Mobile Social Software: Definition, Scope and Applications

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Abstract: In this paper we describe the role of Mobile Social Software (MoSoSo) applications in the development of a human-oriented Ubiquitous Network Society aiming at economical growth and social cohesion. In order to achieve this goal, both policy makers and enterprises need to address a number of technical and political challenges, such as the implementation of effective mechanisms for privacy management and protection of digital rights. All solutions should acknowledge the role of the user, not only seen as a consumer, but also as an active citizen, producing and sharing knowledge. By designing for societal development, enterprises would benefit from grassroots innovation and higher adoption of new services.

1. Introduction

In the last thirty years, the western society has witnessed the transition from an industrial world to a developed information society, which has its main product in knowledge and services. Trains and cars, symbols of the previous era, have been replaced by the computer, which has made the digital revolution possible. In 2004, the Japanese Ministry of Public Management, Home Affairs, Posts and Telecommunications coined the term Ubiquitous Network Society to describe the next step of the Information Society, where users have "*ubiquitous access to information at any time, from anywhere and from any appliance through the use of broadband and mobile access as well as intelligent home appliances and RFID tags that can access networks"* [18]. In 2006, during the Finnish chairmanship of the European Union, the EU Presidency has recognized that ICT have a key role in realizing the Lisbon objectives of competitiveness and growth. Digital convergence is the most evident process, which has led to the emergence of new products and services, which can be accessed in several ways, for instance using wireless terminals, such as Smartphones and Pdas. From communication tools, mobile devices have evolved to portable multimedia computers; with the ubiquitous information society, they will become remote controllers, opening doors and interacting with the surrounding environment on behalf of the user. The objective of this paper is to define the role of mobile social software (MoSoSo) applications and discuss its relevance for the evolution of the mobile market. We also analyze, from the user perspective, what is needed to exploit MoSoSo as a tool for societal development, contributing to realize a human-oriented Ubiquitous Network Society.

First of all, it is essential to understand how communication practices have changed in time; in the early nineties, social circles were still concentrated locally and face-to-face was the primary communication channel, supported by landline phone. Maintenance of distance relationships was achieved through regular visits, phone calls and exchange of letters and postcards. In the last ten years mobile phones and the Internet have added even more communication channels, allowing "*perpetual contact*" with one's social network [12]. MoSoSo applications are a natural outcome of the digital age, exploiting the new powerful medium to enhance social interaction by offering a degree of presence and mutual

awareness, made possible with context recognition through sensors and disclosure of social cues among connected users. Increased interaction is not given only by phone calls, but especially by sharing multimedia, texting and instant messaging, more popular among young generations. Through their spontaneous, informal and original creations, users have evolved from passive consumers to active innovators. The importance of the users' role and the commercial value of user generated contents have been recently acknowledged by Time magazine, which has elected the user as "*Person of the Year 2006*". According to Time's editorialist Lev Grossman, this is "*an opportunity to build a new kind of international understanding, not politician to politician, great man to great man, but citizen to citizen, person to person*" [8]. In which way European enterprises and policy makers could exploit this opportunity, realizing the Lisbon goals and the vision of a human-oriented Ubiquitous network society?

2. A User-Centered Definition of Mobile Social Software

ICT has a crucial role in the realization of the EU goals, which cannot be achieved without the active participation of its citizens. Through social interaction, they can self-organize, create and share knowledge, contributing to the development of the society. Here we discuss how mobile devices can truly enhance social interaction. In particular, we refer to Mobile Social Software, known also under its acronym, MoSoSo, defined as a class of mobile applications whose scope is to support social interaction among interconnected individuals. MoSoSo is an emerging paradigm which exploits the media convergence process and the increasing power of mobile devices to offer a variety of services. According to Squires, young generations "*integrate communication technologies, namely landline and mobile phone, email and instant messaging, with conventional face-to-face communication to form multimedia relationships*" [25]. A user can easily publish information in the Web, informing all contacts of the update through a group text message or a feed update. From this perspective, being user-driven and typically open, services provided by MoSoSo applications constitute a building block of the "*social web*" or "Web2.0", extending the Web by providing data for blogs and media sharing sites.

Although the term Mobile Social Software was recently coined, it has its roots in social software, a class of computer applications designed for the desktop environment and aiming at facilitating collaborative work or learning within a well defined group. Two typical groups that would benefit from these applications are work colleagues or school classmates. Unlike social software, MoSoSo is designed for utilization on the move, thus making use of the user location, automatically inferred by sensors or manually inserted. In addition, MoSoSo applications are highly personalized, not only in terms of visual aspect or configuration settings, but especially in its content, which is user-generated. Most data is explicitly provided by users; typically, this includes photos, videos, podcasts, comments, ratings, diary entries or tags, metadata which can be attached to any kind of information. However, we should also consider implicit data, like user location, which can be utilized by a service, without the need of any user intervention. Both kinds of data, explicit and implicit, can be kept for personal use, but its real value comes from the sharing action, which provides new content and opportunities to the rest of the social network.

Social phenomena of coordination and collaboration have been widely investigated by the scientific community in different settings. For example, research conducted in Computer Supported Cooperative Work (CSCW) and Learning (CSCL) provides results which are still valid in the mobile environment. However, three important differences between desktop and mobile environments should be taken into account when conducting research on MoSoSo: firstly, the physical context of use moves from static desktop setting, where the user is typically sitting in front of his computer, to the more dynamic mobile context, which presents higher constraints to human attention, but also provides an

opportunity for information or communication at anytime and anywhere. Secondly, the social context shifts from group to network concept. Rather than relying on static and known membership criteria, where group members usually know each other, social network ties change often and are not as dense as in traditional groups. Therefore, network boundaries cannot be easily identified. Finally, an important distinction concerns the ultimate goal of MoSoSo. While previous collaborative software was aiming at increasing productivity and teamwork, MoSoSo applications are designed for usage in everyday life situations. Thus, they do include not only tools for knowledge sharing, but also an environment for entertainment and self-expression.

From a technical point of view, Mobile Social Software applications are very connected to the concept of Mobile Internet and the emphasis is more on data sharing than mere communication. Thus, MoSoSo is typically developed for mobile phones with computational power, or Smartphones. A further enhancement is provided by sensors, which can be used for context recognition and adaptation. For example, Apple iPhone includes an accelerometer, which detects when rotating the device from portrait to landscape mode; a proximity sensor, which recognizes when the phone is near the ear and finally an ambient light sensor to adjust the display brightness [1].

The development of MoSoSo applications is rapid and has already evolved from simple clones of Internet social networking sites to powerful software offering novel opportunities for social interaction. One of the early examples is Dodgeball [4], an example of friend-finder application making use of text messages to facilitate meetings by informing friends of the user location. Similar applications have been launched in the last years, giving birth to new acronyms, like Location-Based (LBS) MoSoSo, which focuses on the user location as main parameter for mobile social services. Considering scientific research, MoSoSo applications are also known as social awareness applications, whose primary aim is to build "*an understanding of the activities of others which provides a context of your own activity*" [5]. This goal is achieved by showing a number of cues used to infer the state or context of the other. One example of social awareness applications is ContextContacts [19], a re-designed version of the mobile address-book which supports social awareness. As personal data is continuously gathered by the mobile device and shared with others, mechanisms for control of information disclosure are necessary to lower users' privacy concerns. Unfortunately, even if several solutions have been proposed and implemented in certain applications, like ContextContacts, privacy concerns still remain one of the major obstacles connected to the adoption of MoSoSo applications. Moreover, it is a challenge to design for trust, which is built in time, especially when MoSoso is used to establish social links with strangers by means of shared interests or location. The possibility of creating fake identities makes this process even more difficult to address. Finally, there are also doubts on the human effects of continuous activity in the digital world, which might disconnect the user from the real one, thus weakening existing social ties and personal identity. For these reasons, MoSoSo has not been considered as enabler of eDemocracy or professional tool, but mainly as an entertainment gadget, used for dating or finding new friends, matching people on the base of their location or personal interests.

3. Scope

After having clarified the definition of MoSoSo, it is time to discuss its scope. Through MoSoSo applications, citizens should be able to self-organize, create and share knowledge, not only for individualistic purposes, but also to achieve greater common goals. In a few words, MoSoSo should be designed to support social capital, which is positively correlated with societal and economical development.

One of the pioneers of social capital is French thinker Alexis de Toqueville, who studied American democracy in the 19th century; however, it appeared for the first time in 1916 in

L.J. Hanifan's discussions of rural school community centers. Already in that time, social capital was seen as "*those tangible substances that count for most in the daily lives of people*" [10]. Most recently, the work of Bourdieu [2], Coleman [3] and Putnam [21] has launched social capital as a focus for research and policy discussion. Although many aspects of social capital differ from one definition to another, they all make clear the centrality of social networks, relationships and resources. The lack of agreement on the social capital definition is one of the main problems of the concept. Here, we follow the framework suggested by Ruuskanen, who points out that one of the main limitations of social capital is that it tries to capture very complex and multidimensional phenomena. For this reason, he introduces a conceptualization of social capital where sources, mechanisms and outcomes are three distinct components. The two main social mechanisms, trust and communication, mediate the causality of social capital, taking as input the activity of individuals (micro-level), communities (meso-level) or society (macro-level) and producing easier cooperation and collective action, facilitating flow of information and enforcing norms and trust. It is important to observe that trust is seen both as mechanism and outcome of social capital: "*while interaction creates trust, trust also facilitate interaction*" [23]. Naturally, as both good and bad exist in society, social capital can support both, generating positive or negative outcomes. Portes has identified four negative consequences of social capital: exclusion of outsiders, excess claims on group members, restrictions on individual freedom and downward leveling norms. He believes that the unequal nature of access to social capital must be balanced against the optimistic view if social capital is to be useful as a tool for societal analysis and transformation [20]. Keeping in mind also the criticism to the concept, social capital should be adopted and used as indicator of social cohesion and well being; for this reason, an increase of social capital would help to achieve EU Lisbon goal of social cohesion and higher quality of life. As social networks, relationships and trust are also core concepts of MoSoSo applications, it follows that the primary criterion to meet is "*designing MoSoSo to support social capital*". Keeping in mind Ruuskanen's conceptual model, we consider three main dimensions of MoSoSo: interaction space, user role and social context (Fig.1).

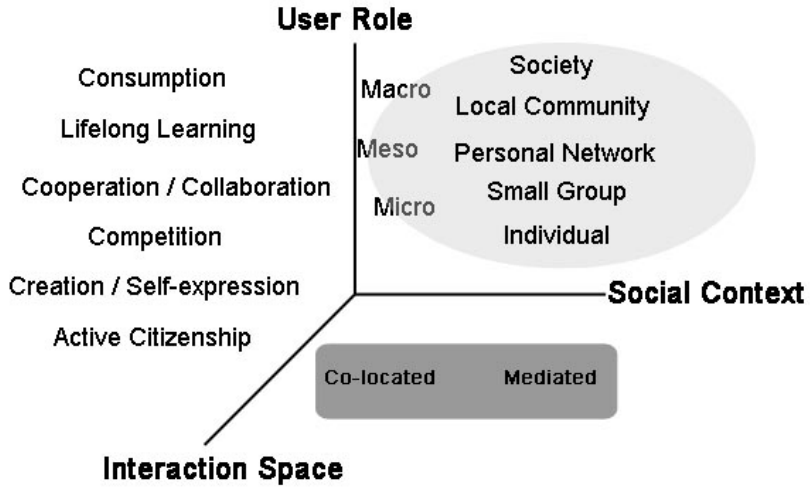

Fig.1: Scope of Mobile Social Software

In order to define the interaction space, we use the framework presented by Marti [17], who suggests three classes of interaction which are relevant in the mobile environment:

- *Class A*: interaction between person and machine/medium
- *Class B*: interaction between person and co-located people

- *Class C*: interaction between person and two (or more) mediated people

The classification was done with the goal of understanding the influence of user interface design on the social impact of mobile communication, defined as "*influence on relationships between social actors*". For our purposes, this classification is useful for two reasons: firstly, because it makes a clear separation between proximity interactions (co-located) and purely mediated communication (not co-located). Secondly, it considers the mobile device as a social actor. For this reason, in our model Class A (user-device interaction) will be part of the social context dimension, rather than being linked to the interaction space. An example of interaction between the user and the device (class A) is the following: when the mobile device is used to listen to music, instead of just listening to music tracks, MoSoSo would also allow adding tags, ratings and recommendations to be shared with others. Applications which enhance social interaction with co-located people belong to Class B. In this domain we can find a number of applications known as *proximity applications*, such as Nokia Sensor and Mobiluck, which make use of Bluetooth to scan the environment and interact with nearby users. In many countries, the *toothing* phenomenon has become very popular, especially among young generations. Finally, MoSoSo applications which allow social interaction at distance fall in the third category (class C). They are often referred as *social awareness applications*, as the shared environment is usually enriched by the *presence* feature, which consists of social cues, such as available status, mood and away-messages. A study conducted by Lugano [14] on five different MoSoSo shows that most applications seem to focus only on one of the three classes and too little attention has been paid to re-design and integration of traditional components of the device, such as the address-book or calendar, to allow both individual and group usage.

The second important dimension refers to the user role, which is, quoting German sociologist Erving Goffman, "*the social mask that individuals consciously wear when they present themselves to others in everyday interactions*" [7]. For example, a middle-aged man might be father and husband at home, employee at work and best friend for one of his contacts. According to the role, the user has different goals and performs specific tasks each time he wears one these "masks". While shopping with his wife, he is a consumer, whereas he becomes a creative person when playing with his child. Work dynamics often require a balance between collaboration and competition with other colleagues, as in an intriguing game which daily presents new challenges and opportunities. Finally, it is important to contribute to the development of the civil society acting as responsible citizen. For any of the roles he takes, MoSoSo applications should provide a range of features supporting his actions by means of an easy to use interface using open standards.

The third important dimension, the social context, is probably the most complex to model, as it does not only reflect differences in scale of a social activity, but has also more subtle properties, like relationship intensity and trust, which are always taken into account when performing any social action. At micro-level, we have the interaction between the individual and the mobile device, seen as a social actor. In other words, the device mediates the interaction between the user and himself, letting him remember events, supporting his memory or expressing his creativity. In this context, projects like Reality Mining have shown that mobile data logs, continuously recorded and stored by the device, can be used to provide useful feedback and services back to the user [6]. In a way, the symbiosis between mobile device and the user makes him a cyborg, as it extends the human senses and capacity. In the near future, emergent ubiquitous technologies, like RFIDs, will make this trend more evident. Already today, RFIDs have been implanted in humans, allowing them to perform a number of actions which are impossible to non-augmented human beings.

4. Applications

Today, mobile devices already allow performing an endless number of functions, replicating features of many existing objects. For this reason, they have often compared to modern Swiss knives, unfortunately used mostly in emergency situations. At home, who would watch a football match on a mobile device, having a much better television handset? Here probably lies one of the reasons for under-use of many functions and services. Therefore, the first real challenge for the industry is not to make existing objects portable and replicating the same features, but to augment them in light of the unique characteristics of the mobile medium: portability, personalization, contextualization and connectivity. As Holmqvist noticed in an introduction to the next generation of mobile services that he calls Mobile 2.0, "*using services designed for a stationary environment on a phone is not such a great idea. In fact, most mobile applications seem to have been dragged kicking and screaming from the desktop, squeezed into ever-smaller devices with tiny screens and diminutive keyboards. On top of all this discomfort, they are forced to live in a notoriously unfriendly environment, a changing world of endless interruptions, abrupt changes of physical and social setting and the constant risk of losing power and network connectivity*" [11]. This step involves re-designing traditional mobile device components, such as address-book, phone logs, calendar, camera, as interconnected modules which can be "augment" an existing object, such as a radio or television. Once the environment is ready, it is essential to tailor it from the users' perspective, not only considering access and user skills, but also their motivation [26]. The combination of the different modules, and its different configuration, could result in a number of new applications, making grassroots innovation possible. On the top of them, enterprises should apply simple and flexible business models, where the user is part of the value chain. Being always connected, users will become part of the Internet, extending the Web with user-generated content provided in real-time from their devices. Already today, without a fully integrated environment, there are already a number of interesting services, which are re-shaping the industry. For instance, some newspapers daily publish photos sent by their readers and award them with a small compensation. Besides augmenting readers' interest and diminishing their distance to the newspaper, there is also an optimization of costs because of cheap and hi-quality contributions of an endless number of freelance journalists.

However, re-designing mobile components in light of the multimedia convergence is not an easy task, requiring years of experimentation and massive investments. In the last years, some interesting academic prototypes have been realized: ContextPhone [22] interconnects the modules of the mobile devices into a context-aware pervasive platform, and ContextWatcher [13], outcome of the MobiLife IST project, makes use of context features to achieve personalization. Both applications are a step towards the realization of the i2010 goal of a Single European Information Space; further development is encouraged by the Living Labs initiative, which support active participation of citizens and dialogue between companies, researchers and investors. One of the most controversial issues concerns the way information flow of personal data should be handled. Being property of the user, it should be him to be always in control of personal data, but in practice there is no single mechanism that provides an effective solution to the privacy management. It would be already a big achievement if users would be able to benefit somehow of their profile information and communication history stored by telecom operators and used for marketing purposes or for investigations. As "*the device knows you better than you do*", massive amount of data, together with probabilistic models, would allow a much better support to user decisions.

In any case, the vision of an integrated communication environment implies that social networking components, such as user profile and privacy settings, should not be managed

by single applications, but built into the environment. Mobile social services could be designed from the ground up, for example using the model suggested by Lugano et al. [15], which takes into account user needs and orientation and actual interaction with the social network in order to render a personal social space to the user. In this way, services would be truly personalized, fitting to everyday situations and personal needs. Furthermore, implicit data, recorded on the device, could be used to support the user decision in the sharing action [16].

Finally, it is crucial to develop innovative business models which generate revenues by exploiting the potential of the new platform and support social capital. Here, we suggest one possible solution. Instead of pay-per-time, pay-per-unit or flat rates, mobile social services could be based on a virtual credit system similar to the ones used in online multiplayer games like Habbo Hotel [9] or Second Life [24]. The concept of credit could be multidimensional, being linked with user behavior, local community structure or service features. For example, the number of contacts in the phone-book gives an estimate of the user's social network, which might be very valuable, according to its members' profiles, intensity of relationships and numbers of interactions. Voting frequency, participation to local projects and other parameters can be used to assess user's active involvement in the local community and frequent usage of a certain service can open new opportunities to the user. More generally, daily actions in the real environment would produce virtual credits, which could be used in a number of ways, depending on the kind of service. Of course, consumerist, citizen or creative perspectives would produce different *rules*, credit configurations and business models. In a way, the whole system could be designed like a pervasive game open to billions of interconnected mobile users, making their mobile devices bridges between the real and the virtual dimension. In addition, the game should evolve with the changing society, making dialogue and cooperation essential. While policy makers are the designers of the massive pervasive game, manufacturers and telecom industry act as system developers and maintainers. Finally, end users are the actual players, providing content through social interaction and feedback to the institutions, which will adjust the rules to the new societal trends.

5. Conclusions

The road to the European Ubiquitous Information Society is open, but several challenges still exist and need to be solved. After the technical convergence has been realized, there is need of convergence of views and strategies of all stakeholders. This is essential for the creation of a human-oriented Ubiquitous Network Society. A crucial point of the discussion is about the role of the users, today seen as citizens by policy makers, but only as consumers by enterprises. The recent Web2.0 phenomenon can contribute to the convergence of views: by extending the same paradigm to the mobile environment and embedding in it the concept of social capital, MoSoSo could play an important role in reaching the EU Lisbon goals of social cohesion and economical growth.

So far, the scope of MoSoSo has been limited, but its potential could be realized by *designing for social capital,* which should replace the old paradigm of *designing for consumption*. In this paper, we suggested a direction for developing user-oriented design of MoSoSo, made of three main dimensions: interaction space, user role and social group. Besides understanding the scope of MoSoSo, there is also the need of re-designing all traditional components of the mobile device as interconnected modules which can be used to "augment" features of everyday things, such as radio, wallet or map in light of the unique characteristics of the mobile medium. In this way, a wide range of novel applications could emerge, transforming social interaction into a global pervasive game where mobile devices act as bridge between real and virtual dimensions. The implementation of all above recommendations is not difficult from a technical perspective, but it presents big challenges

to all stakeholders, such as an effective solution for privacy management and a compromise on the issue of intellectual rights connected to digital content.

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