

Information Technology Capabilities for Digital Social Networks

Camille Grange and Izak Benbasat
Sauder School of Business
University of British Columbia
Vancouver, Canada
Camille.grange@sauder.ubc.ca

Abstract—This paper contributes to the evolving body of knowledge pertaining to the study of digitally-enabled social networks, their usage, and their effects on people, organization, and society. We review the literature on social networks and develop a typology which distinguishes four aspects of digital social networks usage: (i) building and sustaining the network, (ii) observing the network, (iii), extracting the network’s resources, and (iv) disseminating information via the network. The suggested framework identifies several design-related opportunities and challenges, and unveils linkages between usage types. This framework also suggests that future research endeavors could benefit by integrating the perspectives of various online behaviors (e.g., viral communications, identity building, learning, and decision-making) and domains of applications (e.g., shopping, dating, social networking, and money lending).

Keywords- Social networks; Internet; Social Web; Internet; IS design; IS usage; Online behaviors.

I. INTRODUCTION

The evolution of information and communication technologies has fuelled the growth of Web applications that enable people to create social networks, i.e., when users - or their representation in virtual environments - are network entities connected to each other by links of various nature, such as awareness, friendship, proximity, mutual interest, etc. Online shopping is a striking example of a somehow traditional Web application which has lately been integrating some ‘social network’ aspects into its services. Indeed, among the most ambitious attempts to the renewal of online shopping are *online shopping networks (OSN)*, those Web-based shopping communities in which consumers experience rich interactions with other shoppers. OSN users can gather around specific interests forums to exchange experiences, rate, and comment on products, create and share wish lists, compare themselves to others, socialize, gather valuable product knowledge and, importantly for marketers and sellers, develop positive or negative attitudes towards products and brands. Hence, the growth of OSNs exhibits a striking conversion form a transactional and product-oriented platform to a more complex social context and application. In addition to online shopping, the integration of social network aspects into the design of Web services has been thriving in a variety of other domains such as

job seeking (e.g., LinkedIn¹, Viadeo²), *information and knowledge management* (e.g., Delicious³, Slashdot⁴), *innovation* (e.g., Crowdsprit⁵, Kaltura⁶), and *inter-personal communication* (e.g., Facebook⁷, Twitter⁸).

In a recent special issue of *Information Systems Research*, Agarwal et al. [1] discussed research trends in the study of digital networks, highlighting the socially-rich interactions thriving within them, and the technological artifacts involved in facilitating their exploitation by individuals. The scope of the present paper fits the line of research that gives prime importance to “the socio-technical designs that help digitally-enabled social networks better achieve the purpose of supporting members, sponsoring organizations, and society as a whole” ([1], p.250). Specifically, our purpose is to reveal some design opportunities and challenges that are triggered by the development and adoption of Web applications that embed social network features. To do so, we review the relevant literature in the Management, Information Systems, and Human-Computer Interaction fields, and propose a classification of the IT (Information Technology) capabilities that enable and leverage digitalized social networks. This categorization is organized around four different goals that individuals and organizations may have when using digital social networks: (1) building and sustaining the network, (2) observing the network, (3), extracting the network’s resources, and (4) disseminating information via the network.

This paper represents a preliminary step in the study of the digitally-enabled social networks, their usage, and their effects on people, organizations, and society. Studying IT effects is a challenging task that requires accounting for several aspects including the ‘intrinsic’ properties of technologies, users’ goals and capabilities, the potential uses afforded to users by technologies, and the symbols and values technologies convey [2]. For digital social networks in particular, we think that we

¹ <http://www.linkedin.com>

² <http://www.viadeo.com>

³ <http://www.delicious.com>

⁴ <http://www.slashdot.com>

⁵ <http://www.crowdsprit.com>

⁶ <http://www.kaltura.com>

⁷ <http://www.facebook.com>

⁸ <http://www.twitter.com>

are not yet ready to take such a holistic approach, because we first need to develop a language for and a better understanding of these applications and their capabilities. In this context, the present paper's objective is to help develop a classification of IT capabilities for digitally-enabled social networks, which is built by taking into account social network's essential characteristics (e.g., social networks are people and links between them). In the future, researchers could use this work to examine the IT properties, affordances, and values for a specific usage category. Alternatively, future research could focus on a domain of application (e.g., online shopping) and study the various potentially complementary facets of their usage. It is possible that in different domains, certain usage types will vary in terms of their importance and the challenges they entail for IT design.

II. A CLASSIFICATION OF IT LEVERS FOR DIGITAL NETWORKS

A. IT and Networked Structures

Phenomena thriving in networked structures, such as word of mouth, which is of interest to marketers [3, 4], or social movements, which are important for sociologists [5] have not depended on technologies to exist and to impact individuals and society, and hence have been studied by social scientists. Yet, as illustrated in this paper, information technologies can be designed to embed capabilities important for the individuals and organizations willing to use digitally-enabled social networks effectively. In fact, these applications have the potential to provide benefits that would be difficult to attain without them (e.g., scale and rapidity of spread may be among the most obvious comparative advantages provided by network technologies). In the meantime, there are also important challenges to reach advantageous outcomes such as people's participation in online communities or shoppers' stronger commitment to online shopping. For example, privacy issues of online environments thrive within digital social networks because users' actions in networks tend to have faster and broader impacts. In addition, online users have limited time, effort, and motivational resources. Because of these challenges, IT will have to be designed to eliminate or reduce major privacy-related risks and to reduce the social information overload that network insiders or outsiders (i.e., those individuals or organizations exploiting networks) might face.

For the reasons noted above, the IT capabilities that are going to be discussed in this paper should be envisioned as both opportunities and challenges to the improvement of our current designs in accordance with people and organizations' needs and expectations. Figure 1 synthesizes the proposed classification of IT capabilities. It should be noted that the four domains of (1) **building and sustaining the network**, (2) **observing the network**, (3) **extracting resources** and (4) **disseminating information**, are conceptually distinct albeit sometimes complementary, a point that will be addressed in the discussion section. Importantly, each of the above usage aspects emphasizes different facets of the study of social networks, as is also shown in Figure 1. Hence, for the first domain of IT capabilities, "building and sustaining the

network", our attention is on the network's *nodes* (how individuals, as nodes, self-present and develop virtual identities), the *breadth of ties* and the support for intimate relationships (i.e., the strength and richness of the channels supporting one-to-one communications), and the *opportunities for new ties* (i.e., the growth of the network). The main interest for the second domain, "observing the network", is on the *existence of ties* between nodes (i.e., the structure per se) and the *network's activity* (i.e., tie activation). For the third domain, "extracting the network's resources", the focus is on the network's *nodes* (i.e., the actors' presentation and expertise), their *accessibility* (i.e., paths between nodes), and *the relationships between nodes of interest* (i.e., the clusters to which nodes belong). Finally, "disseminating information in the network" is a domain where the attention is on the *number of nodes* (i.e., the size of the network), the *position of nodes* (i.e., their influence, or centrality, on others) and the *ties that link nodes* (i.e., paths to diffuse information).

B. Building and Sustaining the Network

In offline environments, individuals permanently self-present while engaging in their daily social activities [6], i.e., they convey to others who they are through their attitudes, behaviors, membership to organizations, writings, and facial expressions. Actors of a digitally-enabled social network also need to *communicate their identity* to others. Yet, in an online world, individuals rely on IT to create and interpret textual and visual cues (e.g., in [7]), and to evaluate the extent to which they can trust others and prevent deception [8]. However, the breadth of the communication channel for identity presentation is usually reduced to a profile web page, including information such as personal interests, pictures, and list of network's members. These important self-presentation processes have been studied for instance in the online dating context [9]. Other work discussed identity fragmentation in digital social networks [10], highlighting the need for IT to help individuals maintain multi-faced social identities and to control their privacy when presenting as a professional, as a friend, or as a lover under chosen circumstances.

Linking people and providing them with the appropriate features so that they can enact the relationship they share (e.g., interact as friends) according to their needs (e.g., more or less heavily, with more or less contextual information) and cognitive capabilities (e.g., prioritizing salient relationships in large networks) constitutes another essential property of digital social networks. For example, users of online shopping networks may want to develop strong ties with similar shoppers, i.e., interact more frequently and share emotional closeness, but also get access to specific knowledge from other expert shoppers with whom they are not, and do not desire to be, very familiar. Hence, depending on the context, IT may provide features *facilitating the constitution of strong ties and cohesive social structures*, as well as *brokerage opportunities* and *the constitution of weak ties* [11]. Facilitating social interactions in cohesive social structures can be enhanced by designing ITs that enrich the communication channels through which actors of the network interact [12], which is consistent with Blanchard and Markus' emphasis on the importance of affective bonds to develop a 'sense of virtual community' [13].

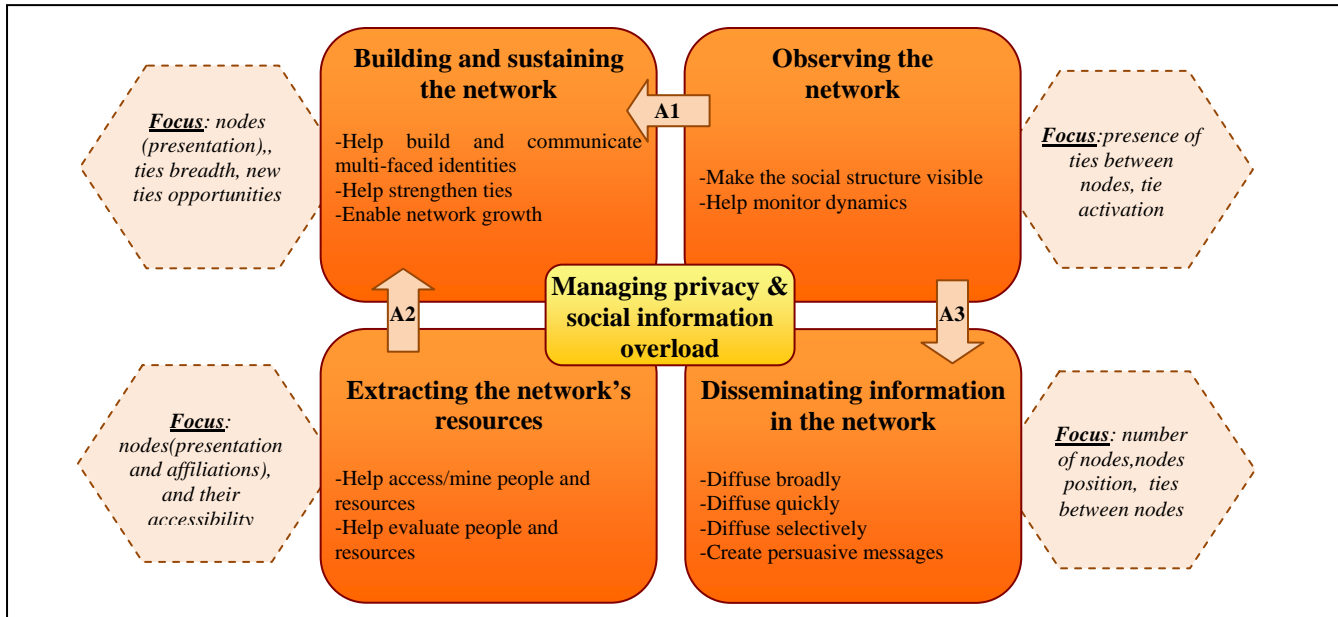


Figure 1. Classification of IT capabilities for digitally-enabled social networks

Ren et al. [14] explored two ways for IT design to help develop commitment to online communities (which can be considered as networks of interpersonal ties that provide sociability, support, information, a sense of belonging, and social identity [15]). First, by triggering common identity, i.e., by implementing design decisions that help members develop attachment to the group as a whole, and second, by triggering common bond, i.e., by implementing design decisions that entice members to develop attachment to individual group members. Such design choices consist, for example, in constraining versus promoting off-topic discussion, and limiting versus not limiting group sizes. When it comes to designing for brokerage opportunities, IT should enable growth and foster reach beyond the reduced scope of strong proximate ties. For example, a study of Facebook use behaviors among college students found out that some users were engaging in 'social browsing', i.e., using the site to develop new connections [16].

C. Observing the Network

IT has much to contribute in terms of the provision of better (e.g., clearer, more complete, more timely, more faithful, more understandable) representations of digital networks' states and properties. As social structures (people and the relationships between them) have a critical role in a variety of aspects of our lives, e.g., the adoption of innovation [17], professional performance [11], then in an online environment, it would be fruitful if IT could provide a better *visibility on digital social networks' structure*, i.e., better social network awareness [18]. This may be achieved thanks to mining features that could help make people and their relationships visible [19]. In the online advertising context for example, this would indeed be highly valuable when it comes to networks outsiders choosing (or "seeding") initial information broadcasters. Indeed, if IT can help identify the structure of a digital social network, then the

efficiency of a viral communication may not only be predicted but also enhanced, e.g., one could detect how many and which people to contact in order to reach an adequate coverage [20]. Likewise, in the online community domain, applications that synthesize the data for a usable level of analysis can help better understand a community through sub-groups analyses or members' pivotal roles identification [21].

In addition, the efficiency of online viral communication would be improved if managers had at their disposal tools to *monitor dynamics*, i.e., how viral messages get diffused [20]. Getting to know who has been 'contaminated' by whom, and identifying the 'stopping points', i.e., the individuals who don't forward a message, can be extremely useful for marketers. Indeed, the latter might want to react to first alerts of low contagion by launching a new seeding wave or by adjusting the message. Network monitoring is a capability that should also be studied for the support of network 'insiders', i.e., end-users that desire keeping an eye on the activities of their online social networks. Risks of distraction and overload have been raised [22], referring to concerns about a social information burden put on end-users. Hence, IT can be valuable in tracking and pushing the synthesized pieces of relevant information that end-users monitoring the network might look for. This point is relevant for various application domains, e.g., online shopping networks where users need to be updated on the shopping activities of their online shopping friends, and for the case of online social networking sites where individuals need to be aware of the personal or professional lives' states and activities of their networks' members. In fact, Lampe et al. [16, p.167], called this the 'surveillance function', i.e., the tracking of "actions, beliefs and interests of the larger groups to which [individuals] belong".

D. Extracting resources from the network

Digitally-enabled social networks can contain a large amount and a wide variety of resources, e.g., psychological, informational, and entertainment-related resources. As discussed in earlier work [23, 24], there are situations where network actors wish to exploit these resources, i.e., they want to detect what others know, and examine whether it is valuable for their own goals. In these cases, network actors use the network with a very specific purpose in mind (e.g., making a decision, solving a problem, learning something) which differs from the “observing” domain described above. Hence, IT designers face the challenge of making the network’s resources readily available for people, who, interestingly, can be either members or not of the network depending (i) on the network’s rules regarding its public visibility and accessibility, and (ii) on the network members’ privacy choices. This has two distinct implications for the study and design of digital social networks. First, there is an opportunity for IT to help resource extractors *access network’s actors and the potential resources* these actors make available. This could happen by providing tools that help search for network members in function of specific criteria, such as geographical location, product expertise, popularity, etc. If resource extractors can’t be helped to become aware of potential available resources they might seek, as well as of who may provide them, then the extraction process will fail. As Borgatti and Cross have mentioned, “knowing that someone else has valuable expertise is important, but their knowledge is really helpful only if they are accessible” [23, p.435]. Second, it also implies that IT should help resource extractors *evaluate* the provider of the resource they seek (as a reminder, the resource can be as diverse as career advice, social support, product opinion, etc.). In other words, people-related information (e.g., personal information, preferences, reputation, social identity, history of contributions) should help evaluate and better understand a network’s members. Note that reputation information (i.e., the rating of an actor by the other network’s actors) and relational information (i.e., the display of an actor’s network relationships and group memberships) also help evaluate the trustworthiness of people. The latter one has been illustrated recently in the original context of online money lending where resource extractors (here the individual seeking the network to find someone to lend money to) identified someone to trust (i.e., someone who will pay back) by examining her/his network of contacts [25].

For an efficient support to resource extraction, not only the *source* (i.e., the network’s actors) but also the *resource* (i.e., the information, support, value provided by the network’s actors) *may need to be accessed and evaluated*. In the case of an online network where people lend/ borrow money to each other, the network resources of interest are largely embedded in people’s profiles and relational information. On the other hand, in the case of an online shopping network, shoppers may want to access both peer-produced product-related knowledge (e.g., product reviews and ratings which can happen to be biased [26]) as well as social or entertainment-related resources embedded in the social interactions they will develop with other actors. Importantly, while mechanisms for accessing and evaluating both people and their activity will be foremost, they will have to be designed taking into account actors’ privacy

requirements, i.e., their willingness to disclose themselves and their resources to others.

E. Disseminating information in the network

Digital social networks can be conceptualized as enablers of large scale inter-personal communication. The technology layer wrapping the social structure has many benefits. In this view, the viral aspect is an important one. Indeed, from a recent study regarding the contagion process of an online viral marketing campaign [20], it is apparent that a digital social network has the capacity to enhance message *reach*, i.e., to ‘activate’ a high number of nodes and to do so in a *very short time span*. It should be noted that leveraging IT to transmit viral - hence likely influential by nature - messages is not restricted to commercial purposes and to marketing companies designing sophisticated viral advertising campaigns. With social network architectures being more and more pervasive through existing public Web services (e.g., Youtube⁹), individuals can also use IT to better reach a targeted audience, a phenomenon referred to as mass interpersonal persuasion [27]. These scale and timely capabilities of digital social networks have also been exploited in the domain of micro blogging¹⁰. As illustrated in a study of Twitter [28], individuals use microblogging in order to distribute frequent brief messages such as daily chatters (e.g., things that happen in their daily routine), information or URLs, and news reporting (e.g., sports, politics), and for these activities, scale and instantaneity are key factors.

In addition to having IT supporting large and quick information dissemination in a social network, recent work has suggested that a tight control on information diffusion was becoming necessary [29]. In fact, as digital networks tend to grow quickly and in a somewhat unorganized fashion, they sometimes risk losing their sense (e.g., mixing professional contacts in Facebook which is an application made for friendships networks). Hence, IT should also be designed in a way that accounts for *the selective diffusion* of information. In a study of the online social networking site Friendster [10], Boyd noted that “most users fear the presence of two people [on Friendster]: boss and mother. Teachers also fear the presence of their students” which highlights the need to provide users with adequate privacy and control features.

In addition to sustaining information dissemination among the nodes of social networks, IT has another role to play with respect to supporting information diffusion. It concerns the *design of persuasive messages*, these messages that grab attention, that are credible, understandable, and that are attractive enough so that they will be read and forwarded to other members of the social network [30]. In addition to Putrevu and Lord’s [31] review of internet communication/message processing, examples of empirical work related to the design of messages for the Web include

⁹ <http://www.youtube.com>

¹⁰ “Form of blogging that lets you write brief text updates (usually less than 200 characters) about your life on the go and send them to friends and interested observers via text messaging, instant messaging (IM), email or the web.” (from <http://wikipedia.ca>).

studies on web background complexity [32], animation speed [33], and time and Web page interestingness [34].

III. DISCUSSION

In the present section, we discuss some interesting aspects of the proposed framework of the information technologies capabilities for digital social networks, and highlight how it may be useful for social media research.

A. Complementarities and Linkages in the Typology

First, as represented through arrows A1 and A2 in Figure 1, “observing” and “extracting” the network can help individuals reinforce the “building and sustaining” of the social network by helping users become more familiar with the network structure and composition (i.e., by discovering who is out there and whom are people related to), and eventually make network lurkers become insiders who participate in creating the network’s value. “Observing” and “extracting” are likely to have congruent effect in the building and sustaining of the network inasmuch as they are conceptually close to each other. We differentiated them by attributing a purposeful task-related objective to “extracting”, and a continuous monitoring (or surveillance) function to “observing”. It is relevant and important to make this distinction as the literature reviewed suggested that they imply different objectives, usage types, and IT capabilities. On another note, there is an evident bridge between the “building” and “extracting” domains with respect to the identity and self-presentation related mechanisms. Indeed, to “build and sustain” a network, we argued that identity management was a key prerequisite, and we also explained that people “extracting” resources made heavy use of that information in order to evaluate the reliability and validity of the resource searched for. This suggests that researchers interested in identity-related mechanisms in digitally-enabled social networks would gain by looking at both sides of use, e.g., examine the influence of some identity-related design features on both “the building” and “extracting” usage aspects. In that regard, it is possible that privacy and trust related aspects may induce network actors to disclose minimal identity-related information which may help sustain the network while in the meantime hamper users’ ability to extract the network’s resources.

Second, activities related to “observing the network” can support the “disseminating” domain, such as in the online viral communication context where one would first better assemble a good representation of the social network in order to proceed to efficient dissemination. This is illustrated through arrow A3 in Figure 1. As recently discussed [18], network awareness can help identify central or influencing people which can in turn help design customized messages and focus persuasion efforts towards these network actors that are most likely to diffuse the message further. It can also help disseminate more relevant messages to actors by knowing their social location, similar to a service that would provide relevant service awareness or recommendation (i.e., the close presence of a restaurant serving an individual’s favorite food) knowing an individual’s geographic location.

A third important aspect of the framework pertains to the central issues of privacy management and social information

overload, which we presented as relevant to the four domains. First, our synthesis of the literature suggested that the management of social information (e.g., through designing advanced visual representation and decision-aids) in digital SNs would be foremost as online social networks and interactions keep growing in number and frequency. Second, as digital SNs foster reach and rapidity of transmission, and involve the disclosure of personal (identity) and interpersonal (social activities) information, individuals not paying enough attention to whom is given access to their resources may find themselves disclosing private information to undesired others without even being aware of it. This is an important issue as it has been found that users of social networking sites have important misconceptions about the size and composition of the SN, as well as about the visibility of members’ profiles [35]. To prevent people from undesired information leaks, it might then be useful to design digital networks in a way that educates network actors about the potential privacy impacts of their daily interactions [36].

B. Contributions and Future Research

Research in social media has been triggering a lot of attention but contributions have been scattered as we lack a framework to organize the new findings and move forward research on the design, the usage, and the impacts of digitally-enabled social networks. This is not so surprising as this research is at the crossroads of numerous fields: information systems, human-computer interaction, sociology, and social psychology, which makes it challenging to build a cumulative and integrative knowledge base. This paper attempts to provide a common language and a meaningful framework that specifically take into account the intrinsic properties of a social network, i.e., it is composed of individuals related to each other by relationships of varying nature and intensity. Some readers may be surprised that our typology does not include collaborative type of usage. In the social media sphere, however, we believe that distinct (and sometimes, but not necessarily, complementary) critical facets coexist, such as the phenomenon of user-generated content, the phenomenon of massive collaboration and peer-production, and the phenomenon of digital social networks. This is this latter aspect that the present article looked into.

Future research could explore various directions. A first avenue would consist in developing a composite index of digital social network usage, taking into account the four facets we presented. This would belong to the measurement and validity realm. In fact, as the proposed typology is limited by its lack of empirical validity, future research could challenge our view and help advance the framework so that it becomes more specific with applicable metrics. The suggestion to develop an index of digital social network usage could help engage in that direction. A second complementary avenue would consist in adopting a fine-grained approach to the study of digitally-enabled usage, e.g., use Markus and Silver’s foundational framework for the study of IT usage [2] to examine for each usage aspect (e.g., resource extraction) the IT properties, functional affordances and symbolic expressions for different user groups (e.g., network insiders versus network lurkers).

IV. CONCLUSION

The framework developed in this paper reveals design opportunities and challenges that may prove useful for the purpose of studying the usage facets of digitalized social networks and their associated IT capabilities. First, we suggested that in order to “build and sustain” a digital social network, IT design should help build and communicate multi-faceted identities, develop stronger ties, and enable network scaling. Second, in order to “observe” the state and properties of the social network, we suggested that IT design should make the social structure visible and help monitor dynamics. Third, we proposed that to “extract” resources from the network, IT design would have to consider providing support in terms of accessing and evaluating appropriate people as well as their resources. Last, it was suggested that in order to “disseminate” information, a digital social network would have to be designed in a way that enables large, quick, and selective diffusion, and with capabilities that help create persuasive messages that networks’ actors would be willing to forward to others.

REFERENCES

- [1] R. Agarwal, A.K. Gupta, and R. Kraut, “Editorial Overview—The interplay between digital and social networks,” *Information Systems Research*, vol. 19, pp. 243 – 252, September 2008.
- [2] L. Markus, and M. Silver, “A Foundation for the study of IT effects: a new look at DeSanctis and Poole’s concepts of structural features and spirit,” *Journal of the Association for Information Systems*, vol.9, pp. 609-632, January 2008.
- [3] J.D. Chevalier and D. Mayzlin, “The effect of word-of-mouth on sales: online book reviews,” *Journal of Marketing Research*, vol. 43, pp. 345-354, 2006.
- [4] D. Watts, and P.S. Doods “Influentials, networks, and public opinion,” *Journal of Consumer Research*, vol. 34, pp. 441-458, December 2007
- [5] M. Diani “The Concept of social movement,” *The Sociological Review*, vol. 40, pp. 1-25, 1992.
- [6] E. Goffman, *The Presentation of self in every day life*. Doubleday, New York. 1959
- [7] B. Ploderer, S. Howard, P. Thomas, and W. Reitberger, “Hey world, take a look at me!: Appreciating the human body on social network sites,” in *Persuasive 2008*, Oinas-Kukkonen et al. (eds), pp.245-248.
- [8] J.S. Donath, “Identity and deception in the virtual community,” in Kollock, P. and Smith, M. eds. *Communities in Cyberspace*, Routledge, London, 1998.
- [9] N. Ellison, R. Heino, and J. Gibbs, “Managing impressions online: self-presentation processes in the online dating environment,” *Journal of Computer- Mediated Communication*, vol. 11, 2006.
- [10] D., Boyd, J. Potter, and F. Viegas, “Fragmentation of identity through structural holes in emal contacts,” in the *Proceedings of the International Sunbelt Social Networks Conference*, New Orleans, Louisiana, February 13-17, 2002.
- [11] R. S. Burt, “Structural holes versus network closure as social capital”, in *Social capital: Theory and Research*, N. Lin, K.Cook, and R. Burt (Eds), Aldine de Gruyter, 2001.
- [12] R.L. Daft, and R.H Lengel, “Organizational information requirements, media richness and structural design,” *Management Science*, vol. 32, pp. 554-571, May 1986.
- [13] A. Blanchard, and L. Markus, “The experienced “sense” of a virtual community: characteristics and processes,” *The DATA BASE for Advances in IS*, vol. 25, pp. 64-79, Winter 2004.
- [14] Y. Ren, R. Kraut, and S. Kiesler, “Applying common identity and bond theory to the design of online Communities” *Organization Studies*, vol. 28, pp.377-418, March 2007.
- [15] B. Wellman, “Communities: from neighborhood to network,” *Communications of the AC*, vol. 48, pp. 52-55, October 2005.
- [16] C. Lampe, and N. Ellison, and C. Steinfeld, “A familiar Face(book): profile elements as signals in an online social network,” in *Proceedings of CHI 2007*, San Jose, CA,USA, April 2007.
- [17] R.S. Burt, “Social contagion and innovation: cohesion versus structural equivalence,” *American Sociological Review*, vol. 92, pp. 1287-1335, May 1987.
- [18] D.F. Steiny, “Network and persuasive messages,” *Communication of the Association for Information Systems*, vol. 24, pp. 473-484.
- [19] J. Heer, and D. Boyd,. “Vizster: visualizing online social networks,” *Proc. IEEE Symposium on Information Visualization*, IEEE Press, Piscataway, NJ, pp. 33-40, 2005.
- [20] M. Bampo, M.T. Ewing, D.R. Mather, D. Stewart, and M. Wallace, “The effects of the social structure of digital networks on viral marketing performance,” *Information Systems Research*, vol. 19, pp. 273-290, Spetember 2008.
- [21] J.C. Wang and C. Chi-Lu, “An automated tool for managing interactions in virtual communities -- using social network analysis approach,” *Journal of Organizational Computing & Electronic Commerce* , vol. 14, p1-26, 2004
- [22] S. Atkinson, “A more intelligent way to collaborate,” *Knowledge Management Review*, vol. 6, pp.8-9, 2003.
- [23] S. Borgatti, and R. Cross, “A relational view of information seeking and learning in social networks,” *Management Science*, vol. 49, pp. 432-445, 2003.
- [24] J. Nebus, J, “Building collegial information networks: A theory of advice network generation. *Academy of Management Review*, vol. 31, pp. 615-637, 2006.
- [25] M. Lin, S. Viswanathan, and N.R. Prabhala, “Judging borrowers by the company they keep: social networks and adverse selection in online peer-to-peer lending,” Working paper, March 2009, Electronic copy available at: <http://ssrn.com/abstract=1355679>.
- [26] X. Li, and L. Hitt, “Self-selection and information role of online product reviews,” *Information Systems Research*, vol. 19, pp. 456 – 474, December 2008.
- [27] B.J. Fogg, “Mass interpersonal persuasion: an early view of a new phenomenon,” in *Persuasive 2008*, Oinas-Kukkonen et al. (eds), pp.23-34, 2008.
- [28] A. Java, T. Finin, X. Song, and B. Tseng, “Why we twitter: understanding microblogging usage and communities,” in 9th WEBKDD and 1st SNA-KDD Workshop ’07, August 12, 2007. San Jose, California, USA, ACM.
- [29] W. Moncur, “Improving control of information sharing on social networking sites,” Workshop “Social Mediating Technologies: Setting the Research Agenda” at CHI 2009, April 2009, Boston. [<http://social-mediating-technologies.org/> accessed April 29th 2009].
- [30] G. Weiksner, B.J. Fogg, and X. Liu, “Six patterns for persuasion in online social networks,” in *Persuasive 2008*, Oinas-Kukkonen et al. (eds), pp.151-163, 2008.
- [31] S. Putrevu, and K.R. Lord, “Processing internet communications: A motivation, opportunity and ability framework,” *Journal of Current Issues and Research in Advertising*, vol. 25, pp45-59, Spring 2003.
- [32] J.S. Stevenson, G.C. Bruner, and A. Kumar, “Webpage Background and Viewer Attitudes,” *Journal of Advertising Research*, vol. 40, pp 29-34, January 2000.
- [33] S. Sundar, and S. Kalyanaraman, “Arousal, memory, and impression-formation effects of animation speed in Web advertising,” *Journal of Advertising*, vo. 33, pp 7-17, Spring 2004.
- [34] G.C. Bruner, and A. Kumar, “Web commercials and advertising hierarchy-of-effects,” *Journal of Advertising Research*, vol. 40, pp 35-42, January 2000.
- [35] A. Acquisti and R. Gross, “Imagined communities: awareness, information sharing, and privacy on the Facebook,” *Proceedings of the Privacy Enhancing Technologies Workshop*, Robinson College, Cambridge, United Kingdom, June 2006.
- [36] K. Strater, and H.R. Lipford, “Strategies and struggles with privacy in an online social networking community,” *Proceedings of the 22nd British HCI Group Annual Conference on HCI: Culture, Creativity, Interaction*, Liverpool, United Kingdom, September 2008.