Participation in Social Networks as Feral Information Systems

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ABSTRACT

Social networking systems blur the distinction between the private and working spheres, and users are known to use such systems both at home and on the work place, both professionally and with recreative goals. In fact, several traditional information systems have been modified in order to include social aspects. However, in the vast majority of cases, social networking platforms are used without corporate blessing, maintaining their status as feral systems. This chapter provides some background notions about theories of participation in social networks. In particular, it reviews the notion of social capital, which may be important both for the individuals that are able to accumulate large amounts, and for organizations. Subsequently, it shows the role of social capital in the participation in online social networking activities, in the various cases of Virtual Organizations, Virtual Teams, and online Networks of Practice. Finally, it describes the present situation and some possible prospects, where social elements are being increasingly introduced into more traditional business systems, such as CRMs and ERPs, with great promises and mixed initial results.

INTRODUCTION

The most important technological trend of the last ten years has been the rise of social networking systems to social phenomena involving hundred of millions of people all around the world, attracting users from several social groups, regardless of age, gender, education, or nationality.

Social networking systems blur the distinction between the private and working spheres, and users are known to use such systems both at home and on the work place both professionally and with recreative goals. Social networking systems can be equally used to organize a work meeting, a dinner with the colleagues or a birthday party with friends.

Nowadays, most popular social networking systems are the largest information systems accessible to the general public and, because of their neutrality regarding the public-private and the work-home axes, they often assume the role of feral systems.

For example, the chat systems that are embedded in social networking platforms are often the most practical way to contact a colleague to ask an urgent question, especially in technologically oriented companies.

Moreover, several traditional information systems have been modified in order to include social aspects and several organizations: (*i*) allow external social networking platforms to be used (e.g., Facebook was available for Microsoft and Apple employees before the general public launch); (*ii*) have created an internal social networking platform (DiMicco & Millen, 2007); or (*iii*) allow other social platforms for specific purposes (Millen et al., 2006). However, in the vast majority of cases, social networking platforms are used without corporate blessing, maintaining their status as feral systems.

According to DiMicco (2008), most users that use social networking platforms for work purposes are mostly interested in accumulating social capital, either for career advancement or to gather support for their own projects inside the company. Given the close relation between professional usage of social media and social capital, in the following sections we discuss both the notion of social capital and how it affects participation in social media. Finally, we discuss how virtual teams and organizations benefit from social media.

BACKGROUND

The result of the interactions among the users in a social networking system is an Online Social Network, i.e., a special case of the more general concept of social network. A social network is defined as a set or sets of actors and the relations defined on them (Wasserman & Faust, 1994). Social networks are typically studied using social network analysis, a discipline that focuses on the structural and topological features of the network. More recently, additional dimensions have been added to the traditional social network analytic approach (Monge and Contractor 2003; Borgatti and Foster 2003; Parkhe et al. 2006; Hoang and Antoncic 2003).

An important theoretical foundation for the analysis of participation in social networks is constituted by **social capital**. Social capital represents a person's benefit due to his relations with other persons, including family, colleagues, friends and generic contacts. The concept originated in studies about communities, to underline the importance of collective actions and the associated enduring relations of trust and cooperation, for the functioning of neighborhoods in large cities (Jacobs, 1961).

Social capital has been studied as a factor providing additional opportunities to some players in a competitive scenario, and, from this point of view, it has been studied in the context of firms (Backer, 1990), nations (Fukuyama, 1995) and geographic regions (Putnam, 1993, 1995). In this sense, social capital is defined as a third kind of capital that is brought in the competitive arena, along with financial capital, which includes machinery and raw materials, and human capital, which includes knowledge and skills. Moreover, the role of social capital in the development of human capital has been studied by Loury and Coleman (Loury, 1977, 1987; Coleman, 1988).

Social capital is typically studied: (*i*) by drawing a graph of connected people and their own resources, creating a connection between each player's resources and those of his closest contacts; or (*ii*) by analyzing social structures in their own right, and supposing that the network structure alone can be used to estimate some player's competitive advantage, at the social stance. The size of the ego-centered social network is an important factor to estimate the social capital of one individual; however, the size alone does not provide enough information. According to Burt (1992) social capital is related with the number of non redundant contacts and not directly with the simple number of contacts.

In fact, although information spreads rapidly among homogeneous, richly interconnected groups, Granovetter (1973) argues that new ideas and opportunities are introduced in the groups by contacts with people from outside the group. In order to explain this phenomenon, Granovetter distinguished among three types of ties: (*i*) strong ties, (*ii*) weak ties, and (*iii*) absent ties. A quantitative distinction between strong and weak ties has been subject of debate, but intuitively weak ties are simple acquaintances, while strong ties are reserved for close friends and family. The "*absent ties*" indicate missing relations in the network. Burt capitalizes on

Granovetter's insight, and emphasizes the importance of absent ties, that create the "*structural holes*" in the network texture. According to Burt, structural holes allow the individuals that create a weak link among two otherwise separated communities to greatly increase their social capital.

Nahapiet and Goshal (1998) discuss the role of social capital in building intellectual capital inside organizations. The authors distinguish the structural, relational, and cognitive aspects of social networks. The structural properties describe the patterns of connection among actors and regard the social system as a whole. The relational properties describe the type of ties people have developed during their interactions, including relationships like friendship, trust, and respect. The cognitive properties refer to basic knowledge, representations, languages and other systems of meaning, shared among actors. Nahapiet and Goshal focus on the development of intellectual capital, which is essentially an aspect of human capital, but may also be owned by a social collectivity. In fact, they classify knowledge as (*i*) either implicit or explicit, and (*ii*) either individual or social. In the case of social knowledge, they argue that social capital facilitates the creation of intellectual capital primarily by creating conditions for exchange and combination of knowledge. Finally, they discuss the features of an organization that are more effective for the development of intellectual capital, including duration of contacts, type and frequency of interactions, interdependence of actors and closure of the community. These features are often found inside organizations and institutions with enduring relationships, more than in neoclassical markets.

Contractor and Monge (2003) proposed a multifaceted approach, with a Multi-theoretical multilevel (MTML) model, for explaining the various motivations for the existence of social connections in a network. Their analysis considers the following theories:

- **Self-interest.** According to the theories of self-interest, people create ties with other people and participate in teams activities in order to maximize the satisfaction of their own goals. Such theories focus on the reasons, including personal preferences and desires, that guide people in their social choices. The most known theories of self-interest are based on the notion of social capital (Burt, 1992). Another foundation of these theories lies on transaction cost economics (Williamson, 1991), which compare different social structures in relation to broad transaction costs, i.e. the costs of running the economic system. Self-interest explains participation of an individual in a community on the basis of some goals or benefits he wants to achieve, for example accessing some data or knowledge.
- **Mutual interest and collective action.** These theories study the coordinated action of individuals in a team. They explain collective actions as a mean for reaching outcomes which would be unattainable by individual action. Thus, individuals collaborate in a community because they share mutual interests. Through coordinated action, they try to reach their own goals or at least to obtain some improvement in the context they operate in (Fulk et al., 2004). A provided example regards scientists collaborating in realizing and populating a common data system, which may be finally studied by each participant.
- **Homophily and proximity.** The principle at the basis of these theories is that connections are mostly structured according to similiarity (McPherson & Smith-Lovin, 1987; McPherson, Smith-Lovin, & Cook, 2001). Moreover, connections between

dissimilar individuals break at a higher rate. This happens in very different relationships, including marriage, friendship, work etc. It has strong implications for the formation of attitudes, ideas, and for the diffusion of information and innovations. In particular, Wuchty, Jones and Uzzi (2008) show that collaborations in the academy mostly involves individuals working in universities with similar ranks. Instead, there is a weaker tendency to collaborate on the basis of geographic proximity.

- **Exchange and dependency.** Another founding motivation for the emergence of groups can be the exchange of available and required resources (Cook, 1982). On the one hand, an individual may join a group for accessing some resources he needs. On the other hand, members of the group may look forward to access the new resources carried by the new member. Thus, these theories explain the creation of communities by analyzing the network structure together with the distribution and flow of resources in the network. Example of exchange networks vary from data analysts to bands of musicians.

- **Co-evolution.** The underlying principle of these theories is that evolution based on environmental selection can be applied to whole organizations, and not only to individuals. Thus, they study how organizations compete and cooperate to access limited resources, and how communities of individuals create ties both internally and towards other communities (Campbell, 1985; Baum, 1999). Groups are created with the expectation that they will improve the adaptation to a particular environment, providing a better chance to survive. Coevolution theories compare how different groups, for example based on homophily or exchange, adapt to evolving conditions.

- **Contagion.** For explaining the spread of innovations, contagion theories study how people are brought in contact trough the social structure (Burt, 1987). In fact, adopting a new practice or accepting new ideas often requires an accurate analysis of possible benefits against costs and risks. Individuals often base their evaluations also on the definition of an acceptable risk and the decision made by close contacts. Social contagion is described as a sort of interpersonal synapse through which ideas are spread. Conversely, some sort of social inoculations may prevent ideas from spreading to parts of the network.

- **Balance and transitivity.** Since macroscopic patterns originate from local structures of social networks, balance theories (Holland & Leinhardt, 1975) start from the study of triads in a digraph, or a socio-matrix. The typical distributions of triads configurations in real social networks show that individuals' choices have a consistent tendency to be transitive. These studies provide a foundation for notions like "*friends are likely to agree, and unlikely to disagree; close friends are very likely to agree, and very unlikely to disagree*".

- **Cognition.** Finally, another aspect of social network analysis regards the importance of knowledge and semantics in the development of teams and the impact of increasing specialization over collaboration. In this sense, the decision to form a collective depends on what possible members know (Hollingshead, Fulk, & Monge, 2002). These studies are grounded on the concept of transactive memory. In the area of academic research, for example, specialization is an incentive for collaboration. In fact, researchers look for ways to combine ideas from different sectors, to open new perspectives and create new inventions.

PARTICIPATION IN ONLINE SOCIAL NETWORKS

The study of structure of Online Social Networks, expressed as patterns of links among nodes, can exploit models and ideas from classical sociology and anthropology, with particular attention to contextual and relational approaches. In fact, all the results obtained in decades of studies of human networks are also at the basis of the analysis of Online Social Networks. However, these results cannot be simply applied to the different context of online relations. Instead they have to be evaluated and adapted to the new networks, which may have significantly different structure and dynamics. Moreover, online social networking platforms may greatly vary both technically and in their aims. They may be used by people for organizing quite diverse activities, in the scope of Virtual Organizations, Virtual Teams, or online Networks of Practice (or interest).

Types of virtual communities

In the following paragraphs we discuss the main features of some kinds of virtual communities: (*i*) Virtual Organizations, (*ii*) Virtual Teams, and (*iii*) online Networks of Practice.
Although there are several differences that clearly set the concepts apart, the *trait d'union* of these virtual communities are (*i*) the lack of central authority, (*ii*) their temporary and impromptu nature, and (*iii*) the importance of reputation and trust as opposed to bureaucracy and law.
According to the definition given by Mowshowitz (1994), a **Virtual Organization** is "*a temporary network of autonomous organizations that cooperate based on complementary competencies and connect their information systems to those of their partners via networks aiming at developing, making, and distributing products in cooperation.*" The term was then popularized by the Grid Computing community, referring to Virtual Organizations as "*flexible, secure, coordinated resource sharing among dynamic collections of individuals, institutions, and resources*" (Foster, Kesselman & Tuecke, 2001). The premise of Virtual Organizations is the technical availability of tools for effective collaboration among people located in different places, but their definition also emphasizes the possibility to share a large number of resources, including documents, data, knowledge and tools among interested people. In the context of Grid Computing, finally, the possibility to share computational and hardware resources was made even more central, including computing power, disk space, usage of diverse devices. Virtual Organizations have become particularly important in the global research community, often exploiting Grid Computing platforms, but they also apply to other fields of knowledge workers, including corporations, institutions and non-governmental organization. Their importance is sustained by continuing trends in production and social forms, including the growing number of knowledge workers, the emergence of integrated industrial district and other aspects developing at an international level, like dynamic supply chains, just-in-time production, sub-contracting, delocalization, externalization, global logistics and mass migrations which collectively are usually named "*globalization*".
A **Virtual Team**, according to Powell, Piccoli and Ives (2004), is a "*group of geographically, organizationally and/or time dispersed workers brought together by information and telecommunication technologies to accomplish one or more organizational tasks.*" Virtual Teams can represent organizational structures within the context of Virtual Organizations, but they can also come into existence in other situations, where independent people collaborate on a project, for example an open source software. Virtual Teams are often temporary and exist only until the

achievement of a specific goal, such as developing a computer program, conducting a political campaign, or launching a product on the international market. Unlike conventional teams, the operation of a Virtual Team occurs mainly through communication networks and tools, thus crossing space, time, and organizational and cultural boundaries.

An online **Network of Practice** (or interest) is a group of people who share a profession or a craft, whose main interactions occur through communication networks and tools, including forums and other discussion boards. The creation of the group typically occurs either: (*i*) in a spontaneous and natural way, because of a common interest of its members, or (*ii*) it can be tailored exclusively to actual practitioners, forged specifically with the goal of sharing and increasing their professional skills and knowledge.

Motivations for participation

In order to understand the reasons that motivate the users in engaging in online social activities in general, and, more specifically, in sharing their valued knowledge in online communities, it is necessary to analyze (*i*) the nature and the structure of their relationships in the context of a specific community, and (*ii*) their implication over both online and offline reputation. Wasko & Faraj (2005), for example, analyze the motivations for participation in a specific online Network of Practice. In particular, the analyzed network is a public online forum of legal professionals, who participate under their real identities. The study takes the following features into account, as possible enablers of participation.

- **Individual motivations.** One key aspect of social contribution is an individual's expectation that some new value will be created, as result of his participation in the network. The individual should expect to receive some benefits from his contribution, even in the absence of direct acquaintance with other members of the community and without mechanisms enforcing or encouraging reciprocity. Increasing the reputation is one of the most important forms of return of investment, especially if the online reputation is believed to have a positive impact on the professional reputation. Another form of reward is self-evaluation, for attesting competence and social acceptance through engagement in community activities. This form of reward may also drive to engagement for applying to fun and challenging activities, or simply for the enjoyment of being helpful.

- **Relational capital.** Another enabling factor for contributions to an online community is represented by the personal relationships among individuals, as members of that community. Relational capital is directly related to the level of an individual's identification with the community, trust with other members, perception of obligation to participate and reciprocate, acceptance of common norms. In particular, commitment can be associated with a community, apart from individuals. It can be described as a perceived moral obligation, due to previous interactions, to engage in future activities. In this sense, it represents a social norm of reciprocity in the community. Trust is another enabling factor, since previous positive interactions lead to optimistic expectations about future behaviors.

- **Cognitive capital.** Any meaningful interaction between two members of a community requires some basic shared understanding. All those common semantic resources,

including languages, interpretations, narratives, contexts and norms, are usually described as cognitive capital. In fact, an individual can participate in community activities only if he possesses the required knowledge and, more in general, the required cognitive capital. Usually this level of common understanding is related to the duration of tenure in the network. In a Network of Practice, it is the norm that individuals with more expertise and skills are also those providing the more frequent and helpful contributions.

- **Structural capital.** Communities characterized by dense internal connections are dialectically correlated with collective actions. In fact, individuals who are strongly embedded in a social network, have many direct ties with other members and a habit of cooperation. On the other hand, an individual's position in the network influences his willingness to contribute, thus increasing both the number and quality of interactions.

Those factors have different weight in different social contexts. In the case study analyzed by Wasko & Faraj (2005), reputation plays a crucial role, since it also affects professional reputation. Other factors, though, also have significant correlation with the number and usefulness of contributions in the online community. The final results compare both the level and helpfulness of contributions against the following factors: (*i*) reputation, (*ii*) willingness to help, (*iii*) centrality in the network structure, (*iv*) self-rated expertise, (*v*) tenure in field, (*vi*) commitment, (*vii*) reciprocity.

With regard to individual motivations, results for the case at hand show a stronger influence of reputation over intrinsic motivations, like willingness to help. Social capital, assessed by determining each individual's degree of centrality to the network, is confirmed to play the most significant role in knowledge exchange. Also cognitive capital, assessed by self-rated expertise and tenure in the field, shows a strong influence over participation, but this is mostly limited to the individual's experience in the field, while self-rated expertise is not quite significant. Finally, in the analyzed Network of Practice, relational capital, assessed by commitment and reciprocity, is not strongly correlated with knowledge contribution, suggesting that these kinds of ties are more difficult to develop in an online network.

Support for social online collaboration

One of the goals motivating the participation in online communities is the benefit of team work over solo work. Wutchy, Jones & Uzzi (2007) demonstrate that academic research work, for instance, is moving consistently toward team work, in all fields. Moreover, teams produce research works with a higher impact over the whole research community. In a subsequent work, Wutchy, Jones & Uzzi (2008) show that scientists collaborate in geographically sparse Virtual Teams, more than locally organized teams. These Virtual Teams produce results with a higher impact than solo researchers and co-located teams.

Various studies (Van de Ven, Delbecq, & Koenig, 1976; Malone and Rockart, 1991; Malone and Crowstone, 1994) describe the advantages and costs of coordinating team activities. In fact, while an increase in coordination can lead to greater effectiveness, typically it also produces a faster growth of coordination costs. As a consequence, a lot of effort is being devoted in creating tools and technologies that make group work more effective by containing the costs of their coordination. Virtual Teams assembly is another problem that online social platforms can help

solve. In fact, the success of a team depends largely on its assembly process, for identifying the best possible members.

Social collaboration platforms should also help to model and manage multidimensional networks. In fact, apart from direct relationships among people, such platforms should also include other resources. For example, in the area of academic research, a network model could include both people and the events they attend (Wasserman & Faust, 1994), thus creating a bimodal network. Su and Contractor (2011) propose a more complex multidimentional network model, including people, documents, data sets, tools, keywords/concepts, etc.

Additionally, in some online communities, participation may also strongly depend on adopted mechanisms and policies for preserving privacy, including confidentiality of messages and identity. Facilitating participation in those cases requires to balance the protection of users' online presence with the need to identify and evaluate the parties they communicate with. For personal identity privacy, stable pseudonyms could be assigned at registration (Andrews, 2002). Moreover, in online communities and Virtual Teams, acquaintance may happen online, without previous connection in real life. In those cases, a member's reputation is directly related to his pseudonym, and ratability of his online activities may be more important than his real world identity for creating trust. Complete anonymity may also have a value in some activities of Virtual Teams, apart from encouraging participation in general. For example, an anonymous brainstorm activity may help opening a conversation about trust and ground rules for online meetings (Young, 2009).

SOCIAL NETWORKS AS FERAL INFORMATION SYSTEMS

The initial adoption of online collaboration tools and social networking platforms in the work environment has occurred largely on an individual basis. Faced with an increasingly decentralized, expanded and interconnected environment, workers and members of organizations began adopting social networking platforms as better tools for connecting and collaborating with colleagues and partners.

Thus, at their first appearance in firms and organizations, without indications from the management and without integration with internal information systems, social platforms took the form of feral systems. In fact a Feral Information System can be defined as "a computerized information system that is developed by individuals or groups of employees to help them with their work; it is not condoned by management nor is it part of the corporation's accepted information technology infrastructure. Its development is designed to augment, or in some cases, circumvent existing organizational information systems" (Houghton & Kerr, 2006). In this sense, social media can often be considered as "feral systems". In fact, along the definition, (*i*) they are not "part of the corporation's accepted information technology infrastructure", and (*ii*) they are "designed to augment" that infrastructure.

The following subsections will explain these aspects in greater detail. In particular, they will deal with: (*i*) the reasons why social networks are not yet accepted as part of the IT infrastructure, i.e. the risks and challenges associated with using social networks in the working environment; (*ii*) the reasons why employees adopt them, nevertheless, i.e. the opportunities they give to users and the way they can augment the official infrastructure; and finally (*iii*) what is the actual state and trends about the endorsement of social networking by organizations and firms.

Risks and challenges for firms and organizations

In a study published by at&t (2008), ten main challenges are listed for the adoption of social media by businesses. In fact, these challenges can be grouped in three main areas: (*i*) organizational costs, (*ii*) risks of capital loss, and (*iii*) technical challenges.

About **organizational costs**, the first issue is that social networking have indirect benefits, which often are not fully appreciated. It is probably the main area of resistance, due to the perceived costs of networking time, not seen as cost efficient activity, and the necessity to allow employees to manage their working time with more freedom. However, traditional ROI methods make it difficult to incorporate all the benefits of social media, both direct and indirect. Thus new performance indicators will be needed. Another issue is the definition of an effective plan to reach the critical mass for the social network to be functional. In fact, common figures of users creating content and collaborating through social media are pretty low, typically from 1% to 20%. Resistance to adoption can come from both regular employee and cadres, possibly including managers and executives. Such a plan would also face the problem of timeliness. In fact, developments in the Web 2.0 environment occur very fast: successful applications may reach millions of users in a couple of years, sometimes creating a new market. Thus, organizations need to plan and enact their plans in a responsive way, or face the risk of being surpassed by the adoption of new unauthorized tools and media by members, in the form of feral systems.

Other challenges are related to the risk of **loss of capital**, faced by organizations in the adoption of social media. The capital at risk can include intellectual property , as well as human and social capital. In fact, organization members may easily and inadvertently leak sensible and protected content on social media, and such content may face rapid diffusion by "word of mouth" mechanisms. An even greater risk, however, may come from the increased mobility of organization members and employees. This risk is increased by the exposure of members' profiles to the outside world, including other organizations and competitors. Such profiles may be provided explicitly, or obtained through the analysis of the history of member's activities with counterparts though social media.

Finally, the adoption of Online Social Networks implies **technical costs** for creating and maintaining a more complex and open infrastructure. Some important challenges regard security, which is harder to enforce as intranets need to open to the external world, for enabling social collaboration. The risks include the malicious behavior of users, as well as the proliferation of viruses and malware. Also on the technical front, social media applications require increased levels of bandwidth, storage and computational capacity, to support interactions through videos and other form of rich content. Moreover, the increased and differentiated use of social media will pose challenges for the interoperability of different applications, especially with regard to security and authentication schemes.

While the study of at&t is formulated in reference to the business context, it is interesting to notice that similar considerations are also referred to government agencies and other types of organizations. For example, Bev et al. (2008) describe the case of **government agencies**. Among other issues, the study underlines the problems of (*i*) employees wasting time on social networks, (*ii*) risk of malware and spyware coming from high traffic sites, and (*iii*) bandwidth requirements. About the first issue, that we described as one aspect of the organizational costs, the authors of the document argue that the problem is not specific to Web 2.0 technologies. In

fact, a similar argument was used with respect to mobile phones, emails, etc. For this reason, it is better treated as a management problem, than a technology problem. About security, efforts should be dedicated to at least mitigate the risks, if they can not be canceled. Finally, with regard to bandwidth and other technological issues, enough resources should be deployed, to allow at least some selected employees to use rich-content media to communicate with the public, in the most effective way.

Another study, about the adoption of Web 2.0 in the USA **Department of Defence**, presents similar results (DoD, 2009). Regarding the organizational costs, authors list the need to replace legacy processes and make decisions to drive the change, considering contributions from users; train the workforce to take advantage of new technologies; define a clear articulation of the value. About the risk of loss of capital, the authors point out information leaks as particularly serious treats. According to the study, the opportunities of increased sharing and collaboration should be exploited, and not left in the hands of adversaries. For this reason, risk should be mitigated, as completely avoiding it is not a viable solution. This requires that policies are updated accordingly, and the establishment of trust is fostered. In particular, the necessity of organizations to work together must be adequately addressed. Finally, with regard to technical costs, the study discusses the use of "cloud computing" services and the issues of edge users, who connect through mobile devices and applications.

As a final example, also the case of the **Ohio Division of Wildlife**, which decided to remove the barriers to adoption of social media applications, demonstrates the real potential of the new technologies (Cockerill, 2013). Notwithstanding initial concerns, which were similar to the other reported cases, the agency was able to make good use of social media, with no security breaches and exploiting already available networks. However, additional staff was necessary for the management of new social media applications.

Social media for augmenting information systems

Although often social networking technologies are not condoned as part of the official information system, yet people use them routinely, at least on an individual basis. In fact, many work activities, in many different sectors, benefit from social media. The use of social media can help workers in their activities (Casson & Della Giusta, 2007; Isari et al., 2011). Social media are a suitable means for coordination among people. Usually it happens across firms boundaries, but they can help in the coordination of activities within a same firm with a big help when employees work in different sites. In this last case, they can provide a complete environment to enable employees to self-organize online, report their status, and stay aware of the status of the other employees of course, considering all the information necessary for coordinating or helping their work. Moreover, the access to social media and, in particular, to community discussing about the technologies and the business of the company can help in the distribution of knowledge within the company and minimizing misunderstandings between colleagues who do not meet face-to-face frequently. Of course, the use of corporate microblogs, either feral or officially supported, can help in the previous cited tasks, but also it allows employees to spread knowledge, ideas, and suggestions about the ways of improving their work.

It is quite easy to find many concrete cases of use of social media for work activities, adopted at first on an individual basis. Just as examples, we will briefly cite the two quite different cases of (*i*) journalism, and (*ii*) software development.

In the field of **journalism**, social media have already acquired an important role, especially for reporting on breaking news. In those cases, when journalists lack direct sources, social media can guarantee an alternative flow of information, produced by eyewitnesses and other non professional reporters, who happen to be on the scene at the right moment. However, this new flow of information poses new challenges, as professionals have to discern interesting and trustworthy sources and pieces of content in a magma of information overflow. Professional journalists, in particular, should be wary of rumors and misinformation which are easy to spread on social networks. They should avoid to augment their epidemic potential, to provide credible reports to the public and protect their own professional reputation. For this reason, some research works are targeting specifically the problem of filtering and assessing the veracity of sources found through social networks. For example, Diakopoulos et al. (2012) propose a filtering system, based on various mechanisms. A first filter is meant to detect eyewitnesses, on the basis of a principled dictionary approach. Another filter is used to classify users, segmenting sources according to some archetypes of information producers (e.g. organizations; professional journalists and bloggers; common people). The filtering process is also supported by an estimation of location information, based on a source's friends network, and by an analysis of content cues, for automatically detecting misinformation and evaluating information credibility.

Another, very different, example is **software development**, where Virtual Teams are quite a common practice. In fact, individual developers increasingly use social networks to self-organize both with colleagues in the same organization, and across organizational boundaries. Also, some large communities have emerged as a grassroot process, empowered by new social media and motivated by common interests and emerging attractive targets. In particular, Begel (2010) apply a specific model of teaming (Tuckman & Jensen, 1977) to the process of software development. The teaming problems are central in the process, and thus it is highly dependent on developers' abilities to connect and relate with colleagues with similar interests and sufficient skills. The role of social media can then be analyzed in the various aspects of teaming: (*i*) forming, i.e., to select and organize developers into a team; (*ii*) storming, i.e., to reach consensus about the team's goals; (*iii*) norming, i.e., to define guidelines and development methodologies; (*iv*) performing, i.e., to actually develop the new product, through coordinated activities; (*v*) adjourning, i.e., to evaluate accomplishments and failures and improve the team's functioning.

More in general, social media are appreciated by individuals and organizations as they improve collective thinking an thus foster innovation. In fact, **creativity and innovation** have long been the subjects of organizational studies and social network analysis. Though not all creative ideas lead to innovation, yet it is from creativity that innovation may arise, if followed by successful implementation. Fedorowicz et al. (2008) note that creative ideas rarely come from individuals. More often, they come from teams and groups. Today, this frequently happens in Virtual Teams, through social media and e-Collaboration. Studies focus on various important aspects, such as: (*i*) the impact collaborative tools; (*ii*) the impact of e-Collaboration processes; and (*iii*) the design requirements for tools supporting creativity and innovation. Dwyer (2011) argues that, apart from the number of collaborators, it is also important to measure the quality of collaboration. In

fact, various collaborator segments can be identified, with significant differences in the value of contributed ideas and the timing of participation. Thus, new metrics should be used, taking those differences into account and being based on information content. Hayne & Smith (2005) note that groupware performance depends on the fit between the structure and task of the group. However, they argue that an important role may also be played by the **cognitive structure**, which also maps to the group structure. In fact, collaborative tasks may push human cognitive capabilities to their limits, in terms of perception, attention and memory. Thus, the authors argue for the integration of different areas of study, such as: psychology, especially with regard to abilities and limitations; theories of social interactions, with regard to group communication and motivation; studies of groupware structures and human interactions mediated by artifacts. Recent theories of cognition, including template theory, transactive memory and distributed cognition, provide some ground for the analysis of groupware. The main goal is the definition of methods to improve the fit between cognitive structures and group tasks, for minimizing the group cognitive effort and maximizing the application for the collective task.

To leverage the advantages of social networking, organizations and firms should support their transition from the individual adoption as feral systems to the formal incorporation into existing information systems. To achieve this goal, knowledge management professionals should act as **social networking architects**, in conjunction with other managers and IT professionals. In fact, social network analysis can highlight the patterns of connection among individuals and the main knowledge flows in a whole organization. Thus, it can be used by managers as a basis for reshaping the organization and advancing towards the business goals. Anklam (2004) describes three main types of intervention, to conduct after a social network analysis: (*i*) structural/organizational, i.e. change the organigrams to improve the knowledge transfer; (*ii*) knowledge-network development, i.e. overcome resistance to action on the basis of evidence, instead of intuition; (*iii*) individual/leadership, i.e. resolve problems with the particular role of individuals, for example acting as factual gatekeepers and resulting in a knowledge bottleneck. More in general, social network analysis can be useful to cope with common business problems, including: launching distributed teams, retention of people with vital knowledge for the organization, improve access to knowledge and increase innovation.

Along the same lines, Roy (2012) discusses the profile of leaders in Virtual Teams. In fact, apart from usual technical and leadership capacities, to work effectively in a virtual environment, they also need abilities to build relationships among participants and to defuse frustrations. In fact, on the one hand, they need particular communication skills, as well as good knowledge for operating video conferencing softwares and other CSCW tools. On the other hand, they must be able to establish trust, embrace diversity, motivating team members and fostering the team spirit. Forgie (2011) discusses in particular the case of a matrix organization, in which people collaborate with others, often without the usual context of authoritative roles. This scenario is frequently accompanied with a request to do "more with less", through the collaboration of flatter and leaner organizations. In this case, leaders are challenged to develop a culture of cooperation trough existing boundaries, guiding members with competing priorities to achieve the common goals.

Endorsement by firms and organizations

The trend toward introducing social media systems in the work environment has seen a massive increase in importance in recent years. At their first appearance, without indications from the management and without integration with internal information systems, social media took the form of feral systems. However, organizations and firms are finally becoming to accept this situation as a matter of fact, trying to gain benefits from the same features that drove the introduction of social platforms in the first place. Thus, information systems are moving from the communication level, to the coordination and collaboration levels, increasingly acknowledging and leveraging the various dimensions of social relations among people, both internally and across organization boundaries.

A first strategy, that some organizations and brands are adopting, is to use social media for improving their **Customer Relationship Management** (CRM). In fact, social media can be a means for firms and organizations to listen to customers and to cope with the difficulties in collecting data through interviews (Murphy et al., 2011). Social media allow the use of online sources of information, sometimes for free. So firms and organizations are moving to reduce costs and time needed by traditional survey researches. Moreover, in the last years several social media monitoring tools and platforms have been developed to listen to the social media users, analyze and measure their content in relation to a brand or enterprise business and so it is reducing the time necessary for extracting the useful information through the huge data provided by social media (Stavrakantonakis et al., 2012). However, this quite popular trend towards so-called "*Social CRM*" has not always been satisfactory. A study by IBM (2011) shows that there's a quite large gap between the expectations of brand managers and social media users. In fact, only the 23% of users are keen to engage with brands on social media, and only 5% of users declare active participation. The majority, instead, limit their communications and shares with parents and relatives. Among the potentially interested people, many expect tangible benefits, including discounts, services, additional information and reviews about products. The study is in accordance with the difficulties that brands face to engage with users and to launch viral campaigns. Nevertheless, businesses continue to be greatly interested in using social media for rapid distribution of offers and content, reaching new people trough trusted introducers, but also for improving customer care and research.

A second type of effort is directed to augment internal tools, in particular **Knowledge Management** (KM) systems, with explicit and rich data about relationships among involved people. The long term goal of KM, in fact, is to let insights and experiences existing in implicit way into an organization emerge and become easily accessible for wider internal adoption. Such knowledge can be either possessed by individuals or embedded into common practices. To provide effective access to valuable internal knowledge and expertise, it is essential to recognize and value the particular knowledge possessed by different persons, and then to have means to contact the relevant persons in a timely manner, thus making information-seeking an easier and more successful experience. In many regards, such a scenario can be fully developed only on the basis of the evolution of existing ICT tools and the creation of new ones, by making some typical features of social networking applications available in tools for daily activities.

This trend regards existing Information Systems and also, for some aspects, platforms for **Enterprise Resource Planning** (ERP). In fact, some aspects of traditional ERP systems are integrating features of social networking platforms, fostering collaboration among people on the

basis of direct interpersonal links and simple knowledge sharing tools. The centralized and inward approach of early systems is being challenged also in the core area of production management software. The drift towards network of integrated enterprises is testified by an increasingly dynamic production environment, arranged in the form of complex Virtual Organizations and Virtual Enterprises. In this context, the tasks of supply chain management, project and activity management, data services and access control management require the participation of actors of different organizations and possibly different places and cultures. Thus, as inter-organizational collaboration is becoming a central point in the new digital society, focus is moving from prefigured organigrams to the real emerging relationships, in either a local or global network, in which people are actually engaged while performing their activities.

FUTURE RESEARCH DIRECTIONS

While the difficulties faced to deploy effective Information Systems in an increasingly globalized scenario are leading enterprises and organizations to integrate Online Social Networks into their systems and workflows, those new systems also face similar problems, including insufficient and scattered participation. In fact, Online Social Networks are not a silver bullet, but they must be modeled and deployed to fit the peculiarities of the particular environment where being used.

Some analysts argue that, in general, the adoption of social networking tools by businesses may improve their market presence and also increase revenue (at&t, 2008). In this case, apart from revenue, new indexes have to be analyzed to measure the social performances. The shift could materialize in: (*i*) expanded reach in new markets and niches; (*ii*) effectiveness of direct marketing and product launch; (*iii*) improved customer experience through some form of social CRM; (*iv*) integration with external information channels.

The effects we mentioned are expected to be stimulated by embracing the changes brought by social networking, in communication forms, business vision, internal culture and organization. From the point of view of internal organization, project leaders need to play the role of social networking evangelists, while knowledge management professionals should become social networking architects, in direct contact with other IT professionals (Anklam, 2004; Forgie, 2011; Roy, 2012). However, the adoption of social networking tools is going to occur at different speeds, requiring plans for implementing changes and means for encouraging effective participation. In fact, rather unsurprisingly the impact of social networking is much larger and started sooner on Virtual Teams, start-ups, small and geographically sparse organizations than on large corporations.

In any Virtual Teams, the adoption of an open social networking tool allows each participant to improve his skills and knowledge, not only by accessing raw information, but also by receiving mentoring from online contacts. On the other hand, a participant in the team will similarly enjoy an increased visibility inside a larger community, making his expertise known and available to his acquaintances. Thus, depending on the dimension of his social network, each participant is: (*i*) increasingly involved in lateral activities, and (*ii*) solicited to move to other projects. However, this tendency is potentially disruptive for both large companies and small teams, because it represents a risk of loss of human and intellectual capital. In order to overcome this issue, teams and organizations are expected to motivate participants to continue their engagement in collaborative work. Solutions include (*i*) specific reward systems based on

growing reputation inside the community, (*ii*) individual incentives (Chui, Miller & Roberts, 2009), and (*iii*) active efforts by "*animators*". Career paths could also be designed to acknowledge the important role of animators, business bloggers and other experts, acting in a visible way inside a community and promoting participation.

Especially in the case of software development, product life-cycles are getting shorter and shorter. The materialization of an idea into a mature Web 2.0 application, with millions users, may take just a couple of years. Innovation is often sustained by forms of collective thinking (Dwyer, 2011; Fedorowicz, Laso-Ballesteros & Padilla-Meléndez, 2008; Hayne & Smith, 2005), either through e-Collaboration tools or real meetings, involving team participants and other partners from the value chain. This may be particularly useful for anticipating customer needs. The capacity to react to such a dynamic environment depends on the size of the organization, but also on visions, plans and tools deployed to embrace changes.

Conversely, resistance to the introduction of social networking tools may slow innovation down. It is often motivated by the perception of social networking as a cost inefficient activity, in which employees get involved despite of duties with higher priority. This perception may induce a sort of "*Big Brother syndrome*" among managers. Another important issue is the confidentiality of sensitive information of projects and organizations, which may become harder and harder to maintain while organizational boundaries fade. Encryption and access control mechanisms are necessary, but not sufficient. Training on the risks of information leakage should not be limited to those in contact with customers. Instead, security awareness should be introjected by all the participants in a Virtual Team or the members of a large organization.

CONCLUSION

In the present chapter, we reviewed the notion of social capital in the context of human social networks. Social capital is important both for the individuals that are able to accumulate large amounts, and for organizations.

Subsequently, we showed how social capital, or at least the idea of being able to accumulate it, either directly or indirectly, is an important factor in the participation in online social networking activities. These activities are sometimes blessed by the company, that provides official means to engage, but more often than not take place in feral informative systems, with no intervention from the management or even against it.

Finally, we discussed how social elements have been introduced into more traditional business systems, such as CRMs and ERPs. Whether these experiments are successful is still a matter of debate. For certain, their success does not always match the most optimistic expectations.

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KEY TERMS & DEFINITIONS

Social Network: social structure made of agents (individuals) that are connected by relationships; relationships may represent various kinds of ties between agents, and may be either symmetrical or asymmetrical.

Social Networking System: a software system that allows users to manipulate a representation of their online social networks and to interact with the other users in the system, especially collaboratively discussing user-produced resources (e.g., posts, pictures).

Social Capital: the benefit, either received or expected, that agents in a social network derive from specific social structures; in particular, it is realized by an agent thanks to his peculiar relationships with other agents.

Virtual Organization: a network of autonomous organizations and individuals, typically with the main aim of sharing resources in a coordinated fashion; such networks may have different timespans, levels of flexibility, security requirements; participants can benefit from the complementary competencies and resources; one of the distinguishing features of a Virtual Organization is its reliance on information and communication technologies, with the possible integration of existing Information Systems; a Virtual Organization may be created in different contexts, including the development and distribution of products in cooperation.

Virtual Team: a group of workers connected mainly through information and communication technologies; such group may be dispersed geographically, its members may belong to different branch in a certain organization, or to different organizations, and they may also have different cultural backgrounds, including language and habits; Virtual Teams may exist either independently, or in the context of a Virtual Organization; they are often temporary and exist only until the achievement of a specific goal.

Online Network of Practice: a group of people who share a profession or a craft, whose main interactions occur through communication networks and tools, including forums and other discussion boards; the group may emerge in a spontaneous and natural way, because of a common interest of its members, or it can be created purposely for including actual practitioners, with the goal of sharing and increasing their professional skills and knowledge.

Customer Relationship Management (CRM): CRM is a process for managing the relations of an organization with its current and potential customers; it is typically supported by analytical models, workflows and software systems, integrated into the Information System of the organization; a CRM system may provide support in the areas of sales force automation, marketing, customer service and support, appointments, analytics.

Knowledge Management (KM): KM usually describes a range of processes and practices used to manage the insights and experiences available into an organization; in this respect, it may help to identify, create, represent, distribute, and enable adoption of insights and experiences; such insights and experiences can be either embodied in individuals or embedded in organizations as processes or practices.

Enterprise Resource Planning (ERP): an ERP system is an integrated software application supporting the various phases of development and distribution of a product or a service by an organization; it automates the flow of data inside the organization and facilitates the relations with outside stakeholders; it is typically based on a database system and may be hosted on different computer and network configurations; it integrates all management information, including data from internal or external sources about finance/accounting, manufacturing, customer relationship management, sales and service, etc.