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Crowdsourcing or Expertsourcing: Building and Engaging Online Communities for Innovation?

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Abstract

Internet-based collaboration technologies provide organizations new and valuable tools to engage online communities. However, effectively leveraging internet-based collaboration technologies and online communities for product innovation requires careful consideration of a community's composition and the organizational mechanisms for community engagement. Building on literature from user innovation, open innovation, and demand-side value creation, we conducted a grounded theory based qualitative study of firms using collaboration technologies for co-innovation. We build theory and offer propositions regarding how a firm can structure interactions and manage such community engagements. By specifying the above, we clarify the conditions for creating value when engaging online communities in co-innovation.

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Abstract

Internet-based collaboration technologies provide organizations new and valuable tools to engage online communities. However, effectively leveraging internet-based collaboration technologies and online communities for product innovation requires careful consideration of a community's composition and the organizational mechanisms for community engagement. Building on literature from user innovation, open innovation, and demand-side value creation, we conducted a grounded theory based qualitative study of firms using collaboration technologies for co-innovation. We build theory and offer propositions regarding how a firm can structure interactions and manage such community engagements. By specifying the above, we clarify the conditions for creating value when engaging online communities in co-innovation.

Introduction

Organizations are increasingly using internet-based collaboration technologies (CT) to engage the creativity and problem solving skills of online user communities, employees, and experts in joint product innovation or co-innovation (e.g. Dahlander and Frederiksen 2012; Fuller 2010; Jeppesen and Frederiksen 2006; Nambisan and Baron 2010; Sawhney et al. 2005).¹ Internet-based collaboration technologies include software tools and applications that leverage social interactions within an online platform to facilitate collaboration among members of an online community (OC) and between members of the community and a firm (Kaplan and Haenlein 2010; Kleeman et al. 2008).² For example, Threadless, an apparel company, sources t-shirt artwork from an online community using a contest format. Community members not only submit artwork, but also use collaboration technologies to share their ideas and gain feedback from the community. For each contest, the company selects a winning design from a short list of designs generated by community members' scores. The winner receives a monetary award and Threadless sells t-shirts with the winning design. The community also helps promote the designs thereby engaging in multiple stages of the innovation process (ideation, development, and launch). By Fall 2013, more than 2.5 million community members submitted over 300 million designs.

As firms increasingly adopt community-based approaches to innovation, research has started to examine how and why these communities are engaged. Recent work highlights the role of external communities in problem solving (Afuah and Tucci 2012), innovation (Mount and Martinez, 2014; Prandelli et al. 2006 Sawhney et al. 2005) and knowledge sharing (e.g. Faraj et al. 2011; Fuller 2010). Other work focuses on community design (e.g. von Hippel and von Krogh 2003) and motivations for participation (e.g. Franke et al. 2013; Faraj et al. 2011; von

Hippel and von Krogh 2003). Importantly, while online communities provide access to a wide knowledge pool, research suggests that not every member of an external community or crowd has the necessary creativity or problem solving skills to support a firm's product innovation initiatives (Afuah and Tucci 2012; Lakhani 2011). Yet, the literature is relatively silent on how the composition of a community, such as whether it includes randomly selected members or experts, affects the value created and captured via CT-based innovation (Afuah and Tucci 2013). We also lack a comprehensive understanding of the various organizational mechanisms required to facilitate collaborative knowledge creation within different types of communities (Nambisan 2002; West and Lakhani 2008).

We address these gaps in the literature by examining the conditions under which firms effectively create and capture value by employing CT for co-innovation. We conducted a grounded theoretical study of 32 firms employing internet-based CT to support innovation projects. Our research is informed by fieldwork and semi-structured interviews with firm executives. Interview data were augmented by archival data including private company documents, white papers, case studies, presentations, and website content specific to a firm's CT-based innovation processes and activities.

Our results show that firms are particularly effective in value creation and capture using CT and communities for product innovation when they: 1) build expert-based communities rather than open crowds, 2) use repeated long-term engagement to build communities, 3) use iterative content development mechanisms among and between community members and the firm, 4) facilitate task or problem evolution during a community engagement, 5) include expert community members in content management, and 6) constrain the time duration of a community's engagement with a task or problem. These findings help build theory on co-innovation for firms and online communities.

The paper is organized as follows. We begin with a theoretical background section where we define and review key concepts such as value creation, open innovation, crowdsourcing and expert-sourcing. Next we discuss our methods and analysis technique. The subsequent sections build theory by providing propositions that advance our understanding of how organizations may create value via CT-based innovation. We conclude by examining the implications of these findings for both theory and practice.

Value Creation and Open Innovation

Anecdotal evidence suggests that CT-based innovation activities create value for a firm, but systematic empirical evidence is sparse. In fact, despite the growing, albeit fragmented, literature in this area and the increasing adoption of CT for product innovation, our understanding of the conditions under which CT-based co-innovation activities create value for a firm remains limited (Afuah and Tucci 2013; Mount and Martinez, 2014). And although work on demand-side value creation calls for more explicit attention to the role of customers (e.g. Adner and Zemsky 2006; Bowman and Ambrosini 2000; Priem 2007), the term value creation is often used loosely and with different interpretations. Additionally, most empirical work in strategy and organization theory tends to focus primarily on supply-side (or firm-specific) activities associated with value creation such as building barriers to imitation or barriers to entry and engineering a firm's value chain (for a review, see Priem 2007). Hence, we begin by defining value creation relative to customers where the demand-side view of value creation maps to the concept of open innovation.

Value Creation

It is widely recognized that a firm's innovation activities benefit from interactions with external actors such as users, field experts and other stakeholders (Chesbrough 2003; Chesbrough et al. 2006; von Hippel 1998; 2005). Consumers “validate the value of products and services” (Priem 2007, p. 219) based on their perceptions of how well a product's utility aligns with their own needs, experiences, beliefs and expectations, which is referred to as use value (Bowman and Ambrosini 2000; Priem 2007). The difference between use value and the price defines a consumer's surplus, or how much value the consumer captures in an exchange with a firm (Hoopes et al. 2003). Value creation relative to customers thus involves innovations that increase the gap between a product's perceived use value and its price. Since collaborating with a community can enhance a firm's understanding of an innovation's use value, it can increase the opportunities for a firm to capture value by strengthening the likelihood of the product's adoption. These conditions coupled with the lower costs of community-based innovation also increase a firm's surplus (e.g. the price of a product minus cost incurred to create the product) or the amount of value that a firm captures from its innovation activities.³ Thus, activities that enhance a firm's ability to aid consumers in maximizing use value serve as one critical precondition for value capture (Hoopes et al. 2003; Priem 2007; Lepak et al. 2007).

Open Innovation

The notion of leveraging the creativity and knowledge of external sources for a firm's internal product innovation efforts aligns with the concept of open innovation, formally defined as, “the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively” (Chesbrough 2006, p. 1). Open innovation includes interacting and cooperating with actors external to a firm's boundaries in the

development of innovations. While initial work on open innovation focused on formal contractual relationships that cross a firm's boundaries (Chesbrough 2003), recent work and practice suggests that it spans beyond the formal agreements to include informal, non-contractual forms of collaborative value creation involving communities of actors (Chesbrough 2012; Gassman et al. 2010; West and Lakhani 2008). This presents an opportunity for intersecting work on open innovation and value creation with work on innovation communities (West and Lakhani 2008).

Methods

This study uses the grounded theory approach to gain insight into the use of CT for innovation. Our research question necessitated a flexible method that facilitates identifying mechanisms not known *a priori*. The grounded theory approach has proven useful in theory building studies (Singleton and Straits 2005), particularly those examining innovation (e.g. Bourgeois and Eisenhardt 1988; Koners and Goffin 2007). In studies with similar types of research questions, scholars recommend employing extreme examples of the areas of interest to provide heightened visibility into the dynamics at play (Eisenhardt 1989). Thus, our sample was obtained by identifying firms that were known to use CT and online communities for product innovation. Firms were chosen by compiling a list of firms using internet-based CT from experts and consultants working in the field and searches of technology related websites and news articles. These firms were contacted for participation. Consistent with other grounded theory studies, additional firms were added to the sample through snowballing where our initial interviewees were asked to provide a list of firms that they knew used CT and online communities for innovation (e.g. Evans et al. 2004; O'Mahony and Bechky 2006; Santos and

Eisenhardt 2009; Granqvist et al. 2013). To gain a wide range of perspectives and to generalize our findings, participants were intentionally selected from a broad spectrum of industries spanning from consumer goods (e.g. food) to computer software. Table 1 shows the summary of the sample firms by industry. Key informants included executives and managers directly involved in innovation projects with actionable decision-making positions (Campbell 1955; Siedler 1974). We interviewed 29 informants at 20 firms between 2010 and 2011. Approximately one third were executives, one third were high level managers, and the remaining were engineering or project managers.

[Insert Table1 about here]

We employed semi-structured interviews for several reasons. Semi-structured interviews aid in building rapport with interviewees which, in turn, facilitates more complete data collection (Singleton and Straits 2005). The semi-structured interview technique also allows researchers to develop and refine theory with clarifying questions as the data is collected (Berg and Lune 2011). Thus, communication problems, such as the misunderstanding of idiosyncratic acronyms prevalent in innovation projects, are minimized.

An initial interview protocol was developed based on prior literature. We iterated data collection and analysis to refine theory building over time (Eisenhardt 1989; Glaser and Strauss 1967). As data were collected, the study team discussed the interviews to determine if patterns or themes were emerging. As insights were formed and additional questions arose, we refined the protocol, which also supported theory reflection over time (Yin 2008).

The interviews started with a set of open-ended questions and progressed to free dialogue. Questions centered on each firm's innovation projects and its use of CT and communities to support these projects. Interviews lasted from one to one and a half hours. More

than one researcher was present at 80% of the interviews. Approximately 75% of interviewees consented to the recording of their interviews; these interviews were transcribed. Due to the sensitivity of the content being discussed, the remaining interviewees declined recording. In these cases, at least one researcher at the interview wrote extensive notes. Interviews were concluded when the data no longer provided new insights.

Interview data were augmented by archival data. In addition to the firms represented by interviews, 12 other firms provided access to their documentation of CT and community use for innovation. Archival data included private company documents, such as white papers, case studies, and presentations, as well as website content specific to a firm's CT-based innovation processes and activities.⁴

As mentioned, we conducted data collection and analysis simultaneously. Specifically, each of the researchers performed a content analysis of collected data to identify patterns and themes that emerged from the data (Miles and Huberman 1994). Each researcher separately analyzed the content of the interview transcripts, notes, and archival data for trends in the use of CT for innovation. Summaries for each firm were compiled and the research team met to compare their analyses. When questions about the content or interpretation arose, the team contacted the interviewee or representative from the firm for clarification. Data were grouped by topic and first order concepts developed. Over time, second order themes emerged from the first order concepts. These findings were further discussed with interviewees and two external experts with over 20 years of experience in the field of social media and product innovation.

Findings: Mechanisms for building and engaging effective online communities for innovation

Success in leveraging online communities for innovation relies on the composition of a community and the organizational practices or mechanisms established to support collaborative knowledge creation (Nambisan, 2002; West and Lakhani, 2008). Thus, we begin by exploring community participation through composition and community building. We show how firms used expert-sourcing and repeated engagements, respectively, to optimize community participation. Next, we examine the four main challenges faced during the process of community engagements for product innovation – fostering conversations, evolution and change, information volume and shared focus. Four mechanisms are identified to overcome these challenges: iterative development, allowing for change, community based management, and time bounding, respectively. Throughout, we provide examples of the challenges that firms faced and how they engaged these solutions, as summarized in Table 2. In addition to the examples and quotes presented here, the Appendix provides illustrative examples from the data.

[Insert Table 2 about here]

Mechanism 1: Community composition and expert-sourcing

Using online communities for product innovation involves at least two modes of open innovation, ‘outside-in’ where external sources provide static input to a firm (primarily solution-based content), and ‘externally coupled’ where external sources operate more as a dynamic resource by collaborating with a firm on ideation and problem (Enkel et al. 2009). These two modes of open innovation align with two types of online community models used for innovation: crowdsourcing and expertsourcing, respectively. Table 3 summarizes some of the distinctive features of these two types of communities.

[Insert Table 3 about here]

Many organizations embrace the ‘outside-in’ crowdsourcing model for innovation or problem solving with the assumption that anyone has the capacity to be a problem solver or innovator. Crowdsourcing is a distributed model where a firm broadcasts a problem or task to an undefined external group (a crowd) (Howe 2006; 2008; Afuah and Tucci 2012). The crowd typically forms an online community whose members not evaluated or pre-qualified, but, in some cases, may demonstrate a baseline level of knowledge or expertise. One benefit of crowdsourcing is that firms can engage non-obvious problem solvers in identifying a solution and, in turn, reduce the costs of distant search (Afuah and Tucci 2012). The solution provided by the crowd is primarily owned by the firm, but awards or royalties may be offered. For example, Netflix used crowdsourcing from 2006 through 2009 to identify an algorithm that improved the identification of customer preferences based on his or her previous movie ratings, awarding \$50,000 for a one percent improvement and \$1,000,000 to the first ten percent improvement.

Several attributes of crowdsourcing are notable, shown in Table 3. Typically, crowd members act autonomously rather than elaborating on the ideas of the others (Howe 2006; Jeppesen and Lakhani 2010; Lakhani 2011). The firm soliciting solutions rarely interacts with crowd members. Thus, collaboration among crowd members and between the crowd and the firm is typically low. As a result, the locus of innovation lies in the crowd itself, with solution-based content flowing from the crowd to the firm. In this approach, the winning solution is often selected by the firm. For example, Cisco created its iPrize, where entrepreneurs submitted proposals with the hopes of being Cisco’s next billion dollar business. The 2010 competition involved 2900 participants and 824 ideas. As such, crowdsourcing is often considered a form of outsourcing (Howe 2006; Afuah and Tucci 2012), particularly for technical, analytical, or scientific problems (Boudreau and Lakhani 2013).

Yet, expertise and problem solving capabilities are heterogeneously distributed among members of a given ‘crowd’ and thus, only some members possess the knowledge relevant to a focal task or problem (e.g. Hayek 1945). Individuals who have self-selected to solve a problem, but are unqualified to do so, may offer sub-optimal solutions. Consequently, a crowd generates a wide gamut of solutions that the firm must spend time and resources evaluating. As an executive at Daffodil voiced his frustration by saying, “How do you weed out the noise?” Under these conditions, the firm’s cost and duration of search may actually increase (Fleming 2001).

An alternative to crowdsourcing is expertsourcing where a firm defines the qualifications for community membership. Expertsourcing is based on the premise that firm innovation activities can benefit from not only crowds or users of a firm’s goods or services (West and Lakhani 2008; von Hippel 2005), but also the users of competing products, field experts in adjacent or complementary fields or non-obvious problem solvers in distant domains (Afuah and Tucci 2012; Lakhani 2011). Expert community members have knowledge or skills relevant to the firm’s product domain based on their experience and/or education. For example, Laursen and Salter (2006) find that suppliers and clients are among the most important external sources of knowledge for innovation in UK manufacturing. In contrast to crowdsourcing, expertsourced community members have a shared understanding of the firm’s market and an interest in a product’s development and efficacy. These shared attributes promote interaction among community members and, in turn, idea development (e.g. Dahlander and Frederiksen 2012; Nambisan and Baron 2010) and learning (Demsetz 1986). Firms also reported that expertsourcing enabled the disqualification of potential members when there may be a conflict of interest; a feature unavailable in crowdsourcing.

Several organizations leverage expertsourced communities for innovation. For example, Del Monte Foods' Pet Products Division found that traditional market research techniques lacked the depth of user understanding necessary for successful product development. To facilitate the interactive exploration of user needs and preferences, the firm created an expertsourced online community called, "I love my dog, dogs are people too." Del Monte invited "extreme dog lovers" to join who were interested in enhancing the health and wellbeing of their pets. Del Monte collaborated with this community over six weeks to develop and successfully launch a new vitamin and mineral-fortified dog snack, Snausages Breakfast Bites. Expertsourcing lowered the costs of Del Monte's product innovation while fostering a tight fit between the new product and customer preferences, thereby enhancing the consumer use value.

While crowdsourcing and expertsourcing both allow firms to obtain innovation-related information from external sources, the differences extend beyond community composition to include the degree and structure of interactivity. As such, the experience and knowledge of the expertsourced communities provide at least three benefits in the context of product innovation. First, as noted, expertsourced communities include proficient users or consumers of a firm's products or services who are vetted before being invited to participate. Consequently, each community member has a well-developed understanding of the field and related cognitive frames (Felin et al. 2012; Kaplan and Tripsas 2008; Walsh 1995) and is likely to hold knowledge that is more relevant to a firm's domain than non-users. As a result, these expert community members are more likely to contribute content that is specific to a firm's innovation trajectory (Bogers et al. 2010; Franke and Shah 2003; Franke et al. 2006) than non-experts. An executive at the firm Iris found that, "Employees, business partners and customers [are] cited as the top three sources of innovation in GBS (business unit)." Indeed, in a study examining an online idea sourcing

contest, the users of a firm's products generated ideas that were more novel and beneficial for customers than those by the firm's product development professionals (Poetz and Scheier 2012). Thus, expertsourcing may create a higher consumer use value for an innovation project than crowdsourcing.

Second, a portion of a user's expertise may be situated in how a product is used and in the user's relationship with it (Tyre and von Hippel 1997). The latter often involves tacit knowledge that is sticky or difficult to transfer, but critical to problem solving and innovation (von Hippel 1994, 1998). The ability to call on sticky knowledge increases the likelihood that a user will develop distinctive innovations that align with a firm's objectives (von Hippel 1988; 2005). As a result, users with such knowledge may contribute content that has a stronger fit with the firm's products (or services) than non-users. Since this stronger fit fosters greater demand, expertsourcing enhance a firm's ability to create and capture value.

Third, sticky knowledge may be expressed in a common language (Grant 1996; Kogut and Zander 1992), which facilitates communication among community members and enables the sharing and integration of knowledge that is not common among them (e.g. Hoopes and Postrel 1999; Grant 1996). In product development, a shared or common understanding aids activity coordination and reduces the likelihood of costly mistakes (Hoopes and Postrel 1999). These conditions also reduce friction during idea development a community and in turn, increase the efficiency of knowledge aggregation (Grant 1996). It follows that the value created increases and the cost to create value decreases. Thus, expertsourcing is more effective for CT-based innovation activities than crowdsourcing.

Some work suggests that a firm's innovation sourcing may benefit more from crowds than experts. One argument is that experts hold specialized knowledge and only search locally

for new knowledge (Schilling 2005). Since local search may limit the scope of knowledge creation or development, innovation-oriented content developed by expert communities may be more competence-enhancing or incremental rather than competence-destroying or radical (Katila and Ahuja 2002; Katila 2002; Rosenkopf and Neerkar 2001). Alternatively, sourcing from a crowd provides access to distant knowledge that increases the possibility of novel solution generation (Fleming 2001; Levinthal and March 1981) and radical innovation (Rosenkopf and Neerkar 2001). However, distant search is more applicable for complex and highly uncertain problems that are not easy to articulate and could thus benefit from knowledge beyond a firm's core (Afuah and Tucci 2012; Jeppesen and Lakhani 2010). In contrast, when a problem or task is part of a predefined product roadmap or innovation process, local knowledge may be more beneficial to innovation efforts since the experts' experiences and tacit insights directly relate to a firm's products or services (Dahlander and Frederiksen 2012; Poetz and Scheier 2012).

Second, crowds are typically commissioned to generate solution-based content related to a particular problem (e.g. Afuah and Tucci 2012; Jeppesen and Lakhani 2010); whereas, expert communities may be commissioned for a spectrum of innovation activities including those that require needs-based and solution-based content. Since content reflecting users' needs and use preferences is critical to creating value from product innovation, expert communities may be more effective than crowds.

The majority of organizations in our study used expertsourcing to support their innovation projects. For example, AT&T Interactive engaged an expert community for the development of a new version of their yellow pages website. A core group of experts was defined based on their backgrounds and active engagement on the website. A subset of this group, identified as top tier experts, was further engaged for feedback as the product

development progressed. This expert community accelerated the time to market with a new version of yp.com. More importantly, the community identified product features that were not part of AT&T's roadmap, but were valued by the users. As a result, the final product increased the consumer's surplus by providing a tighter fit with a user's needs and preferences.

Conversely, Dell's IdeaStorm is an open community where anyone can register as a member, post ideas and rate ideas posted by others. Dell monitors the contributions and culls ideas. While this approach contributes to a large volume and range of ideas, most suggestions are not meaningful or adopted (see Bayus 2013). Thus, the large volume of ideas increases the time required for evaluation. This increases the cycle time, cost of the innovation process and in turn, lowers the amount of value a firm may ultimately appropriate from the community engagement. In a similar example, Starbucks crowdsourced a call to the general public in its MyStarbucksIdea program. In its first five years, the firm sourced and evaluated over 150,000 suggestions, mainly incremental product line improvements (e.g. "Bring back the chocolate croissant") or repetition of earlier recommendations (repeated calls for free soy milk). During this time, Starbucks implemented 277 ideas, or 0.2% of all submissions, many of which reinstated past product offerings.

Communities generated by crowdsourcing and expertsourcing provide different levels and types of content. An IBM executive discussed the company's expertsourced communities created for IBM Jams (collaboration events) and summarized that, "People are invited to IBM Jams because they have a reason to be there. There is only wisdom of the crowd if there is a focus and the participants are qualified to contribute to this focus area." It naturally follows that collaborating with experts in CT-based innovation activities can enhance a firm's understanding of the use value of a potential innovation and, in turn, increase its adoption.

Mechanism 2: Community building through repeated engagements

In addition to expertsourcing, firms used collaboration through repeated engagements to build the online community and develop relationships with members. Since creating a sense of partnership with a firm enhances a community member's contributions to a firm's innovation activities (Nambisan and Baron 2010), the primary source of value creation in expertsourcing lies with collaboration among community members *and* the firm rather than solely in the community (as in crowdsourcing). Engaging the community for a set of interdependent tasks or activities, such as multiple stages of the product innovation process, rather than a single, independent activity has several benefits. First, community members' commitments to a co-innovation effort may be strengthened when they anticipate an ongoing or long-term interaction with the firm hosting a project. These relational investments tend to increase a member's perceived switching costs (Hagel and Armstrong 1997; Shapiro and Varian 1999) thus enhancing the prospects of retaining members for the entire product innovation process. If community membership erodes as the innovation process progresses, knowledge developed in different stages may be disconnected or simply lost. For example, the loss of community members can cause problems in the flow of tacit knowledge between stages that may disrupt the process and negatively affect results (Hoopes and Postrel 1999). The stability of community membership allows a firm to avoid incomplete convergence in the evolution of content developed in a community (Faraj et al. 2011). Incomplete convergence can potentially compromise the reciprocal feedback mechanism necessary for ongoing collaboration (Faraj et al. 2011).

Repeated engagement also has the benefit of building engagement when the members feel safe to share ideas or opinions. For example, an executive at Nasturtium said that, "we wanted to create a safe place where our customers, employees, and partners can engage in an

interactive and positive manner and promote the learning because there's so much knowledge that these customers hold, so much knowledge our partners hold." They found that their outcomes was, "loyal group of customers in the community. Because we're there for them, they're there for us. We're there for each other." Sunflower executives specifically created, "a sheltered environment and everybody was under NDA of course so we are free ... to ask for honest candid feedback without [members] worrying about those ideas getting out to competitors or getting out in the public." Thus, repeated engagement built engagement and trust within the community and with the firm.

Mechanism 3: Community interaction: The role of iterative development

The next challenge interviewees identified in the use of online CT for innovation was the difficulty in developing ideas with the community. Crowdsourcing relies on one-way communication. For instance, a firm might broadcast a problem to a crowd (Lampel et al. 2012) or community members might post content on a firm's site. In both cases, no interaction among members or between members and the firm is intended such as in the Netflix and Cisco iPrize examples. Conversely, firms can facilitate reciprocal interactions and the iterative creation and refinement of content. In this case, the technologies provide for real-time collaboration among community members and between community members and the firm. This collective engagement forms a connection among a community's members (Brown and Duguid 1991; Knorr-Cetina 1999). Although one-way communication allows for the amassing of ideas, effectively engaging community members as joint innovators requires reciprocal interaction among community members and between community members and the firm. This exchange process allows members to share, refine, and disseminate content and, in turn, facilitates learning

among community members (Brown and Duguid 1991; Boudreau and Lakhani 2013). Thus, reciprocal interaction is central to supporting iterative content development, problem solving, and consequently, the innovation process (Birkinshaw et al. 2008; Leonard-Barton 1992).

In addition to expertsourcing, executives and managers interviewed found the technique of iterative development to be useful in building community engagement and collaborations. Hibiscus found that "Out of that (the campaigns), generally people are talking to each other that might not have ever talked before then joining forces to bring some idea forwarded." IBM engaged communities in reciprocal interaction to "drive increased, longer-term real world collaboration across the enterprise." These firms treated expertsourced community members as partners who participate in multiple, interdependent tasks. Executives also found value in engaging with the community over multiple stages since this provides community members with opportunities to jointly develop both needs-based and solution-based content.

Another distinctive benefit of iterative development stems from the opportunity for community members *and* a firm to engage in dialogue, building on one another's ideas. For example, as a starting point, a community member may contribute a baseline idea to the community. Other community members may comment on the idea, augmenting or refining its content. As members interact with each other iteratively, the base idea evolves. The firm also may contribute to an idea's evolution or offer content that addresses members' questions. For example, a firm in our study, Sunflower, informs their community members that they are part of a community feedback loop and encourages interaction. Threadless community members use CT to interact and iterate on each other's design content online in real time. This iterative process provides an opportunity for the integration, adaptation and recombination of information and knowledge that was previously separate or disconnected. Hibiscus, another firm in our study,

used community forums to “learn and share about subjects, add comments, react, and add to other’s comments.” A Hibiscus executive explained that iterative content development allowed the exchange of ideas such that when an idea is presented, “others can go, ‘Well that’s a good idea, but if you do this... little discussions start within each idea to make it better’.”

Iterative development also provides other modes of value creation in CT-based product innovation activities. First, when sticky information is needed for the innovation process, iterative idea development may reduce the costs of knowledge transfer since the intermediate outputs generated at each stage of the process are typically less sticky than the entire bundle of knowledge needed to produce a collective output (Tyre and von Hippel 1993; von Hippel 1994). Consequently, the iterative process reduces the time and costs associated with knowledge transfer or sharing. Second, using CT to support iterative content development centralizes the intermediate outputs of the process. This centralization yields an additional cost benefit by providing a firm the ability to access information, knowledge, or problem solving skills distributed across a wide range of community members *and* to do so concurrently. In contrast, traditional, non-internet based product innovation techniques typically lack the opportunity for rapid, ongoing, and concurrent bilateral interaction among members and between the members and a firm. Due to these differences, using CT may accelerate the iterative development process, reduce the cycle time for product innovation and in turn, lower costs. Last, innovation focused community engagements that only allow unidirectional flow of content from a member to a firm prohibits the contributor from discovering how their contribution was considered, changed or implemented. As a consequence, potential contributor may discount his perceived role in the firm’s innovation and, in turn, reduce his commitment to a project (e.g. Fuller 2010; Nambisan and Baron 2010). This might also diminish the quality of content generated from the user.

One might argue that iterative development is an obvious practice for product innovation. Yet, as mentioned, traditional crowdsourcing does not involve iterative content development. By design, crowdsourcing is a tournament-based approach where members compete to solve a specific problem or task (Lampel et al. 2012; Boudreau et al. 2011). As a result, interactions are unidirectional from the crowd to the firm. The competitive nature of this approach reduces member interaction and learning. Thus, efficacious CT-based product innovation requires that a firm design community engagement to enable iterative development among community members and the firm, which is critical to engaging members as co-innovators and to facilitating the accretion of learning to strengthen the product innovation process.

Mechanism 4: Evolution and change

The iterative development approach described above not only allows for content evolution during a community engagement, but also for project or problem evolution (Roser et al. 2009). Such evolution is critical to value creation and capture when engaging online communities for product innovation for at least three reasons. First, as members work on a project or task in the product innovation process, they may discover the “real” problem that differs from the originally specified problem or they may uncover information that requires re-specifying or redefining the project or task. For example, an executive at Sunflower found that the use of CT for innovation especially informative since, “Lots of time an issue that we're not aware is an issue bubbles.” When a host firm does not allow the project definition to evolve, it risks engaging a community to solve the wrong problem, which may be costly and can lead to products that do not meet customer needs. Thus, understanding the “real” problem associated with a particular innovation activity is vital to value creation. For example, a director at the firm Rose stated that content iteration and dialogue with the community to clarify and prioritize

problems and tasks improved the firm's ability to effectively complete each stage of the innovation process. Second, project evolution also assists firms in overcoming core-rigidities that constrain generative development (Leonard-Barton 1994). Such rigidities often bind the scope of knowledge creation, thereby limiting the value that a firm may create by product innovation. Finally, iterative development fosters relationships that allow for sticky knowledge to be used to solve more intricate problems as they evolve. These relationships become collaborative during content development iterations.

In contrast, in crowdsourcing, members are tasked with developing a solution to a "fixed" problem. As such, the problem does not evolve, even if a more accurate articulation of the problem emerges (Lakhani 2011). For example, the founder and CEO of Rose argued that one of the biggest problems with using an open call to a crowd for product innovation is the potential for making decisions on stale data. As a result, the firm may need to repeat a particular task or the solution development that increases the costs and duration of the product innovation process. Therefore, crowdsourcing lowers the value that the firm may create compared to expertsourcing.

Firms in our study found that allowing for problem evolution was valuable in several ways. For example, Carnation used iterative task development to create documentation for a product. An engineer at Carnation found that by engaging multiple expert-based communities and allowing for iterative communication, he could watch the innovative content evolve. He observed that community members could go in at any point and contribute useful content. In the end, the "quality of the product was aided by the eyes around it... the whole process was better and faster." Other companies found that problem evolution was especially useful before the firm took action. For example, at AT&T, "We want to be able to get the early iterative ideas in front of the community and have them weigh in, narrow the list of ideas before taking action and

moving them into the lab for testing." In both cases, the firms avoided costly mistakes by fostering project evolution.

Mechanism 5: Information volume and community based management

Firms leveraging CT to co-innovate with communities manage large amounts of content generated by community members, such as the 150,000 posts to MyStarbucksIdea. However, not all community-generated content has equal value to a firm and too much input increases the complexity of content management. In addition, the bounded rationality of managers limits their capacity to acquire, store and process knowledge (Simon 1945; 1991). Firms consistently identified content management as a key challenge in the use of CT for innovation. As a result, to fully utilize a community's contributions, firms must develop methods for managing, evaluating and selecting content generated by a community.

Methods for managing community-generated content vary on at least three dimensions: how content is aggregated and evaluated, how solutions are selected, and who participates in these two activities. Firms often use software, employees or an outside firm to evaluate information. For example, Hibiscus and Sunflower used software-based voting and ranking systems to sort and aggregate content. Alternatively, Nasturtium created a team of employees to perform this function; while Innocentive, BrightIdea and Spigit provide these services to other firms. Once the top set of content is identified, different actors may be involved in selecting an idea/solution for development. Similar to sorting and aggregating, a firm may make the final selection internally or use a community. For example, MyStarbucksIdea allows members to rank ideas; however a team of employees reviews all ideas and determines which are presented to management for potential implementation. The firms Sunflower, Hibiscus and Fuscia in our study and Threadless, the apparel company mentioned earlier, employ a similar approach where

the community members score designs and the firm chooses the final product. Other firms relied on external firms of the community to determine which ideas to develop. In fact, the firm Marigold allows community members to champion their own projects.

Several benefits arise when a community is involved in content management. First, shifting the content evaluation and selection activities to a community reduces the resources and manpower a firm must devote to these activities. This may also lower the costs of, and time required to identify optimal solutions for a given stage of the innovation process; thereby increasing the surplus that a firm may capture from the innovation initiative. Second, involving a community in selecting content further legitimizes the community's voice and in turn, may strengthen the community's commitment to the firm (e.g. Nambisan and Baron 2010; Roser et al. 2009; Wiertz and de Ruyter 2007). For instance, members of Marigold's online community defended their responsibility to the company to such an extent that if a reporter misrepresented the firm's products, the community would quickly respond online and explain how it was incorrect. An executive at Nasturtium summarized that, "That's what we're looking for... creating a loyal group of customers in the community. Because we're there for them, they're there for us. We're there for each other." Increased commitment to the firm may also increase the likelihood that community members adopt a product based on their inputs. However, in expert-based communities, a member views himself as a partner in the innovation process. As a result, a firm that omits community members from content management while benefiting from their content generation efforts may reduce the members' commitment. This effect may be even more detrimental to a firm's innovation efforts when a community is engaged to support the entire product innovation process, from ideation to launch, rather than on a one-time basis for a

single task. In the case of the former, loss of community members at any stage of the innovation process may compromise the accretion of learning and in turn, the value created.

In contrast, members of a crowd are more loosely coupled with a firm than members of expert communities. Crowd members may perceive themselves as merely providing suggestions instead of partnering with a firm. Therefore, a crowd member may value more involvement in content aggregation via polls or ratings than in selecting the ultimate solution, unlike experts. Furthermore, using community members for content management is detrimental when they lack sufficient knowledge about a firm's innovation trajectory. Since the members of a crowd are generally less knowledgeable regarding a firm's products and innovation process than experts, the evaluation of online content by crowd members might be inferior and yield weak insights. In fact, when crowd members are not familiar with a firm's products, their input may misalign with a firm's preferred trajectory.

Observations from the field underscore the need for firms to consider how they manage content in CT-based innovation activities. For instance, an executive at Carnation warned, "Be wary of the fact that you should have a proper process in place to absorb the information coming in.... A lot of haphazard random information is stored and you need to be good at managing it/sorting it." Hibiscus used content management software to solicit experts to evaluate ideas contributed by the expert community. The software distributed evaluation forms to community members and organized responses, reducing the managerial time required for sorting and aggregating content. A Hibiscus executive found that by using the content management software, managers "get to see the quick view of the idea and decisions can be made rapidly...when doing this purely collaboratively it was taking too long." Hibiscus also used community moderators to manage feedback from members. This involvement ensured the timely interaction with

community members and was critical to winnowing beneficial content from the entire pool of information submitted.

Some firms in our study relied on employees to manage content such as Nasturtium, which preferred to use employees to manage and cull content. Nasturtium integrated content management into their marketing teams such that team members monitored the community and ensured that a Nasturtium employee responded to community members' posts within three to four days. When a post was not addressed in a timely manner, product managers and active community members were directly charged to respond. Nasturtium executives found that timely interaction with the community improved member retention. However, Nasturtium managers complained that content management by employees took too much time away from other projects and that other priorities suffered.

We also observed that firms lacking content management mechanisms often struggled with achieving benefits from the use of CT for innovation. For example, Sunflower lacked a method or dedicated support for content management. Over time, Sunflower found that the quality and level of participation of the community members eroded, largely because members perceived that the firm did not value their voice and contribution. The efficacy of content management is also influenced by how a firm works with the community throughout the innovation process. Involving expert communities in task evolution strengthens their contributions to content management. First, participating in problem evolution provides community members with insight into a host firm's needs and preferences. This knowledge makes the community members more informed partners and more likely to understand the rationale for culling and selecting content. In addition, since they were provided the opportunity to refine the problem, they are also more likely to be invested in the problem's resolution as

compared to members not involved. Expert community members may take the content management more seriously and thus, identify more robust solutions. It follows that an expert community's involvement in task/problem evolution strengthens content management efforts and in turn, increases the value a firm creates with CT-based product innovation.

Mechanism 6: Shared focus through time-bounding

While no innovation initiative lasts forever, some are set up as open and perpetual while others have discrete time limits. The temporal dimension of organizing a CT-based innovation engagement has implications at two levels -- task and innovation process. Specifically, the length of time that a community is engaged influences both short-term and long-term outcomes. Next, we show how time-bounding or restricting the duration of a community's engagement in an innovation process affects the value created and captured.

Task-level

At the task level, time-bounding an engagement facilitates the active and focused participation of a community. Limiting the time for a particular task tends to focus efforts from community members and reduce the likelihood that the focus dissipates (e.g. Faraj et al. 2011). When firms deliberately and explicitly impose a deadline for contributions, those most interested in participating may do so more readily rather than postponing their contributions. Such focused or concentrated efforts may strengthen a member's task orientation (Nambisan 2002) and in turn, the quality of contributions. Indeed, community members respond to time-bounding by prioritizing their contributions (see Faraj et al. 2011). Since time-bounding raises the quality of content generated in a community engagement, a firm can devote less time to evaluating and filtering content. In sum, time-bounding a community's engagement may enhance the efficacy of

contributions and lower the costs of content management, which increases the value that a firm may appropriate from the engagement.

Innovation process level

Time-bounding may also improve the efficiency and effectiveness of the product innovation process as a whole. First, CT enables communities and firms to engage in rapid exchange. By bounding the amount of time allocated to the exchange, firms may benefit from a faster rate of iterative content development. Time-bounding each stage of the innovation process may reduce the total cycle time required for the overall process. Additionally, time-bounding tasks provide the opportunity to perform a task multiple times and improve the quality of the final outcome. Such replication helps a firm adapt a product to user preferences and improve market acceptance. In sum, time-bounding may promote community participation and efficient collaboration thereby enhancing the total value created and captured.

However, time-bounding may limit the scope of a community's contributions. Time-bounding a community's engagement limits the amount of time that a community may work in iterative development and hinders the amount of content that might be generated. Similarly, "the more time people spend evolving others' contributed ideas and responding to others' comments on those ideas, the more the ideas can evolve" (Faraj 2011, p. 4). Conversely, not all content is equal and more does not necessarily equate to "better" content. A community must have sufficient time to meaningfully contribute to the innovation process, but not so much time as to lose focus.

Several firms employ time-bounding mechanisms in their innovation focused community engagements. According to Liam Cleaver of IBM, one form of their Jams (online collaborative

innovation events) are time-bounded to 72 hours to accelerate the development of innovative ideas. SAP employs a similar time-bounds their InnoJams to 30-48 hours. A recent InnoJam resulted in 12 ideas receiving recognition and attention for development and implementation.

Discussion and Future Research Directions

The use of internet-based CT is rapidly growing with immense ramifications for both theory and practice. However, not all online communities are created equal. Extant work recognizes differences in online communities, but thus far, says little about the implications for value creation in co-innovation. In this paper, we argued that differences in community composition are critical to creating value from firm-hosted communities commissioned specifically for co-innovation. In particular, we introduced expertsourcing as a new form of firm-community collaboration and illustrated how it varied from crowdsourcing and traditional open source models. We then explored factors related to organizing and managing online community collaborations for product innovation – the roles of iterative content development, content management, and time-bounding. We conclude that, in the context of product innovation, a firm may enhance value creation from online communities when it: 1) employs expertsourcing versus crowdsourcing; 2) uses internet-based CT to facilitate iterative development among community members *and* between community members and the firm; 3) facilitates problem evolution; 4) involves community members in content management; and 5) time-bounds the duration of a community's work.

Taken together, the above allows us to contribute to theory on open innovation and the use of online communities for co-innovation. The involvement of users in new product innovation has witnessed a broad array of research from multiple viewpoints. Initial work on open innovation directed attention to formal contractual relationships that cross firm boundaries

(e.g. Chesbrough 2003). Our theory emphasizes that open innovation extends to informal, non-contractual, boundary-spanning relationships as well (see also Chesbrough 2012; Gassman, Enkel and Chesbrough 2010; West and Lakhani 2008). Specifically, we examine one category of informal relationships, online communities engaged in co-innovation with a firm. By collaborating with a range of experts in building knowledge and solving problems, firms may broaden their understanding of unserved needs and gain insights into novel approaches to problem solving. As such, we specified five conditions (see above) to optimize co-innovation with expert-based communities. These conditions may substitute, in part, for an organization's lack of formal control and contractual relationship with an online community. Our results clarify the conditions under which engaging online communities using internet-based CT might benefit a firm's innovation activities.

Involving online communities as co-innovators also has potential theoretical implications as well. To appropriate maximum value from such endeavors, organizations need to consider several key issues. In particular, who is responsible for organizing, managing and monitoring a community engaged for an innovation task? Product developers, marketing managers, or information technology staff, or should organizations establish a new, autonomous role? Furthermore, since treating customers as partners increases the efficacy of their contributions (Mills and Morris 1986; Nambisan and Baron 2010), organizational actors involved in co-innovation may need to develop new relational and knowledge integration capabilities. Value creation from community co-innovation initiatives requires understanding and optimizing these resource allocation differences.

This study raises another question: how might firms garner organizational support for community-based innovation initiatives? In our interviews, we consistently observed that

product developers and marketing managers were initially reluctant to collaborate with online communities for product innovation. In many cases, even when additional support and resources were provided, product and project teams were unwilling to leverage technologies to support development. Frequently, such initiatives were championed by a manager who was passionate about understanding how social media and internet-based technologies could be used to support innovation. However, these individuals typically had to push online communities to product developers, marketing staff and/or to business units and assertively encourage their use.

In one firm we studied, this situation slowly reversed over time as product developers began to recognize the value of an online community's engagement. At Azalea, the lack of ownership and support for internet-based CT confused both employees and community members, consequently leading to the dissolution of the campaign. In Hibiscus, executive support was critical to the success of internet-based collaboration campaigns. Similarly, such campaigns at Nasturtium did not take off until executive leadership championed online collaborations. This indicates that the source and engagement of support may influence how a firm interacts with an online community and if that interaction is useful.

Other areas of inquiry also warrant exploration. For instance, few firms consider the role of intellectual property (IP) rights when engaging crowds or experts in innovation. One exception is the intermediary firm InnoCentive that has instituted a formal multi-country system to account for IP created by problem solvers operating around the world. In contrast, other early adopters of crowdsourcing and expertsourcing for problem solving or innovation have ignored IP issues. In most cases, the firm assumes ownership of content developed in an engagement.

Further work is warranted to understand the conditions under which such behavior is appropriate

(Afuah and Tucci 2013) as well as unbundling the challenges in managing both foreground and background IP in these contexts.

Firms are rapidly adopting a variety of approaches for leveraging online communities in product innovation. Yet, many struggle with understanding the organizational processes and mechanisms needed to ensure these efforts create value for a firm. Against this backdrop, we view this study as an important first step in exposing and understanding, some of the critical questions associated with CT-based co-innovation. Indeed, each area we examined may merit a separate research paper to fully develop the micro-conditions and macro-conditions that shape their efficacy. Nonetheless, this study improves our theoretical understanding of the factors critical to creating and capturing value from expertsourcing for co-innovation.

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Table 1. Sample Firms by Industry and Data Source

Industry	People Interviewed	Firms Interviewed	Firms with Archival Data
Automobile	0	0	2
Food	3	3	6
Hardware	7	4	4
Business infrastructure	4	3	3
Multiple consumer products	3	2	3
Software	9	5	7
Other (including services)	3	3	7
Total	29	20	32

Table 2. Mechanisms for Building and Engagement Online Communities for Innovation

Level	Participation		Process			
Mechanism	Expert-sourcing	Repeated Long-term Engagement	Iterative Development	Allow for Change	Community-based Management	Time-bounding
<i>Challenge Addressed</i>	<i>Composition</i>	<i>Community Building</i>	<i>Fostering Conversations</i>	<i>Evolution and Change</i>	<i>Information Volume</i>	<i>Shared Focus</i>
Community Challenge Examples	<ul style="list-style-type: none"> • Heterogeneous knowledge • Inability to define community when crowdsourcing • Inability to screen community participants; self-selected • Inexperienced members lack understanding of fit with firm needs • Inexperienced members lack understanding of innovation use • Difficulty communicating between community and firm • Lack of common language • Avoiding conflict of interest 	<ul style="list-style-type: none"> • Community building • Member retention • Community members not engaged or become detached • Knowledge loss • Participants feeling safe • Trust 	<ul style="list-style-type: none"> • Idea development • Limit of unidirectional information • Conversations & Interactions • Collaboration • Firm-community conversations • Inability to obtain feedback on multiple aspects of product 	<ul style="list-style-type: none"> • Solving the wrong problem • Stale information • Evolution through NPD Process • Inability to get feedback before internal action taken (e.g. testing) • Inability to get new feedback after changes made • Lack of flexibility 	<ul style="list-style-type: none"> • Data management difficulty • High data volume • Identifying levels of data importance • Firm-specific evaluation • Content diverges from firm goals and strategy 	<ul style="list-style-type: none"> • Speed requirements • Lack of urgency • Lack of goals

Table 3. Types of Internet-based Collaboration for Innovation

Type of Community	<i>Crowdsourcing</i>	<i>Expertsourcing</i>
Sourcing Type	External: Outside-in	External & Internal Coupling
Purpose	Solution Seeking	Task specific relative to the product innovation process
Community Composition	Members have no relation to the focal firm	Users of the firm's product (service), members of the host firm, &/or field experts
Locus of Innovation	Crowd	Partnership: Community & Firm
Degree of Firm X Community Collaboration	Low	High
Source of Value Creation	Crowd	Interactions among and between community members and the firm
Examples	Netflix, Cisco iPrize, Lego, MyStarbucksIdea, Threadless	Yp.com (AT&T); Del Monte; Solidworks; Salesforce; NetApp; Kraft; IBM

Appendix. Examples: Expertsourcing for Innovation

Level	Mechanism	Quote / Example	Firm Source
Participation	Expert-sourcing	Core 100 experts: "these were the ones that every time we sent an email, they were on-site, signing in, participating in events; these were the ones who were more likely to share information about the site and refer friends."	AT&T
		"The great thing about the tool ... is that you know there are people who are your experts - to get them to easily evaluate something."	Hibiscus
		"We get these design partners, people who are going to really exercise. They've got experience in areas, and (we) gather requirements and directions from them, to give us feedback. It's a much more controlled process than just a alpha or beta test."	Hibiscus
		"Employees, business partners and customers cited as the top three sources of innovation in GBS (business unit) CEO studies."	IBM
		Expert community members, "are the type of people that are devoted to the (firm's) mission and the (product), and what it means to them. And so they are more than happy to voice their opinions and their concerns as well as any ideas.... You just have to have those people at the end of the day."	Marigold
		"We have a private community that's for our subscription service customers."	Sunflower
		The firm "uses expertsourcing to push back on specific ideas or resource ideas (to gain further insight)."	Daffodil
Repeated Long-term Engagement		"So that was the objective... create a safe place where our customers, employees, and partners can engage in an interactive and positive manner and promote the learning because there's so much knowledge that these customers hold, so much knowledge our partners hold."	Nasturtium
		"So in a year's time basically it went from idea to prototype to alpha product. And during that time customers were involved. The big deal to us is the view of the customer in all this."	Hibiscus
		"We reached out to several of our customers and partners and some industry experts and what came out very clearly was that they want an interactive space where they can collaborate on an ongoing basis, they can share the knowledge and the expertise among themselves."	Nasturtium

Level	Mechanism	Quote / Example	Firm Source
Process	Iterative Development	"We want to be able to get the early iterative ideas in front of the community and have them weigh in, narrow the list of ideas before taking action and moving them into the lab for testing."	AT&T
		Interactive discussion forums are used for new product development.	AT&T
		Customers used CT-based innovation tools so they could talk "among the peers [and] customers, but they can also talk to Nasturtium. They can also talk to partner communities. And partners can talk to Nasturtium."	Nasturtium
Process	Allow for Change	"Out of that (the campaigns), generally people are talking to each other that might not have ever talked before then joining forces to bring some idea forwarded.	Hibiscus
		"Collaboratize" - The term executives at the firm used to describe prioritizing innovations with the customers using collaboration throughout the entire innovation process.	Rose
		Orchid used collaboration technologies such as digital prototyping (modeling things digitally, advanced visualization, virtualization, and simulation). This has saved the company a lot of resources and money compared to creating physical prototypes.	Orchid
	Community-based Management	"The community is helping us design several different projects throughout the course of this campaign. The first one is the ultimate CAD Share. There have been probably 15 to 20 different new features or iterative features that have been added from the community."	Sunflower
		"Our goal is not that Nasturtium is going to be moderating the entire community. So our goal is that we're gonna have <i>some</i> power. Nasturtium users out there are going to handle some of the power of the community and they will be the one looking out for us."	Nasturtium
		"Solutions [are] around the world ... They're working together then to better the idea. So that's what we're using the tool for - idea management, but a big piece of it is collaboration, bringing people together and running these campaigns."	Hibiscus
		Rose executives found that the problem they were experiencing stemmed from "having the massive amount of data" that they are getting from their clients and customers across all different channels of communication.	Rose
		"We do actively monitor the forums, we do jump in at times - the time when it's appropriate... They aren't meant specifically for talking (about) new features... and we don't do direct tech support within the forums... So we have a strategy and just some guidelines we use as far as how we participate and when we participate within the forums."	Sunflower
		We don't have a system in place to take requirements and transfer them as they come... we make a note of it, then go back and exchange notes, then make sure some of the ideas are captured on the roadmap. [paraphrased]	Carnation

Level	Mechanism	Quote / Example	Firm Source
Process	Community-based Management	"One of the last projects that I mentioned is the feedback system of figuring out a way to get all of our feedback (to) database or databases... into one portal that we can search ... because we have so many different feedback mechanisms."	Marigold
		The project teams "have another tool... that enables you (to) have an evaluation team – this is called Switch Board -- that you actually send out ideas to people with an evaluation form. And they can fill out online the evaluation, and all that comes back into the system to help make a final determination."	Hibiscus
		We need some way to manage the influx of information happening: what is coming through social media information management system - to effectively manage ideas coming in. [paraphrased]	Carnation
Time-bounding		"One [content management technique] we like to use is called chip voting. We give everybody a number of chips. Maybe we give you fifty chips. And if you think one idea is just the best, then you can put all fifty chips. Or you could vote for five different ideas. You know, one with twenty, a couple with ten, and five, and ... it's just a way to get a big crowd's view of what they think is the best."	Hibiscus
		Fuscia uses contests that run for 4 weeks during which contributors go online and post their ideas. There is no voting. The CEO and Project Manager decide on top 3.	Fuscia
		"We run the campaign for a couple of weeks... and then ask for a wisdom of the crowd perspective: what do they think are the top ideas to guide the sponsor of the campaign."	Hibiscus
		"Innovation events (are used) to capture the pulse of the group or to solicit specific ideas to critical business issues."	IBM
		IBM Jams - run about 72 hours and are structured for over 20,000 users.	IBM
		InnovationJam 2006 outcome: "Clients, business partners and family members explored emerging technology for benefit of business and society."	IBM
		"Our customers will have usually about a month or so to look at what those ideas are. They can comment on things and they can also give us their opinion by voting for or against those things."	Sunflower
		Rose uses the community that comes together for a focused task and then goes away. The notion is of ephemeral or temporary communities that solves a problem and then is released. [paraphrased]	Rose

1. Firms using internet-based CT for co-innovation include Dell, Netflix, Cisco, IBM, Dupont, Hewlett Packard, Solidworks, Amway, AT&T, Starbucks, Kraft, Del Monte Foods, Salesforce, Proctor and Gamble and Facebook.

2. Internet-based CTs include discussion forums, virtual community platforms, electronic bulletin boards, virtual product design toolkits, virtualization software for product scenarios and testing, and collaboration platforms (e.g. Kaplan and Haenlein, 2010).

³. Since a detailed review of the concepts of value creation and capture are beyond the scope of this paper, our discussion highlights some of the core ideas that are relevant to our focus. For a detailed dialogue of these concepts, please see Bowman and Ambrosini (2000), Hoopes et al. (2003) and Priem (2007).

⁴. Most firms in our study agreed to allow their names to be used. In cases where firms requested anonymity, a pseudonym replaces the firm's name (e.g. Sunflower, Nasturtium, Carnation).