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Research Issues in Social Computing *

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Abstract:

Social Computing and online communities have ushered in a new era of the web, where information and communication technologies are facilitating organized human endeavor in fundamentally new ways. The broad impact of social computing in diverse domains and the complexity of features that span diverse disciplines pose new challenges for Information Systems researchers. Information Systems research should expand its scope and adapt theories and methodologies from even more disciplines to address this challenge. This phenomenon has diverse theoretical connections and bridges social and technical aspects. Thusit offers an ideal opportunity for IS researchers to take the lead in demonstrating the focus of IS in cross-disciplinary research and emphasizing praxis. We outline salient traits of social computing as a precursor to discussing research challenges. Research issues related to organization theory, property rights, motivational and social aspects, and network dynamics are discussed. We emphasize aspects where social computing may offer insights for reference disciplines. We also discuss research issues in the business deployment of social computing, including network effects, trust and reputation, business models, market structure, and customer interaction. We indicate thatthe field of IS can point the way to using social computing in transforming research and education.

Keywords: Social Computing, Mechanism Design, Communities, Networks, Web 2.0, Information Systems, Paradigms, Disciplinary Identity, Social Networks, Social Capital, Theory of the Firm, Intellectual Property, Corporate Governance, Trust, Reputation, Network Effects, Reciprocity, Network Dynamics

* *Kalle Lyytinen was the accepting Senior Editor*

1. Introduction

Through the end of the twentieth century, advances in computing and networking technologies largely manifested themselves in dramatic shifts in business computing. Many of the new trends emphasized organizational computing, in diverse domains like enterprise resource systems, customer relationship management, and electronic commerce. However, the 21st Century has seen new trends emerge in social computing, where the scope shifts from corporations to social organizations, and the structure shifts from top-down to bottom-up. Social computing initiated at the grassroots level has been growing quickly in several divergent sectors: some leading to real business models, while others remain community oriented. Some of the better known social computing initiatives include blogging; Wikipedia; flickr; social networks like orkut, MySpace, Bebo, FaceBook, and LinkedIn, social bookmarking services like del.icio.us; and multiple initiatives from Google. Recently, the Hollywood film Snakes on a Plane took social computing to a new level by enlisting online fans to contribute to the making of the movie, as well as to its publicity campaign (Biggs, 2006). Social computing also impacts various other domains such as politics, education, and arts.

The emergence of social computing raises new research challenges for information systems researchers. Research in information systems (IS) needs to evolve to encompass new theories and methodologies that can address questions posed by social computing, which extends the scope of usage of information and computing tools to the realm of social endeavor. IS research needs to guide organizations in adapting to the changes in their environments induced by social computing. We suggest that the information systems community needs to focus on this emerging domain as a priority topic, and, in the process, evolve the core of research in the discipline itself.

The remainder of this paper is organized as follows. Section 2 presents an overview of social software, focusing on common traits. Section 3 discusses general research issues related to social software. Section 4 discusses research issues in the interaction of business and social computing. Section 5 concludes.

2. Overview

A bevy of factors, including more powerful and affordable end user machines, a faster network edge1 with more redundant connectivity, advances in easy-to-use tools for creating and sharing content, and a proliferation of portable and wireless platforms that promote a more technologically empowered lifestyle have led to the empowerment of the individual user. Consequently, the locus of control in creation and configuration of content has been shifting to the grassroots.

It is important to note that it is a confluence of technological advances, that led to the phenomenal growth of social computing; online collaborations, and community interactions have existed before on a limited scale. The size and scope of communities of participants and the nature of the tasks they can perform changed dramatically with broadband and a host of client-level computing technologies.

Web 2.0, social software, social computing, online communities, peer networking, and immersive web are some of the popular terms used to describe these technologies and communities. Their meanings overlap, and definitions are somewhat fluid. The term Web 2.0 is slightly different in that it includes more technologies within its scope and does not bind itself closely with the social aspect (O'Reilly, 2005). In this article, we use the terms social computing and social software most commonly, with the latter used when

[1] The 'edge' refers to peripheral parts of the network where the users connect to it, as differentiated from the backbone of the networks. Traditionally, slower, intermittent connections of lower service quality and low processing power typified the edge; and the edge was completely reliant on the core for communication and routing. With faster, always-connected, powerful nodes at the edge, more and more content and service creation, distribution, traffic management functions are increasingly taking place at the edge.

need for specialized software or resources, with most of the impact being felt by broadband users. We identify common traits of social computing platforms from the perspectives of software (Table 1) and systems/communities (Table 2) below. For a detailed overview and list of URLs, see Parameswaran (2007b).

Table 1. Agent Typology, Roles, and Attributes in Knowledge Management

Attribute	Traditional	Social Computing
Content	Relatively static	Highly dynamic
Quality assurance	Standardized procedures	Peer feedback, unstructured
Development tools	Mostly proprietary, require expertise	Mostly open-source, easy-to-use, light-weight
Interoperability	Limited	Highly interoperable
Portability	Limited	Highly portable
Reusability	Limited	Can be integrated with other applications/networks to create new systems
Locus of control	System-level	Close to user
Ease of use	Relatively low	High

Table 2. Traits of Social Computing as Systems/Communities

Attribute	Traditional	Social Computing
Organization	Mostly Centralized	Mostly decentralized
State	Less dynamic	Highly dynamic
Membership	Relatively static	Highly transient
Structure	Well defined	Minimal, loosely defined
Scope	Organization	Fluid boundaries, overlaps with other stake holders like customers
Preference information	Limited content	Rich content, enhanced by dissemination structures and peer influence mechanisms
User identity	Limited mobility	Highly mobile
Scalability	Limited	Very high

3. Research Issues in Social Computing

The research focus and central research questions in the relatively young discipline of information systems have evolved over time. For instance, in earlier days, decision support systems, expert systems, and similar topics were the main focus of research. With the arrival of the Internet and enterprise systems and data mining, the research focus has changed significantly. This reflects the transformational and often subversive role of IT in the organizational context, and the very high degree of innovation in the field of IT. Information systems research must necessarily evolve in response to the emerging trends, and go further in driving new trends. The domain of research focus for information systems may not be fully captured by rigid and structured frameworks; the impact of IT has been dramatic and diverse enough to warrant a more dynamic outlook that borrows from several disciplines as the field evolves, and is flexible in adopting innovative methodologies. This suggestion follows Lyytinen and King (2004), who argue for 'plasticity' of the Information Systems, thereby "adapting to the shifting salience of issues that concern the field." The authors suggest that the real center of the IS field ought to be a "market of ideas," which both takes from and gives to other disciplines in a dynamic way. In particular,

by inviting new ideas from outside, such a market can respond more quickly to fundamental changes when new technologies and techniques combine in disruptive ways.

Traditional research in IS has had a tendency to being scoped within organizational boundaries. Today, with the arrival of social computing, the uses of IT in the business context are no longer confined to organizational boundaries. Nor do the research themes follow a structured pattern as in the past, where the questions centered around issues like productivity or return on investment or technology acceptance. Social computing platforms have introduced a highly unstructured model of computing, and prescriptive models may not fit its exploration very well. It is individual agents, not corporate entities, that are primary players in this type of computing. Highly dynamic and decentralized communities engaging in grassroots innovation lead to significant unpredictability in the system.

As a result, the scope of IS research has expanded significantly; some of the basic research questions have changed as well. Research methodologies need to expand accordingly. For example, the extensive degree of social aspects observable in online communities suggests the use of theory and methodology from sociology, where similar social aspects have been extensively studied. Where economic models of production are used, the notion of a production function, itself, may need to be superseded in the context of social computing. Alternately, some form of social function may replace the conventional production function. Other disciplines that have direct relevance include biology, cultural history, computer science, law, marketing, and organization theory. Thus, social computing transforms the scope and nature of IS research, extending the set of reference disciplines, methodologies, and research questions.

Some aspects of social computing are striking enough to merit rethinking basic ideas in some of the reference disciplines; for example, ways of organizing production in economics. Social computing platforms are also experimental platforms by themselves, with a great degree of realism, control, and information gathering capabilities. Thus, IS researchers can not only borrow from other disciplines, but make contributions to them as well.

In social computing, information technology facilitates organized human endeavor, the primary dimension of which is social rather than commercial. Social computing affects both business and society and holds great promise of transformational impact in both. IS research is tasked with investigating the enabling technologies and models—the social aspects, as well as the business aspects of this phenomenon—in order to help businesses and society take better advantage of it, as well as to influence new directions in information technology and systems. In the following subsections, we list some of the research challenges.

3.1. Organizational Form and Social Computing

Organization theory and Economics have used transaction costs and bounded rationality as the basis for classifying markets and hierarchies (Williamson, 1973) as two distinct forms of organizing production, building on earlier work by (Coase, 1937). Under certain conditions, when transaction costs in contracting are significant enough to cause market failure, a set of parties to transactions may find it advantageous to internalize such costs by forming organizations. Online communities do not appear to fit the structure of markets or hierarchies. Communities represent organized human enterprise creating economic value, and hence should count as an organized form of production. It is necessary to apply the transaction cost framework to communities in order to examine whether it can sufficiently explain this form. In turn, it can be explored whether communities as a way of organizing production holds new insights for economic theory, and also whether this type of organization can be effectively used elsewhere.

Ouchi (1980) frames markets and hierarchies in terms of the ambiguity of the measurement of individual performance (performance ambiguity) and the congruence of the employees' and employers' goals (goal congruence). Markets are efficient when there is little performance ambiguity, and hierarchies are efficient when both performance ambiguity and goal incongruence are moderately high. Using this framework to investigate communitieswould be interesting. Social instincts and communal benefit may be more important than performance in the context of communities. Also, in many communities, individualism and diversity in creation of content may undermine the concept of goal congruence. The question may not be whether performance is ambiguous or whether goals are congruent in communities; rather, it may be whether they are primary factors at all in sustaining this form.

After observing certain Japanese organizations in which employees were indoctrinated early to be loyal to the organization and rewards were not linked to performance, Ouchi (1980) proposed an alternative form called the clan. The clan form exhibits high performance ambiguity as well as high goal congruence. Clans resemble communities in the sense of their strong social aspects. In comparing online communities to clans, it may be useful to look at the normative requirements for

Journal of the Association for Information Systems

clans Ouchi identified in the Organizational failures framework. Requirements that hold for communities are common values and beliefs; however, in communities legitimate authority is weak and reciprocity questionable or at best variable.

Networks are an alternative candidate organizational form that has been proposed (Powell, 2005). Earlier, Salancik (1995) observed that network research would do well to expand its focus from individual perspective to that of collective action. Powell (2005) investigated networks and their dynamics as an organizational form. For instance, the process of new nodes attaching to the network was classified into four types: nodes seeking out the most popular nodes to join, nodes seeking similar nodes, nodes following the common trend, and nodes seeking diversity. Such network dynamics phenomena could illuminate the study of social computing, although differences exist. For instance, online communities are networks of individuals rather than of organizations, and the network form may be more useful as a tool to study network dynamics rather than as an organizational form to compare directly with markets, hierarchies, and clans in the context of social computing. In studying network dynamics, aspects such as the attachment process, clustering, and local and global characteristics may be investigated. Such research could borrow from physics, sociology, biology, evolutionary game theory, and mathematics.

Given the primacy of social instincts and collaboration in online communities, it may be sociology and cultural history rather than economics that could provide insights into the determinants of this organizational form. For example, the role of altruistic instincts and shared preferences as factors governing the formation of communities may be investigated. Extensive literature on interpersonal interactions and social effects exists in sociology, starting with pioneering researchers like Simmel and Weber (Knapp, 1994). Recent trends in economics that consider behavioral and cognitive aspects may be useful approaches as well.

3.2. Governance Structures

Firms, and institutions in general, depend upon associated governance structures that serve to sustain organized action and incentive structures. On the other hand, social computing communities, in most cases, develop from the grassroots without a deliberately designed governance structure. Limited governance structures do emerge in many cases, and some of these resemble democracy. Some others involve some form of meritocracy; Slashdot is an example, whereparticipants in online discussions get "promoted" to moderator status based on community perception of the quality of their participation. Wikipedia may be said to exhibit aspects of both democracy and meritocracy, in that everyone has equal veto rights in principle, and reputation plays a role in conferring administrator status. Some of the open source communities also exhibit traits of meritocracy, as some of the developers acquire a reputation for quality and leadership, and their opinions and directives are respected in the formulation of general directions followed by the community in software development. However, formalized governance structures are few, and even where they exist, they are far different from comparable structures in firms and other institutions. Most are soft, in that they lack enforcement powers, and it is convention, social norms, and collective agreement that sustain them rather than contractual rigor.

Most of these communities emerge spontaneously and support freedom of expression and anonymity. They have very limited control and are decentralized. They often scale rapidly and are highly dynamic. Together, these characteristics make up conditions ripe for subversive actions and instability. Yet, the soft governance structures survive. This is a remarkable aspect, and investigating it can help us better understand the workings of communities and organizations both online and offline.

Organizations are concerned about the governance of communities, because they need to protect their investments and intellectual property. Research on governance in social computing, as mentioned earlier, would inform organizations that wish to create or participate in online communities. For instance, if social norms primarily ensure coordination of the decentralized action, it may be counterproductive to impose a stronger structure in an effort to commercialize communities. What's more, the governance structures that emerge in online communities are frequently based on trust and reputation. In some communities, hierarchies of reputation may be said to exist, acting in lieu of formalized governance structures. It would greatly help reduce the unpredictability associated with these environments to better understand the dynamics of trust.

3.3. Intellectual Property Rights

The issue of intellectual property rights (IPR) is contentious in the realm of digital products. In the U.S. constitutional intent to promote innovation and benefit the public, various pieces of legislation, and judicial interpretation have together created a complex regime of patents, copyrights, and protected trade secrets. The imperfect adaptation of this regime to the world of information products, whose idiosyncratic traits undermine some of the premises of traditional law, has led to much debate. Disparity in global perspectives and practice further complicate the issue, given that digital products transcend national boundaries. (For an overview, see Abramson 2005; Lessig, 1999 & 2002; and Benkler, 2006).

The issue of IPR is relevant to social computing research due to some distinguishing aspects. A significant amount of innovation happens in social computing, often created by users who don't have as much IPR protection as organizations do. Further communities witness a high degree of replication of information products, some of which are copyrighted. The lack of governance structures in communities also implies the likelihood of lawlessness. Some communities, like darknets, may not be visible to the rest of the Internet. Information systems research could interface with the disciplines of law, public policy and economics in addressing intellectual property issues in social computing.

Most importantly, it is from social computing that the most significant challenge and alternative to the current IPR regime has emerged. In open source communities, first for software, and then for text, alternatives like the GPL2 (GNU General Public License) have come to signify a spirit of sharing rather than privatizing information products. In essence, associating a piece of software with a GPL gives anyone the rights to use or add to the software, provided they in turn distribute the additions with a similar GPL. Variations on GPL have been attempted by commercial initiatives in open source. An example is the CPL, devised by IBM in its open source launch of Eclipse, a software development environment. The license allowed individual firms to protect their contributions as their own intellectual property, while protecting the original from being hijacked (O'Mahony, 2005). The primary intention was to provide incentives for other firms to contribute to extending the Eclipse platform. Research into IPR and the design of licenses is particularly relevant to business initiatives in social computing, as organizations need licenses with legal validity and credibility as incentive vehicles.

While such licenses are often given credit for driving collective content creation, it would be more accurate to view them as representations of the social norm. They are a consequence rather than a driving force of collective, non-profit action. They do form part of the governance structures in these communities, but these licenses are not strong enough to have enforcement power or the ability to drive collective action on their own.

3.4. Motivation for Participation

Theories from social science would suggest that the social dynamics of community life promote the social instincts for participation in a social setting. Yet, there are striking differences between online communities and communities in real life in terms of factors that may influence participation. Participation in online communities tends to be anonymous. Online communities have very little 'bonding' or formation of relationships among users. Communities may be formed by users with assorted collections of nicknames, which may not be fleshed out into real personalities persona with whom one forms full-fledged, healthy social relationships. Consider the MMORPG (Massively Multiplayer Online Role Playing Games) or the much older MUD (Multi User Dungeon) games: in these games, teams of players work their way through adventures, with team members helping each other and depending on each other for success, often for very long periods of time, but most of the time they are anonymous to each other. Quite frequently, team members engage in discussions of topics unrelated to game play and help each other, without actually knowing who they are talking to in real life. These observations suggest that social science-based models may have to be extended and used to investigate the nature of the motivating factors for social action in online communities. In particular, the lack of personal gain or reputation effects that have concrete impact in the real world characterizes these interactions.

3.4.1. Cooperation and Altruism

New research directions that borrow from sociology and biology to inform economic models of community behavior explore new theories of motivation and cooperation that factor in behavioral issues, cultural norms, neurobiological factors, and evolutionary issues. Altruistic behavior is not guided by expectations of future benefits, especially where repeated interaction is unlikely. Nevertheless, altruistic behavior has been visible in human societies, at the cost of personal utility; and such behavior is key to sustaining cooperation. Fehr (2003) suggests that the net implication of contemporary research is that the uniquely human trait of altruism sustains cooperation in genetically unrelated groups. Repeated prisoner's dilemma experiments indicate that randomly selected, mutually unacquainted players interacting anonymously and repeatedly may spontaneously exhibit altruistic behavior (Andreoni, 1993). Such reciprocal altruism is limited in its power of explanation of cooperation in communities, being focused on repeated, pair-wise interactions. In online communities, identities may be anonymous, and rewards may be real only within the context of the community, which suggests that altruism may have a stronger case here as an explanation for cooperation. Research in the role of altruism in cooperation in offline communities may be extended and adapted to online communities.

[2] http://gnu.org

3.4.2. Public Goods and Free Riding

The issue of motivation for participation becomes more complex when a commons type good is involved and free riding is a possibility. While economic models would predict that self-interested agents would have no incentive to contribute in a public goods setting, experimental evidence suggests individuals contributing 40-60% of their endowment in such settings. (Dawes, 1980) Furthermore, individual agents have been observed to contribute more when they expect other participants to contribute more. However, high cooperation is not sustained as an equilibrium; with repetition, the degree of free riding lowers expectations, and cooperation decreases (Fischbacher, 2001). A small fraction of free riders can lead to non-cooperation being the only equilibrium. Conversely, punishment of free riding by a small group of altruistic agents can sustain cooperation (Fehr, 1999) A type of altruism stronger than reciprocal altruism engages in rewards and punishment by some of the participants to sustain social norms in the presence of free riding, without expectation of personal benefit, and quite possibly incurring personal losses in the process. While such behavior is not aligned with maximizing personal economic utility, the degree of such behavior is dependent on the costs; if the losses incurred by the altruistic agent are relatively high, the degree of altruism goes down. (Gachter, 2002)

These results are particularly relevant to social computing, where public good and free riding aspects may prevail, conventional motivators for participation are weakened and yet participation prevails. Social computing would also form candidate platforms for making empirical observations similar to those cited above. The absence in social computing of certain factors that seem to motivate participation in the real world may help to focus theoretical enquiries into the role of altruism. The fact that many social interactions in online communities use pseudonyms and other faux identities suggests that studying motivational factors online may offer key insights for psychology and sociology as well. For example, the degree of altruism exhibited by offline and online persona of the same individuals may be compared in controlled experiments. From the notion of individuals projecting alternate persona it is a short step to communities creating alternate realities. The phenomenal growth of the virtual community, Second Life, may be revealing in this respect.

3.4.3. Reputation and Other Factors

Reputation building is another powerful motivator in social cooperation. Cooperation is higher with expectation of meeting same partners in future. The indirect reciprocity model suggests that reputation building may explain such seemingly selfless behavior (Leimar, 2001). Obviously, reputation matters more in repeated interactions. In one-time interactions, of more significance is the altruistic rewarding and punishment behavior. Alternative approaches suggest that agents may use cooperation as a means to signal their potential as partners. On the other hand, Chen (2007) shows that under certain conditions in online communities, agents may put in more effort when their reputation is bad, and once they attain good reputation, their effort level may deteriorate.

Co-operative behavior in social contexts suggests motives beyond utility maximization, or, subjective assessment of utility by individuals differing from what economic models compute as utility. Theories of motives that are different from self-interest are presented in Bolton (2000), Rabin (1993), Levin (1998), and Falk (2001). Recent evidence suggests neurological phenomena respond favorably to cooperation from human partners and negatively to defection from partners. (Rilling, 2002) Emerging models suggest that cultural norms and social learning may impact formation and survival of co-operative groups. Much of this research bears direct relevance for the motivational aspects of online communities.

3.4.4. Social capital

Social capital theory has a direct relationship to the community aspects of and motivation for participation in social computing. Woolcock describes social capital as "norms and networks facilitating collective actions for mutual benefits'" (Woolcock, 1998). Granovetter (1973) and Coleman (1988) discussed the concept of social capital in the context of benefits accruing to groups and individuals consequent to social interactions. Research along this direction has gone beyond studying benefits to the community (Putnam, 1993) to exploring how individuals may deliberately develop social interactions that can lead to individual benefits (Cross, 2004). Such benefits may be tangible or intangible, economic, psychological, emotional, or social (Lin, 2001). There is some divergence in views about the location and nature of social capital within communities. In particular, there are different views on whether social capital resides in the relationships, or whether it accrues to the individual participants.

Social capital theory's dimensions of networks, trust, reciprocity, willingness to participate and social norms are directly relevant to the factors driving engagement in online communities and sustaining them as social systems. The focus on individual benefits having a role in building social relationships may be worth investigating, in particular, since in many of the online communities individualism may have an equal or greater role than altruism in sustaining participation. For example, many users approach content publishing platforms as a forum for individual expression rather than for any social benefit.

3.4.4.1. BitTorrent – A Case in Point: One of the most widely used peer-to-peer technologies today, BitTorrent depends on many users simultaneously downloading tiny fragments of the same large file from many other users. BitTorrent's incentive mechanism that compels users to contribute bandwidth has a loophole that allows those users who acquire all the fragments of a large file to leave the system without further disseminating the file. The survival of a torrent community is dependent on altruism or reputation motivating some users to stay on, in spite of the fact that torrent networks comprise largely opportunistic users seeking content. The efficacy of the distribution mechanism makes it highly attractive as a candidate for broadband content distribution and motivates attempts to improve on its incentive mechanisms with the help of economics or technology. Viewed from the social capital angle, an entirely different approach to the design of incentive mechanisms could be to use such a technology in communities where altruism is established as a social norm; thus, in effect, obtaining a social alternative to the engineering or economic tools for incentive mechanisms.

3.5. Formation, Efficiency and Stability of Online Networks

Both economists and sociologists have looked at social networks. [3] The economic approach addresses how networks evolve and attempts to characterize conditions for stability and efficiency, including how to allocate any surplus generated. In the context of efficiency and allocation, two sets of approaches exist: one explicitly designing allocation rules on how the surplus is divided among participants, and the other, non-interventionist approach, allowing the group to function on its own. Whereas many of the currently existing and spontaneously emerging online communities may fall into the latter category, firms attempting to launch business models linked to communities may be interested in the former. Another type of differentiation is based on whether the structure of the network is material to its functioning and results or not; that is, whether a participant is affected only by membership in a group, or by the number and nature of individual links to other members as well. Economic models also need to consider the relative positioning of participants within an online network. Modeling complexities in characterizing online communities as economic systems include externalities inherent in the system.

Game theoretic analysis is used to analyze stability and efficiency in social networks. Evolutionary game theory has been used in the study of network formation in Jackson (1998), Goyal (2003), and Skyrms (2000), for example. Similarly, evolutionary game theory may be applied to study how online communities form, evolve, and survive. Game theory may also be useful in studying knowledge transfer (Lin, 2005) in online communities.

Since communities are dynamic systems, experimental research investigating system evolution, stability, and behavior patterns would be valuable. Only limited experimental research from an economic point of view has been conducted into social networks (Corbae, 2000).

3.6. Objectivity through Collaboration

Despite its spontaneous nature and low barriers to entry, social computing demonstrates a remarkable ability to converge to objectivity in content. It may be observed that, as the reputation of a social software site grows, the quality of the collectively generated content also improves, possibly due to more high-value participation and refinement. Research into convergence of content in organic systems like online communities can inform the design and development of knowledge networks, collaborative environments for scientists and professionals, and education. Perhaps such convergence can lead to the creation of new forums for academic research, where consensus in theoretical frameworks may be arrived at by researchers from diverse disciplines contributing in online communities, somewhat like continuously running and highly scalable workshops. A topic such as social computing, which calls for input from diverse disciplines, may well be best suited for such a forum to pursue.

4. Research Issues in Applying Social Computing to Practice

4.1. Introduction

The world of business is waking up to the opportunities and challenges offered by social computing. Business models can leverage the massive customer bases that accumulate through social computing channels. Some organizations have started their own blogs and networks (McAfee, 2006, Joe, 2005). Organizations from diverse industry sectors such as Google, Cisco, and Fox, have sought to acquire or invest in successful social computing enterprises. Microsoft has sought to enter Enterprise Relationship Management with its product for internal networks, Microsoft Enterprise. The success of social computing networks derives from the freedom they afford and from community aspects. Hence, business models will need to go beyond hosting social networks; instead, they will need to focus on identifying and fostering the underlying success factors.

[3] The use of the term social networks in sociology and economics does not have any relation to online communities; rather, online communities constitute one of the domains where social network theory may be applied.

Academics can look into a wide variety of research questions on the role of social networks in business. Research into current and potential business models associated with social networks can characterize business models in terms of their requirements, identify feasible models, and evaluate their performance. Such research would need to touch on broad themes such as how businesses can generate value through social networks, how communities in these initiatives can gain value, and how to assess the costs and benefits of social computing initiatives.

One approach would be to outline models that leverage specific aspects of social computing, either by analyzing existing applications or by proposing candidate models. A second approach would be to investigate the general defining traits of business initiatives in social computing through theoretical and empirical studies. The phenomenal growth of social computing has led to a degree of hype, resulting in a possible bandwagon effect among business initiatives. It is important for research to address the performance of business investments in social networks and their risks, so as to guide prudent investment. Subsections 4.2 through 4.7 cover research issues related to business models addressing specific aspects in social computing, and 4.8 through 4.12 address general research issues associated with business initiatives in social computing.

4.2. Network effects

Online communities hold the promise of substantial network effects for businesses. Effectively anchoring a community around a product can create a business eco-system comprised of customers and partner firms. While several information products, and the online environment in particular, have been characterized by network effects, social computing can have even more pronounced network effects. For instance, social computing goes beyond dealing with networks of individual consumers to the possibility of networks as the customers. Building on the extensive research that has looked at network effects in technology industries, both theoretical and empirical investigations informed by economics and strategic management can look into how and whether network effects differ in social computing networks as compared to traditional networks of consumers. Related issues to consider include tipping points, size of networks, degree of lock-in, and impact on standards.

During the heyday of the dot-coms, significant amounts of capital were invested in online initiatives based on measures like number of registered users and page views. The expectation that network effects and business gains would be linked to these measures was not always rational, nor borne out by subsequent performance. It is important that academic research address how network effects from social computing may be translated into revenue gains. Linking online communities to revenue models may be looked at by research guided by industrial organization theory, strategic management, and marketing.

Direct revenues are easier to realize when the community is anchored around a product. However, business gains from social computing need not always be direct: reputation, brand visibility, bargaining power derived from the locked-in community, customer trust, and goodwill are all potential gains. Given the risk of irrational investments due to hype, research should take the lead in crafting guidelines for assessing intangible and indirect benefits from social computing initiatives. Such research may need inputs from strategic management, economics, marketing, and organization theory.

4.3. Methods of Entry into Social Computing

Firms set on entering social computing face choices on how to go about this process. We illustrate three simplified choices firms may face, the tradeoffs involved in each of which can be the focus of research aided by economics and strategic management. The first involves whether to acquire an established network, or to grow one from scratch. Acquisition immediately supplies many of the network and social effects, but can also bring with it risks and conflicts, as discussed below. The second choice makes a distinction between two types of communities: product–based communities, and interest groups. The members of the former group are linked by consumption of the product, for example, a music player or a game console. Members of the latter group are characterized by some similarity in preferences, which may derive from demographic factors, for example, Facebook or communities for teens. The key to success in targeting such communities will be in understanding the dynamics of peer interactions and reinforcement behavior, and innovatively exploiting these.

Each of the two types of communities offers potential gains and challenges that need to be studied. The third choice to be investigated involves the nature of the investment made: to fully own a network or to sponsor it. Full ownership may bring better control and the ability to extract value, but outside sponsorship may foster community aspects better and lead to creation of more value. Besides examining these choices, it would also be useful to characterize specific conditions under which a given choice is preferred. For example an interest group may be a better candidate for sponsorship, which can be helpful in market research and in the targeted marketing of multiple products.

4.4. Communities as Customer Interface

A community of customers constitutes a direct interface for exchange of information between an organization and its customers in each direction. Organizations may use customer communities for feedback on products, specific features and, in general, as a means for eliciting customer pull as an input into innovation and product development. Volunteer communities of customers can be used for market research. Relevant research should address issues like how to effectively ensure customer participation and how to assess the benefits of such participation. In particular it is important to investigate whether such communities and information gleaned from them are truly representative of the underlying market segment. Industrial organization theory, marketing, and sociology may guide such research.

Further, customers can be enlisted as voluntary contributors of content, in the form of recommendations, reviews, tagging or organizing of products. When successful as in the case of Amazon.com, customer communities effectively become stakeholders in the organization. Soliciting quality participation, creating trust in the review system, and effectively leveraging customer recommendations in offering a better selection of products are all valid research questions.

Communities can also mediate information flow from the organization to the customer. Online communities present a direct interface to self-selected groups with common traits. An organization can use this interface to signal the quality of its products, services, or personnel. For instance, the blogs developed at Dresdner Kleinwort Wasserstein illustrate use of social software to signal expertise to customer communities (McAfee, 2006). Lawyers can run blogs that focus on their area of specialization and demonstrate their expertise as well as experience. Some blogs run by economists have become very successful, as well. A potential research question would be which types of products can effectively use communities for signaling, knowledge products being obvious candidates.

Signaling may involve giving away information for free in return for expected gains in reputation effects. This is a recurring theme, for example, in organizations choosing to open up their source code. It would be useful to characterize and measure actual gains in this context and compare these with expected gains.

4.5. Innovation

Communities can serve as incubators of innovation. Organizations converting proprietary software into open source software can be viewed as trying to tap into this source of innovation. At one extreme, such efforts may be seen as saving R&D investment; at the other, the organization and customers may be seen as working together to develop products that are optimally aligned with customer preferences. It would be interesting to explore how organizations can provide incentives for the grassroots innovators. Research can also look into property rights for innovations in online communities. Social computing has led to a significant degree of innovation happening at the community level. This can motivate research into the nature of innovation itself, factors that promote it and whether such factors can be replicated elsewhere.

4.6. Navigation

Social computing proliferates a wide array of dynamic content. Social computing tools also empower users to pull preferred content and configure their own interface to the online world. In the process, users deal with considerable information complexity. This offers the opportunity for firms to specialize as navigators of social computing content. Design of such Web2.0 portals may involve techniques such as data mining, filtering, AI and knowledge management. The interoperability, semantic content, client-level open source tools, and tagging would allow these portals to be more sophisticated than web portals. Likewise, the more dynamic and unstructured nature of social computing makes exploration of related portals a different research problem than exploration of portals for the web.

4.7. Other Applications

Other specific domains where social computing may have a significant impact include politics, placement, and education. Social computing is highly active in politics with different interest groups gravitating to correspondingly themed blogs. A pertinent research question is whether social computing tools promote fragmentation of information and, in effect, reduce information sharing across communities, as evidenced by politics. From the political science perspective, social computing's role in promoting democracy by providing a forum for expression of the popular will may be the most relevant research topic. Indeed, political blogs have started influencing political events rather than just reporting and discussing them.

Social computing networks find moderate use in placement and recruiting activities mainly by virtue of recommendations from peers. As some organizations begin to focus on networks like LinkedIn, the possibility of nepotism, reliability of recommendations, and possible reduction of the organizational 'gene pool' are relevant research issues.

Education is a domain where the full potential of social computing has not yet been fully visualized, let alone realized. In higher education, in particular, where direct contact may be less critical, the information sharing tools and the extended reach offered by social computing can dramatically transform the delivery channels and organizational boundaries. It would be worthwhile for IS researchers to lead experiments in such transformation. Indeed, in the long run, educators will need to adopt such enhanced means of delivery to compensate for losing the edge in knowledge in the age of Wikipedia. Specific research tasks may include breaking down the confines of time and location in instruction, and experimenting with education as a collective activity where multiple educators, professionals, and students exchange and critique ideas.

4.8. Alignment of Objectives

The profit motive of a business embarking on a social computing enterprise can clash with the collective benefit motive and spirit of camaraderie of the community. A key requirement for gaining and retaining the confidence of community members is to ensure that the objectives of the firm are aligned with those of the community; that is, any benefit to the firm should not be at the expense of the communal benefit. Thus, alignment of business and community interests in business initiatives is an interesting research topic. Related to this is the research issue of sharing surplus, or designing revenue models. The surplus value generated through a social computing initiative may be shared among the (sponsoring) organization, the community, and individual customers. Here, we make a distinction between community and individuals to account for value that accrues to the community as a whole, as well as the increased utility to individual customers. Design of feasible business models will be followed by the need to address the sharing question, which, in turn, will reinforce alignment of objectives and incentives.

Distinct from trust and reputation within the community discussed earlier, there is a second dimension when considering business initiatives: trust in, and reputation of, the sponsoring organization. Trust and reputation affect alignment of objectives between the community and the sponsoring organization. It is not sufficient that the organization is not seeking to exploit the community; the organization should be perceived as a benefactor of the community. Trust in the organization will need to be cultivated among the community. Consequently, the role of trust and reputation in the success of business initiatives in social computing needs to be investigated; both in the context of what are the determinants of such trust, and of how sponsoring organizations can foster such trust. Of particular interest is the question whether trust can be sustained through transitions such as acquisitions. Is the individual customer primarily concerned about features, content, and interaction, or about trusting the intentions of the organization sponsoring the platform as well? Both sociological and economic theory will inform these investigations into alignment of objectives and trust among organizations and communities.

4.9. Impact on Market Power

In general, communities represent collective bargaining power in interacting with firms. On their own, communities of users collaborating on creating applications and content will assume market power. Communities impact market power and market structure in their roles as customer and competitor; and each role may be investigated separately via economic theory. Research in strategy may be focused on how best to respond to communities exercising market power in each role. Further, research might compare the differing value of co-opting existing communities or creating new communities. Organizations may yield bargaining power to the community, while simultaneously leveraging the community feedback to provide better value to the customer; Thereby hoping to generate more surplus in the long run. Whether such a strategy would benefit or undermine corporate objectives is another question for investigation. For example, should NewsCorp partner with a community like YouTube or litigate against it?

A research topic that touches on network effects as well as on market power is the impact of communities on lock-in. While a community itself may be the source of lock-in, it is arguable whether the lock-in is to specific products or to the community. Where products are loosely tied to communities, the herd effect in the community may significantly weaken product lock-in; for example, communities may switch en masse. What's more, the high degree of information dissemination inside communities can reduce search costs, allow for rapid comparison shopping in terms of quality and price, and lower switching costs. It has been suggested that organizations should view communities as the brand,; it may also be relevant to view the community as a customer who is much better informed, and quicker to switch. The role of informational cascades can be studied in the context of influencing herd behavior (Duan, 2006) in social computing communities.

4.10. Market Research

Communities are rich repositories of demand information and customer behavior information of fine granularity. Many of the platforms together create a continuous and multifaceted profile of the customer on the move. Tools and methods to extract such information both at the level of individuals and market segments need to be investigated. A specific problem to solve would be how to glean and integrate information from multiple platforms.

4.11. Corporate IT

The significant role to be played by corporate IT in business deployment of social computing may be a research topic exclusive to Information Systems. For example, an IT task would be to build internal social computing initiatives that disseminate and leverage organizational knowledge and expertise. Another would be to use social computing platforms to promote innovation with possible participation of external stakeholders. Most of the other business initiatives discussed in this paper would obviously be dependent on corporate IT as a facilitator.

For IS research in the context of corporate IT, an obvious research direction is exploring new tools and new ways of building social computing platforms. Of specific interest would be: a. integration or portability of content and identities across multiple platforms; b. the addition of security, transaction, and collaboration layers to the platforms for corporate deployment; c. support for location-aware participation; d. development of extensible modules that can plug into other initiatives; e. creation of modules for personal productivity and collaboration that can together with social computing platforms form self-sufficient online operating environments that are accessible from anywhere; and f. design of meta-engines that crawl multiple social networks to gather customer information, product reviews, content cross-references, and preference information for various demographics. Some of this would be design research, but new methodologies in search, data mining, and possibly artificial intelligence may be investigated as part of such research.

4.12. Segregation of Internet Users

Social computing may not be equally accessible to all Internet users. A faster, higher QoS connection can enable users to access social computing platforms, many of which call for more computing and connectivity resources at the client device. Users of social computing may be said to get higher utility from Internet use. Further, a significant share of online discourse and collaboration shifts to communities formed by these users, in effect segregating them from the rest of Internet users. For instance, personal websites increasingly move to MySpace, and discussion threads on popular topics like a sport or a hobby are supplanted by blogs. The possible emergence of such divisions raises interesting research questions for sociology, Internet design, economics, and information retrieval. This issue may be investigated in conjunction with digital divide-related research, leading to questions such as whether regulatory authorities should view broadband as a candidate for universal service. Pricing research into the differentiation of service classes by service providers may find additional impetus here. Differentiation of service by providers may also entail different levels of security (Parameswaran, 2007a).
Designs for the future Internet would have to account for the vision of universal service being challenged. As domains of information form within communities, search and information retrieval will need to be improved to look within social computing platforms as well. For example, a Google query on alumni of a particular institution may no longer yield current results if the search did not also look within communities like Orkut or Yahoo! Groups.

5. Conclusions

Social Computing offers IS researchers an exciting opportunity for new research, as well as for further evolving the discipline and its practice of research and education. The enabling technologies for social computing are already available; the next step is for IS researchers to take the lead in using them for social change, to deploy new socio-technical systems, and to create new institutions. Researchers can explore a wide variety of social, economic, and organizational aspects related to social computing. For instance, online communities simultaneously manifest a focus on individualism in the form of personal expression and altruism in the form of sharing and communal benefits. This interplay can offer rich insights for both social and technical systems. In pondering the next stage of social computing, semantic tagging of objects within communities and design of aggregation and filtering tools can create confluence among communities and prevent a fragmentation of the online collective. Such a fragmentation is possible today as individual communities close themselves off from the rest of the Internet.

There is increasing recognition in the Internet infrastructure design community of the social, behavioral, and human aspects of the cyber environment. The National Science Foundation (NSF), as part of its Cyberinfrastructure vision (NSF, 2005), envisions development of data repositories and interoperable discovery services that enable online collaboration by scientists and engineers. The report (Berman, 2005) from its workshop on Cyberinfrastructure and social sciences recommended that organizational frameworks, incentive structures, collaborative environments, decision making protocols, and other social aspects are important components of Cyberinfrastructure, and that social and behavioral scientists should be funded and involved in designing and developing these.

A varied collection of theories, including organization theory, social capital theory, social networks, evolution of communities, reciprocity and altruism, collective bargaining, network effects, incentive mechanisms, and network dynamics, may be brought to bear on social computing research. A large set of questions including the formation, evolution and stability of communities; the nature of knowledge creation and verification processes; protection of property rights; the nature of motivation for participation; role of trust; reputation; and governance can be explored. Researchers can use these

communities as experimental platforms, and mine the rich information available for insights. In turn, social computing research can contribute to some of the reference disciplines: alternative organization forms can be explored, social instead of economic incentive mechanisms can be studied, social instincts in alternative realities where rewards are virtual can improve understanding of behavior and sustainability of reputation-based governance structures can be investigated.

IS researchers can also focus on using data mining and statistical techniques to analyze the rich data from these channels to discover trends about social behavior, online behavior, and technology use and adoption. They can use a better understanding of communities to push alternative organizational forms for production in knowledge industries. Within academia, the focus can be on transforming curricula to emphasize technologies like Ajax and scripting languages, and using the same in design research to craft new systems that leverage social aspects and create new meta-level tools. Further, the potential of social computing for transforming delivery channels and media for education and academic discourse, including publishing and conference formats, can be explored.

Research issues in social computing span a variety of disciplines such as computer science, sociology, law, marketing, organization science, economics, cultural history, and cognitive science. It is important that information systems research expand its domain to bring in theories and influences from these disciplines so as to take the lead in social computing research. It is our view that information systems research has not been at the forefront in some of the highly relevant and visible domains of research related to information and communication technologies. For example, in topics such as intellectual property law, the digital divide, and sustainable development, the most visible scholars and forums have not been primarily linked to the information systems research community. It is also true that some of the most popular works in these domains, while insightful and erudite, may have been even better with input from the information systems community. We suggest that it is high time that the research community in information systems took steps to expand the scope of its research framework, including issues addressed and theoretical models used. This would also entail significant enhancement of doctoral curricula, to bring in training in more diverse disciplines. Journals and conferences would need to expand and diversify their scope, and as the community is in the process of enhancing cross-disciplinary skills, invite leading scholars from some of these disciplines to exchange ideas. Such expansion and diversification would also provide stimuli for researchers and doctoral programs to be bold in diversifying. Further, more emphasis should be given to forward looking research, which seeks to outline potential new business models and trends or to find solutions for existing problems. Information systems is a field of rapid transformation and innovation with far reaching societal and commercial impact; accordingly, its research frameworks should allow sufficient flexibility for its researchers to contribute toward IS-initiated changes. A strong emphasis on methodologies adapted from other disciplines can ensure academic rigor; but in the absence of flexibility, such an emphasis can lead to most published research being after-the-fact, where the IS researchers become merely witnesses that transcribe revolutions in their own domain after they have happened.

References

Abramson, A. (2005), Digital Phoenix: Why the Information Economy Collapsed and How It Will Rise Again, Boston: MIT press.

Andreoni, J. and J. Miller (1993),"Rational Cooperation in the Finitely Repeated Prisoner's Dilemma: Experimental Evidence", Economic Journal (103) 418, pp.570–585.

Benkler, Y(2006), The Wealth of Networks: How Social Production Transforms Markets and Freedom, http://www.benkler.org. (January 2007)

Berman, F., and H. Brady (2005) "Final Report: NSF SBE-CISE Workshop on Cyberinfrastructure and the Social Sciences", NSF SBE San Diego Supercomputer Center, http://vis.sdsc.edu/sbe/reports/SBE-CISE-FINAL.pdf (January, 2007)

Biggs, S. C.(August 17,2006), "Why Will 'Snakes on a Plane' be a Hit? Its the Internet, Stupid", Fox News, http://foxnews.com.

Bolton, G. E. and A. Ockenfels(2000), "ERC: A Theory of Equity, Reciprocity, and Competition", The American Economic Review (90)1, pp.166–193.

Chen, J., Xu, H., and A. B. Whinston (2007), "Moderated Online Community", working paper, Center for Research in Electronic Commerce, The University of Texas, Austin.

Coase, R.H(1937), "The Nature of the Firm", Economica new series (4),pp.386-405.

Coleman, J.S.(1988), "Social Capital in the Creation of Human Capital," American Journal of Sociology Supplement (94), pp. S95-S120.

Corbae,D. and J. Duffy (2000), "Experiments with Network Economies," University of Pittsburgh.

Cross, R., and J. Cummings. (2004), "Tie and Network Correlates of Individual Performance in Knowledge Intensive Work", Academy of Management Journal (47)6, pp.928-937.

Dawes, R. M. (1980), "Social Dilemmas", Annual Review of Psychology (31), pp.169–193.
Duan, W., Gu, B., and A. B. Whinston (2006), "Herd Behavior and Software Adoption on the Internet: An Empirical Investigation" , under review, working paper, Center for Research in Electronic Commerce, The University of Texas, Austin.
Falk, A. and U. Fischbacher(2001), "Distributional Consequences and Intentions in a Model of Reciprocity", Annals of Economics and Statistics (63)64, pp.111–129.
Fehr, E. and K.M. Schmidt (1999), "A Theory of Fairness, Competition, and Cooperation", The Quarterly Journal of Economics (114) 3, pp 817–868.
Fehr, E. and U. Fischbacher (2003), "The Nature of Human Altruism", Nature (425) 23, pp.785-791.
Fischbacher, U., S. Gachter, and E. Fehr (2001), "Are People Conditionally Cooperative? Evidence From a Public Goods Experiment", Economics Letters (71) 3, pp. 397–404.
Gachter, S. and A. Falk (2002), "Reputation and Reciprocity: Consequences for the Labour Relation", Scandinavian Journal of Economics (104) 1, pp.1–26.
Goyal, S and F. Vega-Redondo (2003), "Network Formation and Social Coordination", University of London Queen Mary Economics Working Paper No. 481. Available at SSRN: http://ssrn.com/abstract=369460 (January, 2007)
Granovetter, M.S.(1973) "The Strength of Weak Ties," American Journal of Sociology (78)6, pp.1360-1380.
Jackson, M.O. and A. Watts (1998), "The Evolution of Social and Economic
Networks," Caltech WP # 1044, http://citeseer.ist.psu.edu/jackson99evolution.html (September, 2006)
Knapp, P. (1994), One World -- Many Worlds: Contemporary Sociological Theory, New York: Harper-Collins.
Leimar, O. and P. Hammerstein (2001), "Evolution of Cooperation through Indirect Reciprocity". Proceedings Royal Society London: Biological Sciences (268), pp.745—753.
Lessig,L (1999), Code and Other Laws of Cyberspace, New York: Basic Books, Inc.
Lessig, L (2002), The Future of Ideas: The Fate of the Commons in a Connected World, New York: Random House Inc.
Levine, D. K. (1998), "Modeling Altruism and Spitefulness in Experiments", Review of Economic Dynamics (1) 3, pp.593–622.
Lin, L., Geng, X., and A.B. Whinston (2005), "A Sender-Receiver Framework for Knowledge Transfer", MIS Quarterly (29)2, pp.197-219.
Lin, N(2001), Social Capital: A Theory of Social Structure and Action, New York: Cambridge University Press, pp.150-151.
Lyytinen, K., and J. L.King (2004), "Nothing at the Center?: Academic Legitimacy in the Information Systems Field", Journal of the Association for Information Systems (5)6, pp.220-246.
Mcafee, A, and A. Sjoman(2006), "Blogs at Dresdner Kleinert Wasserstein", Boston:Harvard Business School Press, HBS Case 9-606-072.
NSF CISE (2005), "NSF's CyberInfrastructure Vision for 21st Century Discovery", CI Draft, Version 4.0, http://www.research.uiuc.edu/iacat/NSF-CI-Vision_v40.pdf (January, 2007).
O'Mahony, S., F.C. Diaz, and E. Mamas (2005), "IBM and Eclipse", Boston:Harvard Business School Press, Case 9-906-007 .
O'Reilly, T(9/30/2005), "What Is Web 2.0:Design Patterns and Business Models for the Next Generation of Software", O'Reilly net, http://www.oreillynet.com/pub/a/oreilly/tim/news/2005/09/30/what-is-web-20.html
Ouchi, W. G.(1980), "Markets, Bureaucracies and Clans",Administrative Science Quarterly (25)1, pp. 129-141.
Parameswaran, M., and A.B. Whinston (2007a), "Social Computing: An Overview", Communications of the AIS, forthcoming.
Parameswaran, M., Zhao, X., Whinston, A.B., and F. Fang (2007b), "Reengineering The Internet for Better Security", Computer (40)1, pp.40-44.
Powell, W.W., D.R. White, K.W. Koput, and J.Owen-Smith (2005), "Network Dynamics and Field Evolution: The Growth of Interorganizational Collaboration in the Life Sciences", American Journal of Sociology (110) 4, pp.1132-1205.
Putnam, R.D.(1993), "The prosperous community: Social capital and economic growth," American Prospect (13),pp.35-42.
Rabin, M. (1993), "Incorporating Fairness into Game theory and Economics", The American Economic Review (83) 5, pp 1281–1302.
Rilling, J., D. Gutman, T. Zeh, G. Pagnoni, G. Berns., and C. Kilts (2002), "A neural Basis for Social Cooperation", Neuron (35)2, pp.395–405.
Salancik, G (1995), "WANTED: A Good Network Theory of Organization", Administrative Science Quarterly (45) 1,pp.1-24.
Schwartz, J (November 2005), "If you want to lead, blog", Harvard Business Review, p. 1. http://www.blogs.sun.com/jonathan (January, 2007)
Skyrms, B. and R. Pemantle(2000), "A Dynamic Model of Social Network Formation," Proceedings of the National Academy of Sciences (97), pp.9340-9346.
Williamson, O.E. (1973) "Markets and Hierarchies: Some Elementary Considerations", The American Economic Review (63)2, pp.316-325.

Woolcock, M. (1998), "Social Capital and Economic Development: Toward a Theoretical Synthesis and Policy Framework", Theory and Society (27) 2, pp.151-208.

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