Encouraging Collaborative Idea-Building in Enterprise-Wide Innovation Challenges

Research-in-Progress

Yusun Jung
Case Western Reserve University
Cleveland, OH 44106
yusun.jung@case.edu

Ann Majchrzak
University of Southern California
Los Angeles, CA 90089
majchrza@usc.edu

Arvind Malhotra
University of North Carolina
Chapel Hill, NC 27599
malhotra@unc.edu

Jeremiah Johnson
University of Southern California
Los Angeles, CA 90089
JeremJeremiah.Johnson.2012@marshall.usc.edu

Abstract

Innovation challenges are increasingly adopted for idea generation in inter- and intra-firm innovation to elicit novel solutions from employees to strategic and business-related problems of the firm. However, the current idea-oriented approach is limited in leveraging the full capacity of open innovation, as it focuses more on identifying the best ideas through competition rather than generating new idea through participants' recombination and integration of their expertise. We argue that the capabilities of innovation challenges can be fully leveraged when participants engage in collaborative interactions during innovation challenges. We propose the notion of "collaborative challenge," denoting innovation challenges in which individual participants behave in ways that foster knowledge integration across diverse ideas.

Keywords: Open innovation, online collaboration, knowledge integration, discursive behaviors

Introduction

Innovation challenges are online tournaments, in which a firm offers a business problem, asks solicited participants to post ideas to solve the business problem, then selects a small set of ideas as "winners", with the original idea contributor receiving some reward (money, reputation). Innovation challenges began as an approach to open innovation with customers and suppliers (Boudreau and Lakhani 2009; Chesbrough 2003; Chesbrough et al. 2006; Fredberg et al. 2008; West and Gallagher 2006). Increasingly, innovation challenges are being used by firms to elicit novel solutions from employees to strategic and business-related problems of the firms. Initially popularized by IBM (Majchrzak et al. 2009), the intent of internal firm-based innovation challenges is to broaden the sourcing of new ideas beyond a small team of experts to include employees from a range of backgrounds, geographical regions, departments, and functional disciplines. Innovation theories such as creative abrasion (Leonard-Barton 1995) and heterogeneity (Bunderson and Reagans 2011) indicate that, by expanding the diversity of opinions and experiences brought to bear on the business problem, the solution will be both more innovative (because different assumptions are surfaced that stimulate new thinking) and more feasible to implement (because the solution has been vetted by the diverse parties that may become responsible for deployment).

However, individual expertise is widely distributed and highly mobile in a firm; appropriating the expertise to solve a particular purpose has never been harder. Especially, as the open innovation paradigm is increasingly adopted for idea generation in inter- and intra-firm innovation, explicit

incentives, such as monetary reward and recognition, that aim to encourage competitive participation is limited in fostering collaborative interactions that are crucial to integrate distributed expertise and co-create innovation. We thus propose an alternative approach of open innovation, "collaborative challenges," denoting innovation challenges in which individual participants behave in ways that foster knowledge integration across diverse ideas. Similar concepts are suggested by a few prior studies, such as communitition (Hutter et al. 2001) and coopetition (Bullinger et al. 2010), but the prior concepts still rely on competition as the incentive for idea generation.

In this study, we aim to investigate how to encourage online collaborative co-creation that leads to useful novel solutions in enterprise-wide innovation challenges. Based on theories of innovation in online open communities, innovation appears to largely arise from provisionary social structures that lack formal workflow and roles, since such structures impede the iterative, spontaneous, and often unexpected knowledge flows of collaborative idea-building (Faraj et al. 2011; Fleming and Waguespack 2007; Tsoukas 2009). Thus, we focus specifically on how participants, themselves, emergently help to manage the unpredictable ebb and flow of ideas, comments, and knowledge evolution.

The rest of this paper is organized as follows. We raise the importance of collaborative knowledge integration and novel recombination in open innovation. We derive a research model that explicates how a set of behaviors crucial for integrating knowledge from dispersed resources could enhance the quality of participation outcomes. Then, we explain our research design that will test the influence of integrative behaviors on participants' satisfaction and outcome quality. We close this paper by discussing implications for research and practice.

Literature Review

Open innovation challenges constitute an approach that is increasingly being adopted for enhancing the absorptive capacity of a firm for the purpose of radical innovation by leveraging the intra- and even extra-organizational human intellectual capital. Open innovation challenges by firms have generated ideas, but ideas alone are not sufficient. The combination of collaboration and competition should be based on "creative abrasion" referring to "ideas that really rub against each other productively not destructively."[1] For desired innovation to occur, ideas must be combined and recombined (Leonard-Barton 1998). However, most open innovation challenges only encourage participants to post their ideas, with other participants asked to simply refine the posted ideas without combination and recombination. *Very few challenges go to the next level, whereby enterprise-wide participants comment on, modify, and recombine ideas of others' to come up with even better ideas that are further reframed and recombined in an iterative process.* Consequently, the true potential of open innovation challenges has not been reached. In other words, if the challenges only result in participants merely contributing their ideas but not modifying, combining and recombining their ideas with others through a discourse, desired radical innovation may not result (Almirall and Casadesus-Masanell 2010).

Collaborative Knowledge Exchange and Open Innovation

Knowledge is locally embedded in organizational practice and social relationships and socially constructed through an ongoing generative knowledge creation process that is collectively maintained in organizational relationships (Boland and Tenkasi 1995; Brown and Duguid 1991; Brown and Duguid 2000; Hutchins 1995; Latour 1987; Lave 1993; Lave and Wenger 1991; Nidumolu et al. 2001; Nonaka and Konno 1998; Orr 1990; Weick and Roberts 1993; Wenger 1998). Innovative knowledge generation requires collaborative knowledge exchange and novel recombination in firms, which is dependent upon firms' capabilities to recombine current capabilities in novel ways (Kogut and Zander 1992), to assimilate external information and internalize it adaptively (Cohen and Levinthal 1990), to create and share intellectual capital (Nahapiet and Ghoshal 1998), and to integrate existing individuals' specialized knowledge (Grant 1996). Social factors such as shared identity, trust, and social capital are crucial in constituting social relations and emergent work structures that support such interactions (Gallivan 2001; Kane et al. 2005; Wasko and Faraj 2005). That is, a firm's capabilities for innovation rely highly on its adaptive reconfiguration of existing resources and creative recombination (Pavlou and El Sawy 2010).

---

[1] http://www.creatingthe21stcentury.org/JSB11-Ecology-PARC.html

Fostering communities of practice is one way to promote such collaborative knowledge exchange and novel recombination in which participants are committed to sharing their expertise, knowledge, and experiences, and collaborate to solve problems in creative ways (Brown and Duguid 1991; Goodman and Darr 1998; Kereki et al. 2004; Orlikowski 2002; Wenger and Snyder 2000). In communities of practice, knowledge creation is accomplished by establishing a collaborative working environment where members experience working in communal and coherent ways rather than by simply acquiring knowledge from other members (Gongla and Rizzuto 2001; Orlikowski 2002). Different from innovation tournaments (Boudreau and Lakhani 2009), collaborative communities aim to facilitate enterprise-wide participants who may not know each other to share ideas and reactions and build on each other's ideas and reactions to collaboratively generate possible solutions. Collaborative communities form a sort of information commons that serve firms' innovation needs, whereas innovation tournaments are motivated more for intense competition.

However, establishing such a collaborative structure in open innovation is significantly challenged due to its provisional social structure and unpredictable resource flow. Online settings where open innovation is commonly situated inherit various types of resource tensions that emerge due to unpredictable and uncontrollable resources such as attention, time, idea divergence, and ambiguous identities (Faraj et al. 2011). These tensions need to be effectively managed for knowledge creation to occur.

We propose that one way to manage the tensions inherent in online knowledge cocreation is by applying the principles of dialogue for cocreation that have been developed in offline contexts (Tsoukas 2009). Dialogue is a "meaning-making process" that bridges theory and action — the two ways of knowing (Bohm 1996). Dialogue is an important means of group interpretation and negotiation of meaning in collaborative challenges (Boland et al. 1994; Carlile 2002; Kudaravalli and Faraj 2008; Tsoukas 1996). People achieve understandings and generate new ideas while exchanging and questioning thoughts belonging to dialectically opposite domains (Kolb et al. 2002). It is essentially dialectic, in that it begins with contradictions and differences but seeks consensual agreement by embracing the whole situation despite one's awareness of tensions between opposites (Baker et al. 2005). Good dialogue enables each individual to fully promote one's own voice and to preserve the differences and the diversities, rather than evaporate them (Barker and Kolb 1993; Kolb et al. 2002). In doing so, people relate themselves to others with different perspectives, to influence each other, to incorporate external values, and to modify each other's opinions. Through this recursive interaction, a group can incorporate low and unspoken voices into the creation of its values and practices. Tsoukas (2009) argues that new knowledge creation necessitates combination, expansion and reframing, and dialogue in this regard enables participants to distance their ideas from self to collectively reframe the topic.

The importance of dialogue becomes even greater for open innovation in which dispersed participants depend heavily (or even solely) on dense textual dialogue (DeSanctis et al. 2003). Because participants represent diverse expertise, purposes, and values, they need to engage in dialogue that helps them to learn about each other's perspectives if they are to collaboratively innovate (Gloor 2006; Hemetsberger and Reinhardt 2006). The way in which conversations are started, continued, and evolved will determine if the dialogue leads to new ideas instead of solely the transfer of information (Fayard and DeSanctis 2008; Isaacs and Clark 1987; Kudaravalli and Faraj 2008; Schegloff 2007; Sherry 2000). Jung (2012) proposes a set of dialogic actions that are essential to achieve successful open collective inquiry in which participants generate working knowledge through critical reflection on existing knowledge, negotiation, experimentation, and revision. Thus, participants are encouraged to start online discussions about an issue to begin shared sensibility (rather than immediately post ideas for solutions), to post seeds of ideas to foster dialogue (rather than post fully constructed solution ideas), to challenge others to conceptually expand distinctions (rather than simply refine a posted solution idea), and to conceptually combine and reframe when synthesizing across idea seeds.

In order to truly enhance the assimilatory and transformational aspects of novel knowledge generation, we propose a *discourse-centric* approach to innovation challenges to encourage and motivate participants to engage in creative abrasion. Next we present our research model that systemically implements the discourse-centric approach.

Research Model

Our research model explains that facilitating participants' discursive behaviors can increase the level of participation outcomes, which in turn positively influences the quality of solution outcomes (Figure 1). In this way, we argue that interventions that encourage participants' discursive behaviors can be one way to facilitate collaborative challenges.
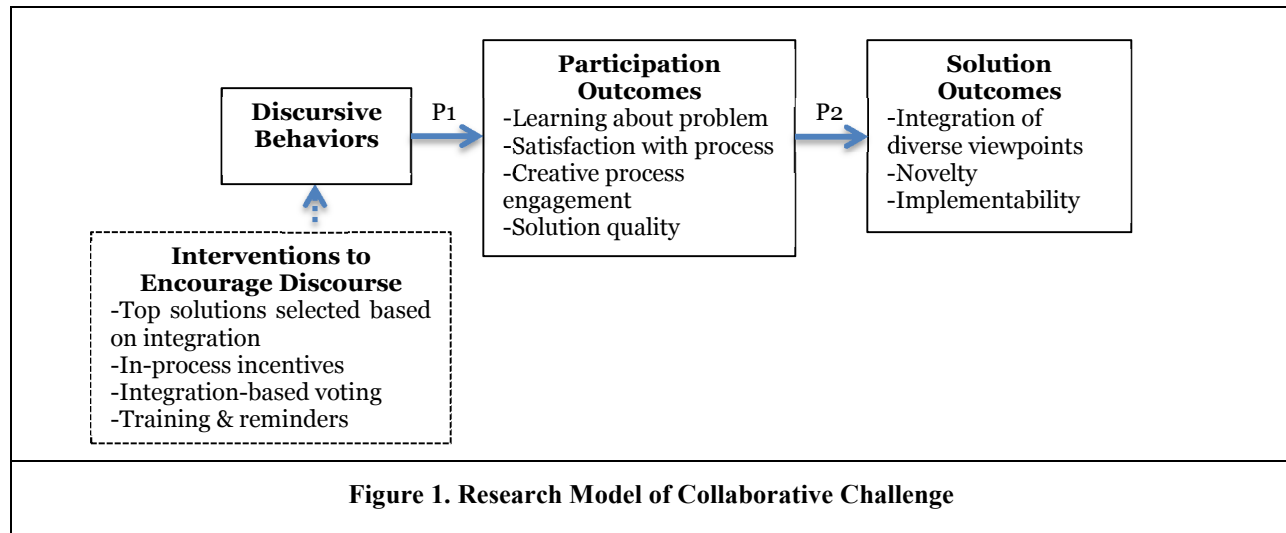

Figure 1. Research Model of Collaborative Challenge

Interventions to Encourage Discourse

To encourage discourse, we offer four interventions that are delivered before and during the challenge. First, participants are encouraged to overcome reluctance to share using incentives for participation. They are reluctant to share their ideas on a public forum for fear of rivalry, stealing, and lack of reciprocity (Mockus et al. 2002). Their sharing and reuse of information tends to occur selectively rather than openly, violating basic reciprocity norms (Gulley and Lakhani 2010; Henkel 2006). Consequently, community members often fail to use the resources of the broader community, limiting their interactions and thus innovation to ideas generated within self-created teams (Bullinger et al. 2010). Second, ideas are evaluated not only for their innovativeness by stakeholders, using Amabile's (1982) definition of innovation as both novel and feasible, but also for their integration by co-participants. In line with the second intervention, the third condition is one in which participants are also presented with in-process incentives through voting on comments that encourage integration. Fourth, participants receive training on shaping behaviors (Majchrzak et al. 2012) through which they become aware of ways to encourage integration.

The training consists of specifying guidelines for discourse likely to lead to cocreation. These are:

1. *Start online discussion about the problem, not post an idea:* This behavior starts conversations that help participants to learn more about the complicated issues involved in creating solutions to address the challenge. Comments that provide fact and experience allow others the opportunity to expand and combine individual meanings underlying the purpose, problem and nature of the Challenge.

2. *Post idea seeds to stimulate others:* Too much detail and conclusive opinions make it difficult for participants to see the real kernel of an idea which discourages others from changing the idea. Therefore, participants are asked to post a seed of a solution idea (rather than a complete solution) in a way that can be developed further by others, such that no one owns the idea.

3. *Challenge assumptions to surface new points of synthesis and differences:* To take risks of disagreements or confrontation in "creative abrasion", a crucial behavior is to ensure that

comments challenge rather than attack, with evidence and logic aimed at understanding differences and areas of similarities.

4. *Post ideas that combine different idea seeds:* Integration is encouraged when new ideas are posted that incorporate a number of different perspectives, ideas, concerns, and experiences. To avoid infringing on others' intellectual property, participants need to acknowledge originators of idea seeds and how the integration adds value above the individual ideas.

5. *Vote on comments and ideas based on whether integrative or not:* As a form of in-process incentives, participants need to acknowledge others' efforts to integrate dispersed ideas instead of being a solo-player.

We posit that these discourse-based behaviors become the essence of what we call a "discourse-centric" model of collaborative challenge. It can influence the following two constructs associated with outcomes of collaborative innovation: participation outcomes and solution outcomes.

Participation Outcomes

The discourse-based behaviors influence how participants interact with others and participate in ongoing innovation-oriented discourse. Thus, we presume that the influence of the discourse-based behaviors on solution outcomes will be actualized through an enhanced quality of participation. For example, ideas are presented as a seed in an incomplete yet stimulating manner, which is likely to affect perceptions of the quality of the participation. For example, the more participants learn about a problem inquired about, the better their chances of constructing satisfying working knowledge (Jung 2012). In this way, we presume that the discourse-based behaviors will improve the quality of participation which should in turn affect solution quality. In this study, we consider participants' perception of the extent of learning about challenge problem, satisfaction with process, and creative process engagement in this construct.

Solution Outcomes

The innovativeness of the solution is defined following Amabile (1982) as a solution that is novel for the organization and yet can be feasibly implemented. In Open Innovation Challenges, novelty and feasibility have typically been judged by the stakeholders who initiated the innovation challenge and are responsible for implementing the solutions; this is a practice we will follow in rating innovativeness. Since there may be several solutions generated, there may be the opportunity for within-case designs in which some solutions use the intended structures and some do not.

In sum, this discourse-centric research model of collaborative challenge leads to the following two propositions:

> Proposition 1. The extent to which participants engage in discourse behaviors is positively associated with their participation outcomes.

> Proposition 2: Participation outcomes can positively mediate the influence of discourse behaviors on the quality of solution outcomes.

Research Design

We have designed a quasi-experiment to study the effectiveness of in-process interventions that encourage discourse behaviors in collaborative challenges by contrasting a control group with experimental group (Shadish et al. 2001).

Data Collection and Analysis

The typical length of an innovation challenge is from 6 weeks to 3 months. To minimize extraneous variation, we will encourage all innovation challenges to last 2 months. The research model presented in Figure 1 necessitates multiple data sources and data collection strategies to be tested properly. Proposition 1 will be tested through the experimentation, and Proposition 2 will be explored through a case study associated with stakeholders. We have obtained three companies' agreements to closely collaborate with us to tune the study implementation.

In-Process Interventions for Quasi-Experiment

We summarize the distinct interventions given to control and experimental groups in Table 1. The control group will not be given any instructions on discourse behaviors, whereas the experimental group will receive training and reminders for discourse.

Table 1. Experimental Design		
Types of Intervention	*Control group*	*Experimental group*
1. Outcome Incentives	Top idea will be recognized based on external evaluation.	Top integrative solution will be recognized at the end of the challenge
2. In-process incentives	1. Participants asked to rate each idea in real time based on novelty and implementability for general consumption	1. Participants asked to vote on comments based on how well it helps to integrate others' ideas 2. Every 15 days, researchers will send out an email with reminders about the best shapers
3. In-process roles and dialogue interventions	The participants in the challenge will be: 1. Asked at time of registration to read instructions that remind them of the typical innovative challenge behaviors (e.g., post fully thought out ideas, refine ideas) No subsequent instruction or reminders will be given	The participants in the challenge will: 1. Be asked to read Instructions at the time of registration as to discourse behaviors they should perform during the innovation challenge 2. During the Challenge, emails will be sent at set times reminding the participants of the disourse behaviors
4. Overcoming Reluctance to Share	No instructions	Include in instructions rules for overcoming reluctance to integrate

Participant Surveys

We will administer surveys to the participants in the innovation challenges in three waves. In the first wave (at registration), we will obtain data on general demographic information, familiarity and prior experience of online activities including forums and innovation challenges. In the second wave (halfway through the challenge), a brief survey will be given for the purpose of a partial reminder of shaping behaviors to the experimental group and traditional non-integrative behaviors to the control group. The survey will also ask about self-perception of distance to others to determine if a feeling of community is arising in the experimental group. In the third wave (at the completion of the challenge), we will conduct a more detailed survey that will ask various aspects of participants' satisfaction and performance, such as extent of online collaboration, innovativeness of outcomes, satisfaction with innovation process, in-process moderation activities performed, dispersion of contributors performing moderation activities, ideas exchanged, ideas built upon, and manipulation checks. Finally, a survey will be sent to the stakeholders of the innovation challenge to rate the ideas on their integrativeness, innovativeness, and implementability.

Discussion

We expect that the four types of interventions will effectively change the extent to which participants engage in discourse behaviors. As a result of such change, we anticipate participants of the experimental group will create more integrative solutions and, more importantly, obtain greater satisfaction at

participating in collaborative challenges. The more integration occurs, the more innovative outcome firms can obtain.

Our study design and the anticipated outcomes will have several implications for research and practice. First, innovation challenges are intended to be an effective means of garnering dispersed expertise within a shared platform. We extend the literature one step further and argue that active intervention to stimulate knowledge integration can enhance innovation challenge's potential to generate innovative knowledge. Further, as collaborative challenges, we intend to demonstrate that such challenges provide a more satisfying experience to participants and thus sustain the shared platform for future innovation.

Second, we propose a discourse-centric intervention for innovation challenges. Monetary awards and reputation are common types of incentives, which are proven to have partial effectiveness for voluntary knowledge workers (i.e., online participants) (Beenen et al. 2005; Bock et al. 2005; Ling 2005) and to stimulate competitive desires (Preece and Schneiderman 2009). We believe though that the negative aspects of competitive idea-generation can be overcome through in-process interventions. Recognizing the importance of dialogue in online platforms, we derive in-process interventions that inform participants of ways to act.

Third, we propose a set of design implications for open innovation platforms that support collaborative challenges. Most popular open innovation challenge platforms are designed based on discussion threads: a problem is posted and comments are added like threads. In such platforms, dialogue is likely to be fragmented, and ideas cannot flow freely between participants (Bohm 1996; Jung 2012). This hardly supports participants' close interaction for knowledge integration and recombination. The four types of in-process interventions can be implemented in innovation challenge platforms. For example, the criterion of integrativeness can be implemented in voting systems, and periodic reminders of integrative behaviors and top integrative ideas can be automatically distributed.

Fourth, we undertook a novel research objective and develop a research method to serve it. We created a scenario-based training to simulate and increase subjects' experiential learning; a three-wave survey in which each wave is designed to measure participants' performance, satisfaction, and attitudinal and behavioral change toward integration and future participation; and a coding scheme to analyze learning-oriented discourses of innovation challenges. We triangulate the quasi-experiment, case study, and interview data to increase the fidelity of our study. However, we invite multiple future studies that test our research model, replicate our study design in different contexts, and examine its reliability and validity.

References

Almirall, E., and Casadesus-Masanell, R. 2010. "Open Versus Closed Innovation: A Model of Discovery and Divergence," *The Academy of Management Review* (35:1), pp 27-47.

Amabile, T.M. 1982. "Social Psychology of Creativity: A Consensual Assessment Technique.," *Journal of Personality and Social Psychology* (43:5), pp 997-1013.

Baker, A.C., Jensen, P.J., and Kolb, D.A. 2005. "Conversation as Experiential Learning," *Management Learning* (36:4), pp 411-427.

Barker, A., and Kolb, D. 1993. "Diversity, Learning, and Good Conversation," in: *Diversity and Differences in Organizations,* R. Sims and R. Dennehy (eds.). Westport, CN: Quorum Books.

Beenen, G., Ling, K., Ludford, P., Wang, X., Chang, K., Li, X., Cosley, D., Frankowski, D., Terveen, L., Rashid, A., Rensick, P., and Kraut, R. 2005. "Using Social Psychology to Motivate Contributions to Online Communities," *Journal of Computer-Mediated Communication* (10:4).

Bock, G.W., Zmud, R.W., and Kim, Y.G. 2005. "Behavioral Intention Factors in Knowledge Sharing: Examining the Roles of Extrinsic Motivators, Social-Psychological Forces, and Organizational Climate," *MIS Quarterly* (29:1), pp 87-111.

Bohm, D. 1996. *On Dialogue*. New York, NY: Routledge.

Boland, R.J., and Tenkasi, R.V. 1995. "Perspective Making and Perspective Taking in Communities of Knowing," *Organization Science* (6:4), pp 350-372.

Boland, R.J.J., Tenkasi, R.V., and Te'eni, D. 1994. "Designing Information Technology to Support Distributed Cognition," *Organization Science* (5:3), pp 456-475.

Boudreau, K., and Lakhani, K. 2009. "How to Manage Outside Innovation," *MIT Sloan Management Review* (50:4), pp 69-76.

Brown, J.S., and Duguid, P. 1991. "Organizational Learning and Communities of Practice: Toward a Unified View of Working, Learning, and Innovation," *Organization Science* (2:1), pp 40-57.

Brown, J.S., and Duguid, P. 2000. *The Social Life of Information*. Boston, MA: Harvard Business School Press.

Bullinger, A.C., Neyer, A.K., Rass, M., and Moeslein, K.M. 2010. "Community Based Innovation Contests: Where Competition Meets Cooperation," *Creativity and Innovation* (19:3), pp 290-303.

Bunderson, J., and Reagans, R. 2011. "Power, Status, and Learning in Organizations," *Organization Science* (22:5), pp 1182-1194.

Carlile, P.R. 2002. "A Pragmatic View of Knowledge and Boundaries: Boundary Objects in New Product Development," *Organization Science* (13:4), pp 442-455.

Chesbrough, H. 2003. *Open Innovation : The New Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Press.

Chesbrough, H., Vanhaverbeke, W., and West, J. 2006. *Open Innovation: A New Paradigm for Understanding Industrial Innovation*. Oxford University Press.

Cohen, W.M., and Levinthal, D.A. 1990. "Absorptive Capacity: A New Perspective on Leaning and Innovation," *Administrative Science Quarterly* (35:1), March, pp 128-152.

DeSanctis, G., Fayard, A.-L., Roach, M., and Jiang, L. 2003. "Learning in Online Forums," *European Management Journal* (21:5), pp 565-577.

Faraj, S., Jarvenpaa, S., and Majchrzak, A. 2011. "Knowledge Collaboration in Online Communities," *Organization science* (22:5), pp 1224-1239.

Fayard, A.-L., and DeSanctis, G. 2008. "Kiosks, Clubs and Neighborhoods: The Language Games of Online Forums," *Journal of the Association for Information Systems* (9:10), pp 677-705.

Fleming, L., and Waguespack, D. 2007. "Brokerage, Boundary Spanning, and Leadership in Open Innovation Communities," *Organization science* (18:2), pp 165-180.

Fredberg, T., Elmquist, M., and Ollila, S. 2008. "Managing Open Innovation - Present Findings and Future Directions," VINNOVA - Verket för Innovationssystem/Swedish Governmental Agency for Innovation Systems.

Gallivan, M.J. 2001. "Striking a Balance between Trust and Control in a Virtual Organization: A Content Analysis of Open Source Software Case Studies," *Information Systems Journal* (11:4), pp 277-304.

Gloor, P.A. 2006. *Swarm Creativity : Competitive Advantage through Collaborative Innovation Networks* Oxford ; New York: Oxford University Press.

Gongla, P., and Rizzuto, C.R. 2001. "Evolving Communities of Practice: Ibm Global Services Experience," *IBM Systems journal* (40:4), pp 842-862.

Goodman, P.S., and Darr, E.D. 1998. "Computer-Aided Systems and Communities: Mechanisms for Organizational Learning in Distributed Environments," *MIS Quarterly*), pp 417-440.

Grant, R. 1996. "Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration," *Organization science* (7:4), pp 375-387.

Gulley, N., and Lakhani, K.R. 2010. "The Determinants of Individual Performance and Collective Value in Private-Collective Software Innovation ". Harvard Business School.

Hemetsberger, A., and Reinhardt, C. 2006. "Learning and Knowledge-Building in Open-Source Communities a Social-Experiential Approach," *Management Learning* (37:2), pp 187-214.

Henkel, J. 2006. "Selective Revealing in Open Innovation Processes: The Case of Embedded Linux," *Research Policy* (35:7), pp 953-969.

Hutchins, E. 1995. *Cognition in the Wild*. Cambridge, MA: MIT Press.

Hutter, K., Hautz, J., Füller, J., Mueller, J., and Matzler, K. 2001. "Communitition: The Tension between Competition and Collaboration in Community-Based Design Contests," *Creativity and Innovation Management* (20:1).

Isaacs, E.A., and Clark, H.H. 1987. "References in Conversation between Experts and Novices," *Journal of Experimental Psychology* (116:1), pp 26-37.

Jung, Y. 2012. "A Dialogic Action Perspective on Open Collective Inquiry in Online Forums," in: *Information Systems*. Cleveland, OH: Case Western Reserve University.

Kane, A.A., Argote, L., and Levine, J.M. 2005. "Knowledge Transfer between Groups Via Personnel Rotation: Effects of Social Identity and Knowledge Quality," *Organizational Behavior and Human Decision Processes* (96), pp 56-71.

Kereki, I.F., Azpiazu, J., and Silva, A. 2004. "Knowledge Management in Learning Environment Design," *34th ASEE/IEEE Frontiers in Education Conference*, Savannah, GA: IEEE.

Kogut, B., and Zander, U. 1992. "Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology," *Organization Science* (3:3), pp 383-397.

Kolb, D.A., Baker, A.C., and Jensen, P.J. 2002. "Conversation as Experiential Learning," in: *Conversational Learning: An Experiential Approach to Knowledge Creation,* A.C. Baker, P.J. Jensen and D.A. Kolb (eds.). Wesrport: Quorum Books.

Kudaravalli, S., and Faraj, S. 2008. "The Structure of Collaboration in Electronic Networks," *Journal of the Association for Information Systems* (9:10).

Latour, B. 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.

Lave, J. 1993. "Situated Learning in Communities of Practice," in: *Perspectives on Socially Shared Cognition,* L.B. Resnick, J.M. Levine and S.D. Teasley (eds.). Washington, D.C.: American Psychological Association, pp. 63-82.

Lave, J., and Wenger, E. 1991. *Situated Learning*. Cambridge, UK: Cambridge University Press.

Leonard-Barton, D. 1995. "Managing Creative Abrasion in the Workplace," *Harvard Business Review* (73:4), pp 2-3.

Leonard-Barton, D. 1998. *Wellsprings of Knowledge : Building and Sustaining the Sources of Innovation*. Boston, MA: Harvard Business School Press.

Ling, K. 2005. "Using Social Psychology to Motivate Contributions to Online Communities," *Journal of Computer-Mediated Communication* (10:4).

Majchrzak, A., Cherbakov, L., and Ives, B. 2009. "Harnessing the Power of the Crowds with Corporate Social Networking Tools: How Ibm Does It," *MIS Quarterly Executive* (8:2), pp 103-108.

Majchrzak, A., Wagner, C.W., and Yates, D. 2012. "The Impact of Shaping on Knowledge Reuse for Organizationalimprovement with Wikis," *MIS Quarterly* (forthcoming).

Mockus, A., Fielding, R., and Herbsleb, J.D. 2002. "Two Case Studies of Open Source Software Development: Apache and Mozilla," *ACM Transactions on Software Engineering and Methodology* (11:3), July, pp 309-346.

Nahapiet, J., and Ghoshal, S. 1998. "Social Capital, Intellectual Capital, and the Organizational Advantage " *The Academy of Management Review* (23:2), pp 242-266.

Nidumolu, S.R., Subramani, M., and Aldrich, A. 2001. "Situated Learning and the Situated Knowledge Web," *Journal of Management Information Systems* (18:1), pp 115-150.

Nonaka, I., and Konno, N. 1998. "The Concept of "Ba": Building a Foundation for Knowledge Creation," *California Management Review* (40:3), pp 40-55.

Orlikowski, W.J. 2002. "Knowing in Practice: Enacting a Collective Capability in Distributed Organizing," *Organization Science* (13:3), May-June, pp 249-273.

Orr, J. 1990. "Sharing Knowledge, Celebrating Identity: War Stories and Community Memory in a Service Culture," in: *Collective Remembering: Memory in Society,* D.S. Middleton and D. Edwards (eds.). Beverly Hills, CA: Sage Publications.

Pavlou, P.A., and El Sawy, O.A. 2010. "The "Third Hand": It-Enabled Competitive Advantage in Turbulence through Improvisational Capabilities," *Information Systems Research* (21:3), pp 443-471.

Preece, J., and Schneiderman, B. 2009. "The Reader-to-Leader Framework: Motivating Technology-Mediated Social Participation," *AIS Transactions on Human-Computer Interaction* (1:1), pp 12-32.

Schegloff, E. 2007. *Sequence Organization in Interaction : A Primer in Conversation Analysis*. Cambridge ; New York: Cambridge University Press.

Shadish, W., Cook, T., and Campbell, D. 2001. *Experimental and Quasi-Experimental Designs for Generalized Causal Inference*. Boston, MA: Houghton Mifflin.

Sherry, L. 2000. "The Nature and Purpose of Online Conversations: A Brief Synthesis of Current Research," *International Journal of Educational Telecommunications* (6:1), pp 19-52.

Tsoukas, H. 1996. "The Firm as a Distributed Knowledge System: A Constructionist Approach," *Strategic Management Journal* (1:17), pp 11-25.

Tsoukas, H. 2009. "A Dialogical Approach to the Creation of New Knowledge in Organizations," *Organization Science* (20:6), pp 941-957.

Wasko, M.M., and Faraj, S. 2005. "Why Should I Share? Examining Social Capital and Knowledge Contribution in Electronic Networks of Practice," *MIS Quarterly* (29:1), March, pp 35-57.

Weick, K.E., and Roberts, K.H. 1993. "Collective Mind in Organizations: Heedful Interrelating on Flight Decks," *Administrative Science Quarterly* (38), pp 357-381.

Wenger, E. 1998. *Communities of Practice: Learning, Meaning, and Identity*. Cambridge, UK: Cambridge University Press.

Wenger, E.C., and Snyder, W.M. 2000. "Communities of Practice: The Organizational Frontier," *Harvard Business Review*), January-February.

West, J., and Gallagher, S. 2006. "Challenges of Open Innovation: The Paradox of Firm Investment in Open-Source Software," *R&D Management* (36:3), pp 319-331.