FIDIS

Future of Identity in the Information Society

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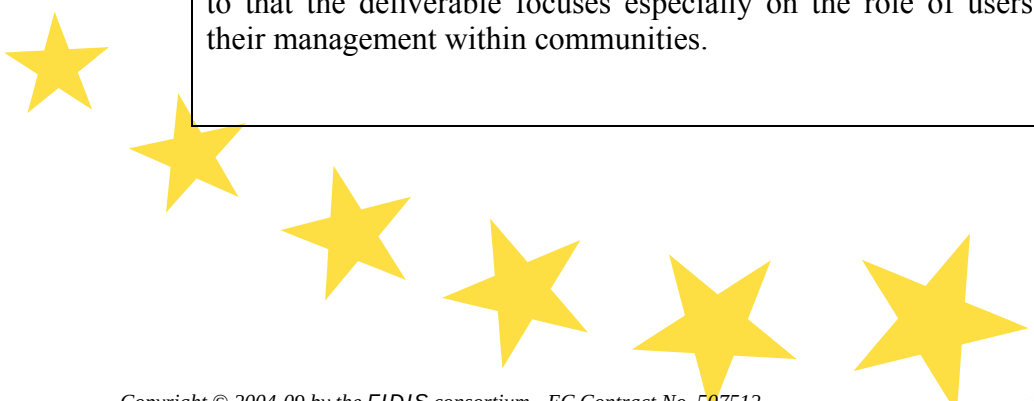
Summary

Web2.0 is a synonym for users' evolvement from passive consumers to providers of contents and information. In communities, a special type of Web2.0 application, this user generated content to a large degree consists of information on users' identities. This is especially true for mobile communities that, in addition to classical communities, consider users' location.

Within this deliverable we define and distinguish different types of (mobile) communities, describe their characteristics and their value approach. In addition to that the deliverable focuses especially on the role of users' identities and their management within communities.



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Foreword

FIDIS partners from various disciplines have contributed as authors to this document. The following list names the main contributors for the chapters of this document:

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Table of Contents

1 Executive Summary

Community platforms are an ever-evolving topic in web-based technology. Today there are several hundred available portals as e.g. flickr, youTube, and a wide diversity of blogs, offering community based services to their users. In this area, mobile communities provide new ways of interaction within communities by taking advantage of new possibilities that come along with mobile technologies such as location and context aware services. However, this also causes problems with regard to the handling of private attributes. This especially holds true for mobile communities allowing for the consideration of additional context information based on users' positions. In conjunction with other identity attributes disclosed in community profiles users' positions can be used to derive additional information about general habits, thereby extending users' identity by an action specific context (c.f. FIDIS Deliverable D11.12 on Location based services).

Building on the findings of Work Package 11, this deliverable will look into the topic of mobile/online communities, covering the following aspects:

- What are (mobile-) communities, what other types of communities exist and what are their characteristics? A common understanding of the term community will be derived that is going to be used across the deliverable. Furthermore the understanding of communities will be extended towards a common understanding of the term mobile communities.
- What is their value for users? The development of communities can be seen in line with the development of other Web2.0 applications. Web2.0 applications are characterised by users' active role in creating contents. In communities a large part of "user created contents" consists of information about users' identity that is disclosed and stored in user profiles.
- Case studies: professional vs. private communities. Users can join communities for different purposes. This has also an impact on different parts of their identity. Users might even be obliged to join communities when it comes to business applications forcing to participate in order to fulfil their duties and receive orders.
- What do community platforms look like? How is the identity management handled or how should it look like (security and privacy aspects)?

Within this deliverable it is shown that users can benefit from joining communities, but also threatened with regard to the protection of their privacy and identity. Mobile communities have a special position when putting them into the context of work performed in FIDIS Work Package 11 on Mobility and Identity. In contrast to "classical" location based services in mobile communities users' position information is disclosed to a much broader audience. This makes it even more necessary for users to apply privacy protecting mechanisms as e.g. provided by identity management tools within communities.

As an initial step users' awareness towards risks and pitfalls related to the disclosure of personal information in communities needs to be raised.

2 Introduction

The development of communities started somewhere in 1985. Besides the so called multi user dungeons, one early manifestation of central, text based multiplayer games as part of the Usenet in 1970, the Well (The Whole Earth 'Lectronic Link) appears as first real online community (Mühlenbeck and Skibicki 2007, p. 13).

The Well differed from most of the existing platforms at that time, mainly bulletin board systems (BBS) where communication and data exchange were the most important issues. At the same time the Well, while technically also being a BBS, offered well structured discussion forums as well as conferences on some of the topics. Based on the idea just to structure the communication in San Francisco, the Well became the basis of today online communities (Patalong 2008).

The development of the WWW (World Wide Web), text based as well as graphical interfaces (e. g. the Mosaic browser) in the beginning of the 1990 lead to the breakthrough of today's Internet which basically allows the world-wide usage of online communities. With their 1997 book "Net Gain" Hagel and Armstrong identified for the first time the economic potential of online communities. After the dot.com crash in 2002 (Mühlenbeck and Skibicki 2007, p. 17) the Internet was revitalized by the Internet industry through a completely new idea of online communities under the label Web 2.0 (Baumann 2006, P. 38). Internet platforms with user generated content and social interaction in virtual worlds between different people all over the world became important (Rüdt 2007, p. 2).

The economic potential of online communities was demonstrated in 2005 when MySpace.com was bought by the Australian media company Rupert Murdoch for 580 Million USD. One year later Google spent 900 Million USD in order to get advertisement space at MySpace.com and took over YouTube for 1,65 billion USD in October 2006 (Kollmann 2007, p. 80). At the End of 2006 the online business network XING went public (Mühlenbeck and Skibicki 2007, p. 18). The online community StudiVZ was bought by the Holzbrinck Group for 85 Million USD in the end of 2007. There is no doubt that online communities have a high potential.

Why is it important to focus on (mobile) communities within the FIDIS Network? Having a closer look at the reasons responsible for the growth rates one has to see the development of online communities in connection to the development of Web2.0. A central characteristic of Web2.0 is that users are no longer silent recipients of contents. Instead they actively contribute in creating contents. One of the flagship examples is the online compendium Wikipedia. The relevance of communities for the Future of Identity in the Information Society is quite obvious when having a look at "user generated contents" in online communities, a Web2.0 application as well. User generated content in online communities basically consists of users profiles consisting of a variety of disclosed identity attributes, and the relations to their peers.

Fig.1: Structure of the deliverable

What types of identity attributes are disclosed depends on the focus of the community. Therefore, and as a first step, the deliverable stresses on finding a common understanding of the term community that will be used across this deliverable (Chapter 3.1). This involves e.g. an explanation of different types of communities (Chapter 3.2), and some popular examples of online communities. A classification concerning its context, purpose, usage, infrastructure and roles brings up a round figure of the term communities (Chapter 3.3).

To understand the drivers of the development of communities Chapter 4 describes and discusses the added value of online communities as well as their success factors. This is supplemented by Chapter 5 by distinguishing between private and professional communities. Chapter 6 then stresses on the role of trust, especially on the question how reputation can be build and attributed to users partial identities disclosed within communities. Chapter 7 finally provides a set of identity related risks in communities, describes PETs that can be brought into action to conquer the risks, and derives and discusses a set of identity management funcionalities considered to be valuable. The deliverable concludes in Chapter 8 by giving a short summary and an outlook on further developments.

3 (Mobile/Online-)Communities

Online communities spread out and therefore it was just a matter of time for different types of communities or the first mobile community. Part of this chapter is the definition of the term community in general (Chapter 3.1). All communities we are going to talk about are so-called online communities. You have to be online somehow with a mobile device, a notebook or a personal computer. After the definition itself several types of communities, especially mobile communities are discussed. The types are:

- social communities (Chapter 3.2.1)
- mobile communities (Chapter 3.2.2)
- social bookmarking (Chapter 3.2.3)
- social blogging (Chapter 3.2.4)
- crowd sourcing (Chapter 3.2.5)
- meta communities (Chapter 3.2.6)
- social shopping communities (Chapter 3.2.7)
- virtual mobile community (Chapter 3.2.8)

Before an attempt of a classification of communities is given (in Chapter 3.3) some of the most popular communities will be mentioned (Chapter 3.2.9).

3.1 Definition

Although the term community is well known a definition in general language usage is missing. With reference to communities in the WWW there is a distinction between online and virtual communities (Mühlenbeck and Skibicki 2007, p. 15) but all of them are addressing the same principles.

In general the term community describes an association of people with bonds, for instance given by common interests and therefore social interaction (Rüdt 2007, p. 3).

Communities which primary focus lies on the Internet (mobile and fixed) are defined as online communities. An example could be a music community as Uptrax.com or DeviantArt.com. The term virtual community was used for the first time by Howard Rheingold in his book “The Virtual Community” in 1993. Within his book a virtual community is defined as “social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace” (Rheingold 1993, p. 5)

As a common understanding so far the focus of communities lies on online communication and social interaction.

The following chapter (Chapter 3.2) will explain the differences between different identified types of communities. Some of them were already mentioned.

3.2 Types of Communities

Figure 2: Different Types of Online-Communities

As mentioned at the beginning of Chapter 3 a lot of different online communities are available (see Chapter 3.2.7), illustrated by figure 2. Their identification and categorisation into different types of online communities is based on a cooperation between the FIDIS and the EU project PICOS (Privacy and Identity Management for Community Services). Some of the upcoming definition as well as the classification are based on public PICOS deliverables (D 2.1, 2.2 and 2.3) available on their project website.

In the following descriptions are given for eight different identified communities:

- social communities (Chapter 3.2.1)
- mobile communities (Chapter 3.2.2)
- social bookmarking (Chapter 3.2.3)
- social blogging (Chapter 3.2.4)
- crowd sourcing (Chapter 3.2.5)
- meta communities (Chapter 3.2.6)

- social shopping community (Chapter 3.2.7)
- mobile virtual community (Chapter 3.2.8)

3.2.1 Social Communities

Based on the rapid development of information and communication technologies (ICT), a special kind of online community (social community) has emerged, as e. g. MySpace.com. The interaction at this kind of platform is socially motivated. Most of the people are connected to share interests and activities or explore interests and activities of others (Kosta and Dumortier 2008a, p. 14).

3.2.2 Mobile Communities

The understanding of a mobile community is very similar to a social community. The community is also based on a group of people generally united by shared interests but the communication is provided by mobile communication technologies (Kosta and Dumortier 2008a, p. 14). Most online communities also have a mobile interface which takes into account the restrictions of mobile devices. The most important difference is the consideration of location information for content provisioning (e. g. dating portal qeep.de, micro blogging service twitter.com, etc.).

A couple of surveys indicate that nearly 46% of all social community members used available mobile community versions. Most of them used MySpace or Facebook on a mobile device (Alby 2008).

3.2.3 Social Bookmarking Communities

A social bookmarking community centers on the idea of disseminating links to websites that one user finds interesting to share. The predominant web-application that enables the working of these communities is the 'social bookmark' which allows access to the stored bookmarks from basically every computer with an Internet connection. The stored bookmarks are often commented, indexed and tagged to allow a broader mass (the community) to easily screen a list of bookmarks to find websites which they have a particular interest in. A general blog and an RSS feed are often used to inform the community about new developments and other issues surrounding the community itself (Kothanikkel 2008, p. 8).

To give an impression what social booking is about, De.licio.us as one of the largest communities of this type will be explained. As claimed by De.licio.us itself, the community had 5.3 million registered users in 2008. Characteristic for a social bookmark is the search

application on the site. By typing in a specific search word, all bookmarks by oneself and others, which are 'tagged' will be displayed and can be sorted by timelines. By following the link of a specific header, the user/member will be redirected to the website. If the user finds the website relevant, he has the option to save that website to his personal bookmarking list. The number surrounded by the blue rectangle is the actual number of users who have that specific website in their personal bookmarking list. Delicious also uses a blog to clarify issues or to publish new technical developments which can also be accessed through an RSS feed subscription (Kothanikkel 2008, p. 8).

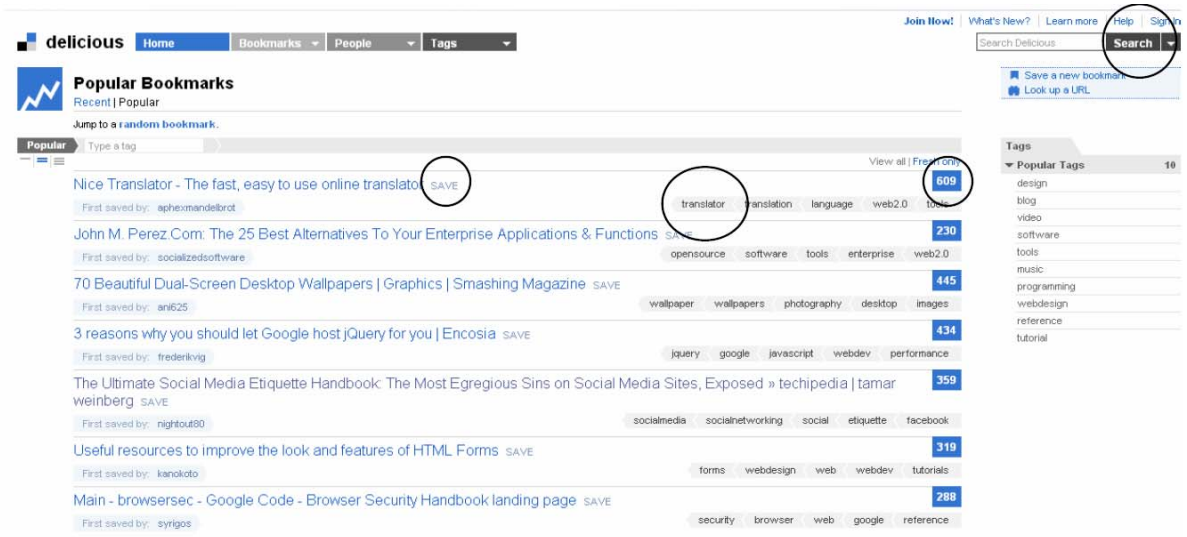

Figure 3: Social Bookmarking at De.licio.us

3.2.4 Social Blogging Communities

A social blogging community is a combination of a social network with a micro blogging community. 'Micro Blogging' is the authoring of rather short messages on a website. So, the combination of these two communities forms, in essence, a 'tracking platform' for the users' circle of friends (Kothanikkel 2008, p. 9).

Social blogging are using a deviation of the blog web application as the text message is restricted to a specific number of chars. Also, unlike in traditional blogs, no pictures and video's can be inserted, yet. Most social blogging communities provide an API, whereupon several applications were developed and provided for the broader community. RSS feeds and a traditional blog are used to keep the community informed about new developments and other relevant news (Kothanikkel 2008, p. 9).

One highly popular social blogging community is "Twitter" (www.twitter.com). As of numbers from March 2008, Twitter has passed the 1 million users threshold and achieves a growth rate of 800+ % per year (Arrington 2008). The aim of Twitter is to keep the circle of friends (and even others) of a user up to date about events of his everyday life. For that the user has exactly 140 characters. So, by premise, his message will be short. The user may

follow the postings of an 'associate' by using the "follow" function attached to each member on the twitter site.

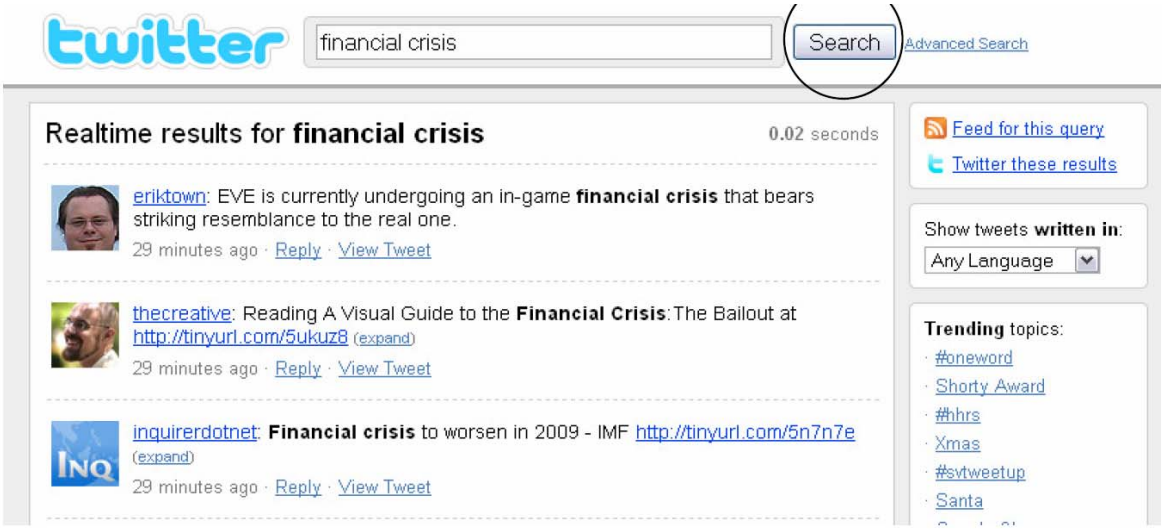

Figure 4-1: Twitter.com – Social Blogging

As can be seen in figure 4-1 each user is virtually surrounded by his postings, where the most appropriate catchwords extracted from the postings of the user will be used to enable a satisfying search result (Kothanikkel 2008, p. 9).

Figure 4-2: FIDIS @ Twitter

The FIDIS Network is also represented at Twitter (see figure 4-2). More information can be found at the FIDIS Website at www.fidis.net.

3.2.5 Crowd Sourcing

In the June 2006 issue of Wired Magazine (Howe 2006a), Jeff Howe defined 'crowdsourcing' as "the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call."

A crowdsourcing community uses rather simple web applications to foster the creation of the community. Traditional email alerts are utilized to keep the community members aware of

new challenges. In addition, a blog is used to discuss issues concerning crowd sourcing and to keep the community up to date about new developments. Here, bookmarking and tag clouds find their application (Kothanikkel 2008, p. 10).

As an example for crowdsourcing communities the Innocentive community (www.innocentive.com) will be presented. Innocentive claims to have a global network with 160,000 members which can earn cash rewards ranging from $5,000 to $1,000,000 upon solving a challenge. A challenge is a problem in the developing stage of an innovation where a company cannot find a solution (Kothanikkel 2008, p. 10).

On the Innocentive website every user can browse new challenges by discipline and decides whether to work on a solution. Each challenge is endowed with a cash reward which often reflects the urgency and the relevance of a challenge to be solved. As companies often seek the 'wisdom of the crowds' (Surowiecki 2005) when in-house researchers do not find a solution to a very detailed and specific problems, a 'solution seeker' provides all relevant information about the case in the challenge description. Also, the users are able to contact the solution seekers in case of a further clarification of the issue.

To give an example of the workings of crowd sourcing, Jeff Howe provided an example in the June 2006 issue of Wired Magazine. (Howe 2006b) He introduced Ed Mecarek, a 57 year old electromechanical engineer (Kothanikkel 2008, p. 10). Although not having any substantial knowledge in the chemistry or biology field, he was able to solve a challenge of Colgate-Palmolive in a very short amount of time. The $25,000 challenge of Colgate-Palmolive was set to find a way to inject fluoride powder into toothpaste without dispersion into the surrounding air. Mecarek could solve the problem which in-house researchers at Colgate-Palmolive did not find by using his knowledge of electromechanical coherences (Kothanikkel 2008, p. 10).

The principle and value behind a crowd sourcing community was subsumed in 2008 by Google CEO Eric Schmidt at a conference in Washington D.C. "An open system means more voices; more voices mean more discussion, which leads to a better decision. A community will always make a better decision than an individual." (Lyons and Stone 2008; Kothanikkel 2008, p. 10)

3.2.6 Meta Communities

Meta communities are communities which provide a single access point for various other social, private or professional communities in order to support the user to maintain an overview over his various social profiles. Basically, a Meta community is an umbrella community where other (single) communities are collected and maintained (Kothanikkel 2008, p. 13).

To be able to view the content of other sites "a common set of APIs for social applications across multiple Websites" has to be established. This concept is called, "open social" (Owyang 2007). The Socialurl community (see figure 4) will serve as an example for a Meta community.

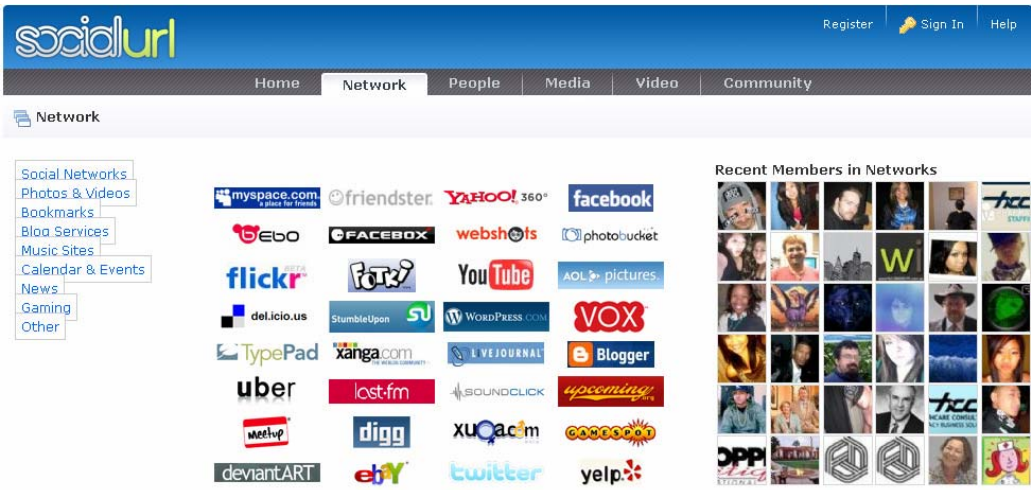

Figure 5: Socialurl Community

The site allows organizing and access friend feeds of several social networks as can be seen in figure 5. The tab 'network' allows access to users of that specific community either known to you or not. By clicking on the tab 'people', the user will be able to see the online 'friends' and search for others on various sites without logging into these communities separately (Kothanikkel 2008, p. 13).

Respectively, 'media' and 'video' allows finding content like photo albums and videos. The value of a Meta community is its organizing function. As of today, more communities are established every day. Keeping an overview over one's profiles in the respective communities and the information provided and such protecting one's privacy, can be handled by a Meta community with great efficiency. However, not all communities provide APIs to interconnect their community with a Meta community (Kothanikkel 2008, p. 13).

3.2.7 Social Shopping Communities

A social shopping community is a web-shopping service where its members can purchase, rate, criticise, or suggest enhancements for products in communication with others. The difference between e-commerce platforms, which simply offer products, assortments of goods and prices and social shopping communities lies in the interaction of its members (Kothanikkel 2008, p. 14).

Each member provides a description of their preferences. Searching for these preferences a user may find shopping partners, who share the same preferences. These shopping partners basically function as 'real world' friends who give an opinion on a product. There are various approaches to social shopping, ranging from open to closed shopping communities, from unique items to mass production items, and from multiple offered products to a single product per day (IT Wissen; Kothanikkel 2008, p. 14).

Social shopping communities do use blogs and forums to foster the communication among their members. Also, tags are used to utilize search engines on the website more effectively.

As an example for social shopping communities Thisnext (www.thisnext.com) is introduced in the following paragraph. The Thisnext homepage is separated into frames which represent the different activities a user can do (Figure 5). Basically, a user can look for products by category, by trends in cities, by new discoveries and by recommendations of connected shopping partners. On the other side, each user can introduce a product to the community or suggest, recommend or comment on a member's taste or talent for example (Kothanikkel 2008, p. 15).

Also, in the statistics area of each members profile a user can find all kinds of information, like total amount of recommendations and ratings. The value of social shopping communities lies in the reduction of transaction costs which occurs by comparing the quality, prices and technological innovations of products against each other locally. A social shopping community will have members who share the same taste and interests and may have information about interesting products which may be useful or interesting to the user. It also supports independent product designers to scale up the distribution of their products and to gain reputation (Kothanikkel 2008, p. 15).

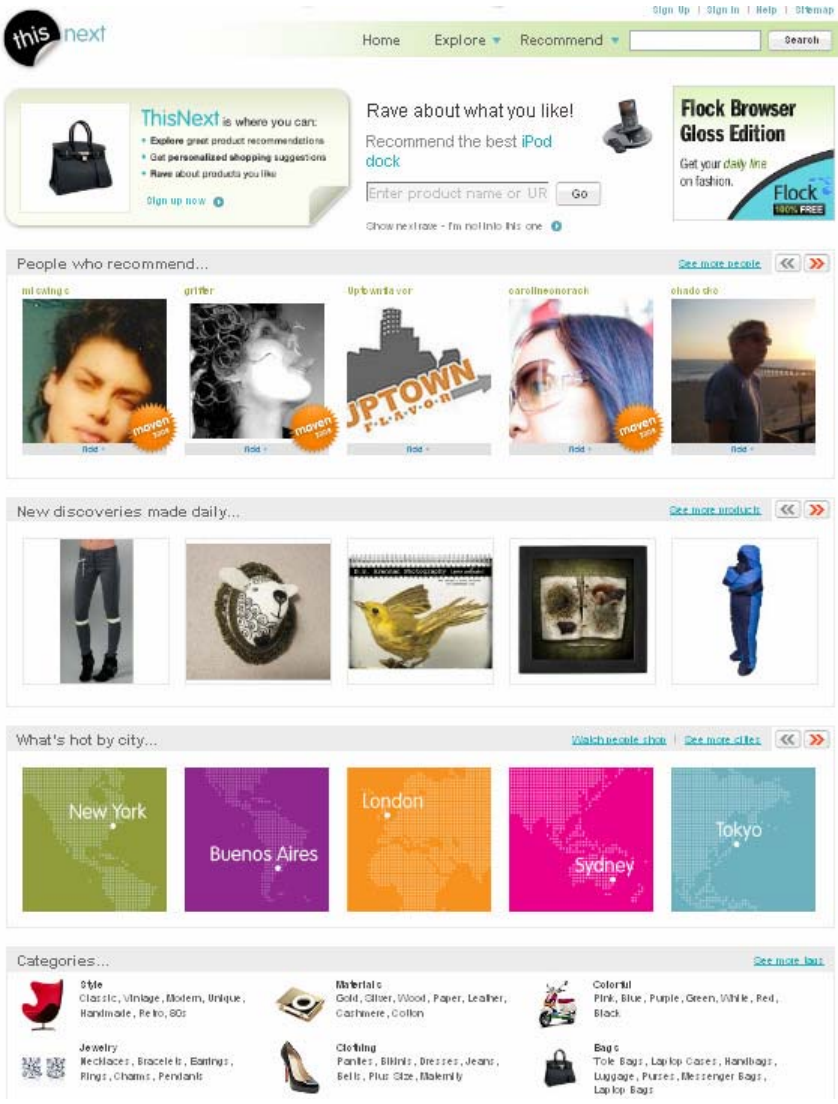

Figure 6: ThisNext – shooping community

3.2.8 Mobile Virtual Communities

Mobile virtual communities are groups of people who on many- to- many (Rheingold 2002a, p. 1) relationships communicate with each other both, with a computer, and a mobile device, such as smart phones. To enable several 'activities' which the members of the community could pursue, the mobile device must be 'always on' and needs access to a fast Internet connection (Kothanikkel 2008, p. 15).

Among the activities are coordinated actions of groups of friends in geographic areas through location-based services (Rheingold 2002a, p. 3) or sharing ideas, media content (photos, videos) practically anytime and anywhere. Rheingold also proposes a term for these relative new communities, 'Smart Mobs' (Rheingold 2002b).

To further describe virtual mobile communities, Loopt (www.loopt.com) will serve as an example. Loopt enables several services both on the web and on mobile devices, like chatting, geographical location tracking, access to journals and other location based users recommendations. However, access to these services is restricted to users who both have one of a limited range of mobile devices, e.g. iPhone and have an account at one of a limited range of networks, e.g. Verizon (Phones 2008, see Figure 6).

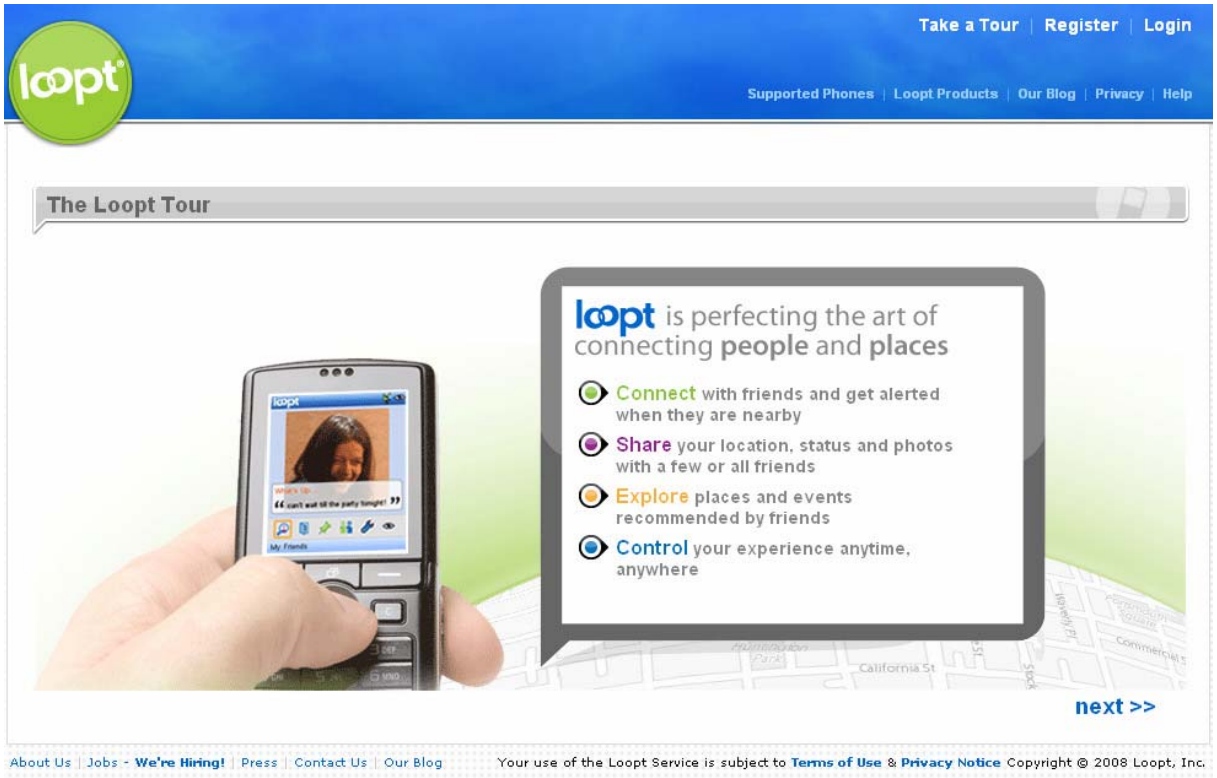

Figure 7: Loopt

Once a member of loopt, a user is able to report on his everyday life's events practically anywhere and anytime, which then is distributed to the connected friends of the users, either onto the mobile device or on the web. The 'connect' function allows users to connect to other members and get alerts if friends of the users are in the near. The 'share' function allows a

user to distribute content (media, comments, recommendations, etc.) to his friends. The 'explore' function allows a user to receive automatic information generated by his friends about locations, shops, or basically every issue, once reaching a specific area. With the 'control' function, a user can organize his privacy settings, e.g. he decides who shall receive what information. The value of mobile virtual communities is that it extends the idea of networks to a new level (Kothanikkel 2008, p. 16).

3.2.9 Popular Examples

The following list offers a view on the wide spectrum of online and mobile communities by naming the mostly renowned international communities (Schrammel et al. 2008).

Online communities:

- MySpace (http://www.myspace.com)
- Facebook (http://www.Facebook.com)
- Orkut (http://www.orkut.com)
- Friendster (http://www.friendster.com)
- Flickr (http://www.flickr.com)
- Del.icio.us (http://del.icio.us)
- LinkedIn (http://www.linkedin.com)
- YouTube (http://youtube.com)
- Wikipedia (http://www.wikipedia.org)
- Digg (http://digg.com)

Mobile communities:

- Dodgeball (http://www.dodgeball.com)
- Socialight (http://socialight.com)
- Yospace (http://www.yospace.com/index.html)
- Qiro (http://www.quiro.net)
- Qeep (http://www.qeep.com/int)

3.3 Classification

The following chapters provide categorization aspects for online and mobile communities based on currently available literature. They are suggested as one possible categorization of many. The classification is separated in usage context & purpose, use of context, communication infrastructure and user roles.

3.3.1 By Usage Context and Purpose

The influence of social networks onto the social capital built has been investigated by Ellison et al. (2006). The survey is based on the Facebook usage of 286 Michigan State University undergraduates. Demographic information, general information about Facebook usage, psychological measures as well as social capital measures were collected and documented. The findings indicate a positive connection between Facebook usage and the creation of social capital. Facebook is used to keep in touch with friends. More than 96% included the name of their school in their profile (Schrammel et al. 2008).

Concerning the categorization of communities the following three possible categories are suggested (Schrammel et al. 2008):

- work-related
- romantic relationship initiation
- shared interests (e. g. music or politics)

Stanoevska-Slabeva and Schmid (2001) developed a comprehensive classification related to the content of virtual communities. They defined four groups of communities and related purposes (Schrammel et al. 2008):

- discussion - exchange of information
- task/goal oriented - achieve a common goal by cooperation
- virtual world - formed around virtual worlds and games
- hybrid solutions - contain elements of more than one of the mentioned categories

3.3.2 By Use of Context

For the most communities the context of use is of importance. Olsson et al. (2008) investigated the context use of four different communities by personal and group interviews, contextual inquiries and distributed usage diaries (Schrammel et al. 2008).

The results indicated that users perceived collective content rather as a sign of communality than as an issue of ownership. The extent to which content is collective was heavily influenced by the semantic content of the content item, the community's contribution and the level of sharing.

Based on the findings Olsson et al. (2008) have introduced a categorization of content according to (Schrammel et al. 2008):

- private content
- public content
- collective content
- personal content

3.3.3 By Communication Infrastructure

An article regarding a categorization of online communities based on communication infrastructures was released by Renaud (2008) in February 2008. He suggests a classification into (Schrammel et al. 2008):

- mass social networks
- social news
- social bookmarking
- social media
- content sharing
- blogs
- microblogs
- hybrid communities

3.3.4 By User Roles

The roles of users in online communities are very different. Renaud (2008) figured out that 52 % of all members of online communities are inactive and are split up into the creators (13 %), the critics (19 %), the collectors (15 %), the sociables (19 %) and the onlookers (33 %) (Schrammel et al. 2008).

Thom-Santelli et al. (2008) have conducted 33 user interviews using an enterprise online tagging system to determine the five major social roles. The system tested disposed of an enhanced contact directory, a blogging tool, a social bookmarking website and a podcast repository.

The researchers investigated five major social roles (Schrammel et al. 2008):

- Community-seeker (finds members of existing communities)
- Community-builder (creates community where it is missing)
- Evangelist (uses different systems and connects the members of a group)
- Publisher (production and dissemination of content)
- Small Team Leader (low frequency tagging; communication to other members)

4 Added Value & Success Factors of Mobile Communities

This chapter investigates the added value of mobile communities (Chapter 4.1) as well as success factor (Chapter 4.2) to assert oneself over the competitors in today's market. Mobile communities are particularly relevant within FIDIS Work Package 11 on Mobility and Identity. As a characteristic feature of mobile communities the user's current position is considered in addition to the classic set of disclosed identity attributes. This has different implications for users' identities. One of the most obvious consequences is that an additional identity attribute is disclosed. The availability of this attribute in conjunction with other available attributes and external geo-information allows an extension of the user's disclosed identity.

Thereby the user's context can be expanded and an action specific user context can be derived. On a more general level this has been explained in FIDIS Deliverable D11.2 as this characteristic holds true for location based services in general (Deuker 2008, p. 17f).

In the following the added value from a user perspective will be described and success factors of mobile communities will be discussed. Special attention is put on the comfortability (Chapter 4.3) of mobile communities.

4.1 Added Value

The added value of mobile communities will be presented by two aspects, location dependence (Chapter 4.1.1) and the strong relation between mobile communities and the real life (Chapter 4.1.2) of the community members.

4.1.1 Anywhere – Location Independence

A survey released by Bitkom shows, that 72% of person questioned want to be reachable twenty-four hours a day and seven days a week. Even when they are at the office, at sports, shopping or in a concert, the mobile phone is always part of their daily life. The fact to be available anytime and anywhere and to stay in contact with one's communities creates not just a direct benefit for the individual user; the combination with GPS and context related interactions is the foundation for further services.

In contrast to the paradigm of permanent availability, LBCS (Location Based Community Services) are able to send context-based information automatically to the user. To prevent unnecessary and annoying floods of messages e. g. in case of advertisement, personalization is an important factor. The combination of personal preferences with profile information enables suitable adverts, just like One-to-One marketing activities.

LBCS are push-based services specialized for location and context based application as for instance a friend alert or local buddy search.

A fusion of real and virtual world is already reality. Community members are able to meet spontaneous by using community services. The selection of a location e. g. a restaurant is done by location based services. Furthermore users can view comments with geotags and virtual post-its of other users to get idea of the restaurants quality.

A virtual postit or a geotag is a connection between a location and information e. g. of previous visits, sometimes with photos.

A lot of information on the fixed Internet is about past and future events. Mobile Internet allows receiving live events like concerts including photos, videos or comments completely location independent. Sitting in front of your PC is not necessary.

4.1.2 Connecting "Real" and Mobile Communities

A user's real life is connected with a mobile community more intensively than with every other online community. This is mostly based on the benefits of a mobile environment. The compact design of mobile devices allows members of mobile communities to have them available at all times. Mobile community members move freely in the real world and are a part of their mobile community, regardless of where they are. The boundaries between the real world and mobile communities can partly dissolve. Members of mobile communities can meet in the real world as a part of their community life. Mobile communities extend individuals' partial identities that are classically used and disclosed in "not mobile" communities.

The usage of mobile communities probably increase the length and frequency of the interaction, since it also takes place in the real world in addition to the communication via the mobile community platform. In comparison to other communities "Meetings" or "Gatherings" doesn't stand for meetings organized by a large part of e..g. virtual communities to reinforce the relationship with the platform. The spontaneous gathering of the members of mobile communities can contribute to achieving goals as direction, reciprocity, density, bonding strength and atmosphere. Members talk to each other outside the community platform. Conversations are being held based on the current location and the reason for the meeting (reciprocity, direction). The community members get to know each other (better). New contacts are being created which are also transferred to the mobile communities thus making them denser. Ties between the members are intensified, because they have met personally. Shared activities, successfully carried out after the meeting.

From an economic perspective the gathering of several members of mobile communities enables offers which take advantage of the greater purchasing power of more than one person with the same or similar buying desire (Reichwald et al. 2002, p. 18). The institution which is behind a mobile community can try to set the location for this gathering at one of its branch offices. In a mobile community with a commercial background, the institution can bring a larger number of customers to their stores. One member can invite the others. This leads to a win-win situation, because the members of the mobile community who become customers will get a discount and the institution achieves higher sales.

4.2 Success Factors

Besides the mentioned added value, the chapter at hand will list some factors which are important for mobile communities to become a successful community. In detail, the following aspects will be described briefly:

- user behaviour (Chapter 4.2.1)
- accessibility and availability (Chapter 4.2.2)
- security (Chapter 4.2.3)
- comfortability (Chapter 4.2.4)
- localisation (Chapter 4.2.5)
- customizing (Chapter 4.2.6)
- trust (Chapter 4.2.7)

4.2.1 User Behaviour

As one success factor user's behaviour, especially changes in user's behaviour must be taken into account to be able to attract and hold members of mobile communities. In the beginning the community content has to support the members. Later on communities will possess their own content, provided by members. The operator have to deliberate whether to continue using and gathering information about changes regarding user's behaviour or to access their own data for the provisioning of mobile communities services.

A mobile community has to offer desired content, suitable to a lot of different situations and available for all community members. In addition technical capabilities have to be provided in order to enable the added value from a members perspective e. g. to access the community anytime, anywhere with different authentication mechanism.

Only when information which is of interest for the member is provied, an added value is achieved. Offering a pastime or communication with other members can also create an added value in free time as part of the private life. The benefits of mobile communities' services in such situations also lead to attaining the goal of a higher interaction duration and frequency. If the operator provides services relevant for the member in particular situations, it will lead to the achievement of those objectives.

It is all about taking the user's behaviour into account when you talk about mobile content in mobile communities. Mostly young people are seen as a target group for mobile communities, as the high mobility and location independence in the form of mobile phones have become a permanent part of their everyday life (Wiedmann et al. 2000, p. 10f).

4.2.2 Accessibility and Availability

Both accessibility and availability are factors of success which rest upon the same technical basis - packet data transmission. They provide the state of always on and allows a non-delayed two-way communication (Tasch and Fremuth 2002, p. 2).

For accessibility, it is important that the member gets the right information at the right time (Durlacher 1999, p. 16). The objective of availability is to ensure that all required information is immediately available for the member (Wiedmann et al. 2000, p. 7). To influence the success of mobile communities by the accessibility and availability the operator must:

- ensure that the information requested by the member reach the recipient at the right time
- ensure that all information requested by the member is available at any time.

In addition, It have to be taken into account that members do not want to be reachable for all information requests and communications at any time.

In the following sub chapters three examples

- push services for transmission of the time-critical information
- constant availability of all information
- realisation of reachability management

for accessibility and availability will be illustrated.

4.2.2.1 Push services for receiving time-critical information

Members of mobile communities can access time-critical information independent of their location and current time. Therefore time-critical data can be accessed faster than on a stationary PC due to the fact that the PCs may not always on (Buse 2002, p. 93).

The non-delayed information flow in a business environment helps to avoid revenue losses or costs which would have occurred based on a delayed response (Scherz 2007, p. 104]). Members are being notified of new entries or information, so they can react immediately. Pushed information or messages will be answered directly if required and will not be lost among multiple messages that would arrive in one batch (if information and messages were collected and processed at once a later date)..

Wiedmann et al. (2003, p. 3) identified four scenarios where promotion activities will encounter a positive response from potential customers − the members of the mobile community:

- freshness: e. g. food
- timeliness: e. g. news, menu of the day in a restaurant
- community experience: e. g. a disco is well populated with people who like the same music
- bargain: e. g. a product has a cheaper price for only an hour.

Sending information considering a commercial background has to be done carefully. even if it was requested by mobile community members. A high number of notifications can quickly be interpreted as spam which leads to a loss confidence (Kalantary 2006, p. 3). To avoid this, effective filter techniques s based on the member's wishes should be used which correspond as closely as possible to the expectations of the member (Buse 2002, p. 94).

4.2.2.2 Constant availability of all information

Due to the mobility of terminals it has to be ensured that accessing mobile communities is possible at any time. If information is not available to mobile community members, network effects will not take part. From a technology perspective a stable connetion that do not need to be re-established between mobile terminals and commnity platforms has to be guaranteed.

In principle mobile devices have advantages in comparison to stationary devices as they usually don't need much time to start and can be used quickly after turning on. However this added value is lost, if a permanent re-establishment of the connection is needed (Wiedmann 2000, p. 7).

4.2.2.3 Realisation of reachability management

Nowadays, each member of a mobile community is accessible for everyone, if carrying the mobile device with them. A result of this constant accessibility is, according to Höflich (2001, p. 7), a reachability syndrome.

People assume on the one hand, that a person can be reached at any time for sure. On the other hand, the "desire for privacy and undisturbance" grows, so the people themselves do not always want to be reachable by everyone (Kuhlenkamp et al. 2006, p. 27). Members of mobile communities should have the opportunity to decide for themselves under what conditions they are reachable or not. Therefore mobile communities should make reachability management available to all members. This becomes increasingly important when the number of members increases. The goal is to allow only desired communication requests.

The reachability management provides the technical support for each member to configure its personal availability individually and in a differentiated fashion. Before connecting, a

reachability management checks the requirements of the message recipient and decides whether the connection is to be established or not. According to Höflich (2001, p. 9), it should be possible for the members of mobile communities to adjust these specifications based on typical options of interpersonal negotiation of accessibility:

- subjective urgency of communication request
- reference to the communication request
- cause of the communication request
- topic of the communication request

The communication context can also influence a successful communication establishment. It includes the mutual awareness of the communication partners, as well as the type of communication. Also the current location of the member at the time when the connection attempt is considered, is of importance (it should not lead to a disruption in an inappropriate moment) (Baumgarten 2001, p. 50).

For a successful implementation of a reachability management, the technology must provide the members of the mobile communities with the possibility to configure it in detail. From an organizational point of view the community must assist a member by supporting the configuration of the reachability management by providing an appropriate allocation of rights.

4.2.3 Security

Since the amount of community members increase every day and so personal information, which are stored and available in the world wide web, security concerns are becoming public.

Spoofing the encrypted communication between two mobile communication parties is more difficult than spoofing the communication between fixed internet terminals (Reichwald et al. 2002, p. 7). Based on the GSM architecture mobile communication is by way of comparison to the fixed internet communication more secure.

The identification is simplified and the user proves his identity by a PIN. This simplicity is a real benefit, which is not available for the fixed Internet but can be used for future internet application after mobile operators following the trend of of Telco services modularisation.

Nevertheless a lot of people still don't trust the mobile Internet like the fixed Internet (Scherz 2007, p. 157). The provider needs to convince these people of the security in the mobile communities over mobile communication infrastructures (Widemann et al. 2002, p. 8).

4.2.4 Comfortability

The goal of a new technology is to make life easier (Durlacher 1999, p. 67) but mobile communication by itself won't generate benefits for mobile community users, so they must feel comfortable in the community while using mobile devices.

The comfortability makes the users stay in the community. A combination of comfort and other attributes of mobile communication brings more benefits, which will increase users' satisfaction and the success of mobile communities. Furthermore the accessibility, the availability and the location tracking feature create together with the comfortability large benefits for the users (Schubert and Hampe 2006, p. 110). Moreover my position will tracked automatically instead of a manual input of the position that would be uncomfortable on a small display (Basole 2004, p. 4; Schubert 2006, p. 110f).

User satisfaction can be a reason to make the user stay in the community when you have a certain amount of user satisfaction, even small issues won't make them leave the community, because they don't want to enter a new unknown community and to find new contacts (e.g. Schubert and Hampe 2006, p. 5).

4.2.5 Localisation

The possibility of location tracking enables mobile communities to be unique and is nowadays one reason for success or failure. (Basole 2004, p. 4). In addition to that this feature could also cause fears (big brother)

The location information can be used to generate additional benefit if the service would react on real context like the user's actual location (Scherz 2007, p. 23). Concerning trust within a community service e. g. geo-tagging, users should only be able to write comments and reviews about certain location, when they are actually at this place. This will increase the quality of comments and the trust to the community, which leads to a higher retention.

The idea of a mobile community is that users should interact with real life contacts. These relationships must be enriched by the platform. This could happen by localisation features as letting users to find and meet each other (Tasch and Fremuth 2002, p. 2). This would be possible by technical implemented communication ways and the establishment of user profiles.

It's also essential to mobile communities that they need the location of their users to offer context based content. But the users typically will fear about letting people know where they are and so the provider needs to establish incentives to make the users share their positions. Nevertheless the user should stay in control about the amount of information he shares (Wiedmann et al. 2000, p. 16; Tasch and Brakel 2004, p. 6). On a more general level this has also been discussed in FIDIS Deliverables D11.2 on Location Based Services (Deuker 2008) and the survey on users' control in different types of Location Based Services that was part of FIDIS Deliverable D11.6 (Royer and Deuker 2009).

4.2.6 Customizing

Based on the phone number and a contract between phone owner and mobile operator, an identification of the person behind the device is possible (Wiedmann et al. 2000, p. 14). Therefore personalization can be supported through identification. Personalized services are already used in e-commerce applications and will be improved by mobile applications (Reichwald et al. 2002a, p. 3). For a successful mobile community the provider has to offer personalized services.

The Internet contains a lot of information, but mobile devices have e. g. small display. By the way of personalizing the amount of information can be reduced and suitable to the device (Basole 2004, p. 4). The reduction is also important to realize the comfortability (Wiedmann et al. 2000, p. 14), which makes the difference between a good and a bad application (Durlacher 999, p. 67).

The operation and maintenance of mobile communities costs the provider a lot of money. If the provider isn't a company or institutions, which uses the platform for direct marketing, an additional revenue source has to be found. A service fee for service usage is one opportunity, but difficult, cause everyone expect everything for fee. That's why provider often charge a fee for premium services like individualized newsletters. But it is a great chance for one-to-one marketing activities (Buse 2002, p. 93; Wiedmann et al. 2000, p. 14), but also a trap because too much profiled marketing activities destroy the users trust in platform and a service.

The usage of the method of personalizing data could cause concerns (Buse 2002, p. 94; Wiedmann et al. 2002, p. 15). Especially the combination of personalized data with location tracking could lead to fear about abuse (Wiedmann et al. 2000, p. 15). To solve this problem the users must be convinced that the trust will be worth the benefits (Baumgarten 2001, p. 52). Furthermore the provider has to be in every action conform to data protection and privacy regulations (Reichwald et al. 2002, p. 22). Finally the technical infrastructure of a mobile community has to protect the community from data abuses by third parties (Baumgarten 2001, p. 52).

5 Case Studies

Individuals can use communities for different purposes and in different situations within their daily life. Thereby communities can affect different parts of users' identity. One very common distinction is to consider and distinct between private and professional usage of communities. To get a better understanding of mobile/online communities the following section distinguishes between professional and private communities. This is complemented by the presentation of an example for a private community (angling) and an example for a professional community (taxi driver).

Both examples are based the work that was conducted as part of the EU project PICOS (Schrammel et al. 2008).

5.1 Professional vs. Private Communities

Private Communities are communities with social orientation. Other kinds of communities evolved out of the original community (Markus 2002b).

According to Markus, the social orientation of communities is structured in the development of relationships and entertainment. Beinhauer (2004, p. 27) changed this concept slightly by adding a third category– the interests-community (Markus 2002a, p. 52; Beinhauer 2004, p. 27).

The development of relationships is one of the main intentions for joining a community. Users develop social relationships to other members at the foundation of shared interests. This is manifested in communication and interaction.

The foundation is for example the seeking of a partner, shared interests and communication via chats (Markus 2002a, p. 52; Beinhauer 2004, p. 27). The coherence of family increased by that (Beinhauer 2004, p. 28).

Users with the main goal of entertainment are often in entertainment communities. This kind of community puts the community interest more in the spotlight than the interest of a specific user. Characteristic contents are often games and communication (Markus 2002a, p. 53).

The main focus of the interests-community is on the exchange of specific topics. The foundation is here build by hobbies, shared topics, and vicinity (Beinhauer 2004, p. 27).

Professional Communities care about professional issues. Examples are the Community of Practice, and Knowledge Communities. The key motivation is to get in touch with people from the working group, who need similar information for their tasks (Markus 2002a, p. 54).

Professional-oriented Communities are dividable into education networks and expert networks. Education networks are networks about education and advanced education. The goal can be the interaction and exchange of knowledge about scholarly and scientific topics. Expert networks concentrate on „the establishment of an expert network in regard to a specific topic“ (Markus 2002a, p. 56). Like in an education community this is about an

increase of know how. This happens "on an informal layer and just on own initiative“ (Markus 2002a, p. 55).

5.2 Case: Angling Community

Schrammel et al. (2008) described an angling community as part of the EU project PICOS. In its description the context of the application, the users behind, the different relationships and a concrete use case is given. To gain better understanding of the needs and the resulting potential for mobile support services, an example of a single person, named John F., is given, which is an excerpt from (Scherner, 2006) and part of Schrammel et al. (2008). The underlying architecture is given in figure 8.

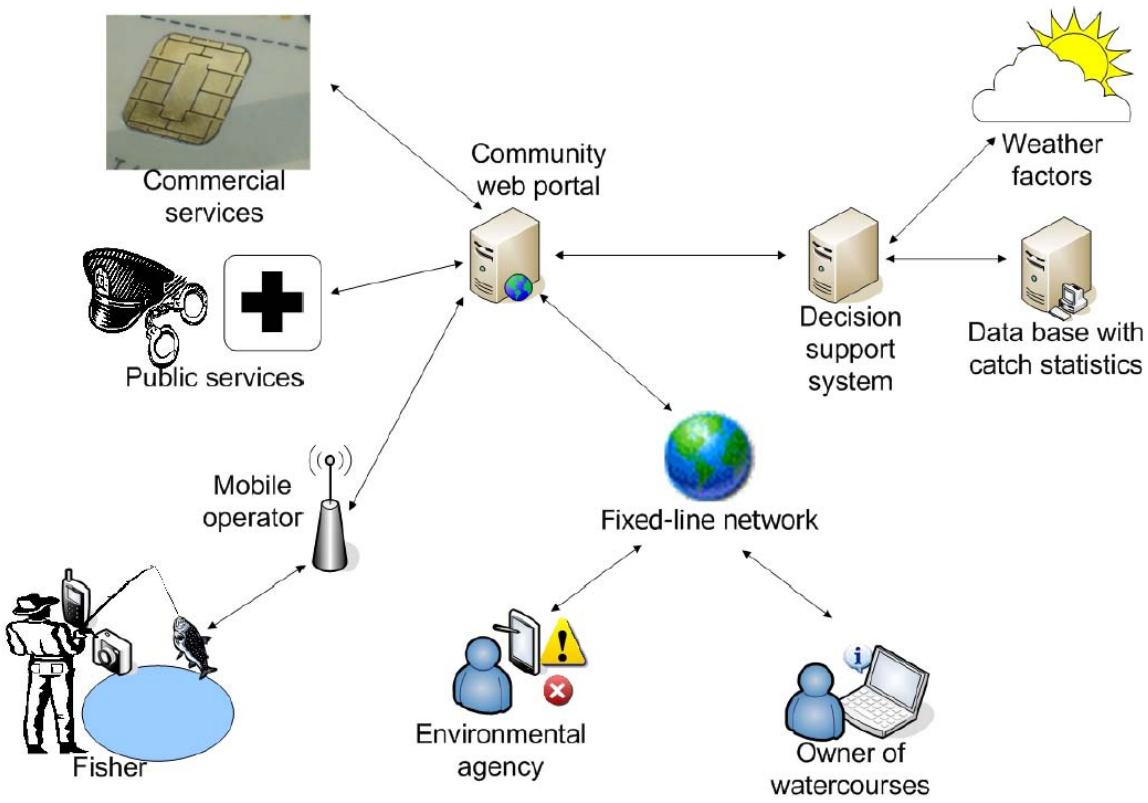

Figure 8: architecture of an angling community

"John F. is an urban man, who is working for a company, which develops e-collaboration tools. He lives near the North Sea and normally he visits the same fishing place close to his residence at the coast. However, for his next holiday, he decided to book a special offer for a fishing holiday in the Alps to gather new experiences with fresh-water fish.

After arriving at the booked hotel, he recognises that he has forgotten nearly everything about how to distinguish unerringly between fishes with similar outer appearance and about the

preferences of bait and living space of certain fish groups. He had learned all this during his youth, but lost it over the years not fishing in foreign areas.

During supper, he tries to get in contact with local anglers. Naturally, they protect their knowledge about their favourite fishing places and most popular baits and John has to leave without any inspirations for the coming days. A little bit worried and sceptical, he starts very early the next morning trying to find a nice fishing place around his hotel. Following a small valley with a mountain stream with his car, he tries to discover an attractive fishing place from the streets. Unfortunately, trees and rocks obstruct his view. After a while, he decides to take the next parking place, and go down to the water to find a pleasing place.

Nevertheless, his actual problem that he has forgotten how to attract certain kind of fish with the right bait (and even worse not knowing which kind of fish he should expect in such a river) complicates the choice of equipment and fishing method. He decides to go for a pose and earthworms and to enjoy a sunny morning – unfortunately without having a single snap.

During his lunch, he sees that fish quickly catch maggots that are falling from the trees. Therefore, he immediately changes over to the apparently better bait and gets rewarded with several snaps within a few minutes. After some failed attempts, he finally accomplishes to hook a pugnacious fish, wangles to get it into his brailer and starts carefully examining his catch. Consulting his fishing permit he tries to figure out which kind of fish this might be. Finally, he concludes that it may be one of a few possible fish species but he is not able to find out which on exactly it is.

However, this is not a satisfying answer, because all these species have different open seasons and minimum length. Furthermore, one of the species, which the fish could belong to, is protected throughout the year. John is very unsure how to proceed. On one hand, taking a protected species with him will endanger him to get a fine of several thousand Euros, if the local authority controls him. On the other hand, releasing the fish might mean to go home empty-handed today. He tries to call a friend who is very experienced in such fishing affairs using his mobile phone but only reaches his mailbox. John ponders with the decision on how to proceed for a while and decides to release the fish to avoid potential trouble.

On his way back to the hotel he remembers that some travelling anglers share their knowledge over different online fora. This would be very helpful, he thinks, regarding his experiences on this day, for gaining more information and sharing knowledge with others. However, he fears a bit the disclosure of private information and the loss of control over the circulation of such information. Ideally he concludes, there should be ways to include privacy mechanisms in community platforms and their services, to ease up anglers' life" (Scherner, 2006).

This example demonstrates that there can be different forms of the disclosure of identity attributes within communities. In communities as in the angling community people may not be aware who will have access to his personal information as the main purpose is to exchange views and information on a specific topic. Identity attributes have nonetheless disclosed to the general public as this can raise the quality of answers one could expect when asking the whole community. In contrast to that a common motivation for joining more social driven communities is to meet and stay in contact with friends. Thus the disclosure of information can be restricted to a predefined group if the appropriate protection mechanisms are available and applied.

5.3 Case: Taxi Driver

The taxi driver scenario is an example of a professional mobile community which was developed in the EU project PICOS. The following description of the community is an excerpt from Schrammel et al. (2008). The underlying architecture is given in figure 9.

"Taxicabs have a long history. They provide transportation services to people, especially in urban areas and areas where other public means of transport were/are not yet available.

Generally, taxicabs are a part of paratransit transportation, which is the layer between private automobiles and public transport. There are three categories of paratransit systems: hire and drive systems, hail or phone systems, and systems that require prior arrangements (Bailey and Clark, 1987 - Bailey and Clark, 1992).

The coordination and planning of a taxi fleet requires a lot of organisational work. The taxis have to be sent to the customers, and in time without any delay. Furthermore, the waiting time of the customers has to be minimised and the booking of the cabs has to be made efficiently. Currently, different systems are employed for this process, such as radio communication, global positioning systems (Liao, 2003), mobile phones and location based services (Silva and Mateus, 2003).

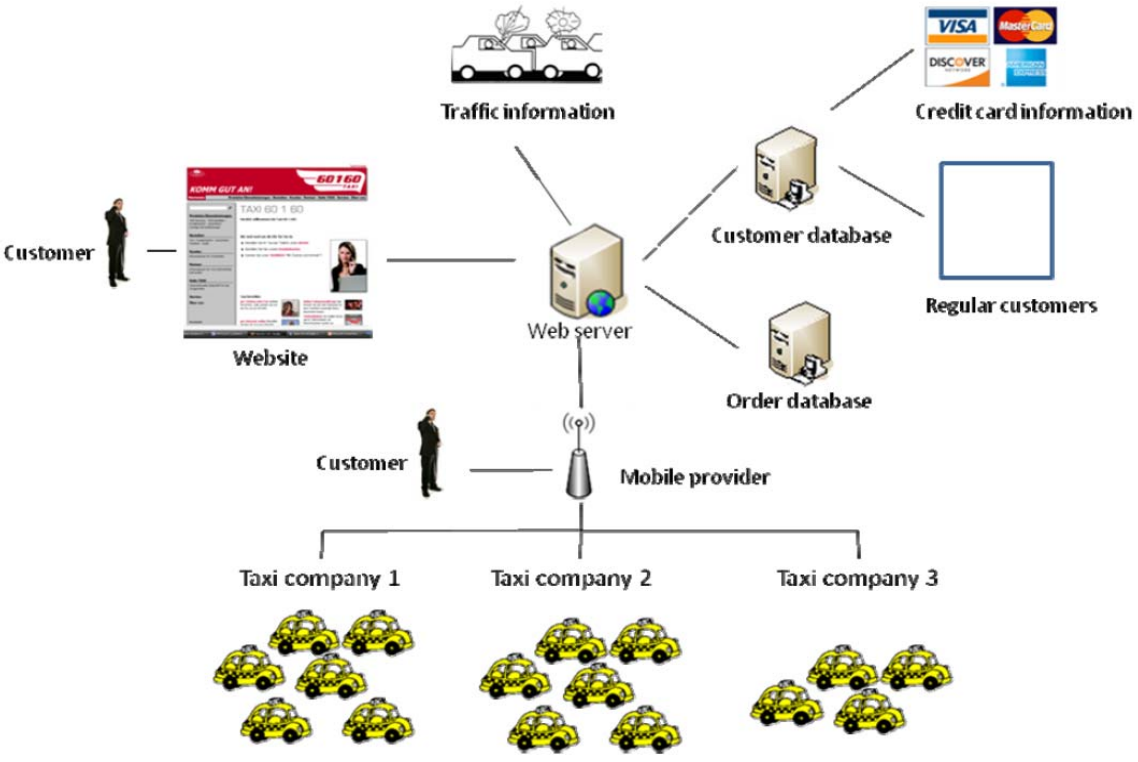

Figure 9: taxi driver community

Sarah is the owner of a small pre-order taxi company, comprising of three cars. The business is family owned and was created by her father about 30 years ago. Since three cars are more easily coordinated using mobile devices than a person employed in a central cb radio station,

only mobile devices are used. Recently, Sarah adopted the PICOS technology for her taxi service.

Each day, customers call her on her mobile to arrange pick-ups. Over the last few years she has acquired a larger number of regular customers that prefer her service because of her reliability. Even when her cars are overbooked, Sarah reliably organises the pick-up. In such a case, the PICOS project eases the coordination with acquainted and trusted taxi companies. The PICOS system allows Sarah to reach all the business partners she trusts only by choosing the desired network and pushing one button. Therefore, a lot of time that would be spent on calling the different companies individually is saved. Furthermore Sarah can do this kind of coordination while driving, because she does not have to look up all her phone numbers, which means she can concentrate on the street."

On a more general level this has been discussed within the scenarios of D11.2 (Deuker 2008). The physical connection from employees e.g. with a vehicle that can be tracked has impact and extends employees' identity. This can also take place within professional communities as e.g. the taxi driver community. Depending on the design of the community special tools and mechanisms need to be installed in order to ensure that only those persons have access to the employees' position that have a justified motivation to protect employees' identities.

6 Trust in Communities

Trust in communities can be achieved in different ways, e.g. by the establishment of reputation or rating systems. In both cases the identity of the evaluated individual or organisation is extended by an additional attribute. This attribute gives indication about the evaluated persons' intentions and attitudes, thereby allowing third persons to better judge on the evaluated persons' trustworthiness.

Despite the existence of legal framework that can be applied to enforce contractual agreements, trust and a positive judgement on the contract-partners' soundness is of paramount importance for transactions.

Interacting in communities is, at least in principle, not that much different from commercial interactions when it comes to the exchange of personal information. Extending the community members' disclosed partial identity by attributes is thus considered to be relevant. In the following two methods on how this could be achieved within communities, trust by reputation and trust by rating, are presented.

6.1.1 Internal Reputation provided by Community Fellows

Perceived goodwill is founded by good intentions of the other. If one is convinced of the good intentions, interpersonal trust can develop. Good intentions and thereby the trustworthiness of other community members can be signalised by their reputation e.g. as in case of mutual evaluation of transaction partners: Often these evaluations are a combination of a standardized scale for assessment (e.g. a scale of one to five) and an open field comment. (Ebner et al. 2004) edited by the individual community fellows, that the user has interacted with in the past. However, the problem is, that the impact of a single (individual) anonymous evaluation is minimal. Only a large number of evaluations from several different users constitutes a reliable statement on the trustworthiness of the evaluated person or party (Galler and Wagner 2001)

The reputation attached to the profile of the evaluated person can be understood as an additional attribute that extends the disclosed partial identity within a network. This attribute is a signal for other users aiming to judge on the evaluated user's soundness and (good) intentions. The reputation attribute allows other community members to assign a certain amount of trust to the evaluated user. The extension of the evaluated users' partial identity is a necessity for various applications that are based on trust, e.g. various forms of transactions. An example of a community like application that employs reputations is Ebay.

6.1.2 External Reputation provided by Rating Agencies

Besides the reputation that is based on a large number of individual evaluations, the performance and trustworthiness of users and organisations can be evaluated by professional rating agencies and services.

In the offline environment users' and organisations' behaviour is monitored by third parties or organisations, which check and rate their credibility. Examples are SCHUFA or financial rating institutes in industry and trading, e.g. EuroRatings AG. These kinds of organisations gather and analyze information about business contacts and publish the information commercially (Koch et al. 2000).

In the online world some so called trusted partners have evolved like TRUSTe, Trusted Shops and Shopinfo (Bullinger et a. 2002). As an independent organization trusted partners guarantee the compliance of specific rules and guidelines like safe pay and encrypted data transmission (Ebner et al. 2004).

Such institutes support the trust development in online environments by following the compliance of rules. Rules are besides transparency of transactions, privacy, access rights, website design and the quality of the information on a website very important to judge on the quality and soundness of processes and thereby for the establishment of trust.

7 Privacy and Identity Management in Communities

The management of identities is a central element and needs to be considered in the design of mobile communities. Personal information about one's identity is disclosed in profiles and by third persons in public accessible spaces. Users need to be empowered to calibrate the disclosure of their personal data according to their own needs and requirements. Within this chapter risks associated to the disclosure of partial identities in communities are described, and mechanisms to protect privacy as well as identity management functionalities are presented.

7.1 Identity Related Risks

Within this sub-chapter a collection of risks related to the disclosure of personal information in communities is presented. This is also a motivation for the employment of privacy enhancing technologies and identity management functionalities that are laid out in subsequent sub-chapters.

7.1.1 Available Information

The biggest risk for identities is the easy access to the information and loss of control after the publication. If the community provider does not block search engines, every Internet user is able to see the profile of a person or a nickname.

Nowadays it is not a problem at all to search profiles. The risk lies in the fact, that community external persons are able to view personal data. This way the community user loses his control about the accessibility of his profile. So the viewing restrictions are useless. The same risk exists, when begrudging thirds can see the profile without the owner's permission.

7.1.2 Lifetime of a Information

As soon as data is inserted into a social community, every authorized user can save the data. This takes the option away to delete or edit information later. By periodical profile saves changes like working place or residence can be logged. This method quantifies the amount and explosiveness of published data.

7.1.3 Secondary Information

Beside of the deliberately published information on profile page community user generates a secondary record for the provider, which shows all his information about his mails and his user behaviour.

Sensitive information like the duration of visits on the website,the IPs, and visited profile pages. The risk of such a data record is not community specific. Communities distinguish themselves from other Internet services through their wide variety of communication ways,

leading to very high concentration of usage and communication data, and allowing for precise analyse of the community user. This also increases the risk for the user's reputation in case of publication. The economical success of an SNS provider is directly connected to the amount of users. If statistics would go public lots of users would leave the network instantly, so this would harm the provider monetary. The use of secondary information is thus very risky. In addition to that the transmission of user data can cause unrequested advertisement, SPAM and price discrimination.

7.1.4 Face Recognition

Face Recognition is a computer based, digital identification of a person by its physiognomic uniqueness. Until now this technique is used in forensics and security techniques.

In November 2005 Germany introduced electronically passports with integrated chips in addition to the regular picture, allowing for face recognition. This technique strongly evolved in the last decade. Search engines like Polar Rose (www.polarrose.com) or Riya (www.riya.com) implemented Face Recognition software and offers a face recognition based image search.

The search considers meta data like filenames and tags in addition to the actual image content. This technical evolution brings new risks to on- and offline identities. An important part of most community profiles is the user photo. Lots of providers offer tools to create and manage photo albums. So in a community profile the photos are connected to personal data.

With face recognition it will be easier to find profiles. Anonymous profile can be identified, by using the search engine to connect identified and anonymous profiles. As soon as this search option is ready, it will destroy the security of pseudonyms.

7.1.5 Content-Based Image Search

The Content-Based Image Search bases its method like Face Recognition on the Content of Images, but this method goes one step further. It checks every information on images, like containing objects and locations.

Present Search engines lack of accuracy and make mistakes. Lew et al. see big research needs in this field. It's still not really working.

Nuno Vasconcelos, tutor at the UCSD, points on a need for this search method, to use and manage large amount of photos and expects further results.

A digital analyse of pictures with Internet search identified persons and their locations brings risk to identities. This would mean a huge loss of security and control about location based data and photos.

7.1.6 Linked Images

When the community provider allows to upload, manage and publish photos most cases support comments and link-options. Linked Images bring two kinds of risks. Linking own

published Pictures will connect yourself to other persons on the photos. So the identities of other persons can be viewed by other users of the network.

The only way for security and control is to delete Linked Images. Another risk for the identity is the linking to other user's uploaded photos. So the user loses control about the quality and quantity of published photos. This makes the access to the photos and to his profile easier.

7.1.7 Deleted Profile

It is possible to delete the own profile, but this doesn't include posts in guest books, blogs and boards of other users. Deleting all posts is impossible or complicated, so the control and administration of your own identity becomes difficult or even impossible.

Moreover the Risk after the delete request increases, because the ex-user can't verify the existence of personal data in the database.

7.1.8 Identity Theft

In most cases it is possible to create profile in community without any identity verification. This allows to create profiles for other persons without their knowledge and to discredit them by mean contents. It seems like the described person created the profile and published the information.

This is a harmful instrument for spoofers and identity thieves to affect others. The risk for the identity is very high in a community. The victim has no access to the profile and the slander hits the whole network of the victim.

7.2 Privacy Enhancing Technologies

Handling personal information is and will be a challenge for online communities. Personal information is more or less some kind of a double-edged sword because they are needed to build a successful community but they are a source of potential damage.

Chapter 7.2 will highlight some privacy enhancing technologies (PETs) that were investigated in the EU project PICOS and can be looked up in detail in (Kosta and Dumortier 2008b).

PETs described by Kosta and Dumortier as a wide range of approaches to enhance privacy. These technologies are continually evolving, as is the understanding of how they can be applied to practical situations. Therefore only a snapshot of twelve different approaches is presented (Kosta and Dumortier 2008b):

- privacy rights: similar to digital rights managing (DRM), allows for instance reading an information but not to save or print it.
- controlled sharing: comparable to privacy settings. The information owner decides how the information is processed and by whom
- cookie management: cookies with personal information have to be monitored and if necessary deleted.

- personal privacy profile and preference management: personal privacy preferences define how personal information can be accessed by others
- de-identification: removes personal information for services where personal information is not necessary
- anonymisation: involves de-identification, describes the removal of identification aspects
- data minimisation: restrict the collection of personal information
- mix networks: method to ensure anonymity
- blind signatures: verification of messages
- sticks policies: method to attach metadata to data in order to e. g. limited access or distribution of personal information
- pseudonymisation: kind of anonymisation. The identity will be protected by a pseudonym

The establishment of PETs can take place in various fashions. The realisation of identity management functionalities in communities is to a large degree also dependent and based on PETs.

7.3 Identity Management in Communities

The usage of identity management solutions is widespread within communities. Following we provide a set of identity management functionalities we consider to be valuable for the protection of users' partial identities within communities. :

- **Restricted visibility of profile information:** Communities classically consist of a large number of users. Nonetheless users may want to restrict access to the information they disclose within their user profiles. Thus users should be enabled to assign access rights to their identity attributes disclosed on their profiles.
- **Scalability of disclosed information:** Identity attributes as e.g. users' position can be disclosed on different levels of abstraction. Although users may want to disclose their position very accurate to close friends they may not disclose information that detailed to other people. Another example can be the users' age. They may want to disclose their day of birth to closer friends while they only want to disclose their age in years to other friends.
- **Withdrawing of disclosed information:** Once information has been disclosed it is sometimes hard to withdraw. Users should be enabled to delete personal information without replacement or to change it at any time.
- **Control of identity information disclosed by third parties:** A characteristic of communities is that information about an individual's identity is also disclosed by third parties, as e.g. peers. This takes place in public spaces within communities as guestbook's, boards, or blogs. In order to protect their identity appropriately user need to be aware of what information about their identity is disclosed to whom, and tools and mechanisms need to be provided allowing for the management of identity information disclosed by third parties.

- **Multiple partial identities:** Users should be empowered to use multiple partial identities within a community. Thereby users can adapt their disclosed set of identity attributes (partial identity) to the context of usage. For instance users may want to disclose less attributes when interacting in a public community forum than in a private forum with a known set of participants; see also PICOS Deliverable D4.1: Architecture (Crane 2009).
- **Aggregated identity management for multiple memberships**: Considering the usage of communities on a higher level of abstraction, there is an additional functionality we consider worth to be mentioned. Management of multiple identities explicitly considers that users are typically members of more than one community. This also means that users have to manage more than one partial identity. As this could easily become a very complex process, the availability of an aggregated identity management is desirable. This can be provided e.g. by meta communities. The availability of meta communities can allow users to manage their disclosed partial identities more efficiently and to be aware of the cumulated amount of identity information that is disclosed across the different platforms.

An essential aspect that has to be considered is that the establishment of identity functionalities needs to come along with creating users' awareness on pitfalls related to the disclosure of personal information. This is a precondition and motivation for users to employ identity management functionalities.

7.4 PETs and IdM vs. Risks - Some Remarks

With regard to users' identity the aggregation of community profiles keeps the advantage that the individual profiles of the different communities can be brought into a consistent fashion. Thus the aggregation contributes to assisting users in dealing with their profiles and thereby with their privacy more carefully and according to their own needs and requirements.

Despite of the availability of identity management functionalities and PETs, a lot of personal information can be misused within communities.

The availability of identity management functionalities and tools supporting users are worth nothing if users do not apply them. For instance this can occur when the application of tools and functionalities to protect disclosed private information is considered to be too complex from the perspective of the user. In addition to that missing awareness with regard to the risks and pitfalls related to disclosing personal information can avoid users from applying identity protecting tools and mechanisms within communities.

A characteristic of communities is that information about its identity is not solely disclosed by the individual itself, but also by its peers within public spaces in the community. This needs to be addressed explicitly in the development of new PETs and identity management tools.

8 Conclusion & Outlook

The deliverable in hand provided an understanding of the term mobile/online communities in the context of the work performed in FIDIS Work Package 11 on Mobility and Identity. Being part of the Web2.0, users' identities present an important part of "user generated contents" within communities. Users disclose partial identities in profiles, whereas the amount of disclosed attributes and their type depends on the type of community.

With regard to the work done in Work Package 11 the difference between "classical" location based services mobile communities is worth to be highlighted. The central aspect hereby is the access to users' position. In case of classical location based service users' position is transmitted mainly to the provider of the service in order to allow for the creation of the location specific service. The amount of people that can access users' position in mobile communities is much broader and perhaps more inhomogeneous. This makes it even more necessary to establish mechanisms that allow users to calibrate privacy settings according to this situation.

Within this deliverable different facets of communities and mobile communities have been discussed. After an executive summary and an introduction, Chapter 3 presented a definition of the word community in a more general manner. Its sub-chapters identified different types of communities and tried to categorize them based on usage context and purpose, use of context, communication infrastructure and user roles.

In order to get an idea of the added value a mobile community may offer in comparison to other online communities, Chapter 4 illustrated the benefits by discussing the location independency and the strong relation between mobile communities and the community user's real life.

As example Chapter 5 presented two different (private and professional) real life communities which are part of an ongoing research project (EU project PICOS). One scenario is about online fishing communities while the other one is about a taxi driver community. Characteristics of those scenarios have been elaborated and connections to other FIDIS deliverables have been drawn. The general scenarios as well as their relation to privacy and identify management are mentioned.

The attribution of trust to disclosed partial identities has been presented in chapter 7.

An important part of this deliverable is chapter 7. There a collection identity related risks in communities is given, and aspects of privacy protection and identity management are highlighted.

Future research in the area of online/mobile communities should address the categorisation of communities as well as the protection of identity related risks, e.g. by substantiating, extending, and implementing the identity management functionalities laid out in Chapter 7.3.1.

Another focal point of research should be on how users can be motivated to apply installed methods to protect their identity while using communities. This needs to be ensured on two levels: At first on the level of personal data disclosure and at second on the level of third party data disclosure. As an initial step, users' awareness of risks and pitfalls associated tho the disclosure of identity attributes in communities has to be raised.

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