A Theoretical Model of User Engagement in Crowdsourcing

Triparna de Vreede[1], Cuong Nguyen[1], Gert-Jan de Vreede[1], Imed Boughzala[2], Onook Oh[1], and Roni Reiter-Palmon[1]

[1] The Center for Collaboration Science, University of Nebraska at Omaha, USA
{tdevreede,cdnguyen,gdevreede,rreiter-palmon}@unomaha.edu, onookoh@gmail.com
[2] Telecom Ecole de Management Institut Mines-Telecom
imed.boughzala@telecom-em.eu

Abstract. Social media technology has enabled virtual collaborative environments where people actively interact, share knowledge, coordinate activities, solve problems, co-create value, and innovate. Organizations have begun to leverage approaches and technologies to involve numerous people from outside their boundaries to perform organizational tasks. Despite the success and popularity of this 'crowdsourcing' phenomenon, there appears to be a distinct gap in the literature regarding the empirical evaluation of the factors involved in a crowdsourcing user experience. This paper aims to fill this void by proposing a theoretical model of the antecedents and their relationships for crowdsourcing user engagement. It is defined as the quality of effort online users devote to collaboration activities that contribute directly to desired outcomes. Drawing from research in psychology and IS, we identify three critical elements that precede crowdsourcing user engagement: personal interest in topic, goal clarity, and motivation to contribute. This paper examines the theoretical basis of these variables of interest in detail, derives a causal model of their interrelationships, and identifies future plans for model testing.

Keywords: Crowdsourcing, engagement, open collaboration, motivation, social media.

1 Introduction

The advent of social web technologies has made it feasible for businesses, non-profits, and the government to engage large numbers of Internet users in performing organizational tasks. This phenomenon is popularly known by the term "crowdsourcing" (Howe, 2006). There are many examples of crowdsourcing initiatives across various domains such as medicine (Norman et al., 2011), journalism (Fitt, 2011), art (Casal, 2011), finance (Belleflamme et al., 2010), and government (Bommert, 2010). The popularity of crowdsourcing can be explained by a number of its perceived advantages. Crowdsourcing provides a low cost and scalable way to access ideas that might be difficult or expensive to obtain internally (Cox, 2011). It can also reduce bias in collective decision making compared with small teams due to the crowd's

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diversity of opinions, assumptions, and beliefs (Bonabeau, 2009). The labor cost paid for freelancers in a virtual crowdsourcing marketplace is much cheaper than that for professionals for the same tasks (Howe, 2006). Companies perceive crowdsourcing as a means to detect trends, recognize customer needs, obtain different perspectives or confirm business intentions (Aitamurto et al., 2011; Dubach et al., 2007). Similarly, the government and public organizations are attracted to the idea of engaging with online citizens since it has the potential to increase the novelty and relevance of ideas and solutions, commitment of the citizens to accept changes, and government transparency (Bommert, 2010; Brito, 2008).

The merits of the crowdsourcing model can be traced back to an important assumption. That is, through crowdsourcing initiatives, organizations can attract an extensive number of online users to help solve problems or issues. Unfortunately, reality turns out to be otherwise – studies show that it often is a challenge to convince people to participate and seriously work on somebody else's problems through the Internet (Brabham, 2008). Consequently, the challenge of user engagement has been repeatedly mentioned in the crowdsourcing literature. For example, Brabham (2009 p. 256) asserts that "how to kick start the crowd that will be responsible for generating needed solutions" is a main obstacle to any participatory public projects. Beyond initiation, Doan et al. (2011) consider user engagement as one of the fundamental challenges in crowdsourcing projects.

Unfortunately, to date research on crowdsourcing engagement is scant (Pedersen, et al. 2013). Therefore, the purpose of this paper is to advance the scientific understanding of the factors that influence crowdsourcing user engagement. We focus our examination in this paper on the *open collaboration* type of crowdsourcing, where the final outcomes are the result of collaborative effort of all crowd members, rather than the independent individual effort in a setting such as a virtual labor market. This focus is grounded in two reasons. First, the open collaboration model has wide application for both for profit and non-profit organizations (Nam, 2010; Vukovic, 2009). Second, among the different crowdsourcing types, we will argue that the open collaboration model is the one that most effectively utilizes the wisdom of crowds.

Consequently, this paper addresses the following research question: *What are the antecedents of user engagement in an open collaboration crowdsourcing initiative?* To answer this question, we have developed a theoretical model that can partially explain the antecedents of engagement on an open collaboration crowdsourcing platform. Even though this model could potentially be applied to explain user engagement in other forms of crowdsourcing, this falls outside the scope of this paper.

Borrowing from the information systems and psychology literature, we propose that user engagement in crowdsourcing is dependent on the alignment of the topics that are being discussed with the users' inherent personal interest. In addition, we also argue that the presence of the interest in the topic is not a sufficient condition to attract and retain user engagement. This interest must be converted into a motivation to contribute. Therefore, we propose that personal interest creates a strong motivation to contribute if the goals of the crowdsourced task are clearly understood by the users and there is no ambiguity in what they are expected to do.

The remainder of this paper is organized as follows. We first discuss crowdsourcing, including the different types of crowdsourcing options that are available for organizations today. Next, we present our model of the antecedents of crowdsourcing user engagement

based on studies found in the psychology and information systems literature. Finally, we discuss the theoretical and practical implications of our model and briefly describe future plans to test this model through laboratory experiments and field studies.

2 Crowdsourcing Background

Recently, crowdsourcing has been a buzzword both in public media and academia. Despite the popularity of the term, different understandings of its meaning across the literature exist. Estelles-Arolas & Gonzalez-Ladron-de-Guevara (2012) found 40 different definitions of crowdsourcing in the literature. The most popular definition comes from Jeff Howe, who coined the term. Howe (2006 p. 1) considers crowdsourcing as a special form of outsourcing and defines it as "…the act of taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call. " In contrast, Brabham (2008) perceives crowdsourcing as a collaborative problem solving and co-production model. From the perspective of online workers, Heer & Bostok (2010 p.1) understand crowdsourcing as "a relatively new phenomenon in which web workers complete one or more small tasks, often for micro-payments on the order of $0.01 to $0.10 per task."

While different definitions extend our understanding of the phenomenon, inconsistent conceptualizations of the term can lead to confusion in identifying which applications are crowdsourcing and which are not. For example, Huberman et al. (2009) consider YouTube as crowdsourcing, while Kleeman et al. (2008) do not. Crowdsourcing can also be easily confused with other related Web 2.0 phenomena, such as social networking, communities of practice or social commerce, because on the surface all of them involve interaction and participation of individuals through the Web. It is also necessary to distinguish crowdsourcing from open innovation, user innovation, and open source application development. Compared with open innovation, crowdsourcing has a wider scope of applications (not only innovation processes) and concerns with the interaction between the firm and an online crowd rather than between firms (Schenk & Guittard, 2009). User innovation also differs from crowdsourcing in that it is initiated by users while, in crowdsourcing, it is initiated by a firm (Schenk & Guittard, 2009). Schenk & Guittard (2009) also argue that open source application development is a specific application of crowdsourcing, rather than a theoretical concept in its own right.

In this paper we follow the definition by Howe (2006) because in our opinion, it captures the most unique characteristics of the phenomenon. That is, a crowdsourcing initiative should have the following three elements:

(1) Users are producers, not only consumers: The role of online users as producers in crowdsourcing applications is a critical distinction between crowdsourcing and social commerce (Saxton et al., 2013). A common feature across social e-commerce websites is that online users go to the sites to consume finished products or services offered by firms. For example, online users access nike.com to buy or gain more information about Nike products provided by other users. In contrast, in crowdsourcing, online users contribute to the production process of the firm and the product design. For example, in threadless.com, there are two types of users. First, there are typical

online customers who browse the site to find and buy T-shirts. Second, there are others who contribute their T-shirt designs that, once selected, will be printed as products by Threadless.

In line with Kleeman et al. (2008), we also distinguish crowdsourcing with market creator websites. In market creator websites such as Ebay[1], online users' contributions are in the form of trading finished products. The website only serves as a sales channel for the sellers. In contrast, in crowdsourcing websites, online users' contributions are in the form of resources in a production process. For example, in the case of Threadless, online users participate in the designing stage of the production process. However, unlike Kleeman et al. (2008) who do not consider labor market websites like Amazon Mechanical Turk or Rent a Coder[2] as crowdsourcing, we classify them as crowdsourcing because the crowd offers a labor resource, not finished products.

(2) The number of participants is undefined: The number of participants in a crowdsourcing event is undefined, meaning that the number ranges from one to several thousand or more. Also, this number is unknown in advance but emergent. This characteristic distinguishes crowdsourcing initiatives from virtual team or distributed group work. While both crowdsourcing and virtual teams involve interactions among individuals through information and communication technologies, the number of virtual team members is typically fixed and known beforehand.

(3) Users' contributions are towards completing a specific task: This feature differentiates crowdsourcing from social networking platforms or knowledge/content sharing websites. Crowdsourcing differs from social networking platforms such as Facebook or Twitter in that interactions among individuals on the crowdsourcing platforms are towards fulfilling certain goals, while in social networking platforms, the connections and interactions are just for individuals' socializing purposes. Crowdsourcing is also different from online knowledge and content sharing websites such as Wikipedia, YouTube, or other virtual communities. In crowdsourcing, contributions made by the online users are in response to a specific request ("an open call"), rather than spontaneous or out of contributors' own will as in the online knowledge and content sharing cases.

While all crowdsourcing initiatives share the above three characteristics, not all of them require (the same amount of) collaborative effort among the crowd members. We distinguish three sub-crowdsourcing models - virtual labor marketplace, closed collaboration, and open collaboration[3].

Virtual labor marketplace

The virtual labor marketplace model refers to the online marketplace through which individuals or organizations trade human labor forces for short term projects with a temporary contract. In this marketplace, there are two main types of users: the problem owners and the problem solvers, i.e. the workers. Problem owners are either

[1] www.ebay.com

[2] www.rent-acoder.com

[3] Besides these three models, some authors also identify crowdfunding as a separate model (Belleflamme et al., 2011). With crowdfunding organizations can mobilize financial capital from a large number of people through an open call for investment. We exclude this type of crowdsourcing from our discussion, as we are interested in how to better utilize the intelligence of an online crowd, not their financial resource.

individuals or organizations who are in need of man power for some tasks. They go to the virtual labor marketplace and post their job requests on the platform so that interested workers can apply. Alternatively, problem owners can browse the list of workers available on the platform to find the ones whose profiles fit their tasks. In contrast, workers are individuals or organizations who are willing to accept job requests from problem owners. They can either search for job requests and apply to them or post their profiles so that problem owners can consider recruiting them. Unlike organizational employees who are tied to their employers by permanent contracts, the relationship between problem owners and workers in the virtual labor marketplace does not last beyond the duration of the tasks. Typically, the workers will get paid right after they deliver the task results to the problem owner.

Freelancer is a typical example of a virtual labor marketplace. On Freelancer, problem owners can search for workers for tasks such as web design, logo design, or sales and marketing. For example, a problem owner may looks for workers for a web design task. He posts the web design task on the Freelancer website with a task description and requirements. Web designers interested in the task bid for it. The problem owner can select among these bidders. Besides Freelancer.com, other popular virtual labor marketplace platforms include Amazon Mechanical Turk, Odesk, and Elance.

Closed Collaboration

In the closed collaboration model, instead of recruiting workers for tasks, problem owners post their problems as an open call for the online crowd to submit their problem solving ideas. The problem owners then determine what are the best ideas internally. In this model, organizational tasks or problems are often represented as challenges in online innovation contests. The contestants who offer the best solutions to these challenges will get rewards. In these contests, the relationship among the contest participants is that of contenders, and therefore there are no interactions between them. Because the quality of the contestants' solutions is evaluated internally by the contest holders this model is called closed collaboration. Typically, the best solutions are not revealed to the public.

InnoCentive or 99designs are typical examples of this model. For example, on InnoCentive, a group of companies operating in oil sands offered a prize of $10,000 USD for the following challenge[4]: "The bitumen produced by the Steam Assisted Gravity Drainage (SAGD) technology in the Athabasca oil sands in Alberta, Canada, is extremely viscous (8-10 API gravity), requiring the use of diluents to aid the flow of bitumen in pipelines. The Seeker is looking for novel, unorthodox approaches to enhance the flow of bitumen through pipelines." The interested contestants can submit their solutions until a specific deadline. After this deadline, the organization will review the submitted solutions and decide the winner. At the end of the contest, the winner receives the $10,000 award and the organization can use the winning solution under a "royalty-free, perpetual and non-exclusive license".

Open collaboration

The open collaboration model refers to crowdsourcing initiatives where the tasks requested by the problem owners are completed through the collaborative effort of the online crowd. "Collaborative" means that the online users complement and improve

[4] www.innocentive.com/ar/challenge/9932959 (last accessed on 22 April 2013)

on the contributions of one another towards finishing the tasks at hand, as opposed to competing with one another as in the closed collaboration model. The task outcomes in the open collaboration initiatives, therefore, are determined through the combination and synthesis of multiple contributions from the crowd members. The term "open collaboration" is used to denote the fact that the problem-solving and decision making process is open to all users, not just to the problem owners.

While instances of the virtual labor marketplace or closed collaboration models are very similar to one another, instances of the open collaboration model are diverse. Through the open collaboration model, the collaborative effort of online crowds can be used to build products. For example, in volpen.com, online users can write books together by participating in either one of three major activities: (1) start a new book by writing a 200-400 word paragraph about the main idea of the book; or (2) continue an unfinished book by adding new continuations to the book; or (3) vote on the continuations of an unfinished book. Through this process, a book is made as the aggregation of small writing pieces created and voted as the most interesting from the crowd members. Moreover, the open collaboration model can also be used to make prediction or detect trends. To illustrate, predictions for ticket sales of newly released movies can be made based on the virtual stock prices of movies on Hollywood Stock Exchange (www.hsx.com), a simulated stock market game where players can trade "shares" of upcoming movies, actors, or directors. Finally, the open collaboration model can appear in form of online discussions over specific issues. For example, through MindMixer.com, city halls can utilize online citizens in solving various municipal problems and issues by letting them (1) brainstorm ideas and solutions and (2) comment and vote to reduce large numbers of suggested ideas into a best few ideas worthy of focused attention by the government agency or public entity.

Crowdsourcing generally aims at making use of the intelligence of a large number of Internet users to solve problems. However, the online crowds' intelligence is utilized in different ways across the three models (see figure 1). Specifically, the virtual labor marketplace helps problem owners solve their problems by finding the right people for the tasks at hand. The closed collaboration helps problem owners gather a large quantity of possible solutions so that they can choose the most suitable ones among them. Finally, the open collaboration

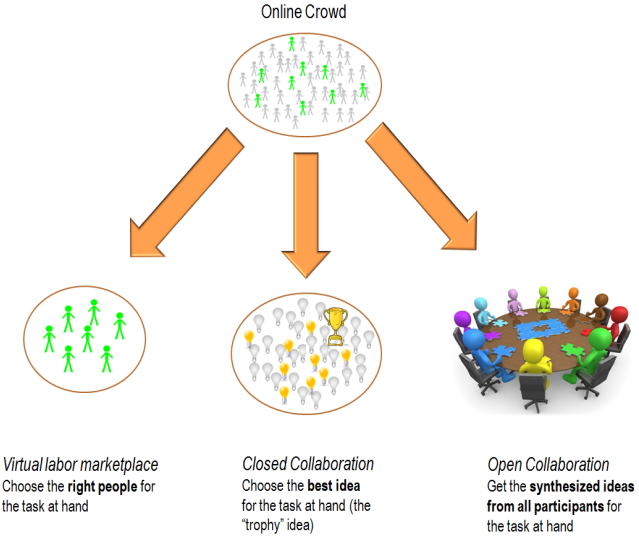

Fig. 1. Types of crowdsourcing

offers problem owners the solutions that are the synthesis of multiple ideas and refinements from the online crowd.

Among the three crowdsourcing models, the open collaboration model exhibits the highest level of sophistication because different people have different, sometimes conflicting ideas and opinions. Synthesizing these ideas and opinions typically is a daunting task. It is even more challenging in the crowdsourcing context where these people are large in quantity and dispersed demographically. However, at the same time, the open collaboration model is also the closest to utilizing the so-called collective intelligence or wisdom of the crowd (Surowiecki, 2004). Indeed, while the best outcome produced by the virtual labor marketplace or closed collaboration is equal to that of the best person in the online crowd, the best outcome produced by the open collaboration can surpass that of any person in the crowd if synergy among the crowd members is created (Surowiecki, 2004). Due to this potential of the open collaboration model, we focus our paper on this type of crowdsourcing only.

3 A Model of User Engagement in Open Collaboration Crowdsourcing

In this section we present the development of our theoretical model. In summary, we propose that crowdsourcing user engagement is driven by motivation to contribute which, in turn, depends on a user's personal interest in a topic. We also propose that goal clarity moderates the effect of personal interest on motivation to contribute.

3.1 User Engagement

Whenever there is an activity that depends on the involvement of individuals, engagement becomes a primary be positive like elation, or negative like disgust or anger. Emotional engagement can be stimulated by addressing important life themes like death, livelihood, and personal struggles. Cognitive engagement occurs when individuals engage in events that are outside their deep emotional range. They are ordinary events that may engage their attention because of the contents or novelty of the text (Wade, 1992). Finally, behavioral engagement can be observed through an individual's set of actions that go beyond what is typically expected (Macey & Schneider, 2008).

Inspite of the interest in engagement in varied disciplines ranging from education (Coates, 2005; Zyngier, 2008) and workplace (Saks, 2006; Towers, 2003) to civic engagement (Pasek, Kenski, Romer, & Hall, 2006) the concept of community engagement has not yet been well-defined (Ludwig & Frazier, 2012). Engagement in a community is usually gauged through the involvement, passion, enthusiasm, and focused effort of community members towards the issues at hand (Bobek, Zaff, Li, & Lerner, 2009). The behavioral component manifests itself as participation in the community whereas the emotional component manifests itself with the sense of identity with the community. Narrowing the focus to crowdsourcing, community engagement can be measured through active participation and identification with the

community. Therefore, in this paper we define user engagement as the quality of effort online users devote to open collaboration activities that contribute directly to desired outcomes. This quality will be quantified through (a) the degree of online participation in the form of suggesting ideas and discussing, commenting, or voting for others' ideas through social technology platforms, (b) the amount of time spent on the platform during the visit, and (c) self-perceptions of engagement by users. This engagement measurement approach is typical in the Web environment (e.g. Lehman et al., 2012).

3.2 Motivation to Contribute

Motivation is one of the most studied constructs in psychology (Meyer, Becker, & Vandenberghe, 2004; Mitchell, 1982; Ryan & Deci, 2000). To be motivated essentially means "to be moved" to do something (Ryan & Deci, 2000). It is one of the most common emotions that individuals experience before they actually engage in a task. However, it has been a difficult concept to pin down in terms of a definition. In a multi-disciplinary review of the literature, Kleinginna and Kleinginna (1981) could isolate at least 140 attempts to define motivation. One such perspective relevant to this paper was defined by Pinder (1998 p. 11) about work place motivation: "Work motivation is a set of energetic forces that originates both within as well as beyond an individual's being, to initiate work-related behavior, and to determine its form, direction, intensity, and duration."

This particular definition is significant because it associates motivation with an energizing force to commit an act. It also suggests that this energizing force determines the form, direction, intensity, and duration of the task to be committed. Said differently, this definition takes into account that motivation plays a role in how long individuals work at a task, how intensely they work at it, and the form it takes – extrinsic or intrinsic. According to Deci and Ryan's (1985) self-determination theory, individuals experience an intrinsic motivation to do something only when they find the activity inherently enjoyable, interesting, or attractive for some other reason. Extrinsic motivation, on the other hand, means that the individuals are performing the activity because they expect it to lead to a separable outcome. In the crowdsourcing context, some exploratory findings showed that user engagement was driven by both intrinsic and extrinsic motivators (e.g. Brabham, 2012; Kaufman et al., 2011). However, it is also noted that in open collaboration initiatives, online users are dominantly driven by intrinsic rather than extrinsic motivators (Bondreau & Lakhani, 2009). The literature is replete with studies that illustrate the close relationship between motivation and engagement in a variety of disciplines. In education, for example, it has been observed that students who perform activities either through intrinsic motivation or through internally propelled extrinsic motivation perform better at school work and experience less resentment towards it (Ryan & Stiller, 1991). It was also found that students who exhibited intrinsic motivation towards a task exhibited greater levels of meaningful cognitive engagement (Meece, Blumenfeld, & Hoyle, 1988; Walker, Greene, & Mansell, 2006). In addition, recent crowdsourcing research shows that participation is the highest only when the incentives satisfy the motives of the users

(Leimeister, Huber, Bretschneider, & Krcmar, 2009). Also, a study on crowdsourcing labor markets by Rogstadius et al. (2011) shows that factors that increase the intrinsic motivation of a task – such as framing a task as helping others – succeeds better in improving output quality than extrinsic motivators such as increased pay. Chandler and Kapelner (2013) also found similar results that meaningful framing of the task increases the quality of output. Therefore, we focus specifically on intrinsic motivation as an antecedent to engagement.

Proposition 1: User engagement in open collaboration crowdsourcing is a function of a user's intrinsic motivation to contribute.

3.3 Personal Interest in Topic

Another factor that we argue influences user engagement in crowdsourcing is personal interest in the topic. If users are not personally interested in the topic or issue that they are exposed to, there is little likelihood that they will stick around to make meaningful contributions, irrespective of the absolute importance of the issue. Literature distinguishes interest in a topic into two categories: topic based interest and situational interest (Flowerday, Schraw, & Stevens, 2004). Topic based interest (or topical interest) is one that is developed over a longer period of time. It is content based and stable (Schiefele, 1999). Topical interest is developed through personal experiences and emotions that give it a cognitive/affective quality that individuals carry with them wherever they go (Alexander & Jetton, 1996; Schiefele, 1999; Tobias, 1994). In contrast, situational interest is more transient in nature. It is short-lived, context dependent, and environmentally activated (Krapp, Hidi & Renninger, 1992; Schraw & Lehman, 2001). It results in spontaneous engagement that may fade as quickly as it materializes and is almost always place specific (Schraw & Lehman). This type of interest is based mostly on the novelty of the topic, curiosity, and the salience of the informational content (Wade, 1992). Situational interest may be a good way to "catch" the attention while topical interest may serve to hold the attention over a longer period of time (Hidi & Baird, 1986; Flowerday et al., 2004; Mitchell, 1993).

A review of the literature shows that topical interest has a stronger effect on deeper text processing activities like application and transfer of knowledge and on engagement towards the topic rather than on the shallow text processing activities like recognition of facts (Schiefele, 1991; Schiefele & Krapp, 1996). For example, Schiefele & Krapp (1996) found that interest in the topic results in student engagement which in turn, results in deeper processing of information. Wade et al. (1999) performed an in-depth analysis of the text factors which influence situational interest. They found that imagery, referential coherence created through connective phrases, and the salience of the information presented appeared to have most effect on situational interest. Other researchers (Schraw, 1997; Schraw, Bruning, & Svoboda, 1995) found additional influencing factors like ease of comprehension, text coherence, and relevance of information to the task at hand. These studies also highlight the importance of positive attitudes, like motivation to contribute, as they mediate the relationship between topical and situational interest and personal engagement (Schraw & Lehman, 2001).

Unfortunately, there is little research in the field of crowdsourcing on the relationship between personal interest and engagement. However, in the related field of online engagement in websites, it appears that engagement is strongly related to how personal interests are addressed by a website (Ho, Lee, & Hameed, 2008). Ho et al. found that web surfers were more engaged in activities that conformed to their own religious views than they were in activities that conformed to the traditional institutional religion. Research to date provides a basic foundation for the study of factors influencing user engagement in general. However, it is important to bear in mind that there are additional steps that occur between being interested and actually becoming an engaged crowdsourcing user. This is especially the case since the presence of personal interest does not always translate into user engagement, yet a lack of interest usually results in reduced engagement.

Proposition 2: A crowdsourcing user's intrinsic motivation to contribute is a function of personal interest in topic.
Proposition 3: User engagement in open collaboration crowdsourcing is a function of personal interest in topic mediated by a crowdsourcing user's intrinsic motivation to contribute

3.4 Goal Clarity

Goal clarity refers to the degree to which the objectives of a task are clearly stated and well-defined (Sawyer, 1992). In other words, a clear goal removes ambiguity in the instructions regarding the recipient's future course of action. Goal clarity has been shown to exert its influence on all aspects of interactions ranging from job satisfaction to a sense of well-being. At the individual level, research by Bipp & Kleingeld (2011) shows that goal clarity is positively associated with commitment towards the goal. Their results showed that goal clarity affects the level of commitment employees experienced towards their work. Teams are also more effective in their tasks if they perceive their goals to be clear. For example, Hu and Liden (2011) detected a positive relationship between goal clarity and team performance. They examined team performance and organizational citizenship behavior of bank employees and found that team-level goal and process clarity served as antecedents to team potency, subsequent team performance, and team organizational citizenship behavior. Similar results have been found at the organizational level in the form of a strong relationship between goal clarity and organizational well-being. For example, a study by Hansson and Anderzén (2009) on the organizational well-being of the upper parish management of 500 parishes in Sweden showed goal clarity had a significantly positive effect on the organizational well-being for those who had former work experience. For older employees these positive effects manifested in the form of a higher degree of engagement to work while for the younger employees, it was expressed in the form of a higher degree of perceived influence in the organization.

In the context of crowdsourcing, goal clarity refers to the extent to which instructions make it clear what users are expected to do. Even though scant data is available in the crowdsourcing context, the research on online behavior confirms the results

found in the organizational psychology literature. For example, studies examining online shopping behavior revealed that clear goals were positively related to exploratory behavior, sense of control, revisit intentions, purchase intention, and positive attitude towards web sites (Chen & Nilan, 1999; Davis & Wiedenbeck, 2001; Guo & Poole, 2009; van Schaik & Ling, 2003). Similarly, Zheng, Li and Hou (2011) demonstrated that explicitly specified tasks enable crowdsourcing users to be intrinsically motivated to participate in a co-creation process. However, we argue that goal clarity is not sufficient by itself to increase user motivation. If a user has little to no interest in the topic, even a clear goal cannot elicit high levels of participation. Therefore, it is hypothesized that goal clarity will positively moderate the effect between personal interest and motivation to contribute. That is, individuals who have a personal interest in the topic will have a higher motivation to contribute and this motivation will be even higher if the goals are clear.

Proposition 4: Goal clarity moderates the relationship between personal interest in topic and intrinsic motivation to contribute.

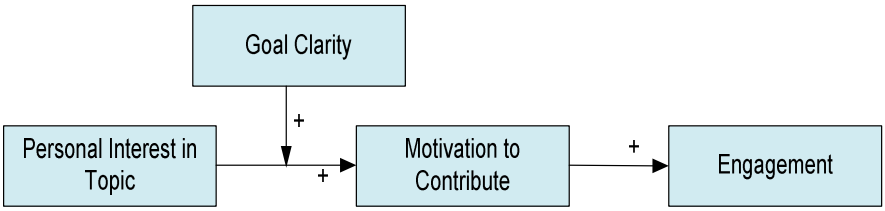

Fig. 2. Model of user engagement in open collaboration crowdsourcing

4 Discussion and Conclusion

Crowdsourcing has become a popular means to take advantage of the collective intelligence of large groups of people. It is likely that organizations soon will be looking on a regular basis towards internal and external crowds to provide solutions to their issues. However, as large as they may be, crowds still represent a finite resource. With the proliferation of organizations that use crowdsourcing, online users will be stretched thin in terms of the time and energy that they can spare towards crowdsourcing activities. Consequently, it will be imperative for organizations to understand what attracts these users and engages them to make quality contributions towards a problem. Understanding the antecedents to engagement will allow organizations to proactively stimulate the level of engagement that they can achieve from users instead of merely putting the problem forward and hoping that crowds will respond.

Interest in crowdsourcing research is on the rise and is a hot topic in many conferences and special issues in management and information systems journals. In addition, many funding agencies like the NSF and IARPA actively encourage research on crowdsourcing. However, there is scant empirical literature on crowdsourcing that

focuses on the drivers behind crowdsourcing processes. For such empirical studies to take place, models are needed that describe the constructs and their relationships with respect to key phenomena of interest in crowdsourcing efforts. To the best of our knowledge, the model presented in this paper is the first that exposes the antecedents of user engagement in social web technology enabled open collaboration. The model can guide the empirical assessment of the constructs and their relationships to determine whether crowdsourcing user engagement is, indeed, determined by personal interest, goal clarity, and intrinsic motivation to contribute.

Even though this model is among the first to posit the antecedents to user engagement in crowdsourcing, it has to be borne in mind that this model is not presented as a "complete" model. There may be additional constructs that influence user engagement that can be included in this model. For example, in an introduction to the research stream on persuasive technology, Fogg (2002) noted that the wording of computer instructions could have a persuasive effect on users' behaviors. This finding is potentially relevant to the crowdsourcing context. Thus, the model can be expanded and elaborated in future studies to create a more comprehensive picture of the relationships between user engagement and its antecedents.

Future research efforts will include testing the model in both laboratory experiments as well as field studies. To this end, we first will operationalize the constructs of the model, in particular the dependent variable, user engagement. We will further identify existing instruments or development new ones that measure crowd members' perceptions on the construct in the model. For a laboratory experiment, we plan to invite university subjects to visit a realistic crowdsourcing site, built on a professional crowdsourcing engine. The subjects will be given the impression that their contributions will be used to improve the quality of student life at their university. This will ensure that they have a fundamental level of interest in the topic. After reading the description, the subjects will have time to check the crowdsourcing website out and to leave comments, suggestions, or idea developments for the topics that will be presented to them. The conditions of personal interest and goal clarity will be manipulated. The subjects will be either given an interesting topic or an uninteresting topic. The 'interestingness' of topics will be determined through an assessment of interest levels among a representative sample of the student population with respect to a list of potential topics. The highest and lowest scoring ones will be included. Goal clarity will be manipulated by framing the goal in clear terms with clear and quantified deliverables or in vague, ambiguous terms. For a field test, we will work closely with the open collaboration crowdsourcing company MindMixer. Through an ongoing partnership with MindMixer, we have access to the participation data from users in about 300 existing open collaboration projects across the United States. Furthermore, we will have the opportunity to design interventions to test process structures and facilitation techniques to increase user engagement. As part of these interventions, we plan to collect questionnaires from crowd members regarding personal interest in topic and goal clarity so that we can examine the relationships between the constructs in our model.

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