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Motivating Knowledge Contribution in Virtual Communities of Practice: 
A Self-Determination Theory Perspective

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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 research applies self-determination theory (SDT) (Ryan and Deci, 2000) to understand motivation to contribute knowledge in VCoPs. It hypothesizes that the three basic human needs identified in self-determination theory—those for autonomy, competence, and relatedness—are motivators for contribution, and attempts to answer research questions formulated within this theoretical framework.

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).

Many companies such as SAS, British Telecom, and IBM have effectively implemented CoPs to reduce training costs, manage projects more effectively, and improve customer responsiveness (Millen et al, 2002). Ultimately, the knowledge developed in CoPs helps to build the intellectual capital of the organization, which is now widely recognized as an important source of competitive advantage (Lesser and Stork, 2001).

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, Hildreth and Wright, 2001).

A variety of technologies can be used to implement VCoPs, with the following being very common: Email. In addition to being of obvious use for one-to-one communication, email is often used in an organizational context for sharing knowledge within a group. For example, email can be used to facilitate group communication for decision making (Benbunan-Fich, Hiltz and Turoff, 2002). The support provided is through dissemination of knowledge gathered by team members, and communication of coordinating instructions by leaders (Wickramasinghe and Lichtenstein, 2006).
Web forums. Web forums allow for the open sharing of knowledge among participating members (Millen et al, 2002). These are typically implemented with an easy to use software package that requires little or no knowledge of HTML. Team members can post ideas, knowledge resulting from external research, opinions, or other contributions to the decision process, which can then be viewed by all participants. These can be organized using “threads” containing knowledge relevant to a particular topic.

Blogs. Web logs or blogs are a kind of online (usually Internet) journal where people can share information and knowledge about their personal or professional lives as frequently as they wish. An important feature of blogs is that they are very public, and others are usually permitted (and often encouraged) to comment on the entries. Companies are increasingly seeing blogs as a useful way to share knowledge both internally and externally (Baker, 2006).

Wikis. Wikis are web pages that allow any person to easily change content without knowledge of HTML, subject to certain style and content guidelines that are enforced by the participants, not the software (Cunningham and Leuf, 2001). Every member of the team becomes a coauthor of the document, and can modify their own work or the work of others without restriction. Wikis have gained growing acceptance in organizations as a way to quickly collaborate (Gibson, 2006).

Social Media. The popularity of social networking websites such as MySpace and YouTube have led to organizational experimentation with software features that provide personal information, such as member pictures and videos. These are often supplemented with operational and structural features of social networking sites, including the ability to subscribe to the MySpace-like personal web page of particular members of the community (using RSS) and the use of Web 2.0 (O’Reilly, 2006) technologies such as AJAX. The intent of these features is to reinforce the community nature of the VCoP (Colison, Dennison, and Bohmer, 2007).

RESEARCH QUESTIONS

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 contribute 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 (Ardichvilli, 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 leads us to our first research question:

RQ1: Why do people contribute to VCoPs?

And our second, which is the converse of the first:

RQ2: Why do people not contribute to VCoPs?

These questions focus on fundamental psychological motivations. There is extant research on these two questions that suggests that intrinsic motivation may play a key role in motivating contribution to VCoPs (Ardichvilli et al, 2003; Osterloh and Frey, 2000), although a simple distinction between intrinsic and extrinsic motivating factors can be difficult to make. Using self determination theory (SDT) (Ryan and Deci, 2000), however, we believe that it is possible to blunt this difficulty by focusing not on the intrinsic/extrinsic nature of the motivation, but rather on the basic human needs that are fulfilled by essentially intrinsically motivated behavior. Using SDT, we can form hypotheses regarding the relationship between the fulfillment of basic human needs and quantity and usefulness of knowledge shared.

We also wish to identify managerial interventions that are possible in order to encourage contribution to VCoPs. To do this, we must understand the nature of the conditions that facilitate or inhibit knowledge sharing. We therefore ask the following research questions:

R3: What are the conditions (organizational, technological, social, etc.) that facilitate knowledge contribution usefulness and quantity in VCoPs?

R4: What are the conditions (organizational, technological, social, etc.) that inhibit knowledge contribution usefulness and quantity in VCoPs?
We have less theoretical guidance to assist us in answering these questions; they are more exploratory in nature. Nevertheless, we will be guided in our investigation by the results of our hypothesis testing for the first two questions.

THEORETICAL FRAMEWORK – SELF-DETERMINATION THEORY

Self-determination theory or SDT (Ryan and Deci, 2000) 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 ones 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. It 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 (although the need for relatedness is pursued in a more distal way), 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.

It can reasonably argued that the social relationships inherent in the social capital formation described by Lesser and Storck (2001) can be seen as an expression of self-determined need for relatedness. Further, one sees the lack of perceived competence and fear of contributing inaccurate information and suffering embarrassment in the community, as described by Ardichvilli and his associates (2003), inhibiting the motivations for the basic need fulfillment of competence and autonomy.

We have described the importance of intrinsic motivation promoting knowledge sharing in VCoPs. While we have been able to broadly define intrinsic motivation, and broadly distinguish it from extrinsic motivation, it is often difficult, however, to draw a precise line of demarcation between the two. For example, is winning a competition where there is no tangible reward an intrinsically or extrinsically motivated? 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.

One method of promoting motivation in many organizational environments is to provide tangible incentives (e.g., money, gifts, time off, etc.). Because these involve external outcomes, they obviously engender extrinsic motivation, which, as we have argued, is not ideal for promoting knowledge sharing in VCoPs. Further, according to another sub-theory of SDT, cognitive evaluation theory, extrinsic rewards will erode intrinsic motivation in that the perceived locus of control becomes external, thereby diminishing the level of the autonomy felt by the individual. This occurs even when the rewards are intangible (Lepper and Green, 1975). On the other hand, positive verbal feedback can have a positive effect on intrinsic motivation, but only if the positive feedback is for an accomplishment for which the individual feels competent and acted autonomously (Ryan, 1982).

HYPOTHESIS DEVELOPMENT

According to SDT, promoting the satisfaction of the three basic human needs (autonomy, competence, and relatedness) will facilitate effective functioning in a vocational environment. Conversely, undermining these needs will be an impediment to effective functioning (Baard et al, 2004). In this proposed research, our interest is in understanding functioning with regard to contributing knowledge in virtual communities of practice.

Our six hypotheses test the fundamental assertions of SDT within the context of knowledge contributions to a VCoP. These hypotheses are preliminary and will likely change in light of a more refined research model with constructs identified in our qualitative investigation.
Several studies have upheld the predictions of the theory that basic need satisfaction is positively related to performance (Skinner and Edge, 2002). These range from purely avocational domains such as sports (Goudas, Biddle, and Fox, 1994) to business (Baard et al, 2004). In the context of VCoP contribution, we define performance as knowledge contribution to the community, both in terms of quantity of contribution and usefulness of contribution. Therefore, quantity and usefulness of knowledge contribution is our dependent variable.

The need for competence describes the need of an individual to succeed at a given task (Baard et al, 2004) and is considered to be a basic need in SDT. The task in the case of contributing knowledge to a VCoP is to effectively contribute useful knowledge to the community. Usefulness may be determined by individual members of the community or the community at large; however, with regard to need fulfillment, it is the contributor’s perception that is the important determinant. We therefore state the following hypotheses:

H1a: Members with a higher sense of competence with regard to their ability to contribute to the VCoP will have more frequent knowledge contribution to the community.

H1b: Members with a higher sense of competence with regard to their ability to contribute to the VCoP will have more useful knowledge contribution to the community.

Autonomy is the state of having control over one’s own actions. It is regarded as a basic human need in SDT (Ryan and Deci, 2002). Undermining one’s sense of autonomy is regarded as having a negative effect on performance (Baard et al, 2004). Rewards have been shown to undermine autonomy (Lepper and Green, 1975), although positive feedback does not have this effect (Ryan, 1982). Therefore, our second pair of hypotheses is as follows:

H2a: Members with a higher sense of autonomy with regard to their contributions to the VCoP will have more frequent knowledge contribution to the community.

H2b: Members with a higher sense of autonomy with regard to their contributions to the VCoP will have more useful knowledge contribution to the community.

The third basic need recognized by SDT is relatedness: the sense of identification or connectedness one feels with other humans. Mutual respect and a recognition of inter-reliance are also characteristic of the need for relatedness. Fulfilling this need is positively related to performance.

H3a: Members with a higher sense of relatedness about their contribution to the VCoP will have more frequent knowledge contribution to the community.

H3b: Members with a higher sense of relatedness about their contribution to the VCoP will have more useful knowledge contribution to the community.

We present a preliminary (unrefined) research model in Figure 1.
PROPOSED RESEARCH METHODOLOGY

While there have been several applications of SDT to organizational environments, the application of the theory to VCoPs to answer our research questions requires the development of contextual mediating constructs, and thus involves exploratory theory development. Under such conditions qualitative research methodology is useful, at least as an initial method of inquiry. This is because these questions are basically “how” questions, (Meyers, 1997) and theory, in the context of VCoPs, is in the formative stage (Benbasat, Goldstein, and Mead, 1987).

Furthermore, we note that the application of a regression model will do little to explore our first two research questions with regard to those members who contribute nothing to the community. (The dependent variable, in this case, will always be zero.) A qualitative methodology will allow us to gain insight into potential threats to need fulfillment perceived to be associated with making contributions. For example, lurking members may be afraid of ridicule for contributions that they perceive to be inadequate or erroneous (Ardichvilli et al, 2003). Such perceptions may undermine the needs for competence and relatedness.

We therefore propose a mixed-methods study that will enable us to understand mediating characteristics inherent in the first two research questions, thus adding increased confidence to the conclusions (Lee, 1991), and more broadly address our third and fourth research questions.

Participant Solicitation

We will post solicitations to professional organizations specializing in VCoPs, such the Yahoo community of practice group (COM-PRAC) and CPSquare (www.cpsquare.org), in order to identify a moderator or other person of responsibility who will give us permission and agree to assist us with the study.

Participants for the study will be solicited in consultation with the VCoP moderator (most likely through a posting on a community forum). The target sample size will be 250. These participants will be used for both the qualitative and quantitative studies. Considering missing data and other data collection difficulties, this sample size should be adequate to meet the requirements of the structural equations modeling analysis.
Qualitative Study

Interviews are one of the most common methods for obtaining qualitative data, and are quite common in the case study methodology, which is frequently used in IS research (Benbasat et al, 1987). We propose to conduct semi-structured interviews with members of the VCoP designed to elicit evidence of support (or lack of support) for our preliminary hypotheses. Since the phenomenon we are studying is a virtual community, we believe that the use of online interviews is appropriate. This is consistent with similar context-sensitive methodology approaches: for example, Internet surveys have been deemed appropriate when the subject of the study is e-commerce (Bhattacherjee, 2001).

The medium of the online research will be left to the interviewee. Two options will be available: text chat and voice over IP (VoIP). Allowing the choice of VoIP recognizes that some interviewees may not have the typing skills to effectively communicate using text chat, or may perceive that these skills are lacking. The choice made by the interviewee will be an important context variable in the analysis of the results: in other words, the assessment of competence using textual communication may be an antecedent to knowledge contribution.

Interviewees will be drawn from the initial participant pool using a theoretical (purposive) sampling methodology (Strauss and Corbin, 1998; Mason, 2002). This methodology is not meant to obtain a representative sample in the statistical sense, but rather a sample representative of the phenomena inherent in underlying theory to be studies. For this study, we will establish quotas for range quantity and usefulness of knowledge contribution. The quotas will be determined based on analysis of descriptive statistics for the site for these parameters.

The interview questions will be structured to tap the domain of need fulfillment in contributing to the VCoP, perceived knowledge contribution of self, and perceived knowledge contribution of others. The semi-structured nature of the interviews will allow for follow-on questions by the interviewer to probe responses more deeply with regard to the research questions. Leading questions will be similar to the following:

“What do you like (dislike) about the VCoP?”

   *Elicits possible effects on needs fulfillment and conditions that facilitate or inhibit knowledge sharing.*

“Do you enjoy making posts to the forums? Why?”

   *Elicits significant motivations and may reveal need fulfillment and conditions that facilitate knowledge sharing.*

“Do you have a sense of ‘community’ as a member of the VCoP”

   *Elicits relatedness need fulfillment and conditions that facilitate or inhibit knowledge sharing.*

“Do you ever feel guilty about not contributing more?”

   *Elicits autonomy need fulfillment.*

“Do you think other members find your contributions useful?”

   *Elicits competence need fulfillment.*

Actual questions will be evaluated for content validity by a panel of expert judges.

The data analysis of the interviews will be done using open coding, followed by axial coding (Strauss and Corbin, 1998). The axial coding will guided by the dimensions of the constructs of the theoretical model: degree of autonomy fulfillment, degree of competence fulfillment, degree of relatedness fulfillment, and perception of knowledge contribution. Open coding will be used to develop the axial coding, and also identify potential emergent theoretical constructs and relationship, especially with regard to conditions that facilitate or inhibit knowledge sharing.

Quantitative Study

Based on the qualitative research, we will create a more refined research model and develop hypotheses consistent with the new model. The hypotheses will be tested using structural equations modeling with latent variables (Joreskorg and Sorbom, 1996). This technique is useful for complex theoretical relationships involving multiple constructs because both the structural and measurement model can be tested simultaneously.

The needs constructs (those related to autonomy, relatedness, and competence) will be measured using survey instruments adapted from Baard et al (2004). While this instrument was designed for a non-virtual work environment, the performance aspect of the knowledge contribution function is very similar to work performance. A preliminary assessment of face and content reliability will be made using a panel of experts, including at least one with experience using the VCoP. Scale
reliability will be assessed using the method of Fornell and Larcker (1981), with a value of .5 deemed acceptable. The instrument will be implemented as a web survey. All members in the participant pool will be asked to complete the survey.

Knowledge contribution will be measured by two items: knowledge volume and knowledge usefulness. Wasko and Faraj (2005), in their study of a “network of practice,” used “helpfulness” as a measure of the quality of individual contributions to the community. Knowledge volume will be simply the total number of contributions to the site over the past year. Knowledge helpfulness will be calculated by evaluating the helpfulness of each contribution and rate it on a scale of 1 to 4 with 1 being “not useful” and 4 being “very useful.” A pilot study of three judges will evaluate 100 contributions. At least one judge will be an expert in the content domain, i.e., he or she will have a working knowledge of the VCoP subject matter. Inter-rater reliability will be assessed Cohen’s kappa (Cohen, 1960), with a value of .8 deemed satisfactory. If a satisfactory inter-rater reliability is obtained, one judge will rate the remaining contributions.

The overall fit of the measurement model will be assessed using the $\chi^2$ statistic, one absolute fit index (RMSEA) and one incremental fit index (CFI). These will be compared with benchmark criteria appropriate to the actual model parameters (Hair et al, 2006). We expect that the initial participant pool of 250 will yield at least 150 usable responses, which is the recommended minimum for a model containing five constructs, assuming sufficiently high item communalities using the minimum likelihood estimation method (Hair, Anderson, Tatham, and Black, 2006). Support for the hypotheses will be determined by evaluating the magnitude of the path coefficients and their significance.

CONCLUSION

Virtual communities of practice are gaining an increasing importance in organizational knowledge management. Confirmation of the hypotheses developed for this research could lead to managerial interventions based on fundamental need fulfillment that encourage meaningful participation in VCoPs. Such confirmation would constitute a basis for future research on specific need fulfillment mechanisms, possibly guided by the qualitative study incorporated in this research.

If support for these hypotheses is not found, future research might identify confounding factors in VCoPs that differ from other organizational contexts where SDT has been supported. The results of our qualitative study may provide useful insight into these factors, or may point the way to a more suitable theoretical framework.

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