility within and outside of the community. The three main categories of concepts are: *Enhanced Identity Management*, *User controlled Information Flows* and *Privacy Awareness Support*.

Enhanced Identity Management. Based on the concept of mobile identity management (Müller and Wohlgemuth, 2005), the PICOS architecture supports users in managing the disclosure of their current position and mobile identity in communities. Sub-communities and Partial Identities are two concepts designed to help users in selectively sharing personal information with others.

Sub-Communities. By founding a Sub-Community, users can create a restricted area, which allows the sharing of personal information among a limited group of community members. Sub-communities can be public or private. In the latter case the founder is able to decide who is allowed to be a member of that group by selecting individual members or by filtering on a set of personal profile characteristics of other members. Users within such a private Sub-Community can trust that published information is only accessible by other authorised members of this Sub-Community. Therefore, a user who wants to share information or resources does not need to approve access of each single user.

Partial Identities. The concept of Partial Identities (Hansen et al., 2004) in particular allows users to create different identities for use in different contexts and purposes. Users are able to have a set of several identities in a single community, and decide for each identity what personal information they want to disclose. Each Partial Identity appears to other users as a unique, individual community member. Partial Identities enable users to either hide or reveal relationships between different elements of their personal information.

User controlled Information Flows. A balance is needed between publishing personal information to use functionalities of the community, and keeping a certain degree of privacy (Liesebach, 2008). The following PICOS concepts support users in maintaining their privacy while letting them use the community according to their needs.

Location Blurring. In mobile environments especially location information is of interest, e.g., for location based services (LBS). Such services are also of interest to mobile communities, since they allow friends to be displayed on a map or to information to be shared about interesting spots in close vicinity. The PICOS concept of Location Blurring foresees the obfuscation of a user's current position or a point of interest at various levels. The position is displayed as a circle of a defined radius (e.g., representing 1, 2, or 5km) randomly placed around the user's exact position. Moreover, the concept allows users to specify, which other users are able to see their exact position and their blurred position.

Privacy Policies. The PICOS community prototype enables users to selectively define Policies that control who is allowed to see certain personal information. These user-centric policies are based on rules, which also take context information into consideration (e.g. the current location of the user). Based on these rules a user can determine which information is available to other users in a defined

situation. This can be done individually for each Partial Identity. It is possible to define policies for a user's presence, his location, and for selected profile information. Thus, the PICOS policy editor enables users to manage their privacy in a very fine-grained manner.

Privacy Awareness Support. Managing privacy by means of Partial Identities is a complex task. The *Privacy Advisor* component is designed to provide guidance on privacy related matters that may affect members as they interact with the community. Privacy (and trust) is subjective, and it is often difficult to find a single 'right answer' to questions and concerns about privacy. Hence, the Privacy Advisor is context sensitive and provides hints in specific situations when personal information of users is involved (e.g. disclosure of location information, registration and profile management). It warns a user when disclosure of information might place the user's privacy at risk.

The Privacy Advisor operates in real-time, looking for evidence of activities that may undermine the member's attempt to remain private, and (2) by educating/alerting the member regarding actions that may expose sensitive personal information. The specific role of the Privacy Advisor includes: Enhanced Content Monitoring; Community Dynamics; Workflow; Policy Matching; Social Presence.

Enhanced content monitoring enables content submitted by members to the community to be 'scanned' for personal information, when 1) shared with sub-group members; 2) shared publicly. Scanning involves 1) content tags (e.g. name, description, etc.) and 2) the body of the content contributed (where the body is interpretable), and applies to situations where 1) a member is about to intentionally disclosed information that is personal and sensitive, and 2) is about to accidentally or unintentionally disclosed information about themselves that is potentially harder for the average member to recognize. *Community Dynamics awareness* includes that the scanning of posted threads, in the same way as asynchronous message content. If the user is sending sensitive information, e.g. as defined in the User's Profile, it will send a notification to the user warning him of the risks. The user react by deciding whether he wants to send the information anyway, or cancel the sending.
Workflow awareness reflects the full lifecycle of membership activity, from registration with the community, interaction with other members, use of shared facilities, and ultimately concerns that arise when a member terminates membership of a community but leaves personal artefacts behind. The Privacy Advisor further performs *Privacy Policy matching* when a member joins a sub-community, where the Privacy Advisor will check the member's own privacy policy rules against the rules of the sub-community or the sub-community creator/owner (assuming that the sub-community inherits the privacy rules of the creator). Finally, the *Social Presence* includes the notification of the member if they publicly revealed their position in high-risk settings (locations), and suggests suitable remediation, i.e. turn off or blur/increase blurring. Detection situations include: 1) A member is notified if another member, who is not a trusted member of their sub-communities, attempts to access their location; 2) A member moves unintentionally and leaves location blurring off as they move to a new location, having previously turned blurring on to assist nearby members.

5 ADVANCED TARGETED ADVERTISING

Besides the previously described privacy enhancing concepts, targeted advertising was one specific aspect focused in our community platform architecture. The foundation for the underlying approach was initially outlined in (Kahl and Albers, 2010). Within PICOS we exemplary applied this approach, in our community platform architecture. The respective advertising component enables targeted advertising activities under consideration of context information and users' privacy preferences. The approach is also part of one of our community application prototypes. While the approach itself is not related to a specific community, the implementation is related to the exemplary gaming community. Therein, commercial points of interest (e.g. internet cafés, game shops) are utilised as an example to provide users (gamers) with location-based targeted advertisements, while additionally supporting recommendations between users.

The research focus in the following descriptions is limited to advertising as one aspect of marketing. Other marketing aspects such as the pricing of products are not considered in this case. It should also be noted that advertising as a marketing activity is in practice part of a social networks' business

model, which usually includes further aspects, e.g. the nature of the offered product or service itself. Advertising represents one aspect of a possible business model of a social network provider, to generate revenues.

5.1 Approach

The basic idea of the advertising approach is that communication can be regarded as one of the main activities which are conducted in social networks (Carroll, 2007). Hence, in order to integrate Marketing activities into social networks, marketing needs to be integrated into the context of these communication processes Palmer and Koenig-Lewis, 2009). Following this approach, which is named as "marketing enriched user communication" (Kahl and Albers, 2010), marketing can contribute to the communication in two ways: First, marketers can directly provide targeted communication (personalized marketing, e.g. targeted ads) to social network users. Second, marketers can indirectly support the communication between users (viral marketing, e.g. brand related groups).

Marketing needs to support these two, complementing types of communication within social networks, in order to be able to receive the attention of the participating users. While the targeting of marketing activities provides a benefit to the targeted users (Nielsen, 2009; Ho and Kwok, 2002) at the same time viral marketing is used in existing social networks[10] to benefit from the intensive social interactions between users. By supporting both, it is aimed that the communication between marketers and users is more tailored to the individual user and in consequence presumably more relevant. Complementary, a further intended effect is that users are encouraged to communicate with each other about such advertised contents: If the contents are perceived as relevant information by users, they might share the contents with other users who have similar interests (Schulz et al., 2007). Such a targeting of advertisements is supported by studies, which show that more targeted advertisements receive more attention by users, in particular, with regard to mobile usage scenarios (Ho, 2009; Beales, 2010; Office of Fair Trading, 2010). These studies indicate that users are interested in targeted advertisements, as they provide a certain benefit to the users, assuming that the advertisements provide relevant and possibly valuable information for them. The combination of targeted advertising and viral marketing remarks a major difference to existing approaches (as mentioned in section 2), which usually focus on one of these approaches.

5.2 Component Elements

In social networks an advertising message can be communicated in two ways: First, the message can be communicated between a 3rd party (the marketer/advertiser) and the user. Second, the message can be communicated between a user and other users. From the business perspective these communication relationships can be referred to as Business-to-Consumer communication (B2C) or Consumer-to-Consumer communication (C2C). Both are supported by the PICOS Advertising component.

Support of B2C communication. B2C communication concentrates on communication between advertiser (3rd party) and user. The social network provider acts as an intermediary between these two parties. From the PICOS point of view, this is a key element and it ensures that personal data of users is neither given to 3rd parties nor that 3rd parties have any direct access to it. It further ensures that the previously described privacy enhancing concepts can be applied by the provider with regard to advertising. The social network provider serves both the advertisers and the users/consumers, while respecting their specific interests (e.g. privacy of users). The PICOS platform provides on one hand an interface for advertisers, which allows them, to configure what they want to advertise to whom. On the other hand the provider needs to identify the users for which a particular advertisement might be relevant and provides them with this advertisement under consideration of their privacy preferences. The social network provider acts as an intermediary and conducts the matching between the users (consumers) and advertisers (represented by advertisements). Thereby we address the mentioned balance between users and advertisers, differentiating our approach from others which usually focus on one of these stakeholders.

---

[10] See e.g. Facebook Advertising (www.facebook.com/advertising)

In order to conduct the matching process detailed personal information is needed, to allow a preferably precise characterization of the user is possible. Social networks already contain detailed personal information about their users, which can be extended by context information within mobile environments (e.g. location, date, time, device) (Schmidt et al., 1998) and information derived from communication between users (Kahl and Albers, 2010). Such additional information also allows drawing conclusions about what users are doing, in addition to who they are. The consideration of such extended context information remarks an further difference in comparison to existing advertising approaches for social networks.

The whole process of supporting B2C communication can be divided into four steps, which are reflected in the design of the PICOS Advertising component as follows (Figure 2).

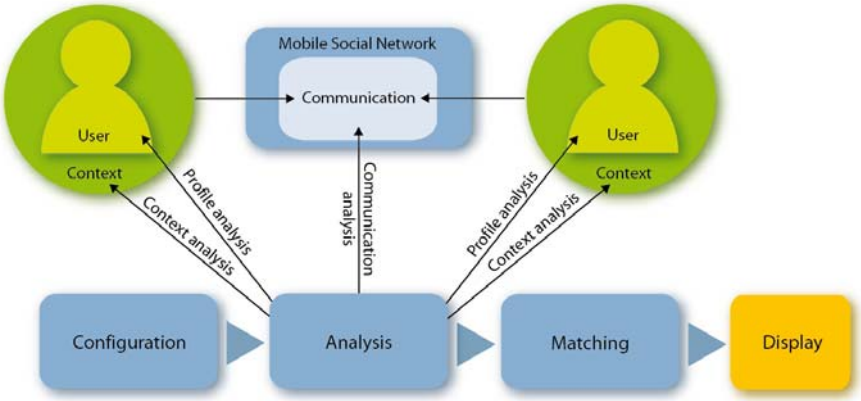

Figure 2. The process to support targeted advertising (B2C) (based on Kahl and Albers (2010)).

Configuration. The advertising component provides a graphical interface, which allows configuring different advertising activities. As similarly described in several papers (Albers and Kahl, 2008; Albers, 2010; Hristova and O'Hare, 2005; Kurkovsky and Harihar, 2006), the advertiser can configure, which message he wants to deliver and whom he wants to target. Hence, the dimensions the advertiser needs to configure are the advertisement itself and the target profile. The form of an advertisement can be a selection of different types, e.g. banners, pop-up, message, invitations to brand specific groups, etc. Example: Advertising: 'Pop-Up' with Message: "Special Lunch offering! Only today between 1 PM and 2:30 PM at Pizza Joe."

By defining the attributes of the target profile, the advertiser can describe those users which he wants to target. Basically, this can comprise all attributes with which a user is described in his profile. In the example below, attributes like gender, age and the distance to the advertiser's shop are defined. The more precise this definition is, the more accurate could individual users be targeted. Example: Target Profile: "male, 20-35 years, within 2 km around my shop, between 12 h and 18 h, key word in communication: 'lunch'"

In addition, the advertiser can configure, how many attributes need to be equal, in order to achieve a "matching" of target profile and user profile. For each attribute the advertiser can also configure if this attribute needs to match in any case. In this case no matching can be achieved if these "necessary" attributes are not fulfilled. E.g., if a user needs to be at least 18 years of age in order to receive an advertisement.

Analysis. In order to determine, which advertisement might be relevant for which user, information about the user is needed. The needed information is gathered from the user profile, the context and communications/interactions with other users (Kahl and Albers, 2010).

The user profile in PICOS describes the user based on numerous attributes such as age, gender, interests, and favourite locations, etc. The context is mainly described by the current location of the user (as geo-coordinates) in combination with the time as well as information which might be derived from the location (e.g. current weather conditions at this location). Communications can be all kinds of interactions in which a user communicates with other users, e.g. directly, by mailing or chatting as

well as indirectly via comments or contributions in sub-communities. The gathered information leads to a dynamic user profile, which contains the profile, the context and communication information about the user.

Matching. The dynamic user profile characterizes the user in his current context. It thereby represents the complement to the target profile, defined by the advertiser, which characterizes the targeted user for an advertisement. In the so-called "Matching" process the dynamic user profile and the target profiles are compared.

There are different ways how to realize such matching in an actual implementation and which of these ways is chosen, might depend on various economic, organisational or technical reasons. In the approach used for the PICOS gaming community prototype a comparison of attributes is conducted. If a pre-defined number of attributes are equal, a matching is given.

In the approach described by Kahl and Albers (2004), the matching additionally contains a comparison between the communicating users, in order to identify similarities and common interests between them and present matching advertisements not only to one but to both of them. This indicates a certain variety of the possible approaches.

Display. In the final step of the process, the actual advertisement needs to be shown to the previously identified matching users. In practice this would also include further considerations regarding the users' device. It might be necessary to adapt the advertisement, due to technical specifications or limitations of particular devices and/or operating systems.

Support of C2C communication. The support of consumer-to-consumer (user-to-user) communication (C2C) is the 2nd step in the integration of Marketing into SNs and complements the direct communication between advertiser and user (B2C). Based on the principle of viral marketing (Kotler and Armstrong, 2006) to initiate a marketing message and let it spread from one user to other users who distribute it further, like a virus, the goal here is to establish and support such a viral (marketing) process. This process is part of the communication between users and as such it complements the direct communication between advertiser and user.

In literature and practice there is a varying understanding about how viral marketing works in detail (Phelps et al., 2004). In many social networks viral marketing is conducted by introducing a product or brand to the community (e.g. with a related profile or group on Facebook or MySpace). In these cases, basic principles of social networks are applied to commercial products, namely to present oneself (the company/brand/product) and communicate with others (customers). Unfortunately, such a communication is hard to influence and control and not targeted to individuals. In our case, viral marketing is designed to work more targeted, in order to address several opinion leaders who further spread the message (Dobele et al., 2007). For our focus it is described as a process which comprises the following steps:

Configuration. The first step represents the configuration of the Marketing Message (Advertisement). Basically, the activity is similar to the configuration in B2C support (as described previously): The advertiser has various options to configure an advertisement and to describe the targeted user for this advertisement. This includes the specification of the target characteristics (e.g. age, interests). The configuration includes as well options regarding the form of the delivery (e.g. pop-up, text message, etc.).

The difference is that the advertiser in this case defines the characteristics of the "key users", which should be addressed in order to further spread the advertisement. These users are regarded as opinion leaders, which have a stronger influence on their social surrounding (Dobele et al., 2005). Depending on the actual advertisement which shall be delivered, there are different definitions of who the "key users" are. E.g. users, who are very active with regard to communication or users who have many relationships to other users (friends) or certain characteristics (e.g. a certain age). The definition of key users might also be a combination of such different characteristics.

Analysis & Matching. While the target profile configuration is different, the Analysis and Matching process itself is similar to the respective steps for targeted advertising (see "Support of B2C

Communication"). The analysis contains the analysis of user information (profile, context, communication) which leads to a dynamic user profile. In the "matching" step, the characteristics of the key users (target profile) are compared to the dynamic profile of a user. The difference to the Matching process for targeted advertising is, that only a limited number of matching users are addressed, namely the key users. These users are the users which match best with the target profile.

Seeding. This phase includes the actual delivery of the marketing message to the identified key users, the so-called "seeding", in order to allow them to pass on the delivered message. Depending on how an advertisement is configured the form of delivery may vary. To support the action of forwarding (spreading) of the delivered message, advertisements need to contain a possibility to immediately and easily share them with other users (e.g. context Link on a specific site, Banner with possibility to forward, etc.).

Triggering. The whole viral marketing process is intended towards the viral distribution of the advertisement. Hence, an important part in this approach is not only to identify adequate users and provide them with the advertising message but also to provide or support a motivation to these Users to forward advertisements they receive (Pousttchi et al., 2008).One step to support this is already the targeting itself, considering that we aim to provide only highly relevant advertisements to users. Furthermore, an already existing intrinsic motivation of users to forward advertised messages can be supported by the availability of technical possibilities, which allow and simplify a recommendation to other users. E.g. in our prototype such a support is realised by providing a forward button in the advertisements for the so-called "commercial Points of Interest" (e.g. game shops). The button allows users to recommend the point of interest to friends.

6 CONCLUSION

The PICOS Architecture serves as a basis for integrating privacy enhancing concepts into (mobile) social networking infrastructures. The architecture enables providers, users and involved 3rd party stakeholders to enable and use privacy enhancing social networking features. Included concepts *enhance Identity Management*, empower users to *control Information Flows* and *support Privacy Awareness*. The advertising approach integrated within the architecture shows how a deeper integration of advertising is possible in social networks, while respecting users' privacy. The prototypical implementation of the PICOS architecture has further shown the feasibility of enclosed concepts such as those focused in this paper.

Nevertheless, further research on the usage and benefits of the privacy enhancing concepts is needed. It needs to be investigated, how these concepts can be applied to existing social networks and which further evolvements might be needed to address emerging privacy challenges (e.g. automatic "Blurring" based on semantic locations). Also the PICOS platform architecture is limited to privacy and trust with regard to other community members. An aspect of further research might therefore be the relation to the community provider and other possibly involved parties. Also advertising in social networks provides further challenges for advertisers and social network providers. Much research in this area so far considers specific aspects of marketing or advertising (e.g. viral marketing). However, holistic approaches are needed, in order to cope with the complexity of community structures and to consider the different stakeholders in social networks as well as the factors which influence the success of marketing activities. The results of the user trials have shown, that the concept of targeted advertising was appreciated. However, the empirical research on this needs to be extended, especially because only a limited part of the previously presented advertising approach could be implemented in the PICOS prototype and technical issues hindered to derive detailed empirical results on this feature.

In one of our next steps, our research activities will focus on the evolvement of the advertising approach integrated in PICOS and its application to a specific application scenario. Such an approach and its applications need to consider the diversity of social networks and as well the diversity of products and brands which are subject to marketing activities.

References

Adu-Oppong, F., Gardiner, C. K.., Kapadia, A., Tsang, P. P. (2008). Social Circles: Tackling Privacy in Social Networks, In: Proceedings of the 4th Symposium on Usable Privacy and Security (SOUPS '08). Pittsburgh, Pennsylvania, July 23–25.

Albers, A. and Kahl, C. (2008). Prototypical Implementation of an Intermediary Platform for Context-sensitive Mobile Marketing Applications, In: Proceedings of the 14th Americas Conference on Information Systems (AMCIS), Toronto, Canada.

Albers, A. (2010). Commercialisation of Context-sensitive Mobile Attention in Mobile Media Markets - Design Recommendations for Mobile Marketing Providers, Schriften zum Mobile Commerce und zum Mobilfunk, Verlag Dr. Kovač, Hamburg, Germany.

Beales, H. (2010). The Value of Behavioral Targeting (Study), Networked Advertising Initative.

Carroll, E. (2007). Success Factors of Online Social Networks, The University of North Carolina, Chapel Hill, USA.

Chew, M., Balfanz, D., Laurie, B. (2008). Undermining Privacy in Social Networks. In: Web 2.0 Security and Privacy (in conj. with IEEE Symposium on Security and Privacy).

Crane, S. (2010): D4.2 Architecture v2. Public Deliverable of EU Project PICOS. Available at www.picos-project.eu/Public-Deliverables.29.0.html.

Dobele, A.; Lindgreen, Adam; Beverland, Michael; Vanhamme, Joelle; van Wijk, Robert (2007). Why pass on viral messages? Because they connect emotionally, In: Business Horizons, Elsevier, Vol. 50 (4), pp. 291-304.

Dobele, A., Toleman, D., & Beverland, M. (2005). "Controlled infection! Spreading the brand message through viral marketing", Business Horizons, 48(2), March-April, pp.143-149.

Dwyer, C., Hiltz, S. R., & Passerini, K. (2007). Trust and privacy concern within social networking sites: A comparison of Facebook and MySpace. Journal of Computer-Mediated Communication, 13(1), 210-230.

Hansen, M., Berlich, P., Camenisch J., Clauß, S., Pfitzmann, A., Waidner, M. (2004): Privacy-Enhancing Identity Management. Information Security Technical Report; 9(1) 35 - 44.

Hartline, J., Mirrokni, V.S., Sundararajan, M. (2008). Optimal Marketing Strategies over Social Networks. In: Proceedings of the International World Wide Web Conference Committee 2008 (WWW 2008), April 21–25, 2008, Beijing, China.

Hiltz, S. R. and Passerini, K. (2007). Trust and Privacy Concern Within Social Networking Sites: A Comparison of Facebook and MySpace. In: Proceedings of AMCIS 2007.

Ho, S.Y. (2009). Opportunities and challenges of mobile personalization: An exploratory study. In: Newell S.; Whitley E.A.; Pouloudi N.; Wareham J.; Mathiassen L. (Eds.) Proceedings of 17th European Conference on Information Systems (ECIS 2009), 1211-1222, Verona, Italy.

Ho, S.Y.; Kwok, S.H. (2002). The Attraction of Personalized Service for Users in Mobile Commerce: An Empirical Study, In: ACM SIGecom Exchanges, Vol.3 No.4, pp. 10-18.

Hoegg, R. et al. (2006): Overview of business models for Web 2.0 communities. In: Proceedings of Workshop 'Gemeinschaften in Neuen Medien', TUDPress, Dresden, 33 - 49.

Hristova, N., and O'Hare, G.M.P. (2005). Ad-me: Wireless Advertising Adapted to the User Location, Device and Emotions, Proceedings of 37th Hawaii International Conference on System Sciences, Hawaii, USA.

IDC Report (2008). U.S. Consumer Online Attitudes Survey Results, Part III: Social Networking. IDC. (www.idc.com/getdoc.jsp?containerId=214899); Retrieved on 2010-06-08

Kahl, C. and Albers, A. (2010). Towards reasonable Revenue Streams through Marketing in Mobile Social Networks, In: Proceedings of the Multikonferenz Wirtschaftsinformatik (MKWI), Göttingen, Germany.

Kahl, C., Boettcher, K., Tschersich, M., Heim, S., Rannenberg, K. (2010). How to enhance Privacy and Identity Management for Mobile Communities: Approach and User driven Concepts of the PICOS Project, In: Proceedings of 25th IFIP International Information Security Conference Security & Privacy − Silver Linings in the Cloud (IFIP SEC 2010) Springer (2010), 20-23 September 2010, Brisbane, Australia.

Kempe, D., Kleinberg, J., Tardos, É. (2003). Maximizing the Spread of Influence through a Social Network. In: Proceedings of Ninth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (SIGKDD 03), Washington, DC, USA.
Kollmann, T. (2006). E-Venture, 1st Edition, Gabler, Germany.
Kosta, E. and Dumortier, J. (2008). D2.3 Contextual Framework. Public Deliverable of EU Project PICOS. Available at www.picos-project.eu/Public-Deliverables.29.0.html.
Kotler, P. and Armstrong, G (2006). Principles of Marketing. 11th Edn, Prentice Hall, New Jersey, Upper Saddle River, USA.
Kurkovsky, S., and Harihar, K. (2006). Using ubiquitous computing in interactive mobile marketing, Pers Ubiquit Compt, 10,1, 227-240.
Leskovec, J., Adamic, L.A., Huberman, B.A. (2007). The Dynamics of Viral Marketing. ACM Trans. Web, 1, 1, Article 5.
Liesebach, K. and Scherner, T. (2008). D2.4 Requirements. Public Deliverable of EU Project PICOS. Available at http://www.picos-project.eu/Public-Deliverables.29.0.html.
Müller, G. and Wohlgemuth, S. (2005). Study on Mobile Identity Management, Public Deliverable of EU Project FIDIS. Available at www.fidis.net/fileadmin/fidis/deliverables/fidis-wp3-del3.3.study_on_mobile_identity_management.pdf.
Nielsen (2008). Critical Mass - Worldwide State of the Mobile Web. Nielsen Mobile. (2008).
Nielsen (2009). Global Faces and Networked Places - A Nielsen report on Social Networking's New Global Footprint. Nielsen.
Office of Fair Trading (2010). Online Targeting of Advertising and Prices (Study), London, England.
Palmer, A. and Koenig-Lewis, N. (2009). An experiential, social network-based approach to direct marketing, Direct Marketing: An International Journal, Vol. 3 No. 3, pp. 162 – 176
Phelps, J.E., Lewis, R., Mobilio, L., Perry, D. and Raman, N. (2004). Viral Marketing or Electronic Word-of-Mouth Advertising: Examining Consumer Responses and Motivations to Pass Along Email, In: Journal of Advertising Research, vol.44 no.4, pp.333-348.
Pousttchi, K; Turowski, K.; Wiedemann, D.G (2008). Mobile Viral Marketing - Ein State of the Art, In: Bauer, H.H.; Dirks, T; Bryant, M.D. (ed.): Erfolgsfaktoren des Mobile Marketing. Strategien, Konzepte und Instrumente. Springer, Berlin, S. 289–304.
Schmidt, A.; Beigl, M.; Gellersen, H.-W.: There is more to Context than Location. In: Computers and Graphics, Vol. 23, 1998. S. 893-901.
Schrammel, J., Köffel, C., Weiss, S., Kahl, C. (2008). D2.2 Categorisation of Communities. Public Deliverable of EU Project PICOS. Available at www.picos-project.eu/Public-Deliverables.29.0.html.
Schulz, S., Mau, G. & Löffler, S. (2007). Virales Marketing im Web 2.0, in: T. Kilian, B. Hass & G. Walsh (Hg.). Web 2.0 – Neue Perspektiven im E-Business, Heidelberg: Springer, pp. 249-268.
Strater, K., & Lipford, H. R. (2008). Strategies and struggles with privacy in an online social networking community. Paper presented at the 22nd British HCI Group Annual Conference on People and Computers: Culture, Creativity, Interaction - Volume 1.
Strater, K., & Richter, H. (2007). Examining privacy and disclosure in a social networking community. Paper presented at the Proceedings of the 3rd symposium on Usable privacy and security.
Study on Social Network Adertisements. Linkshare (2009). Retrieved on 2010-06-08 (www.netimperative.com/news/2009/august/social-network-ads-2018failing-to-engage-users2019)
Subramani, M.; Rajagopalan, B. (2003). Knowledge Sharing and Influence in Online Social Networks via Viral Marketing, Communications of the ACM (46:12), pp. 300-307
Tschersich, M.; Kahl, C.; Heim, S.; Crane, S.; Böttcher, K.; Krontiris, I.; Rannenberg, K. (2011) Towards Privacy-enhanced Mobile Communities - Architecture, Concepts and User Trials. In: Journal of Systems and Software, Special Issue: Mobile Applications (JSS-D-11-00155R1). Elsevier, 2011.