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Motivating Knowledge Contribution in Virtual Communities of Practice: 
Roots, Progress and Needs

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ABSTRACT
Virtual communities of practice (VCoPs) are increasingly recognized as a way to generate and assimilate organizational knowledge. VCoPs extend Wenger’s (1998) concept of community of practice to the virtual world, using technologies such as web forums, wikis, blogs, email, and social networking software. The success of a VCoP as a knowledge-sharing medium depends on active and useful contribution from members. Encouraging such contribution can be a challenge for managers given the informal, low-regulation environment of a VCoP. Conventional managerial controls and incentives become less significant in motivating contribution, and more intrinsic factors come to the fore. This paper describes the theoretical roots explaining such motivation and progress represented by research applying them to online networks. Our central contention is that a unified theoretical approach, suited to the characteristics of VCoPs, is needed to guide future research. Self-determination theory (Ryan and Deci, 2000) is proposed as fulfilling this need.

Keywords  
Communities of practice, virtual communities of practice, knowledge management, knowledge sharing, knowledge networks, self-determination theory, motivation

INTRODUCTION
Communities of practice are traditionally described as networks of informal, face-to-face social learning relationships, centered on a common enterprise, that grow organically rather than develop within a well-defined structure (Wenger, 1998). Despite their intimate, informal, and often impromptu nature, there has been interest and activity towards developing them within organizations as a way of promoting collaboration and knowledge-sharing among employees (Millen, Fontaine and Mullen, 2002; Wenger, McDermott and Snyder, 2002), and adapting them to exploit the advantages of modern information and communication technology (ICT) (Dube, Bourhis, and Jacob, 2006).

Virtual communities of practice (VCoPs) use information and communication technology (ICT) as the primary medium for sharing knowledge (Dube et al., 2006). They are distinguished from virtual work groups or teams in that they have no focused deliverables or goal-defined life cycle (Smith and McKeen, 2003). Furthermore, to be classified as a VCoP, an ICT-based knowledge network must exhibit the central idea of community: online interactions must be socially rich enough to build relationships that engender commitment and a sense of belonging (Wenger et al., 2002), or they must be supplemented with face-to-face interaction (Kimble and Hildreth, 2005).

Much of the research in this area has focused on networks that do not exhibit the structural characteristics necessary for a community (e.g., Wasko and Faraj, 2005). The recent popularity of social networking web sites such as MySpace and the recognition of the importance of the community aspect of CoPs have led organizations to augment their knowledge-sharing ICT with software features that facilitate the sharing of personal information (Colison, Dennison and Bohmer, 2007). These include Web 2.0 features, which more effectively take advantage of the network nature of the technology (O’Reilly, 2006). For example, the software might allow community members to subscribe (using RSS or Really Simple Syndication) to MySpace-like personal web pages of other members where they could find pictures, videos, biographical information, and avocational interests. This may indicate a trend towards ICT-based knowledge networks that are true communities, and reinforces the need to study knowledge-sharing behavior in VCoPs.

It has been reported by industry sources that most virtual communities follow the “90-9-1” rule with regard to participation (Nielsen, 2006). This means that 90% of the members of an online community contribute nothing—they simply gather information from the community (i.e., they are “lurkers”). Nine percent contribute relatively little, and just one percent...
contributes most of the content. While these estimates apply to virtual communities in general, there is evidence that they may be at least approximately accurate for VCoPs—researchers have noted that participation level is a concern for organizational VCoPs and other ICT-based knowledge networks (Ardichvili, Page, and Wentling, 2003; Wasko and Faraj, 2005). Furthermore, it is likely that many of those who do contribute do not do so to their full potential with regard to quantity or usefulness of their contributions. This is troubling because it reduces the quantity of knowledge exchanged in the community to well below its potential, and, presumably, the concomitant benefits.

This paper continues by reviewing foundational theories from behavioral and organizational science that constitute the roots of our understanding of motivation to share knowledge in an organizational context. It next presents a survey of the application of those theories to knowledge contribution in ICT-based knowledge networks, and then proposes a unified theoretical approach appropriate to VCoPs that can be used as a guide for future research.

THEORETICAL ROOTS OF MOTIVATIONAL RESEARCH IN ICT-BASED KNOWLEDGE NETWORKS

Researchers have applied theories from social psychology, sociology, and organizational behavior to explain motivation to contribute to organizational knowledge networks. In this section, we present a review of these theories. This review is not meant to be comprehensive; our intention is to present common theoretical themes from foundational research.

Social Exchange

According to social exchange theory (Blau, 1964), an individual will provide something of value to another only with the understanding that he or she will receive something of approximately equal or greater value in return. For example, within organizations there is an immediate and explicit expectation of reciprocity between employer and employee; compensation will be given for work performed. Beyond this quid pro quo, there is the expectation that good performance will eventually result in increased compensation and other rewards. Exchange expectations are not limited to employee-employer relationships; a worker may expect that knowledge or other assistance provided to a co-worker will ultimately be reciprocated, although there is rarely a defined time frame when this will occur. Such longitudinal expectations of reciprocity are mutually contingent and rely on trust and conformance to social and organizational norms (Cropanzano and Mitchel, 2005). While exchanges are essentially dyadic, the theory can be extended to networks of interrelationships within groups (Emerson, 1976), although organizational researchers have often placed network exchanges within the domain of social capital theory.

Social Capital

Nahapiet and Ghosal (1998) describe social capital within an organization as a facilitator of business advantage because it promotes the development of intellectual capital. They define intellectual capital as the “knowledge and knowing” capability of an organization, which has competitive value. They define social capital as “the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships possessed by an individual or social unit.” (p. 243) In their view, social capital is an artifact of organizational social networks that represents the collective investment members of the firm have in its intellectual capital. This investment, which is essentially synthesized knowledge, is created by joint action of all members of the firm and the benefits are potentially reaped by all members of the firm.

The creation of social capital has a motivational precondition: the members of the organization must recognize that the social capital embodied in the synthesized knowledge has value to them as individuals (Nahapiet and Ghosal, 1998). This recognition is similar to the expectation of reciprocity embodied in social exchange theory; however, here the expectation is for a “return on investment” from the social capital. Perceived inequities in the return on this investment can be readily seen as a negative motivational influence for many individuals. Those who contribute more to the development of the social capital of an organization will reasonably expect to reap more benefits than those who contribute less.

Nahapiet and Ghosal view social capital is a multidimensional construct incorporating the following dimensions:

**Structural dimension.** The structural dimension of social capital relates to the network infrastructure that facilitates the exchange of knowledge. Network ties describe the timing, accessibility, and interpersonal referrals that constitute the interactions in the social network. Network configuration refers to the density and structural arrangement of the nodes (people) on the network.

**Cognitive dimension.** The cognitive dimension of social capital relates to the shared communication conventions that facilitate the exchange of knowledge. Members of the network communicate use shared languages and codes that are commonly understood, and common shared narratives derived from the history and culture of the organizational community.
Relational dimension. The relational dimension of social capital relates to the interpersonal mechanisms at work in the social network to build social capital. Trust is important to foster confidence that this social capital investment will be of high quality and available when necessary. Norms are important for understanding expected modes of behavior, as are obligations and expectations.

Self-efficacy
Self-efficacy (Bandura, 1977), a person’s self-assessment of his or her competence in a given domain, has been extensively researched with regard to the use of ICT (e.g., Marakas, Yi, and Johnson, 1998), and has been shown to be a key antecedent to the use of computer information systems. Self-efficacy is also relevant to domain knowledge—individuals may be reticent to contribute knowledge when they believe that their contribution will not be accurate or useful, regardless of the objective accuracy or usefulness of the knowledge (Ardichvili et al., 2003). The ability of individual knowledge contributors to see the results of their efforts bear fruit in a community is a useful reinforcement of a positive self-assessment of their ability to contribute (Kollock, 1999). The resulting sense of self-efficacy, therefore, becomes a positive motivation to contribute further.

Loyalty
Smith and Rupp (2002) identify the loyalty of knowledge workers as a key component of developing and maintaining knowledge assets. They observe that facilitated communication is an antecedent to organizational loyalty, but warn that ICT poses challenges (e.g., lack of self-efficacy, impersonality) when used as the infrastructure for the “intellectual web” of the organization. The “social glue” hypothesis of social identity theory (Van Vugt and Hart, 2004) posits an explanation for the existence of loyalty. According to this hypothesis, people who identify strongly with a group (i.e., they see themselves as defined, at least in part, by membership in the group) will exhibit greater loyalty to the group.

Altruism
Altruism is a desire to further the common good (Batson, 1998). It is regarded as a personality characteristic of the individual who holds no expectation of reciprocity. Empathic altruism (Batson and Coke, 1981) provides another explanation of knowledge-sharing without expected reciprocity. In this view, people share knowledge to help others for whom they have a feeling of empathy. Those who contribute to the community do so because they see themselves as potentially in the position of those who need the knowledge.

Reputation and Status
Kollock (1999) describes the importance of reputation in online communities. The reputation of individual contributors can be enhanced through the quantity and quality of knowledge contributed, as well as the accomplished use of the technology medium (e.g., clear writing in a web forum). He observes that reputation or “social status” in the community can be reinforced through formalized recognition, such as being named a moderator. The pursuit of such status and recognition is acknowledged as an important motivation to share knowledge.

Intrinsic Motivation
Intrinsic motivation is the desire to act in a way that achieves personal pleasure or satisfaction (Vallerand, 1997). It is contrasted with extrinsic motivation that is based on contingent external rewards, such as payment. It has been argued that intrinsic motivation plays a necessary role in organizational knowledge sharing, especially where creativity and more tacit forms of knowledge are involved (Osterloh and Frey, 2000). Indeed, extrinsic incentives may undermine motivation by directing an individual’s focus towards the reward, thus “crowding out” intrinsic motivation (Osterloh and Frey, 2000).

EMPIRICAL STUDIES OF MOTIVATION IN ICT-BASED KNOWLEDGE NETWORKS
In this section, we describe empirical research that incorporates one or more of the theoretical ideas described in the previous section. The units of analysis vary substantially, but all exhibit three characteristics central to VCoPs: they use ICT as a medium for communication, their purpose is knowledge-sharing, and they have no goal-defined life cycle.

Wasko and Faraj (2005) applied the Nahapiet and Ghosal (1998) of social capital in a study of an online knowledge network supporting legal professionals. They tested hypotheses that posited relationships between member social capital investment in the structural, cognitive, and relational dimensions of the model and the quantity and helpfulness of knowledge contributed. They further posited a relationship between the member’s personal motivations and the quantity and helpfulness of knowledge shared. The researchers found general support for the model.
Cognitive capital, represented by member self-assessment of expertise in the domain, was found to predict knowledge contribution, as did structural capital, which was operationalized as the number of members contacted (regardless of the number of contacts). Interestingly, relational capital did not predict knowledge contribution. The specific hypothesized relationships were that commitment and expectation of reciprocity predicted knowledge sharing; neither was supported. The researchers note that this surprising result may be due to the lack of a shared community history and face-to-face interaction. They did, however, find evidence that perceived enhancement to reputation and enjoyment in helping others predicted the level of knowledge contribution, confirming the importance of member motivation.

Chiu, Hsu, and Wang (2006) also used the Nahapiet and Ghosal model of social capital to test the relationship between the structural, cognitive, and relational dimensions and the quantity and quality of knowledge contributed to a professional knowledge-sharing community. They concluded that facets of the social capital model—social interaction ties, trust, norm of reciprocity, identification, shared language, and shared vision—are important to understanding motivation to contribute.

The researchers suggested that their test of the Nahapiet and Ghosal model is encouraging, but they note that the theory may not fully account for the moderating effects of the technology used as a medium for the community (in this case, a Taiwan-based social networking web site) on motivation to share knowledge.

Ardichvili et al. (2003), in an exploratory study of three knowledge communities at Caterpillar, Inc., conducted structured interviews to identify motivations for knowledge contribution. They found that community members were often motivated by a desire to further the common good, both for the organization and as professionals. The common good derived not from the knowledge alone, but in the establishment of social relationships and mutual trust necessary for effective job performance. They further reported that members believed that their stature in the community and reputation as experts was reinforced through active contribution.

The study also identified barriers to participation in the community. It was observed that participants are often reticent to contribute because of a lack of confidence in their ability to make meaningful contributions and fear of misleading others in the community. The effectiveness of the ICT used was also identified as a barrier to participation.

Koh and Kim (2004) report on an exploratory survey study to identify influences on the level of knowledge-sharing in virtual communities. Their results indicate that loyalty to the virtual community is a key determinant of the level of knowledge-sharing in the virtual communities hosted by the provider.

THE NEED FOR A UNIFIED THEORETICAL APPROACH

The foregoing sections provide a diverse set of ideas explaining motivation to share knowledge in ICT-based knowledge networks. It is useful, however, to seek a more fundamental understanding of these motivational influences, which, while consistent with previous theoretical ideas and empirical research, allows for a more unified approach to future research. We propose that self-determination theory (Ryan and Deci, 2000) may fill this need.

Self-determination theory (SDT) explains motivation in terms of the innate desire that humans have to fulfill certain fundamental needs. These are as follows:

The need for autonomy. People have an innate desire to behave autonomously, i.e., of their own volition and free from external control. To the extent that other people control one's actions, autonomy is threatened.

The need for competence. Competence is an individual's ability to exert effective control over his or her environment. The concept is related to self-efficacy (Bandura, 1977), which is a self-assessment of competence in a given domain.

The need for relatedness. People need to feel connected with others within a community of mutual caring. This is not related to obtaining anything tangible from others, but simply represents a need for association and a feeling of "belongingness."

According to SDT, intrinsically motivated behavior is directed towards meeting these needs and is the most effective way to satisfy them. Extrinsically motivated behavior, which is based on concrete outcomes, substitutes the outcomes for need satisfaction in a way that is less desirable for the individual. Nevertheless, a sub-theory of SDT, organismic integration theory (Ryan and Deci, 2002), hypothesizes that many types of extrinsic behavior can be integrated into the psychological makeup of an individual. To the extent that these motivations are integrated—which is determined by how autonomous these internalized motivations are perceived—they will also satisfy the three basic needs.

While we have described the importance of intrinsic motivation promoting knowledge-sharing in VCoPs, it is acknowledged that extrinsic motivation also plays a role (Osterloh and Frey, 2000). Furthermore, while we have been able to broadly define intrinsic motivation, and broadly distinguish it from extrinsic motivation, it is often difficult to draw a precise line of
demarcation between the two. For example, are virtual rewards, such as graphical “badge of honor” on message board posts an extrinsic or intrinsic motivator? According to SDT, one way to assess intrinsic motivation (or sufficiently internalized and self-determined extrinsic motivation) is to measure the degree to which the basic needs are met. This was the approach taken by Baard, Deci, and Ryan (2004) in analyzing self-reports of the level of autonomy, competence, and relatedness experienced in a major investment firm. Using a 23 item Need Satisfaction Index, they were able to show a significant and positive relationship between need satisfaction and work outcomes. They were also able to develop prescriptive recommendations, based on the results of their survey, for promoting self-determined motivation in common business processes for the firm.

It can reasonably be argued that many, if not most, of the motivating factors described earlier in this paper can be explained by SDT. For example, social relationships inherent in the social capital formation described by Nahapiet and Ghosal (1998) can be regarded as an expression of need for relatedness expressed in SDT, as can the loyalty described by Koh and Kim (2004). The importance of reputation in online networks noted by Wasko and Faraj (2005) and Kollock (1999) point to the need for competence. The perceived lack of competence and fear of suffering embarrassment, as described by Ardichvili and his associates (2003), can be viewed as inhibiting the motivations for the basic need fulfillment of competence and autonomy.

From this perspective, SDT represents a more fundamental explanation—based on basic human need satisfaction—of motivational influences described in previous research on ICT-based knowledge networks.

Furthermore, as we noted in the introduction, the technological environment in which previous studies were conducted is evolving: ICT is becoming increasingly supportive of true community interactions. Previous empirical studies have noted the limitations of the technology to social interaction (e.g., Ardichvilli et al., 2003; Wasko and Faraj, 2005; Chiu et al., 2006), which is central to the community nature of VCoPs.

As ICT further enables community, extrinsic, canonical managerial influences may not be as effective in fostering organizational knowledge-sharing outcomes (Brown and Duguid, 1991). As ICT develops as a rich medium, more tacit forms of knowledge may be more readily communicated and organizational knowledge assets are enhanced (Osterloh and Frey, 2000). Both of these circumstances suggest intrinsic motivation as a basis for understanding knowledge-sharing behavior.

CONCLUSION

Virtual communities of practice are gaining an increasing importance in organizational knowledge management. Classical theories of motivation and recent empirical research have provided valuable insight as to why people contribute to ICT-based knowledge networks. Nevertheless, there is a need for a more unified and fundamental theoretical approach that addresses the increasing ability of ICT to develop a true community. Self-determination theory (Ryan and Deci, 2000) may well address this need.

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