

Organizing User Participation In Online User Community

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Abstract

User participation has been studied extensively and found to increase user satisfaction and system acceptance. However, the system development context and approach are changing, in that systems are increasingly complex and involves diverse group of distributed users, requirements are uncertain and constantly evolving, and the development methods are more iterative and flexible. These changes create challenges for traditional face-to-face user participation mechanisms, making user engagement more expensive and difficult, and yet more important. Little is known about the limitations of the traditional user participation mechanisms and how users can be engaged differently in the new system development context. The emergence of open source software movement suggests that online community maybe a viable way of dealing with the challenges of organizing and engaging users. Reviewing and bridging the user participation and online community literature, this paper proposes that organizing users in online user community, defined as a group of people who engage in regular interactions regarding a new system via a common (Internet) communication technology infrastructure, can lead to desirable outcomes such as user satisfaction with the system, system acceptance, and individuals' willingness to continue participate in the community. The research model proposes multiple mechanisms through which participation in online user community can lead to desirable outcomes.

INTRODUCTION

User participation in system development has been advocated and practiced for decades. Engaging users early in development efforts is believed to be critical for system success, and research to-date demonstrated a positive association between participation and various system outcomes (Hartwick & Barki 1994; Hwang & Thorn 1999). Traditional user participation literature assumes a small number of users who actively participate, and emphasizes on their pre-assigned responsibilities and activities. Participation often involves mandatory and formal tasks for a few user representatives, as well as face-to-face meetings and workshops. The larger population of users often participate by attending training sessions (Hunton & Beeler 1997) or do not have a chance to participate at all (Wilson et al. 1997)

Recently, the system development environments have evolved and changed, creating challenges for existing user participation practices. System development projects become increasingly complex and often have impacts that span multiple business areas. The increasing number of users, the diversity among them, and their distributed locations create great difficulty from collecting user requirements to finding ways to organize development work (Curtis et al. 1988; MacCormack 2001). For complex systems, motivating users to engage in long-term, continuous, and voluntary participation is important. Yet such participation is difficult and expensive to achieve, especially when users are not compensated for their participation time. The emergence of 'flexible' system development approach, which focuses on fast turnaround, iteration and flexibility (Baskerville et al. 2001; Bhattacharya & Krishnan 1998; MacCormack et al. 2001), places additional importance on collecting and reacting to user feedback and also adds to the challenge. The flexible development approach creates high level of uncertainty as system

requirements constantly evolve, because iterations of testing and redesigning are integrate parts of the development process. The increased uncertainty not only makes user testing and feedback more important, but also increased the cost of user participation. Interaction between users and developers become more frequent, demanding more time and effort on both ends. Often, lack of adequate information dissemination, communication, and feedback channel leave users frustrated and lack of real influence (Wilson et al. 1997). Moreover, even when certain users are involved throughout a development project, during ongoing development they would become too familiar with the project to provide new perspectives as novice users. The changes in affected user population and development context have made user participation more critical, yet more difficult.

Despite all the challenges, little is known on how users can be engaged differently in the new context. The more complex and distributed development nature calls for more flexible user participation mechanisms that can accommodate and leverage the changes in the nature of the users and in the development context. The emergence and success of open source software (OSS) movement suggests that online community maybe a viable way of dealing with the challenges of organizing and engaging users. Online communities are virtual spaces where groups of people with common interests communicate regularly. OSS communities like those of Linux, Apache and Mozilla have successfully hosted millions of developers and users distributed across the globe who work together on software development projects. As of summer 2005, there are more than 1 million registered members of sourceforge.net, the single largest repository of open source software. Most of the OSS development and communication activities occur online, and a large number of distributed and diverse users play critical roles in identifying and reporting bugs as

well as providing comments for improvements. The participating users are highly heterogeneous in terms of their demographics, motivation, and technical skills. Some of them are even developers themselves. OSS communities successfully motivate and coordinate work among these heterogeneous users and allow them to benefit from this diversity, leading us to believe that online communities could be a useful and effective way to facilitate user participation in new system development context like OSS development.

This paper proposes that participation in online user community can be an effective mechanism to engage users in system development. In particular, when individuals participate in online communities, their engagements are expected to lead to desirable outcomes such as user satisfaction and acceptance with the system. We know little work that examines the use of online user community to support user participation in system development, or on the effectiveness of such a mechanism on user satisfaction and system acceptance. Although communication technologies have been proposed to significantly reduce cost of interaction, they are not widely used in system development practices. Traditional ISD rely heavily on face-to-face meetings and workshops to engage users. Emails and phones are the most commonly used communication technologies in system development projects (Cummings & Ghosh under review). Thus online communities are rarely studied in user participation research or ISD literature in general. Online group research implied the usefulness of OUC to motivate diverse set of users and developers to participate in system development, but these research rarely examined how such participation affect users attitude and behavior associated with the central product being discussed in these communities, i.e., their focus was often on group dynamic and group success, not the product or topic being discussed. Therefore, this study aims to bridge the user participation research and online group research, in trying to understand whether and how voluntary participation in online

communities improves users' experience of system development process, and further increase user acceptance.

LITERATURE REVIEW

User Participation

Barki and Hartwick in their line of work defined user participation as 'the behaviors, assignments and activities that users or their representatives perform during information system development', including overall user responsibility, user-IS relationship, hands-on activities and communication activities (Barki & Hartwick 1989; Barki & Hartwick 1994a; Hartwick & Barki 2001). Overall responsibility refers to user activities and assignments reflecting overall leadership or accountability for the system development project. User-IS relationship refers to development activities reflecting user-IS communication and influence, such as formal user review, evaluation, and approval of work done by IS. Hands-on activity refers to specific physical design and implementation tasks performed by the users. Communication reflects the frequency of activities involving formal or informal exchanges of facts, needs, opinions, visions and concerns regarding the project among the users and between users and other project stakeholders. In brief, this definition of user participation includes all user activities related to system development and reflects the extent to which these activities occur. They also distinguish this behavioral construct of user participation from a psychological construct, user involvement, which focuses on the psychological state of 'the importance and personal relevance that users attach either to a given system or to MIS in general.' The former is an objective evaluation of the extent of development activities, while the latter relies on users' subjective assessment of the importance of these activities (Hartwick & Barki 1994).

Other researchers have offered different conceptualizations of user participation, considering different aspects including the level of influence or responsibility users have (Hunton & Beeler 1997; Ives & Olson 1984; Zmud & Cox 1979), whether participation is direct or indirect (Keil & Carmel 1995; Mumford 1979), aspects of system design that users are involved in (Hirschheim 1985; Land & Hirschheim 1983), formality of participation, and whether participation is mandatory or voluntary (Cavaye 1995; Hartwick & Barki 1994). In brief, these definitions, along with that of Barki and Harwick's work, similarly take into account the extent and type of user participation activities, the pre-assigned responsibility users have towards system development outcomes, and thus the amount of influence users have over the process. These conceptualizations also imply that the participants and system development context affect the extent and type of participation activities.

User participation and user acceptance

Practitioners' literature

Computer scientists and human factor specialists who study system design have long discovered the importance of involving users. From the 1970's and 1980's emerged various approaches aiming at improving user engagement in system developments, including user centered system design, Scandinavian participatory design, and ethnography. User-centered design focused on building usable systems. In their classic paper, Gould and Lewis suggested that early focus on users and iterative design are critical principles of system design (Gould & Lewis 1985). They believe these principles are essential for building useful and easy-to-use systems and avoiding costly features not wanted by users. These principles have been widely accepted by designers

(Grudin 1991; Kujala 2003). Scandinavia participatory design emphasized the democratic nature of user participation. The key aspect of participatory design is empowering users when they collaborate with developers, improve skills, and affect decisions made regarding system development (Clement & Besselaar 1993; Kujala 2003). Participatory design practices are generally found to lead to higher awareness of system implications, improved user learning and open communication (Clement & Besselaar 1993). Ethnography focused on the social aspect of work, aiming to understand work practices and system requirements through observing users in their natural work context, and thus systems can be used effectively. These different approaches grew out of different disciplines and used different mechanisms, and thus they focused on different benefits of engaging users: from enhancing system quality to facilitating user empowerment and learning, and to actual use of the systems.

IS research literature

Extant information systems research on user participation also shares a common belief that engaging users from early in the development process increases the likelihood of system success. Focusing on users helps designers understand what functionality is desired and what interfaces are easy to use, so that the designed systems can support work as intended and receive acceptance by users (Grudin 1991). From a theoretical stand point, the IS research elaborated the mechanisms through which user participation can achieve different benefits.

Ives and Olson (1984) conducted a comprehensive review of the literature before early 1980's and suggested a research framework describing how user participation can lead to system success, as indicated by user satisfaction and acceptance of the system. In the review, they

identified a set of things that determine the degree, type and extent of user participation necessary to build successful systems, including user characteristics, organizational characteristics, and project specific factors like type of system and stage of system development. They suggested that user participation is associated with wider system acceptance through two different processes. First, The involvement of users lead to more accurate and effective collection of user requirements, which can result in higher quality systems with features that users will value and use, which further improves user satisfaction and system acceptance (Kujala 2003). Second, user participation has an impact on participants' cognitive perceptions of the system, such as level of involvement and commitment (Hunton & Beeler 1997), understanding and expectation (Ginzberg 1981; Newman & Noble 1990), and perceived ownership (Kirsch & Beath 1996; Wu 2002). These perceptions will in turn have positive impact on user satisfaction and system acceptance. Similarly, Theory of Reasoned Action (TRA) has been applied in system development context as a theoretical basis for understanding the relationship between the cognitive impact of user participation and system success. Hartwick and Barki (1994) studied how user participation is associated with attitudes and level of involvement, one type of cognitive belief, and how these attitudes and belief, along with norms of using system, affect subsequent user decisions to use the system. In their longitudinal survey, they found that user participation is positively associated with user involvement and user attitude towards the system, which in turn lead to system use (Hartwick & Barki 1994).

Robey and his colleagues adapted the constructive conflict perspective in Planned Organizational Change literature and proposed a third process through which user participation can lead to system success: user influence (Robey & Farrow 1982; Robey et al. 1993). They suggested that

that participation is associated with user influence, the extent to which users affect decisions about final design of systems (Edstrom 1977; Robey & Farrow 1982). When users play a role in decision making, it is more likely that the final system would fit the user needs. The more influence users perceive to have, the stronger its positive effect on user satisfaction (McKeen et al. 1994). However, because different stakeholders have different goals, interests and values, allowing users to participate in system development enhances the chances that conflicts will arise both between developers and users and among users themselves. Several studies have empirically established the positive link between user influence and conflicts (Barki & Hartwick 1994b; Robey & Farrow 1982; Robey et al. 1993). On one hand, conflicts and disagreements would negatively affect project outcomes if unresolved (Robey et al. 1993). On the other hand, it is easier to resolve conflicts and disagreements when users have influence over negotiations and decisions. Robey and Farrow (1982) found that participation leads to perceived influence in different stages in system development life cycle, which leads to conflict between IS and users as well as conflict resolution. Although conflict alone inhibits system success, the resolved conflicts were found to increase user satisfaction and system acceptance.

User participation mechanisms

In traditional system development settings, a variety of mechanisms were used for user participation (Damodaran 1996; Kujala 2003). The main method is face-to-face meetings in the form of workshops, seminars, interviews, or discussion sessions. Full-day workshops or seminars are planned to offer visions of information systems and educate potential users about the need and implications of the systems. Workshops and one-on-one interviews are often conducted intensively to understand business needs and the work environments. Informal discussion and

communication opportunities between users and developers and also among users are believed to be important for problem solving, supporting user issues, and engaging in long-term relationship with particular users. Thus, having a consultation mechanism for user support is beneficial. Special workshops letting users to experiment with prototype system are often used to collect user feedback on system design and functionalities. Other methods are also used to complement face-to-face meetings. For instance, some researchers advocate observing users at their natural work context to understand the social-political aspect of work. Therefore, they usually use observation and video-recording techniques to collect system requirement inputs. Membership and role assignments are also common method to engage users. Employees are often assigned to steering committees, design teams, or problem-solving groups to take different responsibilities in system development. Separate feedback and communication mechanisms are also necessary for users to express their concern and suggestions to the developers or up to the management. Finally, formal training for all users is necessary not only for them to learn how to use the system, but to understand the value and implication of the system on everyday work processes. These mechanisms, however, are mostly based on the co-location of users and developers.

Challenges

The user participation theories, research, and mechanisms discussed so far are based on assumptions of traditional in-house systems developments. In new systems development context, many of these assumptions have changed, making it necessary to revisit the existing theories and practices to see if they are still valid. In our view, two sets of assumptions in user participation research have changed: the participating user population and the development context. Table 1 summarizes the changes in assumptions.

Participating users

One of the main differences between traditional in-house system development and new form of development lies in who the participating users are. First, in traditional in-house development projects, a small number of user representatives are often chosen to participate from the potential user population being affected by the new system. This small set can include a few expert users to help define system requirements and some less knowledgeable users for prototyping and testing. The majority of the potential system users do not have a chance to participate in the process (Markus & Mao 2004). While in new system development context like enterprise systems implementation or OSS development, a much larger number of participating users is needed. Information systems like enterprise systems are more complex and affect more organizational employees than ever (Markus & Tanis 2000), often affecting multiple functional areas, departments, and local branches. Therefore, developers will need to engage more users in attempts to understand business needs. In development context that is constantly evolving and the requirements are uncertain, comments and feedbacks from any existing user or potential user are important. As a result, the potential participant population includes all users affected by the product, which is in contrast with the small set of representatives in traditional information system development. As the size of participant increases, traditional way of face-to-face meetings or observations may not be sufficient to deal with the level of interaction necessary among participants and developers.

Second, traditional user participation research assumes that users are within an organization, and therefore they are relatively homogenous in terms of system needs, demographics, and

knowledge (Grudin 1991). However, newer types of development approaches affect diverse sets of users who span across departments, organizations or even nations. Organizational users of enterprise systems come from multiple workgroups and locations and therefore have different background, interests and needs. End-users of software applications are even more heterogeneous because they do not share an organizational identity. For instance, the technical efficacy of OSS users varies greatly, and some of the users are developers themselves. These highly knowledgeable users can help novice users solve problems as well as provide valuable comments and suggestions for future software design. Also, these expert users expect different benefits from participating than novice users (Sproull et al. 2005). The increased level of diversity among users creates higher challenge of incorporating and negotiating among the different views and requirements from users. Traditional project meetings may simply result in chaos and leave conflicts unresolved and users unsatisfied.

Insert Table 1 about here

Third, traditional ISD research assumes that system development occurs within organizational boundary and users are internal employees. This implies that users are co-located with developers and are easy to access when developers need input from them. However, this may not be true any more since work is increasingly being distributed and complex information systems like ERP or SCM systems often transcend geographic boundaries. Organizational employees can be scattered in multiple locations, making it difficult to communicate and develop mutual understandings among them. This is even more true for open source software projects, as end users and developers can be located anywhere in the world and never meet in person. The distributed nature of work makes organizing traditional face-to-face meetings costly and difficult.

Development Context

Another main set of assumptions associated with user participation literature are related to the system development context, including the stage of development process, development methodology, system development goal, and forms of user engagement. First of all, in traditional in-house development, users are mostly involved in the early stage of requirement definition. Although user testing is also part of user participation activities, it is not substantial. Therefore, users mainly participate to help define business needs and system requirements, i.e., to determine what features the system should have and the system interface. Traditional user participation methods thus focus on allowing developers to collect user requirements efficiently and effectively early on. In package software implementation or OSS development, however, users typically do not get involved until a functioning system or prototype is already built. In enterprise systems implementation, user participants mainly help determine how a system should be configured and installed and how local practices should be changed to fit the system (Kawalek & Wood-Harper 2002). In OSS development, users try out the new software application and can participate actively in later development stages by providing feedback, submitting bug reports and suggesting improvements. Therefore, UP mechanisms need to reflect these changes and shift focus from collecting user requirements at early stages to motivating, soliciting and facilitating user feedback throughout the process.

Second, the traditional waterfall approach for in-house system development is highly structured and focuses on planning ahead. Changes to the initial system design plan are discouraged, and thus user engagement and feedback in later stages of development process are minimal. The

recent emergence of flexible system development approach emphasizes rapid turnaround, iterative design and testing, and ability to incorporate feedback and changes quickly (Bhattacharya & Krishnan 1998; MacCormack 2001; MacCormack et al. 2001). Changes are constantly incorporated and reflected in design improvements. This is much similar to OSS practice, where software is constantly evaluated, fixed and improved, creating the need for continuous user evaluation and feedback.

A direct consequence of different development methodologies is reflected on the style of interactions between users and developers. Because the traditional waterfall approach focuses on early planning, users interact with developers at early system design stage to define business requirements. This implies that such interaction is sporadic, and ends when developers decide that they have collected enough information from users and a system design is completed. On the other hand, the flexible approach focuses on iterations and changes, making long-term, ongoing interaction with users critical to the development process. Traditional participation mechanisms may not be sufficient to engage such long-term interactions. It has been suggested that the longitudinal nature of Scandinavia participatory design has been largely ignored in common UP mechanisms (Kujala 2003), making it difficult for developers to build collaborative relationship with users and users to learn enough about system development to make meaningful contribution.

As in-house developments are governed by organizational goals and rules, an important goal of traditional in-house development projects is often meeting time and budget constraints. Thus, user participation is enacted in a way to maximize efficiency of the development process. Cost of engaging users should be minimized while collecting accurate business requirements. This

perspective often downplays the importance of users, implying that low level of user-developer interaction is desired. On the other hand, new approaches of system development like OSS development mainly aim at ensuring product quality, acceptance and diffusion, and therefore place a higher emphasis on user needs and user satisfaction. Nowadays, organizations also increasingly realize the importance of user acceptance to achieving business value of new information systems, since much investment is wasted when users resist information systems (Robey & Boudreau 1999). User satisfaction or acceptance has been viewed as importantly as project performance measures, such as meeting budget or time estimates.

Lastly, user participation in traditional development projects is often mandatory. Although users may not be required to engage in certain activities, they are assigned with roles and responsibilities which link their work evaluation with their participation behavior and system outcomes. In this sense, organizational roles require them to participate and take responsibilities in system development. Moreover, use of system can also be mandatory in organizations, leaving little space for users to make their own decisions. The typical participation mechanisms therefore focus on how to facilitate developers in designing system and pay little attention to users' experience. For system users outside an organization, however, there is no organizational incentive. Users make conscious decision on whether they will participate in development or eventually use the system. Effectively engaging voluntary user participation, which can lead to higher satisfaction and acceptance, therefore becomes more important. For instance, OSS developments largely rely on users' voluntary participation to survive and succeed (Mockus et al. 2002). As a result, participation mechanisms in this kind of context need to do a much better job at attracting potential users, involving them, and ensuring they will adopt the system in the end.

Summary of Changes

In sum, new types of system development like that of ERP and OSS often involves a larger population of potential users, and these users are highly diverse in terms of backgrounds, roles, purposes, and geographical locations. The distributed nature of these users adds to the difficulty of collecting information from them, negotiating conflicts, and reaching consensus. System acceptance is given higher priority than traditional in-house settings, when participation and use of system is often voluntary. New system development context creates a need to involve users at later stages of system development as well as early stages. System development approach becomes less structured in recent years, focusing on ongoing, iterative evaluations and changes, increasing the importance for ongoing interaction between developers and users.

There needs to be better user participation tools in order to cope with these changes in assumptions, as traditional mechanisms may become inadequate. In the following sections, we propose online user community as a way of facilitating participation in the changing environments, attenuating some of the challenges brought about by the new development environments, and allowing benefits to be achieved effectively and efficiently. In particular, we discuss how online user community may be an effective mechanism to bridge the gaps.

ONLINE USER COMMUNITY

This idea of using online community as a tool to facilitate user participation is motivated by the advance of open source software (OSS) movement, where most development activities are carried out through electronic communication by a group of developers and users distributed

throughout the world (Lee & Cole 2003; Mockus et al. 2002). From many examples of OSS projects such as the case of Linux and Mozilla, it seems that online community provides an effective and efficient way to coordinate large number of participants in a new type of software development work.

Defining Online User Community (OUC)

Online community in general has been defined in many different ways. Preece (2000) suggested that an online community consists of four key factors: people who interact socially; a shared purpose that provides a reason for the community, policies that guide people's interactions; and computer systems to support and mediate these social interactions. Ridings and Gefen defined virtual community as "groups of people with common interests and practices that communicate regularly and for some duration in an organized way over the Internet through a common location or mechanism" (Ridings & Gefen 2004). Rheingold suggested that online communities experience is getting together and doing everything in virtual cyberspace (Rheingold 2000). Some technical definitions of online communities simply define them based on the supporting technology, such as bulletin boards, Usenet newsgroups or web-based forums (Preece 2000). It seems that all these definitions somehow emphasize on a group of people with common interests or purposes, their regular interaction, and the form of interaction as supported by electronic communication technology.

Therefore, for the purpose of studying system development, we define online user community as a group of people, including mostly users and IS developers, who engage in regular interactions regarding a new system, via a common (Internet) communication technology infrastructure. Here

we emphasized four key components of such an OUC: people are the participating users and developers within the community. The technology infrastructure is the means and technology they use to interact. The interaction is the extent and type of their communications and interactions with each other. Finally the shared interest is the system being developed. Following this definition, we define online user participation as interactions in online user community, which is the extent and frequency users communicate and interact with developers or among themselves regarding the system, using communication technology. Like the traditional construct of user participation, online user participation reflects what behavior occur in online user community, how much of these behavior occur, and how often they occur. The participants in the OUC, their purposes, and forms of interactions all play into how online participation may affect user experience and perception of the system.

Advantages of online user community

Unique characteristics of online user community offer great advantages in addressing the changes in user population and development context. There are two main differences between OUC and traditional user participation mechanisms: first, online user community is enabled by communication technology. Second, it engages users in a group.

Online communication technology facilitates participation

Online community members interact through communication technology over electronic network (Cummings et al. 2002; Lee & Cole 2003; Ridings & Gefen 2004), which releases the constraint of traditional face-to-face meeting that only people in the same place at the same time can participate and interact. As the advance and standardization of the Internet technology, such

network can be accessed from anywhere, any time, by anyone. The archive feature of asynchronous communication over electronic network allows anyone to access prior conversation history, which further removes the constraint of time. Communicating over the network is easy to learn when people are getting familiar with various standard online interaction tools such as email, BBS, newsgroups, Instant Messaging, etc. Hence, OUC offers a highly accessible and easy-to-use channel for users to talk to developers and among themselves without being constrained by time or location. As users and developers are increasingly located away from each other, OUC offers a handy alternative to traditional face-to-face meetings. The most commonly used communication technologies to-date are mailing lists, newsgroups and web forums.

Cost of the communication technologies also decreased dramatically when reliability continuously improved. While Internet technologies become standardized, cost of software and network is increasing negligible. Low cost communication infrastructure can allow many users to engage in interactions and conversations on a frequent, ongoing basis. As a result, many open source communities and online support groups use Internet infrastructure to accommodate large number of participants with diverse backgrounds and opinions (Galegher et al. 1998; Lee & Cole 2003; Mockus et al. 2002). Electronic network and communication technologies enabled a level of interaction not possible before. For instance in Apache project, although most of the development work and message volume are contributed by a small core of 10 to 15 people, a much larger group of over 2000 peripheral users exist to report problems (Mockus et al. 2002). This level of mass participation is hard to imagine or coordinate offline.

Electronic communication also enables more participation options that individuals can choose from, which is essential when the individuals have very different backgrounds, interests and goals. An interesting phenomenon found in user communities, including open source communities, is that the role distinction between users and developers are blurry. Many times, an initial idea of a software grows out of the personal needs of users themselves (von Hippel 2005). Although most of the participants in an open source software communities are users, some of them are highly skillful and motivated to take the role of developers. The levels of technical efficacy, knowledge, and motivations of the participants can therefore vary greatly. Accordingly, OUC can offer many ways a participant can be involved in the community to meet their different needs. OUC can allow individuals to participate anonymously, providing a psychologically safe environment to share experience and express opinions (Galegher et al. 1998). Enabling non-anonymous posting, on the other hand, allows participants to gain recognition and visibility for their contribution (Constant et al. 1996; Moon & Sproull 2000). Also, communities can use different technologies to allow either asynchronous or real-time conversations, or sometimes both, to achieve different level of interactivity. For instance, mailing lists and BBS are typical asynchronous communication infrastructure, while chat rooms and Instant Messaging (IM) allow real-time interactions. Moreover, members can choose to participate actively by posting messages, silently by reading, or participate privately by sending messages to selective members. Most online communities provide some level of record keeping, logging all postings and keeping them for a period of time. This allows individuals to read and observe conversations in online community without actively posting, while still benefit from others' interaction. In brief, OUC provides a much wider range of participation possibilities to interested users compared to the traditional participation methods, and therefore allows a greater degree of diversity among

participants.

Community practice governs participation activities

Engaging users in a community can help deal with several challenges in system development context. It is often hard to motivate users to engage in development when users are not required to spend time in the process, for instance when the reward systems are not directly associated with participation in development projects. Even when users are motivated to contribute, there is often no clear mechanism for them to engage in development after the initial requirement definition solicitation (Wilson et al. 1997). Participants in online community, on the other hand, self-select themselves to join the community. The voluntary nature of contribution in online communities implies that participants are already interested or motivated. Rather than being required to be part of system development, the online community participants are 'helping' with the development process out of their own will. Moreover, community members are governed under normative pressure such as group norms, culture and beliefs. These members can be motivated by their psychological attachment to the group (Constant et al. 1996; Cummings et al. 2002; Wasko & Faraj 2005) besides personal, tangible benefits. Thus, OUC can create group motivation and normative pressure for individuals to contribute to system development. Involving users in a group can also promote the atmosphere of help, facilitating the development of altruism and reciprocity, which create additional incentive to participate.

Meanwhile, a community offers a designated space for long-term, ongoing interactions instead of infrequent interactions as in traditional system developments. It is usually hard to establish long-term interactions in traditional in-house development because there lacks formal feedback

mechanism for users to convey their opinions and suggestions back to the IS staff or to the managers (Wilson et al. 1997). Many times, users feel frustrated because they have no channel to contribute their ideas even though they are motivated to do so. Although traditional ways of user participation allow few selected user representatives to contribute business domain knowledge and provide feedback after trying out prototypes, there is rarely means for them to provide other comments after the planned workshop and seminars are over. OUC provides an easily accessible space for all users to voluntarily share their thoughts and express their voices, allowing them to communicate to others at their own pace, anytime during the project or even after the development project. The users participating in the community may change, as old users leave and new users join, but the boundary object of the community, i.e., the system, ties members together through interactions over electronic network (Baym 2000). Furthermore, the long-term presence of an OUC can accommodate the constantly changing and evolving nature of new development approaches which are increasingly iterative. An OUC enables collection of user feedback whenever change is necessary. In addition, because participating users in an OUC may change over time, there will always be new perspectives from the users, which further facilitate changes and innovations.

HYPOTHESES

Combined together, the user participation and online community literature suggest that engaging users in an online community for system development can provide a unique mechanism that not only delivers the benefit of user participation, but also provide additional benefits of developing long-term user commitment in a group. Individuals' participation in online user community can in various ways increase their satisfaction with the community and the system which the

community is about. When participating in an online user community, the individuals are automatically involved with the system development process. Therefore, these participating users are more likely to feel satisfied with the system. Furthermore, such participation in an online community has the potential to both increase the level of ongoing contribution to the community and thus the system development process, and increase the level of acceptance among participants.

System quality

IS researchers believe that one goal of having users participate is to accurately and effectively gather user requirements, and thus build better quality systems with the features that users will value and use, which leads to higher user satisfaction and system use (Doll & Torkzadeh 1989; Ives & Olson 1984; Powers & Dickson 1973). User participation is often advocated to enhance system usability by enabling better understanding of user need, and getting timely feedback on testing through prototyping and iterative design (Kujala 2003). Empirical studies have demonstrated the positive association between user participation and system quality, which further increases user satisfaction and system use (Hwang & Thorn 1999; Kujala 2003; Pettingell et al. 1988).

Much online community research has examined the benefits for individuals to participate in online communities (Constant et al. 1996; von Hippel & von Krogh 2003), with the assumption that individuals participate when their personal benefits outweigh the cost of participation. Specifically, research on online communities have demonstrated that participation in online groups facilitate information exchange among members (Cummings et al. 2002; Ridings &

Gefen 2004). In particular, an online user community not only allows users to receive information and knowledge about the system (Cummings et al. 2002; Lakhani & Hippel 2003), but also facilitate the collection of user feedback, for example receiving bug reports and getting suggestions for software improvements (Raymond 2001; von Hippel 2005). The electronic nature of online user community also enables individual to participate anytime at any place, opening up the opportunity of participation to a much larger and more diverse audience.

As a result, users participating in online user community will help develop systems with both better quality and closer fit between their personal needs and the system features (Lakhani & Hippel 2003; von Hippel 2005). Findings in open source software projects suggested that the information, ideas, and suggestions collected online from the user population are crucial for project success (Mockus et al. 2002). Therefore, we expect that like traditional user participation mechanisms, participation in online user community will also lead to better system quality, which in turn increases user satisfaction about the system and acceptance of the system.

H1: System quality mediates the positive relationship between online user participation and user satisfaction.

H2: System quality mediates the positive relationship between online user participation and system acceptance.

User influence

In user participation literature, user participation is also suggested to increase user influence, the extent that users affect decisions about final design of systems (Edstrom 1977; Robey & Farrow 1982). Influence, in turn, may lead to perceived success when communication is effective.

Similarly, participants in online community gain sense of ownership and control (Lakhani & Hippel 2003; Moon & Sproull 2000), which can be viewed as private value received by active contributors (von Hippel & von Krogh 2003). Individuals contributing to online community also expect higher visibility and reputation benefits for their work (Constant et al. 1996), which may also increase their influence in the community.

Thus, active participants in online user community can expect to feel more influence over the community and also over the main community activity: the system development, than less active participants. According to perceived justice theory, when individuals perceive they have influence on the outcome of a decision, they are likely to perceive the decision making process as fair and are more likely to feel satisfied (Hunton & Beeler 1997). Therefore, users who perceive high influence on the system development outcome should be more satisfied with the system (McKeen et al. 1994; Robey & Farrow 1982; Robey et al. 1993). Hence we expect that perceived user influence will be another mechanisms how participation in online user community can increase user satisfaction.

H3: Perceived user influence mediates the positive relationship between online user participation and user satisfaction.

Commitment & Involvement

Defined as the psychological state of how users believe the system is important or valuable, user involvement is often found to mediate the relationship between participation and user satisfaction (Hartwick & Barki 1994; Kappelman & McLean 1991; Swanson 1974). Hartwick and Barki (1994) showed in a longitudinal survey that user participation is positively associated with user

involvement and user attitude towards the system, which in turn lead to system use. In their qualitative study, Kirsch and Beath (1996) examined user participation patterns across eight cases and found that although participation pattern does not affect task-system fit or user satisfaction, it is associated with clients' psychological involvement and identification with the system.

Similarly, commitment in online group literature is often defined as the psychological attachment to a group and reflected in members' identification with the group. As opposed to the often mandatory nature of traditional user participation, participation in online community is mostly voluntary. Ongoing, voluntary participation in an online community can often lead to adjustment to community structure, norm, values and the development of a feeling of commitment and attachment (Blanchard & Markus 2004). When the experience in an online community is satisfactory, some participants develop psychological attachment to the community, feeling that they are part of the community, identify themselves with other members in the community, and are emotionally connected to it (Blanchard & Markus 2004). Often, the small set of participants who contributed most actively to a community are the ones who develop such attachment. Studies of online self-help and support groups showed that active participants are more identified to other active members and more committed to the group than less active members (Cummings et al. 2002; Hertel et al. 2003; Moon & Sproull 2000). These committed members gain higher level of community benefit from participation, and they are more likely to behave according to group values and norms and feel satisfied with their experience (Sproull et al. 2005; von Hippel 2005).

Because an online user community is built around a system development process, user participation in the community can indirectly increase their level of identification with the system through establishing their attachment to the community. The concept and measures of identification in the group literature are very similar to those of user involvement in information system development literature. Therefore, this feeling of identification, just like user involvement, should mediate the impact of participation on users' satisfaction and system acceptance.

H4: Identification with the system mediates the positive relationship between online user participation and user satisfaction.

H5: Identification with the system mediates the positive relationship between online user participation and system acceptance.

The group research suggested two different bases for attachment to a group. Individuals can be attached to a group because of its topic or because of its other members (Prentice 1994; Sassenberg 2002). Therefore, some people may identify with a group because their interests are aligned with the interest of the group, while others are committed to a group because they identify with other members in the group regardless of the topic in the group. This suggests that high level of participation in online user community can be associated with both identification with the system (the topic) and identification with other members in the community. Because commitment is often reflected in repeated participation, we expect both type of identification will increase users' intention to contribute to the community in the future.

H6: Identification with the system mediates the positive relationship between online user participation and users' willingness to continue participating in the OUC.

H7: Identification with other OUC members mediates the positive relationship between

online user participation and users' willingness to continue participating in the OUC.

Satisfaction, willingness to contribute and system acceptance

System success have been conceptualized and measured in many different ways. Two commonly used constructs of system success are user acceptance and user satisfaction, and they are often found to be correlated. Because the expected benefits of new IT system cannot be realized without user acceptance and usage, user acceptance is an important indicator of success especially when use of new system is voluntary (Hartwick & Barki 1994). When system usage is mandatory, however, system usage may not be a true indicator of system acceptance. Therefore, psychological measure of a user' level of satisfaction with the system has been another widely used indicator for system acceptance when usage data is not attainable or unreliable. The level of satisfaction is often found to be associated with intention to accept and acceptance behavior (Hwang & Thorn 1999; Kujala 2003).

H8: User satisfaction will increase the level of system acceptance.

When users are engaged in an online community, their contributions to the community activity are in fact participation in the system development process. Users' intentions to engage in the system development process in the future reflect their current interests and beliefs in the system. Therefore, the wiliness to engage in the online user community in an ongoing basis is expected to be positively associated with the users' level of system use.

H9: Willingness to contribute to OUC will increase the level of system acceptance.

 Insert Figure 1 about here

CONCLUSION

This paper proposes that online community, a practice seemed typical for open source software development and online health support, can encourage effective user participation in information systems development. This new mechanism of user participation provides a low-cost and low-barrier channel as well as a long-term, ongoing environment for users to be involved in system development process. The proposed research model outlines different ways participation in online user community can increase satisfaction of the users as well as system acceptance. An empirical test of the model can have practical implication for system development project managers. Effectively involving users in system development and benefiting from user-developer dialog are still problematic issues, and managers struggle to do the right things regarding whom to involve, how to engage them, how much is appropriate, and what kind of infrastructure and resource is necessary to support user participation (Wilson et al. 1997). Evidence of the validity of this research model will reveal whether online community can be an alternative way to engage users effectively and facilitate user acceptance, which will provide useful hints to managers responsible for system acceptance and diffusion.

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TABLE 1**Comparison of User Participation assumptions in old and new context**

Dimension	Variables	Old	New
User	Size	Small	Large
	Heterogeneity	Low	High
	Distance	Co-located	Distributed
Development Context	Voluntariness	Mandatory	Voluntary
	Frequency of interaction	Infrequent, sporadic	Frequent, ongoing
	Stage	Early	Late
	Development method	Structured, inflexible	Flexible, iterative
	Goal	Efficiency (time and budget)	Acceptance

FIGURE 1
Research Model

