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Building Interpersonal Relationship Development Support for an Online Research Community

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Abstract

Although online communities have been thought of as a new mode of collaboration in the scientific world. They suffer from the problem of motivating members to visit and contribute regularly. The main purposes of this study are to explore factors that contribute to online relationship development and to design and evaluate system features to encourage relationship development. This extended abstract first presents the research motivation in introduction section. A theoretical framework to guide the work is described, based on theories from the computer mediated communication field. A field study and the system design based on the framework is then introduced, followed by the research methodology that will be used to evaluate the effectiveness of the framework and the communication features based upon it. Finally, the research timetable will be presented.

Introduction

In the 21st century, the Internet is not only an information-sharing place. More importantly, it is a social technology that connects people together regardless of time and location limitations. Various kinds of online communities have evolved on the Internet as one of the outcomes of this new social technology. A group of people who share similar interests and exchange information and ideas via computer networks is called a virtual community or online community (Rheingold 1993).

This new mode of communication has changed the structure of connections among scientists and the way new knowledge is disseminated. However, online research communities have a problem attracting people and keeping them as actual contributors. The main purpose of this study is to explore factors that influence the online interactions in a knowledge sharing community.

Scientists are not just independent individuals who do research in laboratories. Communication is the essence of science; in some scientific fields, over 65% of publications are jointly authored. Scientists exchange their ideas within the scientific community; the product of this exchange is new information and new research ideas. In conducting research on these new ideas, scientists need to communicate with their colleagues or other scientists in the same area to solve the problems they encounter. Research done by Kraut and his colleagues (1990) showed that informal communication is an important mechanism to help achieve both the production goals and the social goals of groups. Finally, scientific information must be disseminated to become scientific knowledge; a scientific contribution cannot be fully appreciated unless the scientist communicates his/her thoughts and ideas to other scientists (Garvey 1978).

One of the direct outcomes of communication is interpersonal relationships. Before the Internet and computer networks, communications among scientists were usually through journal articles, annual conferences in the field or informal meetings in the local area. It was difficult to communicate with other scientists who had similar research interests but were located in a remote place. The degree of communication and collaboration was very limited because of spatial and time restrictions. However, with the Internet, it is now possible to communicate with people throughout the world. This also creates a good opportunity for scientists to communicate with each other in a much easier way.

Hiltz's (1984) study of scientific research communities using a computer conferencing system as a communication medium found that by using the system, scientists broadened their contacts with others in the same domain and increased their communication across disciplines; they gained a better understanding of others' work; and they obtained more clarification of theoretical and methodological controversies. In terms of productivity, the results showed that the more time spent online, the more likely users

reported increases in quality and quantity of work they accomplished. Star & Ruhleder (1996) studied a geographically dispersed online community of geneticists. The results show that collaborations among scientists may take place across disciplinary or geographic boundaries.

Although theoretically the online community provides a promising opportunity for scientists to collaborate, in the real world this does not always happen. The question is "if you build a community, will users come? Will they stay? Will they participate?" "*Technology may support a knowledge sharing environment, but getting users to participate in effective ways is key*" (Braezlton & Gorry 2003, p23). Can we use technology to encourage the development of a knowledge sharing community? In the next section, a framework of factors that contribute to online relationship development will be presented. We are going to evaluate this framework with an online research community. The community system features that are based on the framework will be discussed in the "Field Study" section, followed by results of the preliminary study based on current features.

Research Framework

Why are interpersonal relationships important to online communities? People who come to an online community are not just seeking information; more importantly, they treat it as a place to meet other people, to seek help, support, friendship, love, etc. In another words, they are driven to develop social relationships with other people inside the community. Thus, it is very critical for an online community to help its members establish interpersonal relationships. This is so crucial that it directly affects the satisfaction of its members, and satisfaction is a potential predictor of continued participation in the online community; from the system aspect, it is a crucial factor for the continued use of the system (Kiesler et al. 1985; Rockart & DeLong 1988)

Relationships are established through interpersonal exchange. In order to develop relationships, People previously unknown to each other must become acquainted with others by forming simple impressions of others through communication. In the face-to-face (FTF) condition, this process is very easy, people can just meet and introduce each other, have a casual talk and they will get an impression about the other person. In an online environment, it is harder to get a clear impression in a very short time of the person you communicated with. In the online world, we cannot see the other person in most cases (except for the video conferencing feature), nor can we use all the nonverbal cues, such as the expression on the other person's face, the movement of the body, or the gestures. However, it is not impossible to make friends in online environments. People were found to establish friendships in Internet Relay Chat (IRC) (Reid 1991); in commercial online services (Van Gelder 1985); in virtual reality systems (Reid 1995); and also in asynchronous Usenet newsgroups (Parks & Floyd 1996).

Based on social presence theory (Short et al. 1976), people communicating via computer mediated communication (CMC) have less capability to convey the presence of communicating participants. They perceive less communication context and interpret less meaning from the conversation. "*Without nonverbal tools, a sender cannot easily alter the mood of a message, communicate a sense of individuality, or exercise dominance or charisma… Communicators feel a greater sense of anonymity and detect less individuality in others*" (Kiesler 1986, pp.48). However, Korzenny (1978) proposed that communication through electronic media creates a feeling of greater propinquity with others, regardless of their actual geographic dispersion. Such "electronic propinquity" might be expected to foster friendships, as traditional propinquity is known to do (see also Walther 1992). Because of the text-based characteristic of the CMC environment, the way that people can feel the presence of others is through awareness of others' postings and their activities. Systems that provide perceptually-based social cues which afford awareness and accountability are called "Socially Translucent Systems" (Erickson et al. 1999). Results from Erickson and his colleagues' study about socially translucent systems show that making people and their activities visible to others will potentially fostering learning, intuition and empathy; it will also foster feelings of responsibility and accountability as people become aware that others are "looking" at them. Thus, a system with "Socially Translucent" features will help users to be aware of each other and encourage their relationship development.

In order to explain the difference between Computer-Mediated Communication (CMC) and face-to-face communication, Walther (1992) presented social information processing theory, which argues that the difference between the two media is rate of transmission. It states that social identity and relational cues can be transmitted by plain text, but this occurs at a slower rate than would occur in a richer channel such as voice, or a face-to-face meeting. Thus, CMC relations should require more time for social information to get through (summarized from Whitworth 1997, p88). Social Information Processing theory predicts that over time computer mediation should have very limited effects on relational communication, as users process the social information exchanges via CMC. This theory tells us that when studying relationship development in a CMC environment, we need to have a longer study interval to effectively observe social information exchange. A short-term experiment is seldom effective in relationship development studies.

As CMC is a new interactive medium, it is extremely vulnerable to start-up problems and discontinuity (Markus 1987). From an individual point of view, when thinking about whether or not to adopt a new medium, it is very likely that a person won't use it unless there is already a sizeable number of his or her communication partners using it. Researchers have referred to this as "critical mass" (Bair & Mancuso 1985; Culnan & Bair 1983; Hiltz 1984; Hiltz & Turoff 1978; Rogers 1986; Uhlig et al. 1979). For online communities, the critical mass theory tells us a community thrives only if there are sufficient people and enough activity to make it attractive and worth-while (Markus 1987, 1990; Morris & Ogan 1996; Rice 1994).

It is reported that lurkers make up the majority of members in online groups (Mason 1999). Nonnecke and Preece (2001) did a study to explore reasons why lurkers lurk using structured interviews. Their results show that the most mentioned reasons for lurking include willingness to be anonymous, concerns about privacy and safety, work related constraints, too many or too few messages to deal with, quality of messages (e.g. off topic), shyness about public posting, and time restriction. Some of these reasons stem from the medium's characteristics; others are from people's subjective perceptions. Both factors influence the way people behave online. Researchers find that users' skeptism towards the CMC environment (Utz 2000) and their expectations for the CMC environment (Hiltz 1884; Utz 2000) will influence their relationship development online.

Based on the discussions above, we present a framework for developing interpersonal relationships online.

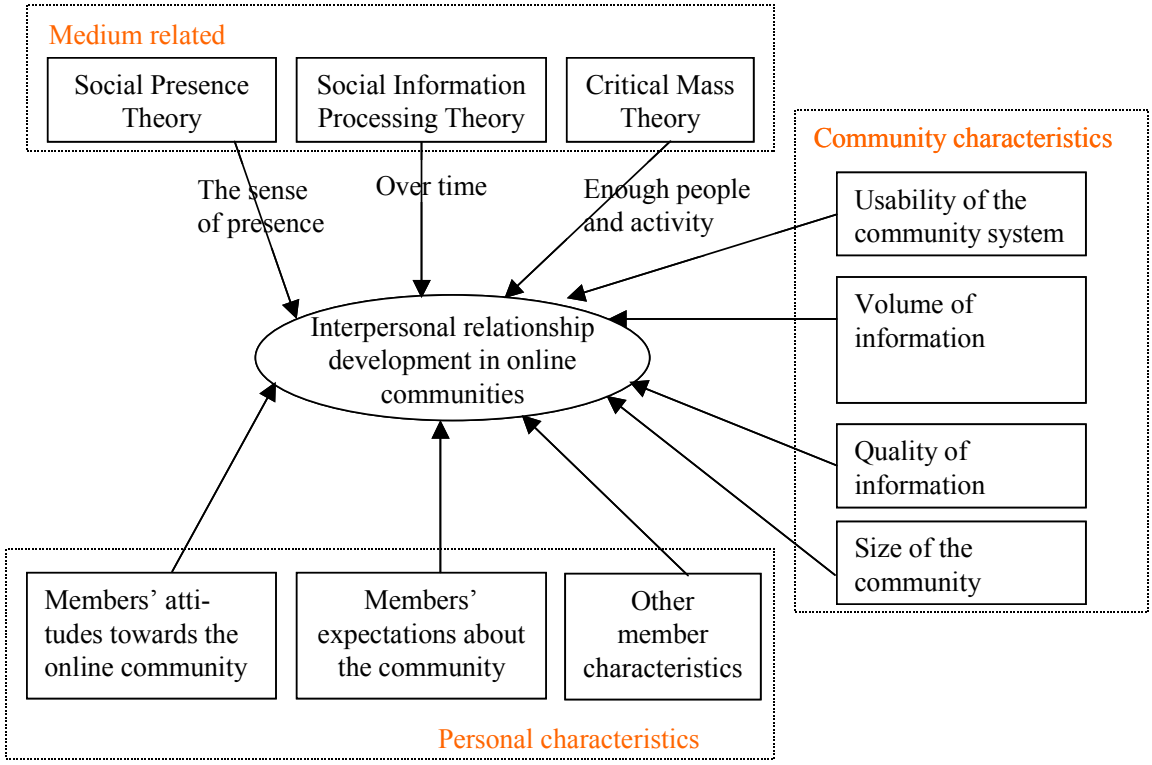

Figure 1. Framework for Online Relationship Development

Based on the framework, from a system point of view, we can build features that increase the social presence in online communities, encourage people to participate online, and also create strategies to advertise the community and increase activity to help the community reach its critical mass and help members to reach their goals.

Research Plan

In order to explore the impact of various factors on members' engagement in online research communities with consideration of the time variable, I am going to conduct a longitudinal field study on an online research community. The virtual space of this community is a website, which is a pull-based technology. First, more detailed research propositions and research questions will

be discussed, followed by the introduction of research site, site system design and research methodology. For data collection, all the usage data of the community site will be logged, and a survey questionnaire will be distributed to members in the community to ask for user perceptions about the community and the system followed by a semi-structured interview with selected users.

Research Propositions and Research Questions

Based on the proposed research framework, the following propositions with derived hypotheses and research questions are introduced.

Given: .With more awareness of other members in the community, people will get to know more about other members and have more sense of community; on the other hand, people are more likely to establish their social reputation inside the community. Making people and their activities visible to others will potentially foster the awareness of and familiarity with them; it will also foster feelings of self-esteem, reputation, responsibility and accountability as people become aware that others are "looking" at them (Erickson et al. 1999, Constant et al. 1997, Girgensohn & Lee 2002).

Proposition 1: Members supported by awareness tools will engage more in the community. This proposition is used to test hypothesis on the factor of technology on social presence and social awareness. Sample hypotheses derived from this proposition are such as:

H1a: Members supported by awareness tools will perceive a higher degree of social presence of other members than unsupported members.
H1b: Members supported by awareness tools will perceive higher possibility of making friends or forming partnerships in the community.

Given: Information is very essential for research communities. Valuable information is one of the main reasons that attract people to come to these communities. However, one person's treasure might be another's trash. It is impossible for all information to be valuable to every member. Recommender systems have been claimed to be intelligent agents for picking up valuable information based on individual preferences (Ramakrishnan 1997; Resnick & Varian 1997; Terveen et al. 1997; Pemberton et al. 2000; Im and Hars 2001). With the support of a recommender system, the community space is expected to serve personalized information needs.

Proposition 2: Members supported by a recommender system will engage more in the community. This proposition is used to test the factor of technology on information volume and quality. Samples of the derived hypotheses will be:

H2a: Members supported by a recommender system will perceive higher usefulness of the knowledge base contents.
H2b: Members supported by a recommender system will perceive a lower degree of information overload.

Given: Community size and communication activities have a dynamic effect on members' engagement. At the community growing stage, larger size and more community activity will attract more people to join and participate. However, when community size becomes too big or demands excessive parallel communication activities, these factors will cause problems such as information overload, free-riding and social loafing (Rafaeli and LaRose 1993, Jones, Ravid and Rafaeli 2002). There are not many studies concerning the impact of size and activities in pull-based online communities. Thus we have research questions rather than specific hypotheses. The research questions here are:

RQ1: How does community size affect members' engagement?
RQ2: How do communication activities affect members' engagement?

Given: Software applications/interfaces are the only support users have when they do things online, thus if the application does not effectively support users in fulfilling their goals, we cannot expect people to stay in the community. In this research, I am going to look at:

RQ3: What are the main concerns related to usability in an online research community?
RQ4: Is there any relationship between usability of the system and the perceived usage of the system? Is there any relationship between usability of the system and the real usage of the system?

Given: Individual concerns about online community spaces will greatly affect individuals' behavior in the community. People who regard online communities only as a place to get information are not likely to start a conversation in the community; people who are skeptical about CMC will be unlikely to interact with other people. Attitudes toward online community will not be used as an independent variable here because of the length restriction of a short survey. However, it will be included a semi-structured interview administered to a small number of users, to explore other factors influencing members' engagements. The research questions for this part will be:

RQ5: How do people's attitudes toward online communities affect their behavior online?
RQ6: How do people's expectations about the online communities affect their behavior online?

Research Site

The "Asynchronous Learning Networks (ALN) Research Community" was selected for this field trial. The overall objective of this community is to increase the quality, quantity, dissemination, and application of results of research on the effectiveness of ALN, a form of e-learning that combines self-study with substantial, rapid, asynchronous interactivity with others (**http://www.aln.org**).The community is hosted on a website called the WebCenter for ALN Effectiveness Research at **http://www.alnresearch.org**. The initial design and implementation of the ALN Research community website can be found in (Zhang et al. 2001). This community is fairly small, with about 170 currently registered members. The potential membership of the ALN research community is estimated to be from one to two thousand people, consisting of current researchers publishing in the field, faculty members who teach online courses, and graduate students doing research in the field.

Although the initial release of the WebCenter for the community was in August 2001, currently there is not much active participation on the community site; most users use the site as a digital library to get research articles or resources. There are very few discussions in the discussion forum and few members' contributions. The community site did not fulfill its task to connect researchers together. The current situation of the site provides a good place for trying out the framework for stimulating members' engagement in the community and encouraging online interpersonal relationship development.

Several features have been or will be implemented based on the proposed framework for the ALN research community.

- Add social awareness tools:
  - Create a member directory with member' photograph: Photographs have been shown to increase affection among people in the CMC environment (Walther 2001). The member directory will provide contact information and research interest of members. It will help members get to know each other and help reduce uncertainty about others.
  - Provide visibility/awareness of people and their activities. This feature will foster familiarity among members, help build self-esteem and responsibility (Erickson et al. 1999, Constant et al. 1997, Girgensohn & Lee 2002) and also help to increase aliveness of the community (Dieberger 1997).
- Provide useful information based on individual needs: In order to reduce possible information overload problems and provide personalized guidance, a recommender system which is based on both content filtering and collaborative filtering technologies will be implemented to help members access information that is most useful to them on the site. Recommender systems can be viewed as intelligent agents that can suggest artifacts of interest using stored information (e.g. user preferences, performance data, artifact characteristics, and cost) of a given domain of artifacts (e.g. books, music, movies, internet resources, or research papers) (Ramakrishnan 1997; Resnick & Varian 1997; Terveen et al. 1997; Im and Hars 2001). Content filtering and collaborative filtering are the most commonly used technologies for developing recommender systems. Content filtering is based on personal preference and collaborative filtering is based on other like-minded people.

Research Methodology

A field experiment will be embedded within the field study. The field experiment will be used to test the propositions. The framework for the field study is shown in figure 2. This experiment will be a 2*2 factorial design (refer to table 1.). The moderators are variables that can be observed / measured, but they are not manipulated for this study. The manipulated variables are support of awareness tools and support of the recommender system. The outcome variables are shown in the framework (refer to figure 2). The following is the simplified procedure:

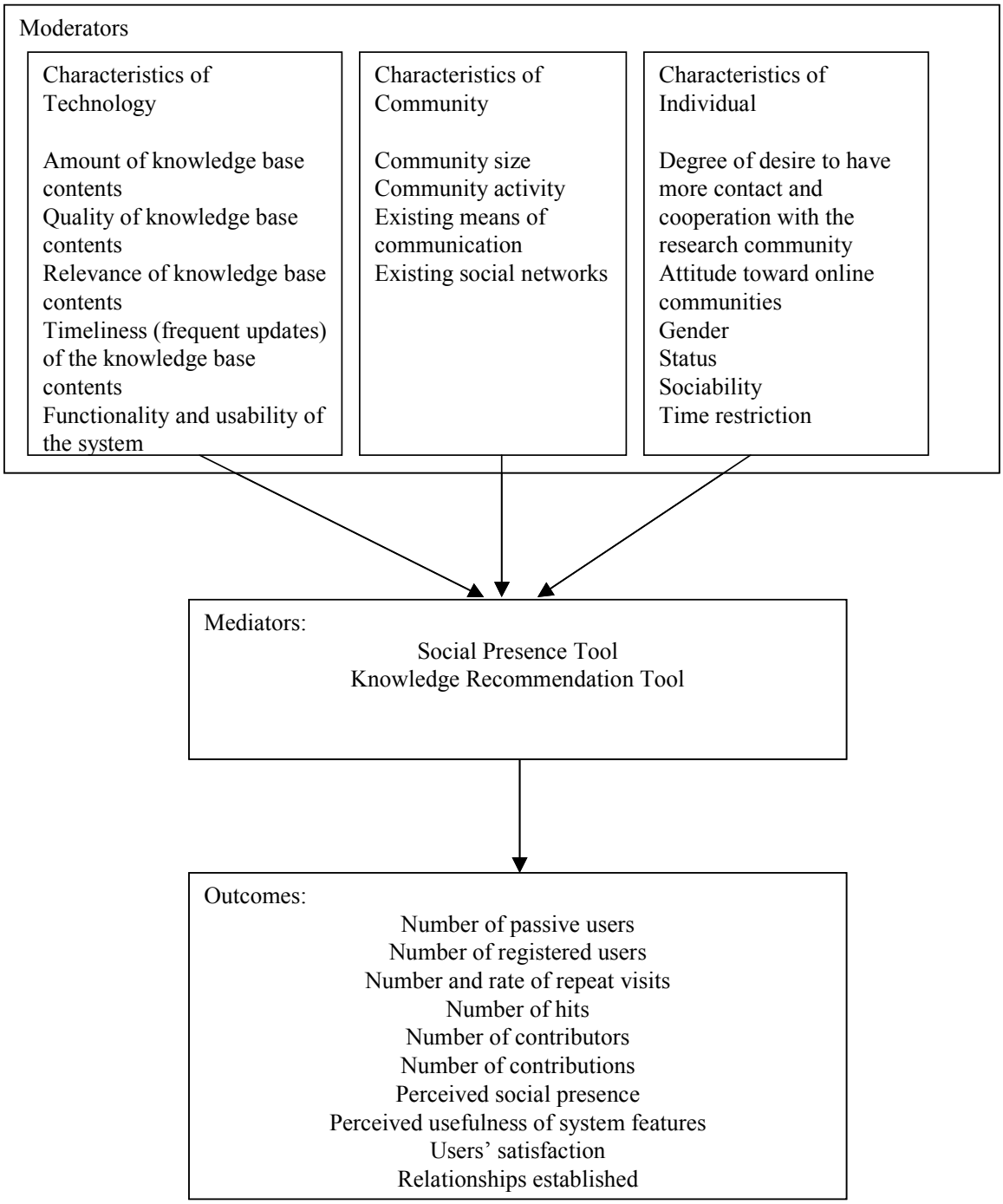

Figure 2. Research Framework

(1) About 600 current and prospective users will be invited to participate in the field experiment. We hope to get 200 participants. They will be randomly divided into four groups as in the experimental design.
(2) Users will be required to log into the system to access the knowledge base.
(3) After a user is logged in, people in different experimental conditions will be given different interfaces and tools according to the group they belong to.
(4) The experiment will last 8-12 weeks. At the end of the experiment, participants will be asked to fill in a short questionnaire to help the evaluation.

After collecting all survey responses, selected participants will be invited to do a semi-structured interview in order to get a deeper understanding of users' concerns about the online community, and to find other factors that might affect their behavior in the community.

Data Collection and Measurement

Online engagement includes number of new members, number of original messages, number of replies, number of passive participation sessions per day, number of hits on each page, time the members spend in the community. All the above can items can be captured from user activity logs, each item will be given different scores to get a total score of engagement.

Community size will be measured by the number of registered members.

Communication activity will be measured by original postings and replies, they will be given different scores to calculate the total scores.

Members' behavior online will be traced by their mouse clicking sequence and the time they spend on each page or part of the site.

Individual's attitudes towards online communities and expectations about the community will be measured from survey data.

Members' perceived usefulness of the system and their satisfaction will also be measured by survey data.

Other factors that impact members' engagement online will be explored from interview data.

Expected Outcomes

This study should show relationships between members' engagement and social awareness support; members' engagement and the recommender system support; members' engagement with community size and communication activity; members' engagement with individual characteristics. However, as the community itself is small and there is only one community studied, the community might not reach its critical mass during the study period and perhaps will not yield significant relationships between members' engagement and various factors. The interview data and users' behavior will enable the exploration of issues on a qualitative level, even if the quantitative data are insufficient to prove or disprove the hypotheses. The framework design and system design will still contribute to knowledge about the impact on online space design on the behavior of online communities of researchers.

Timetable

Time	Task
Nov. 2002	On site questionnaire with ALNResearch community for preliminary study
The end of Nov, 2002.	Literature review completed
Feb, 2002	Proposal Defense
The end of July, 2003	Implement all proposed system features
April. 2003 – Jan. 2004	Data collection and analysis
Jan. 2004	First Draft of Dissertation
Feb, 2004	Second draft
March, 2004	Defense
May, 2004	Graduation

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