Designing for Social Development: Enhancing Mobile Social Software through Social Capital

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Abstract

In this paper, we discuss the problem of designing mobile social software to support social capital. This approach aims at exploiting ICT to reconcile social and economic development, essential to create a human-centered Information Society. Firstly, a literature review of social capital theory is presented. Then, mobile social software is analyzed according to three dimensions: technical, individual and social. Finally, by considering social capital as a personal investment in social relations with expected returns, the relationships between social capital and mobile social software are illustrated, together with some design implications.

1. Introduction

Information and communication technologies (ICT) are present in the everyday life of billions of citizens in the world and their use is expected to be even higher with the realization of the Ubiquitous Network Society, next step of the Information Society. The Internet and mobile telephony have been the two key technologies that transformed the way of working and socializing of modern societies: they spread during the second half of the Nineties as different technologies, but in the early years of the new millennium the industry pushed for the integration of the two media. This process, which also concerns traditional media, such as the press, radio and television, is known as digital convergence. One of the most relevant phenomena of this process is the emergence of mobile social software (MoSoSo), defined as "*a class of mobile applications whose scope is to support social interaction among interconnected individuals […], exploiting the media convergence process and the increasing power of mobile devices to offer a variety of services*" (Lugano, 2007c). As research field, the investigation of mobile social software can be included in the broader area of studies about relationships between society and technology, and in particular about the social consequences of ICT use. However, studies from different disciplines have contributed to the establishment of a multidisciplinary research field, covering human, social and technical aspects. The centrality of the three dimensions is also highlighted by the definition of mobile social software, which focuses on users, social network and technology mediating social interactions. These three elements can be combined in order to design human-centric mobile social services (Lugano, 2006b). Rather than analyzing them separately, it is important to consider the interplay between all components: for instance, applying psychological frameworks to understand user actions (Saariluoma, 2004), or observing how a design solution influences group structure and dynamics using theory and methods of social network analysis (Wasserman and Faust, 1994; Scott, 2000). One of the most interesting frameworks that can be adopted for the exploration of this research field is the concept of social capital, especially when design solutions are considered in the broader perspective of Information Society development. Although there exist several definitions of social capital, we consider it as an "*investment in social relations with expected returns*" (Lin, 1999), exploring how ICT, and in particular mobile social software, can represent effective means for "*accessing and/or mobilizing resources embedded in social structure for purposive actions*"(Lin, 1999).

In this article, we present the theoretical basis of our work, introducing social capital theory with a brief review of its main authors and findings, covering also previous studies of the relationships between ICT and social capital. Next, we discuss mobile social software along its three main

dimensions and finally we illustrate its relationships to social capital and the challenges connected to the design of such applications.

2. Social Capital Theory

2.1 History and definitions

The father of social capital theory is probably the French thinker Alexis de Tocqueville, who investigated the nature of American democracy in the 19th century (Toqueville, 2000), but an American school superintendent, L.J.Hanifan used the term social capital for the first time in 1916 in a publication about the role of schools as community centers. The main finding was that high levels of participation among local people in school affairs not only led to improved support for the school, but also to general improvement in the school's wider community. Hanifan considered social capital as "*goodwill, fellowship, sympathy and social intercourse among the individuals and families who make up a social unit*" (Hanifan, 1916). However, the first modern definition of social capital has been illustrated by Pierre Bourdieu in the article "*The Forms of Capital*". According to the French sociologist, social capital is "*the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition*" (Bourdieu, 1986). The concept is discussed from a socioeconomic perspective, together with economic and cultural capital, the other two possible forms of capital, all with their own characteristics, which are interdependent. Together, "*the distribution of the different types of capital at a given moment represents the immanent structure of the social world"*. Similarly to cultural capital, social capital is immaterial and its benefits are visible in the long term. Although Bourdieu's definition contains the term "network", he often refers to groups, which are usually closely-knit and have well-defined boundaries. Material or symbolic exchanges determine the existence of a group, which "*has more or less institutionalized forms of delegation*". Maintenance of social capital implies a continuous effort of sociability in which recognition is endlessly affirmed and reaffirmed. At any time, it is possible to compute the volume of social capital possessed by one of its members, considering the number of connections and the capital, of any form, they own.

Another important contribution comes from the American sociologist James Coleman, who aims at introducing social capital as a conceptual tool to explain social action, reconciling the economical and sociological perspectives. For the author, "*social capital is defined by its function*" (Coleman, 1988) and facilitates certain actions of actors within the structure. Its outcomes might be specific to certain activities, and result even harmful for others. Social capital is not possessed by the actors themselves, but it exists "*in the structure of relations between actors and among actors*". Unlike physical and human capital, which are private goods, most forms of social capital are public. Here lies one of the differences with Bourdieu's work, which is not mentioned by Coleman. However, they both agree on the immateriality of social capital and on its existence determined by social exchanges. Like Bourdieu, Coleman refers also to other forms of capital, illustrating the role of social capital in the creation of human capital. Because of its definition, there exist different forms of social capital, all facilitating certain actions and constraining others: expectations and obligations between people, communication flowing across information channels and social norms. Some configurations of social structure facilitate some forms of social capital. For instance, the closure of social networks reinforces social norms and creates trustworthiness of the social environment, one of the main elements influencing expectations and obligations.

The third and probably most known author of social capital is Robert Putnam. In his main work, "*Bowling Alone*", he shows evidence about the decline of social capital in the American society after the 2nd World War, analyzing and comparing a massive amount of data coming from multiple sources. A number of possible causes for the decline of social capital are analyzed; the author gives particular significance on the effects of suburbanization and the television (Putnam, 2000).

Putnam's findings have been widely discussed by the research community, contributing to the popularity of the subject. However, Putnam's definition differs greatly from his predecessors, as he describes social capital as "*features of social organization, such as trust, norms and networks that can improve the efficiency of society by facilitating coordinated actions*" (Putnam, 1993). In Putnam's view, social capital and civic involvement are strictly connected; a number of indicators, such as generalized trust, membership and activity in associations and behavior in the community can be used to measure the social capital of a community, a city or a nation. One of the main problems in Putnam's approach is the logical circularity of his definition, as "*a property of communities and nations rather than individuals, social capital is simultaneously a cause and an effect*" (Portes, 1998). Despite of the criticism, Putnam has the merit of having brought popularity to social capital and introduced a number of new ideas. For instance, he has enriched the concept of with the introduction of "bonding" and "bridging" dimensions of social capital, which have different characteristics and effects. The former is about social interactions that reinforce ties of people who already know each other, while the latter refers to the creation of a new relationship with an unacquainted person. Bonding social capital facilitates the establishment of a trusted environment and allows easier coordination within a group. On the other hand, bridging social capital supports information flow between groups, fostering innovation. Another important issue pointed out by Putnam is the existence and relevance of the "*dark side of social capital*", or negative social capital. The same social interactions that bring benefits and facilitate cooperation within a group of trusted people may be harmful to others. Putnam also noticed that there is no general rule for producing "positive" social capital, as it is highly dependent from a specific context. Portes (1998) identified and discussed in detail at least four negative consequences of social capital: exclusion of outsiders, excess claims on group members, restrictions on individual freedom and downward levelling norms. Finally, Putnam's work has been essential for the establishment of research about social capital as a tool for public policy. In particular, the work conducted by OECD (2001) and by the World Bank (1998) moves in this direction, considering social capital as a useful instrument for supporting the social and economic development. According to Ruuskanen (2004), much of the disagreement around the definition and characteristics of social capital emerges because scholars tried to "*capture very complex and multidimensional phenomena*" with a single concept, therefore it is "*difficult to define it unambiguously*" as "*dependent on its context*". However, social capital might be better understood distinguishing "*between the sources (or the inputs), the consequences (or the outputs) and the social mechanisms, trust and communication, which mediate the causality of social capital*". The individual, group (or network) and society represent respectively the micro, meso and macro level of analysis of the sources of social capital; each element has its own characteristics and affects the others: for instance, social norms are typical of groups, while laws of society. Trust and communication mediate the inputs and outputs of social capital, producing direct or indirect consequences. The former is directed to the individual and can be seen as "consumption benefits", includes trust and communication as commodities. Indirect consequences or "production benefits" affect the meso and macro level, including easier transactions, cooperation and collective action. Trust is considered both as mechanism and outcome of social capital: "*while interaction creates trust, trust also facilitates interaction*" (Ruuskanen, 2004).

Moving from Bourdieu's conceptualization of social capital, a number of authors, such as Nan Lin and Ronald Burt, have developed the individualistic view of social capital using theory and methods of social network analysis (Wasserman and Faust, 1994; Scott, 2000). Lin considers social capital as "*an investment is social relations with expected returns*" (Lin, 1999). Social networks have value as they allow individuals accessing and/or mobilizing resources embedded in a social structure for purposive actions. Two main types of outcomes are described: instrumental and expressive. Wealth, power and reputation can be increased with instrumental actions, while expressive actions aim at preserving life satisfaction, physical and mental health. Different types of network configurations have different impacts on social capital; in particular, ego's position is

considered important for both access and use of embedded resources. Bourdieu and Coleman refer to the closure of social networks as fundamental property for creating trust and ensuring social norms, while Burt (1992) has introduced the concept of structural holes, built on Granovetter's "strength of the weak ties" argument (Granovetter, 1973). In strongly interconnected networks, individuals tend to share the same information with all contacts, leading to redundancy. The role of structural holes is very important for the information flow and spread of innovation: in sparse networks, "fresh" information can come from different groups through individuals who act as "bridges" or "structural holes". From a utilitarian point of view, because of their position, they have an advantage over the other nodes. The main contribution that social network theory has brought to social capital is about its measurement.

2.2 Measures of social capital

The complex nature of social capital and the lack of agreement on a single definition have made the measurement of social capital a real challenge. At an early stage, it has been doubted whether social capital should be measured at all (Coleman, 1988). Today, two main approaches to measurement can be identified and are based on the different views of the concept, namely on its private or public nature. *Individual social capital* deals with resources that can be accessed and used by network members through social exchanges, while *collective social capital* takes into account trust, reciprocity, social norms and civic participation associated to a community or to the whole society. Bourdieu, Lin and Burt contributed to develop the former approach, which investigates individual benefits resulting from the inclusion of the individual within his social environment. On the contrary, Coleman and especially Putnam refer to collective benefits arising from participatory and associative dynamics. However, the two views are not completely independent, as the collective may benefit from several individuals pursuing their personal interests.

Collective social capital has usually been measured through surveys, questionnaires and statistics based on a number of indicators, such as networks, trust and social norms. One of the limitations of this methodology is that most authors have relied on existing datasets, not originally designed for measuring social capital. Some author suggest operationalizing social capital with a single indicator: for example, Fukuyama (1995) proposed to assess social capital measuring mutual trust between members of a community. Unfortunately, international comparison cannot be easily done because of cultural backgrounds, which make the concept of trust different from one country to another. However, most authors have used multiple indicators when measuring social capital. For instance, in the analysis of Italian democracy, Putnam aggregated indicators of regional government performance together with people's participation to public life to obtain an index of the strength of civic community (1993). In "*Bowling Alone*" (2000), Putnam's measure includes civic and political activities, using time use surveys, reports and national statistics. All attempts of measuring collective social capital are adequate for the single research, but their method cannot be easily adapted to other contexts.

As mentioned in the previous section, social networks analysis (SNA) has led to a number of useful concepts and methods for the measurement of individual social capital. As all definitions of social capital are rooted in interactions in social networks, it follows that the network perspective is very suitable for examining social relationships between interconnected individuals. Therefore, through SNA techniques it is possible to assess individual social capital, capturing its utilitarian value. According to Bourdieu (1986), the "volume of social capital" is a function of the number of personal connections and capital possessed or owned by one of the connections. The main theoretical point is that an individual has more chances to achieve personal interests through a large network. Another useful concept is the type of resources and relationships which can be accessed. According to Lin (2001), the more differentiation of resources is present, the higher is the social capital. Flap (1994) suggests taking into account also the nature of relationships and the relevance of their strength. Granovetter's work about strength of ties (Granovetter, 1973) and Burt's concept

of structural holes (Burt, 1992) describe two important configurations of social structure. Many others are described by other authors, such as Borgatti et al. (1998). At this point, it is useful to discuss the concept of resource; according to Bourdieu (1986), it is any of the existing forms of capital. However, Van Der Gaag and Snijders (2004) observe that "*what is a valuable resource depends on the needs, goals, and opportunities of the individuals […]. Any resource that may help in goal achievement of the focal individual but is in fact owned by a social network member can be regarded as a constituent of social capital*". In some cases, unintended interactions with others may help in attaining a personal goal; in others, it is necessary to refer to a specific resource present in the social network to perform a task. Flap (1999) calls *goal specificity* the relevance of specific resources for the achievement of certain goals.

2.3 Social capital and ICT

In the last years, researchers have investigated the impact that ICT, and in particular the Internet and mobile phones, has on social capital of individual, communities and organizations. However, research in this field presents several challenges: as Ling (2004) pointed out, relatively few studies have been conducted on this topic, making it difficult to build theories. In addition, there is lack of empirical material, in particular longitudinal data, which does not allow establishing and explaining cause-effect relationships. Finally, most studies have relied only on a single technology rather than "technology bundles", narrowing the possibilities of gaining full understanding of converging media. As pointed out by Huysman and Wulf (2004), three are the main issues that need to be explored: firstly, since social capital is about connected people, it is worth investigating how this concept is influenced by mediated social interactions; secondly, scientific results can suggest directions for design of specific functionalities that support social capital. Finally, it is also important to understand whether social capital is needed in order to develop, to customize and to appropriate ICT.

Using Putnam's definition of social capital, Quan-Haase and Wellman (2004) studied the effects of Internet use on some parameters of civic engagement, such as activity in the own community. Considering the changes in how people socialize, the authors also discuss the need to develop new models for conceptualizing and measuring community. The study presents previous studies classifying them into three main positions concerning the impact of ICT on social capital: according to Kraut (1998) and Nie (2001), the use of *ICTs would diminish social capital*. One of the main points is that time spent surfing the Internet reduces the time for socializing. In addition, global communication reduces the interest and activity for the local community. Intensive web users experienced also significant growth of loneliness and depression. However, in Kraut's follow-up (2002), results were quite the opposite, with intensive Internet users having larger increases of sociability both at local and distant level. Other studies support the hypothesis that *ICTs would supplement social capital* by offering another means of communication to facilitate existing social relationships. For instance, email, chat and other services are effective tools to organize meetings, events and fill communication gaps (Wellman and Haythornthwaite, 2002; Katz and Aspden, 1997; Katz and Rice, 2002). Finally, a third possibility is that *ICTs would transform social capital* by allowing new forms of social links to be established in virtual networks (Rheingold, 2003; Lin, 1999). Therefore, civic involvement and social contact move away from local and group-based solidarities and towards more spatially-dispersed and sparsely-knit interest-based social networks (Wellman, 2004). Quan-Haase and Wellman end their study suggesting that the Internet will intensify the transformation from "door-to-door" to "place-to-place" and individualized "person-to-person" networks. The mobile phone fits perfectly to this model, connecting individuals and letting them exchange information and coordinate actions.

Norwegian researcher Rich Ling (2004) has investigated the relationships between ICT, social capital and quality of life in the context of European Union Information Society policies. In his study, he adopted Bourdieu's view of social capital for pragmatic reasons, since the data used in

models was mainly individually based. Besides conducting a review of existing literature using the same framework suggested by Wellman, Ling also discuss the relevance of ICT in the context of dominant forms of social capital during the course of a life cycle. Bridging social capital is most important for teenagers and young adults, who develop their social network while maintaining family contacts. During the middle age, both bonding and bridging capital are present. Rather than expanding one's social network, it is given full attention to maintenance of family and work ties. In addition, this is also the period of strongest individual civic engagement, or voluntary activities. After retirement, bonding social capital is dominant, with strong emotional ties that provide social support. According to the author, the mobile phone has a positive impact on bonding social capital, as it is an effective tool for development and maintenance of informal social networks, presenting some evidence that mobile telephony increases informal social interaction (Ling 2004; Ling et al, 2002). The author also makes an interesting observation about the digital divide: as ICT use has an impact on social capital, also its dual, non-use, should be taken into account in the analysis. Users' access, skills and motivations, which together form the concept of communication capabilities (Viherä, 1999), allow analyzing non-use, that could result from poor investments in one or more of the three basic components. For social capital, lack of communication capabilities could be used as an indicator of social exclusion, which negatively affects social capital by preventing communication, access and mobilization of resources embedded in the social structure.

3. Mobile Social Software

3.1 Technical perspective

The Internet has always been a platform for social interaction. Traditional Internet services, such as email, mailing-list and forums can be considered as examples of social software. However, recent technical advances, such as broadband connections and use of open standards, have allowed creative users to transform the Internet into an even more powerful tool for social exchanges, emphasizing the importance of collaboration and knowledge produced and shared by groups, communities and social networks. The business potential of mediated social interactions had led to the emergence of a new paradigm, the Web2.0, term coined by Tim O'Reilly in 2005 (O'Reilly, 2005) to identify design patterns and business models for the next generation of software. Popular examples of Web2.0 applications are blogs, wikis and media sharing sites, such as YouTube, Flickr and Linkedin. The popularity of the social Web has been also supported by the transformation of mobile phones into "*portable multimedia computers*", which has extended the Web with user-generated content, consisting of photos, podcasts, videoclips or information users' current activity and context (location, presence). The first important contribution came from the integration of digital cameras into mobile phones, leading to the "camera phone". This innovation, commercially launched in 2002, allowed users taking pictures and sending them as a multimedia message (MMS), evolution of the text message. With the availability of 3G mobile networks, camera phones also allowed video phone calls. For a number of reasons, both services did not reach the popularity of text messaging and phone calls, but the introduction of cameras has had a broad social impact, playing significant roles in crime prevention, journalism and business applications. In some cases, its use also led to voyeurism, invasion of privacy and copyright infringement. Today, multimedia messages do not push consumers to replace their old mobile phone with a cameraphone; rather, the social applications that mobile cameras have represent a strong motivation for the purchase. Other technological advances that make possible storing a large number of multimedia content, such as the increasing computational power of the device, the higher quality of cameras and the introduction of large digital memories, also represent an additional motivation for the user in adopting the new technology. However, there are still some barriers, which have caused the phenomenon of under-use of mobile services. In particular, prices for mobile data connections and services are still too high and the whole mobile industry needs to revise strategies in light of the

digital convergence. For instance, Nokia, global leader in mobile communications, is quickly transforming from a phone manufacturer into a service provider, which can compete at global level with the giants of the ICT market, such as Microsoft and Google. In this context, strategic alliances with content providers are essential. Nokia's next step in connecting people is called Nokia Ovi and represents "*The door to Nokia Internet services*" (Nokia, 2007). Although launched only in August 2007, its presentation suggests that the main characteristic of Nokia Ovi will be "*mobile social networking, encouraging collaboration, creativity and communication*".

In general, mobile social software represents an evolution or alternative of traditional mobile services, such as calls and text messaging. It is an evolution when new technology is used to improve or realize in a different way an existing service. This practice might lead to major changes in business models and industrial processes: for instance, voice calls through IP protocol are a true product of digital convergence and in the near future all calls might go through the Internet. Sometimes, new services are presented as an alternative to existing ones, but they might render them obsolete by incorporating their features. For example, mobile instant messaging allows people to exchange messages in synchronous or asynchronous ways, either by chatting or by sending an "*offline message*", which is archived and displayed to users once they login. An important implication is that mobile instant messaging might replace text messages and represent a quick alternative to emails. An early sign of this trend comes from the Pew Internet American Life Project, which showed that "*email, once the cutting edge 'killer app', is losing its privileged place among many teens as they express preferences for instant messaging (IM) and text messaging as ways to connect with their friends*" (Lenhart et al., 2005). Mobile instant messaging can be seen as the mobile evolution of the original Internet application; this consideration leads to fragment mobile social software into two categories: applications originally ported to or designed for the mobile environment. Mobile instant messaging and mobile email belong to the former category, while friend-finder applications to the latter. However, device independence and multimodality are going to make the same content accessible by any device, in any context and in multiple modes of interaction.

3.2 User-psychological perspective

As mobile social software should support individuals in communication, collaborative or creative activities, one of the main challenges for designers is about getting knowledge about user needs, goals and expectations. In particular, it is important to understand the user actions connected to social networking in the mobile environment; this task is particularly challenging, as the user context is complex and constantly changing. An individual might be performing several tasks at the same time, dynamically allocating his limited cognitive resources. In addition, the user role is also influenced by the surrounding context: at the supermarket, the same person could act as consumer and as family member in its choice of products to purchase. In order to increase citizens' quality of life, mobile social software should be designed taking into account all these essential aspects, which are more human than technical.

The mental understanding of what a computer program can do for a class of users is called user model. Its dimensions include goals and plans, capabilities, knowledge, beliefs and preferences. Traditionally, user models have been inferred from stereotypes representing classes of users, by default assumptions for dealing with incomplete knowledge or on the basis of known facts and data. In a system, the user is described by a profile that typically manages access control, but also stores personal settings and preferences or allows a service to adjust to the user behavior. Models of user profiles are usually designed for a specific user category involved in a well defined task. However, there has been also research on generic user modeling (Kobsa, 2001). A suitable approach for mobile social software might be the modular one, consisting of a few mandatory modules, such as the user identity, and other optional ones, which can be chosen from the user ontology. In mobile devices, the user identity is stored in the SIM card and corresponds to a phone number. In addition,

the SIM card also stores user phone configuration and preferences, information about his contacts and a communication history. Modern devices allow storage of such information also on digital memories. Through agents, mobile phones might turn into smart personal assistants, collecting and analyzing streams of user behavioral data (Biever, 2004). In a way, agents would mediate the relationship between the user and his self, with the goal of suggesting the best choice, maximizing gains and minimizing risks. Data about the user can be either implicit or explicit; the former include communication history and sensor data, while the latter requires the user providing the information. Both kinds of data can be used in mobile social software, but so far the explicit approach has been more common. An important implication is that by providing user profile information, large amounts of knowledge about a specific user become available to the network. People show different attitudes towards the action of disclosing personal data with others; each piece of information has its own privacy sensitivity, but also the nature of the relationship and the context of use influence the sharing decision. Being personal in nature, privacy settings connected to digital resources should be included in the user profile.

Privacy management is only one aspect of the more general issue of control of the information flow in the mobile social network. Ideally, users should be always in control of all operations about their own data. With appropriate tools for collecting and analyzing large amounts of personal information, it would be possible to analyze their own position in a complex social system and the opportunities arising from the dynamics of social structure. In addition, this knowledge might also be used for better personalization and context adaptation. One step in this direction has been adopted in the Reality Mining project, in which researchers have collected mobile communication and other contextual data (location, social context) of a hundred college students for 10 months. Through machine learning techniques and complex network analysis, behavioral data provided insight into individuals' routines, relationships and underlying dynamics governing group and community behavior (Eagle, 2005). Those findings could find useful applications in the context of mobile social software, although particular attention has to be paid to tailor manual or automatic strategies in interpreting collected information. Automatic algorithms cannot be considered reliable in explaining human behavior by analyzing plain data; but their results might be acceptable in many cases. Human performance is certainly more reliable, even if it has the not desirable cost of continuous interactions with the application.

Data collection of users' personal data is also a common practice for service providers with the purpose of using knowledge about consumer behavior and preferences for marketing purposes. When the same pattern is found, users are aggregated in clusters, or segments that are the target of targeted advertisement. The practice of consumer profiling is well described by Elmer (2004), who discusses the social and political implications of this kind of "*electronic surveillance*". In the field of telecommunications, the European Union has recently issued a directive for data retention of telephony and Internet traffic data with the goal of preventing terrorist attacks by traffic analysis and mass surveillance (EC, 2006). These examples show that end users do not always have control or access to their information; instead, such practices represent a threat to individual freedom and might have a negative impact on the adoption of new technologies.

3.3 Social perspective

As mobile communication is an effective means of mediating social interactions, which can be observed through the lenses of social network analysis (SNA) (Wasserman and Faust, 1994; Scott, 2000) with the goal understanding and describing in scientific terms social structure and group dynamics. As our attention is restricted only to social relationships mediated by the mobile phone, it is useful to introduce the concept of mobile social network, defined as "*social network consisting of interconnected mobile users*". The duration of the social connection might be quite short and opportunistic, as in the case of ad-hoc mobile social networks, but more often users communicate with their closest circles. As information about friends, acquaintances and other useful contacts is

stored in the address-book, its size gives a rough estimate of the size of the personal mobile social network. Each record indicates a relationship with another person or a service considered useful; some additional parameters, such as group membership or special ring-tone, reveal additional information about shared interests or type of the relationship. As shown by Lonkila (2004) in a study on phone notebooks, the address-book is the most precious source of data about the structure of the mobile social network. The social aspects of the mobile address-book were explored by Oulasvirta et al (2005) in a study on collaboration and social awareness, and by Sarvas et al (2004), who integrated the address-book with a photo-sharing application to support group discussions around pictures. A number of mobile social applications were compared by Lugano (2006a) to explore the facets of mobile-mediated social relationships.

As actual social interactions are not considered, the address-book gives only a vague idea about the structure of the mobile social network. In order to have a deeper understanding, it is essential to observe the address-book together with the actual communication exchanges, which take the form of phone calls, text messages or data exchanges. While the former two categories typically support the interaction between two individuals, data exchanges are typical of mobile social software applications and support the one-to-many paradigm. Sending a group update, changing one's own presence parameters (status, current location) or commenting a blog entry are all examples of user actions targeted to the mobile social network. This type of communication is often asynchronous, allowing people to check updates when they login into the system. In some cases, applications might be even proactive, alerting the user when a condition is met. For instance, Friend-finder applications monitor the user location, matching the value against a list of other contacts' current locations. If a friend is nearby, a text message is received, presenting the opportunity of meet up.

4. Mobile Social Software and Social Capital

Mobile social software and social capital theory can be observed together by adopting a network perspective. According to Lin (1999), social capital is an "*investment in social relations with expected returns*". The investment is usually done by an individual and consists of any form of capital. Mobile social software can optimize individual investment strategies, which are influenced by the type of expected return. For instance, reputation and self-esteem might be the main motivation behind a user's voluntary action of creating, sharing and organizing videoclips within a community. In other cases, the community can be the most effective way to solve a practical problem, which could result unmanageable counting only on one's own physical, intellectual or economical resources. However, if users exploit the network only for personal goal attainment, their opportunistic behavior easily lead to social exclusion. For this reason, reciprocity represents an essential ingredient that brings benefits to both the individual and the community as a whole. For Lin (1999), "*institutionalized social relations with embedded resources are expected to be beneficial to both the collective and the individuals in the collective*" (Fig.1).

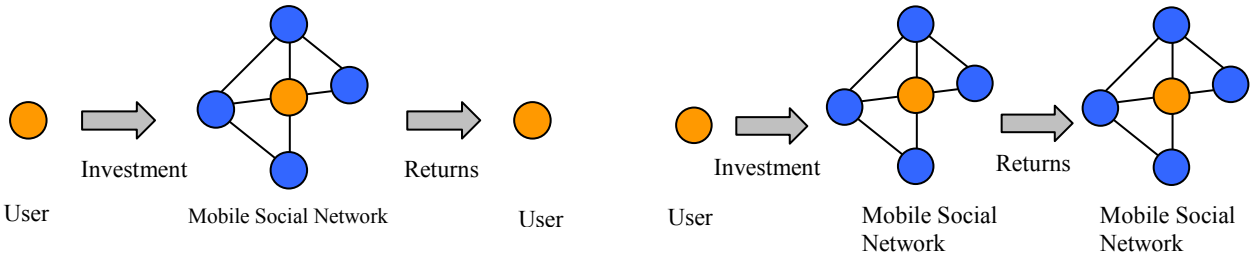

Fig.1: Individual and community orientation of mobile social software

Although the term "network" is more appropriate when considering mobile-mediated social interactions, it is worth presenting two core concepts of social capital, groups and communities, which are often mentioned in the context of mobile social software. The family and the classroom

are two examples of groups, which usually present well defined boundaries and are densely knit. Katz et al (2004) have presented a good review of the concept of community, which includes also virtual communities, which also contain implications for social capital research. The authors' position agrees with previous studies (Walls, 1993; Blanchard and Horan, 1998; Etzioni, 2001; Katz and Rice, 2002) that consider virtual mobile communication-based communities as an effective source of social capital, especially when interactions develop around and extend physical communities.

An important question that should be investigated using scientific methods is about the type of outcomes generated by mobile social software. It would be useful also to explore the usefulness of single and multiple features often present in social applications, as well as their limitations. In addition, it is also important to consider the human side, studying the same problem from the perspective of the various phases of a lifecycle. As Bourdieu (1986) suggests, returns can take the shape of physical, economical, human or social capital and their "*convertibility […] is the basis of the strategies aimed at ensuring the reproduction of capital (and the position occupied in social space) by means of the conversions less costly in terms of conversion work and of the losses inherent in the conversion itself*". In order to be able to have profits from being member of the network, one has to establish and maintain relationships through social interaction. Here, mobile social software plays an important role, mediating social relationships and giving the possibility to access and mobilize resources. First of all, it is essential to define what can be considered as a resource in a mobile social network. For a user, his contacts represent a resource, or more precisely, the capital they possessed and are willing to share. Information about personal capital is private and individuals carefully decide with whom to share this knowledge. The decision is often influenced by the context; for instance, sending the curriculum vitae to a potential employer is a key requirement for obtaining a position. However, sometimes useful information spreads in networks via word of mouth and might result useful for certain situations. Therefore, we consider resource also any information in digital form that is shared with the rest of the network. This definition includes user profile and behavioral data, describing appearance (physical capital), skills, competences and interests (human capital), work position and social connections (social capital).

Compared to phone calls or text messages, mobile social software has also a great potential concerning social network development and management. Social connections can be easily established with people who are nearby through sensor technology. This type of social tie allows even strangers to communicate on the basis of a shared interest or location (Eagle and Pentland, 2005). However, this kind of communication lacks some important ingredients that support collaboration and establishment of stronger ties, such as trust and a common history. Therefore interaction between acquainted users is more valuable from a social capital perspective.

Trust develops in time, as the social relationship develops. However, maintaining ties requires a considerable effort; for this reason, people often follow precise strategies, privileging communication with their closest circle. As emotional involvement is essential, mobile social software could not replace face-to-face contact, but it can contribute to make the relationship stronger by means of sharing digital memories. In addition, it can assist in overcoming distance when it is not possible to meet regularly. On the contrary, weak ties can be maintained with less effort, not requiring regular interaction, but their number is usually much higher than the strong ones. As weak ties have proved to be the most useful for instrumental actions, such as career development, they are extremely important. Through mobile social software, people can easily manage larger networks of contacts and profit from membership opportunities. However, sharing information with a large network presents also several risks. Personal data is very valuable and many users do not consider its value, thinking that in order to maximize opportunities, they should share as much knowledge as possible with all network members. Identity thefts and violation of privacy are becoming very common. Thus, one should take into account the nature of a relationship with a person before deciding what to share. Automatic algorithms could support the user in this task, learning from his communication history and attitude towards different types of resources

(Lugano, 2007a). Analyzing the same issue from another perspective we have the problem of managing the information flow. Opportunities might not be exploiting because there is too much information coming from the network. Therefore, mobile social software should be designed with appropriate mechanisms handling information flow. For instance, they could allow assigning more importance to a specific set of network members, who could provide more valuable resources, and ignore others.

5. Discussion

In a few years, social networking sites, such as Facebook, Linkedin or Flickr, have become among the most popular of the Internet, increasing their commercial value. A recent market research predicted that revenues generated by mobile social networking will increase from 572 million dollars in 2007 to almost 6 billions in 2012. According to Windsor Holden, principal analyst at Juniper Research, mobile social networking allows "*people to use their dead time to continue enjoy social networking*" (Juniper research, 2007). Currently, dating and chatting are the most common applications of mobile social software, mainly used by teenagers and young adults. In other words, enterprises consider mobile social software as an entertainment gadget that has great economic potential. On the other hand, policy makers, such as the European Commission, consider mobile and ubiquitous technologies as enablers of a more democratic society, with higher quality of life and social cohesion. The different goals of the stakeholders influence the way technologies and services are developed and launched in the market. The two conflicting views have origin in different positions concerning the role of the user, which is either seen only as a consumer or as an active and responsible citizen. Lugano (2007b) explored this dichotomy analyzing the way users are described by journalists in stories of mobile communication in different cultural contexts: users are often presented as unable to make their own decisions, victims or guilty of some actions. On the other hand, their ideas, creativity and behavior are relevant for social innovation and new business models. Efforts are needed for adopting a suitable conception of the user that reconciles strategies of economic and social development. Focusing on the user and his interaction with the network, social capital theory can be used as conceptual framework to investigate the relationships between ICT and society, lead to human-centered design of future technologies. Research should focus on the mobile phone: as portable multimedia computer and focal point of digital convergence, it represents what Ling (2004) defined as "technology bundle", allowing to study the social aspect of several media (Internet, mobile phone, television…) at once. By using the mobile phone as a research tool, it is also possible to collect empirical material about communication exchanges happening in the social network and analyzing user data logs with tools and methods of social network analysis (Eagle, 2005).

6. Conclusion

The positive outcomes of social capital, namely social cohesion, well-being and economical development, represent a strong motivation in exploring alternative ways of designing ICT; the ultimate goal is to contribute to a convergence of strategies between public and private sector acknowledging the centrality of users. An important signal in this direction is represented by the Web2.0, which has both social and economical implications. Here, we presented its extension, mobile social software, which enhances communication by means of social awareness and knowledge sharing. From a social capital perspective, interactions in mobile social networks are investments in social relations which allow users accessing and/or mobilizing resources embedded in the social structure for purposive actions. Knowledge acquired from a wide number of scientific fields, such as social network analysis (SNA), complex network theory, information society theories, computer-mediated communication (CMC), computer-supported cooperative work (CSCW) or collaborative learning (CSCL) and ubiquitous computing should be integrated in order

to find effective solutions for the challenges connected to the design of mobile social software. By adopting a multidisciplinary approach, we analyzed current trends and challenges of this emerging category of applications according to three main dimensions: technical, individual and social. In order to support social capital, investigation of user needs and network characteristics should be taken into account before realizing the technical solution. In particular, device features and characteristics should support both the consumer and citizen behavior of users. In addition, a particular effort is needed to implement effective solutions to privacy management and control of the information flow. This paper is a first contribution to the problem of developing a suitable design methodology for mobile social software supporting social capital. In the future, its relevant dimensions should be also evaluated in a real setting, considering existing social practices and relationships of involved users in the broader context of local Information Society strategies.

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