

Stimulating Social Engagement in a Community Network

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ABSTRACT

One of the most challenging problems facing builders and facilitators of community networks is to create and sustain social engagement among members. In this paper, we investigate the drivers of social engagement in a community network through the analysis of three data sources: activity logs, a member survey, and the content analysis of the conversation archives. We describe three important ways to encourage and support social engagement in online communities: through system design elements such as conversation channeling and event notification, by various selection criteria for community members, and through facilitation of specific kinds of discussion topics.

Keywords

Community networks, social awareness, social engagement, empirical studies, community-support systems

INTRODUCTION

There is a growing research literature investigating various aspects of online communities. Much of this research has focused on the nature of the social interaction that is supported by different kinds of virtual environments, including MUDs [3,4], email lists, bulletin boards, and newsgroups [22,23,25,28]. Much of this research has been descriptive, focusing on understanding different types of communities and reporting about the various activities of the members and visitors. Among the various types of online communities that have been the focus of research are *communities of practice* [1,5,12, 20, 26,27], *communities of interest* [13,15,24], and *community networks*, which support a specific geography-based community [2,10,21].

A growing number of studies of online groups attempt to more clearly understand the factors that contribute to specific online behavior (e.g., frequency of participation by message postings). In a recent study of 500 newsgroups,

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CSCW'02, November 16–20, 2002, New Orleans, Louisiana, USA.

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researchers found that repeat participation (postings) from newsgroup members greatly increased the overall interactivity of the group as measured by the depth of conversation threads. Further, cross-posting messages to other groups seemed to increase interactivity, which was interpreted as increasing the visibility of a local conversation in other groups and inviting broader participation in the thread. [28].

In a second study of newsgroups, the factors that contributed to creating a sense of community were explored [18]. The research showed that a significant percentage (two-thirds) of newsgroup participants report feeling a sense of community within the group, and this feeling was predicted best by the degree of effort and time that individuals put into the groups.

In the fall of 1999, we initiated a field study to explore the factors that facilitate or inhibit the development of a geography-based online community in a lightly-settled suburban town. We were particularly interested in understanding the factors that contribute to greater participation in the community network. In this paper, we investigate three possible determinants of increased social engagement. First, we examine the effects of several design elements that were intended to increase interaction: channeling and event notification. Second, we examine the results of a community member survey to look for predictors of social interaction. And finally, we examine the conversation content looking for factors that will guide online facilitators.

CASE STUDY OF A COMMUNITY NETWORK

The Carlisle Community Center (CCC) was created to support online interaction among the residents of Carlisle, a small suburban community outside of Boston, Massachusetts. Access to the community site is free, but is restricted to residents of the town or to teachers who work in the public school (K-8). To promote trust and accountability among participants within the community, a member's online identity is their real-world identity; there is no anonymity.

The online environment is built on Lotus Notes/Domino™ technology, and supports the creation of distinct meeting spaces (or rooms), which may contain persistent message

boards, shared links, calendars, ballots and documents. At present six rooms to support civic groups, four rooms to support clubs or organizations, five rooms to support the school, and five general-purpose rooms including a central meeting place, which is called the lobby, have been created.

The screen shot below (Figure 1) shows the welcome page when a CCC member first enters the site via the Lobby. The gray panels on the left and top are not really part of the Lobby. They are always present as the user moves from room to room. These panels provide three things: a site logo, links for moving among the rooms, and some generally useful links (e.g., access to a directory of people or access to help pages).

The room itself is presented in the dark gray and white panels at the right. There are three panels: the top bar, the browse area, and the button bar. The top bar identifies the room and provides access to the major activities supported by the room. The browse area is the main area for presenting pages to the user. Links within the room cause this area to change. The button bar presents page-specific options to the user. For example, pages in the browse area created by the user may be edited or deleted by the user. These capabilities are made available as buttons appearing beneath the page in the button bar.

The main activities provided within a room are the Message Board, the Calendar, the File Cabinet, and the Links. Each provides a different type of main document and a way to browse among these main documents. The message board is for simple postings, the calendar is for

time-based events, the file cabinet is for uploads, and the links are for shared bookmarks. All activities except the Links support a way to respond or comment on the main document and any subsequent responses. In other words, the main documents are all potentially the “root” or top document in a hierarchically threaded discussion.

The administrator of the room has some ability to control the way that activities are used in the room. Activities may be suppressed altogether or they can be set so that only administrators may create the documents. For example, it is common to let all room members post messages on the Message Board, but hold back the File Cabinet and Links for “approved” postings by the administrator. In addition, the administrator has some ability to cleanup the postings by assigning documents to categories or simply eliminating old documents.

When the user is ready to leave the Lobby for another room he or she will click on a corridor containing the room. The corridor fills the room panels with its own top bar, browse area, and button bar. Any rooms within the corridor are shown in a table with some basic information about the room. Most important are the name, description, and contact person of the room. It has also proven useful to display information about the user’s last visit and whether there is anything new in the room. If the user may enter the room, the room name is an active link for entering the room. If the user may not enter the room, then the room name is simply text and the description is an explanation of why the room has restricted access.

Discussions within the community network have generally

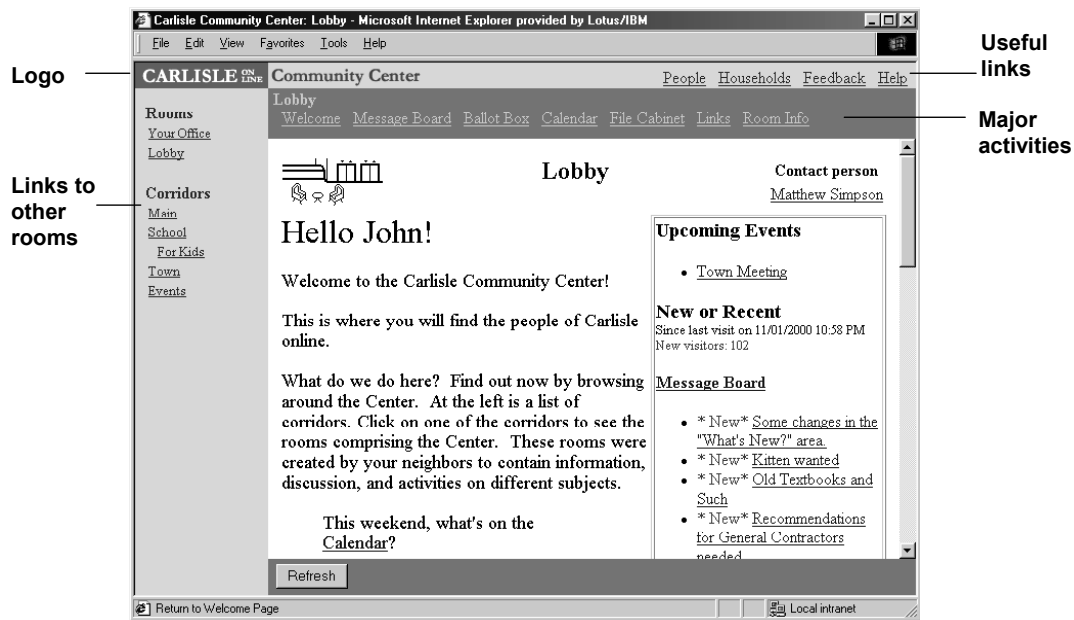


Figure 1 Screen shot from the Carlisle Community Center

focused on topics of local interest. Several threads have focused on political matters within the town (e.g., zoning issues, traffic and bicycle laws, and collective action to bring DSL technology to the town). Other topics have included discussion of local wildlife, procedural conversations about the use of the site, and a great variety of announcements, questions, and requests for assistance.

To date, about 185 of the 1500 households in the town of Carlisle have registered with the CCC. Of the 280 individuals who have visited the CCC, 74 % of these individuals visited the site three or more times. A core group of about 60 members visits the site at least once a week. Like other online communities, a small percentage (20%) of the site members account for a majority (50%) of the site traffic (see, for example, [23]).

A Note on Method

Our understanding of the social interaction with the CCC network is based on multiple sources of data. Members of the research team were allowed access to the site, and through participant observation, we were able to experience the cadence and intensity of the social interaction. The research team interacted face to face with community members during recruiting events, and observed community group meetings at the community center.

The results reported in this paper are based on the analysis of archival records of the social interaction of the network and the results of a self-report survey of the members. The archival records included detailed activity logs and conversation transcripts. The member survey is described in more detail below.

INCREASING INTERACTION THROUGH DESIGN

There are several choices that were made in the design of the collaborative space to promote social interaction. One of these design choices was to “channel” members through a common entry to the site (called the lobby), which concentrates activity and makes new material more visible. We created a central lobby with access from it to other rooms through corridor spaces. New messages and calendar items within the site are highlighted in the lobby. Although members can enter specific rooms directly without going through the lobby, most members enter the CCC through the lobby. We will examine this behavior in more detail below.

A second design element that promotes social awareness is what might be considered a very lightweight and low-granularity *social proxy* (a minimalist graphical representation of users that depicts their presence and their activities, [8]). Lurking and posting activity is captured in the system log, and a small display element shows members how many visitors have been in the room since their last visit. This visitor metric, which includes both lurkers and contributors, and offers the visitor a reasonable idea of how many other community members have been

looking at the same message boards and documents that he/she has been looking at.

As a social proxy, this “number of recent visitors” display is of extremely low granularity; it does not indicate who visited, when visits occurred, or what activities took place. This data was intentionally withheld to protect the privacy of CCC members. In addition, displaying the data in an understandable manner would be impractical with a large community.

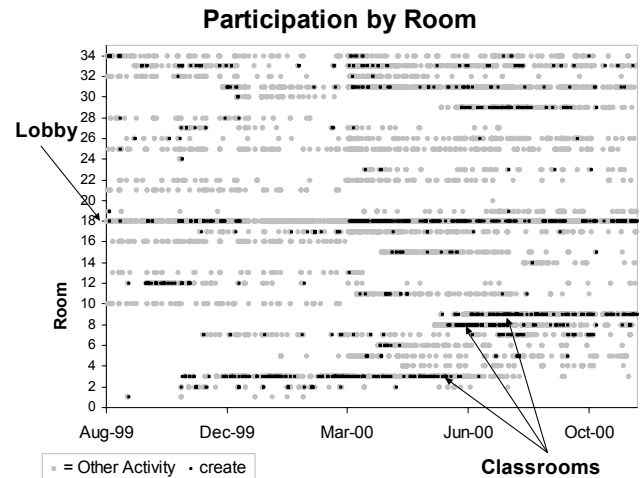


Figure 2. "Channeling" visitors through the lobby.

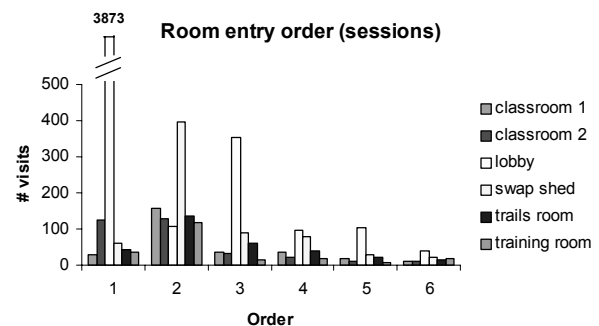


Figure 3. Order of room entry for the CCC.

The result of channeling members through a single place within the online space is evident in Figure 2. This representation of a the community interaction, called a conversation map [12, 19] is built from the activity logs and shows the number of visits and messages posted over time for each of the 34 rooms at the site. As can be seen, the vast majority of member sessions include a visit to the lobby (labeled room # 18 on the map).

We further analyzed the order of rooms that were visited for a sample of 4634 sessions (shown in Figure 3). The overwhelming majority (83%) of sessions begin with a visit in the lobby. While many of the visits are limited to the lobby alone, Figure 3 also reveals that there are several other popular rooms that are also visited (e.g., the swap

shed). Channeling member visits through the lobby resulted in making the lobby the room where the largest number of messages were created and stored.

Competing for attention

A second aspect of the CCC design that is intended to increase a member’s awareness of the activity at the site is the *notification service*. Members can subscribe to notification alerts that indicate when new information has been posted in one of the community rooms. Each alert contains the subject line of each new message and the poster’s name, and is sent to the subscribers email account, inviting the recipient to visit the community site to read the message postings in their entirety. While community members can tailor these alerts to notify them of activity in specific rooms at specified intervals (i.e., daily, weekly, or monthly), the majority of the members monitor the main lobby and receive their alerts daily. This was the default setting.

Email notification alerts have been used in ecommerce sites, and library and electronic publishing sites (see, for example,[9]) for some time. While it seems intuitively obvious that adding notification alerts to a community network will foster social engagement, we were interested in a more formal assessment of this kind of service.

To understand the effects of email notification on social interaction, we examined the activity logs for an eight-month time sample (March through October, 2000), during which time the CCC membership and participation was reasonably stable. All members who visited the community site more than five times were included in the analysis. We examined the lobby activity only, as this room was the most active and email alerts were administered to be on for most community members. We also analyzed the 169 members who had created messages (posters) separately from those who are generally described as lurkers (no postings; n = 63).

As we had intuitively expected, the average number of sessions per day *for posters* was reliably greater on days when an email alert was sent than when there was no alert (average number of sessions = 18.2 vs. 9.4; $t[258] = 10.168, p < .001$). While the number of daily sessions for *lurkers* was considerably smaller, there were also reliably more visits to the community site on days when there were email alerts than without alerts (2.6 vs. 1.5 average daily sessions; $t(258) = 5.06, p < .001$). (See Table 1).

Table 1. The effects of alerts on total sessions per day.

	Alert	No alert	Mean
Posters (n=169)	18.2	9.4	(p <.001)
Lurkers (n= 63)	2.6	1.5	(p < .001)

Having established that the presence of a notification alert results in increased site activity, we wondered if the

number of messages summarized in an alert would also influence site traffic. The average number of daily sessions as a function of the number of messages summarized in the alert can be found in Table 2. For both posters and lurkers, there are a generally increasing number of daily sessions as the number of message references contained in a notification increases.

Table 2. The effects of number of messages in the alert on total sessions per day.

	# message references in notification alert				
	1	2	3	4	5
Posters	16.3	17.3	20.8	20.9	23.0
Lurkers	2.0	2.9	3.2	3.4	2.9

If the presence and size of a notification alert can increase community activity, we wondered if successive days of no alerts would diminish the site activity. To answer this, we looked at the number of daily sessions as a function of successive days without an alert (see Table 3). The results show a pronounced decline in activity for posters, with a less systematic decrease for lurkers.

Table 3. The effects of inactivity on total sessions per day.

	# days since last notification alert				
	1	2	3	4	5
Posters	12.2	9.1	8.7	6.7	4.5
Lurkers	1.9	1.1	1.3	1.2	.7

Online community researchers and practitioners have acknowledged that shared online spaces need to be specially designed to support social engagement [11,16]. Important design elements include support for a range of roles such as facilitator, clear articulation of purpose, flexible gathering spaces, and community rules and policies.

The results of this analysis suggest that a notification alert service is an important design consideration for a community network. Both active posters and lurkers are almost twice as likely to return to the site when they have received an alert. There is also evidence that increasing the size of the alert by increasing the number of messages contained in the alerts is also helpful in promoting increased engagement at the community site. Furthermore, there is a negative consequence of prolonged silence at the site. There appears to be a participation decay rate that is related to successive days of community inactivity. The implications for community builders or facilitators are that ongoing daily activity is important to sustained participation in a community network, and it is important that the members be made aware of this activity.

Our results suggest a second important implication for designers of placed-based systems such as community networks, team spaces, or other shared electronic spaces. As the attention of the heavy communicators is drawn ever more into their email “habitats” [6], there will be an increasing need to integrate place-based systems with personal email. Notification alerts are one way to integrate shared and personal spaces such as email.

Further work is needed to create more sophisticated alerting services that can take into account message content and context, and social relationships between message posters and readers. Improved ways to specify or personally tailor alert rules are needed. And finally, as more and more alerting information is directed to email clients, additional work is needed to effectively manage the deluge.

INCREASING INTERACTION BY MEMBER SELECTION

In addition to aspects of system design, we were curious about what characteristics of the member population would indicate a propensity for social engagement. Approximately six weeks after registering for the Carlisle Community Center, members are invited to complete an online (Web-based) survey. The survey invitation is sent via email and informs members that the survey is intended to obtain additional information about their background and experience, and to determine their general attitudes about the Internet and the Carlisle Community Center. Of the 280 members of the CCC, 132 individuals completed the survey (47% response rate). The survey contained approximately 50 questions, including several open-ended questions. The survey included questions about the respondents’ allocation of time to various activities, technology attitudes and use, and social involvement and attitudes about the town of Carlisle.

Attitudes about technology and security

One group of questions in the survey was intended to measure general attitudes about the Internet and computer proficiency (e.g., I use computers almost every day, I am afraid of using a computer). A factor analysis reduced these survey items to a single factor that we labeled *comfort/skill*.

A second group of survey items focused on privacy and security issues (e.g., I worry about being victimized by malicious behavior like unsolicited email). A factor analysis was performed and also reduced these survey items to a single factor that we labeled *security*.

We included a third group of items in the survey to understand usage levels of various types of communications applications used on the Internet (e.g., Please indicate your level of participation in email lists). A factor analysis of the communication applications yielded two easily explainable factor solutions. The first factor has been labeled *asynchronous* and is heavily loaded on the three popular asynchronous messaging applications. The second factor has been labeled *synchronous* and includes a

high factor loading on the chat and instant messaging survey items.

Time Use

To better understand the CCC users’ personal choices in allocating their time, survey respondents were asked to indicate the number of hours *per week* that they spent on various work, family and social activities. A factor analysis of the time use items yielded three easily interpretable factors. The first factor, labeled *leisure time*, is heavily weighted on the non-work activities that include socializing, as well as screen activities (television and Internet use). The second factor, labeled *unpaid work* is heavily loaded on home and family work as well as participation in group activities. The final factor has been labeled *hobby time* and is heavily loaded on use of free time on hobbies and in various reading activities.

Relationship between factors and participation

In an effort to understand the factors that influence social engagement in the online community of Carlisle, we performed multiple regression analyses using the survey responses as independent variables and a measure of CCC interactivity as the dependent variable. While the determination of a reliable relationship in this analysis does not imply causation, it will increase our understanding of what factors are important in the developing online communities that support real-world towns. The independent variables used in the regression models were based on estimated factor scores, which were computed for each respondent using the factor solutions.

While we considered several behavioral measures of CCC interaction (e.g., number of messages posted, number of rooms visited), we decided to use the number of sessions at the CCC site. This measure of participation is useful in that it includes visits by members who are frequent visitors but infrequent message posters or lurkers. To normalize the session data, we included only the first six weeks of usage history for every CCC member. It should be noted that the models analyzed and discussed below are most useful in understanding early behavior in an online community.

Our first regression analysis was designed to determine whether attitudes about technology and computer use are related to CCC activity. The factors entered into the regression model included the two factors that measured computer application use (i.e., asynchronous and synchronous) and the two factors that were based on attitudes about technology (i.e., comfort/skill and security). The results, shown in Table 4 are not very surprising. They show that prior experience with other communications applications, such as email lists and chat services, reliably predict increased participation in an online community [Model: (F[4,113] = 3.29, p < .05, R² = .10)]. This result is good news for community builders since there is considerable growth reported in the use of various chat services [14].

It is a bit surprising that attitudes about technology were not reliable predictors of CCC use. It is easy to imagine how increased skill and positive attitudes about computer technology would promote online social engagement, while concerns about security would inhibit interaction.

The second regression that we performed was to test the relationship between the CCC participants' reported use of time (taken from the survey) with their participation in the online community. To this end we analyzed the factor scores for each of the three time-use factors (i.e., leisure time, unpaid work, and hobby time). The regression results are also shown in Table 5, [Model: (F[3,104] = 20.46, $p < .001$, $R^2 = .371$)].

These results show clearly that individuals who participate a lot in the CCC are also those who spend their non-work time involved in social activities and non-work Internet. It was a bit of a surprise to us that those individuals who spend the most time in external groups (unpaid group factor) are not also spending time in some of the areas of the CCC that have been designed to support groups.

Table 4 . Relationship between experience and attitudes on level of participation.

Technology experience / attitudes	Beta	Sig.
Asynchronous group chat experience	.189	$p < .05$
Synchronous group chat experience	.249	$p < .01$
Comfort and skill with Internet	-.138	ns
Security concerns with Internet	-.094	ns

Table 5. Relationship between time use and level of participation.

Time Use	Beta	Sig.
Leisure time (non-work screen time)	.608	$p < .001$
Group time (time with others)	-.158	ns
Hobby – reading	-.030	ns

It is important for online community facilitators or builders to understand the kinds of factors that are important in creating participation among members. Taken together, the results of the regression analyses reported here suggest that the early participation in this community network is related to several factors. First, familiarity with other kinds of online interactive services (e.g., chat and email lists) is an important predictor of online participation. This suggests that one strategy to growing a new online group would be to *recruit* members from existing, possibly related online groups. This is also consistent with the reported result that cross posting in newsgroups predicts greater newsgroup interactivity [28].

The second implication for community builders is perhaps not very surprising. Individuals who spend a great deal of

their non-work time socializing and on non-work Internet activities are likely active participants in an online community. One strategy may be to seed the community with a group of people who fit that time-use demographic.

INCREASING INTERACTION WITH CONTENT

As any web master would affirm, interesting content drives interaction. In our final investigation to understand the drivers of social interaction, we looked at the content of the online conversations. We limited our analysis to the conversation within the lobby and looked at a 26-month sample of messages from late 1999 through early 2002.

Since we were interested in understanding the kinds of messages that stimulated conversation, we focused our analysis on threads. In the Carlisle Community Center, threads are reasonably unambiguous, as an explicit reply action is supported and the root message ID is captured in the message file logs. Admittedly, there is some room for error in this definition of thread, as topic drift can occur and thread continuations are occasionally started over in a new root message. Nonetheless, we believe that the thread structures discussed here provide a reasonable approximation of the kinds of extended discussions that took place within the community network.

As can be seen in Table 6, there were 302 identifiable conversation threads during that time frame. Over half (57%) of all messages threads were comprised of a single message. A more accurate label for this group is probably *potential* thread as an opportunity for an extended discussion was presented. A closer look at the content of these singular messages revealed that a majority of these message postings were announcements of some form. It seems reasonable that most of these had no reply.

Table 6. Number of threads of various lengths.

Thread length	Number	Percent
1	171	57%
2	31	10%
3	25	8%
4	19	6%
5	10	3%
6	14	5%
7	5	2%
8	6	2%
>8	21	7%
Total	302	100%

A large number of the medium length threads (2-6 messages) consisted of requests for help or recommendations. Examples include looking for general contractors, moving companies, taxi/limousine services,

and mortgage lenders. For the remainder of the thread analysis, we will focus on the 21 longer threads (>8 messages) as they are the more complex and interesting examples of online social engagement.

Talking about politics

Several early experiences with community networks revealed their potential use for collective political action (e.g., [21]). In many respects, therefore, it is not surprising that eight of the longer threads are about local governance or public services. For example, issues surrounding access to higher speed connection to the Internet occur on four occasions. One initial posting on this topic was:

Our installation date for DSL has come and gone by. After taking our money for the modem, shipping and taxes, [Company NAME] has decided that we after all can not be supplied the service. This whole process has taken 3 plus weeks, ah, aren't monopolies great. This after assuring us that we do indeed qualify for the service when we signed up! Does anyone have DSL service (or know of anyone that actually has a DSL connection) here in town?

The frustration is evident in the posting and invites a response. A lively discussion ensues about similar experiences, alternate service technologies, and possible collective action with (or against) the service provider.

Other politically charged topics that were discussed included public land use, and voting laws. A particularly interesting thread concerned various local traffic and parking laws and enforcement procedures. The political issues involved were local, well known and somewhat controversial. A good mix for social interaction.

Talking about danger and novelty

While there are a number of short conversations about the various kinds of wildlife found in this rural town, several of the longer threads highlight tensions inherent with cohabitation of humans and wild animals. For example, one discussion about birds began as follows:

I'm not really a "birder", but one of our joys since moving to Carlisle this past August is the variety of birds showing up at our back yard feeder(s). No fewer than 15 species and counting. We have a lot of glass on the back of the house, and to my dismay we find there are numerous daily collisions with the glass, and a few fatalities. We have hung ribbons in the windows, and pasted up some of those paper hawks. I'm not sure that is really doing the job. We would hate to give up the feeding as it is a constant source of entertainment. Any suggestions?

The discussion that ensued appears to be a result of shared experiences combined with a desire to be helpful. The self-disclosure in the posting of having only recently moved

into the community may have increased the member responsiveness.

A second interesting and lengthy thread centered on the dangers of fishers, a small but ferocious mammal with an appetite for domestic animals. The thread began with a photo of a fisher and was followed by several postings with possible or confirmed sightings. The blend of novelty and possible danger may have been the provocative ingredients that carried this thread.

Talking about finding people and stuff

The final group of discussions to be summarized here covered a variety of topics. In one long thread, someone suggested that the site could be used to find someone to be a trading partner. This conversation about online bartering became the impetus to start a separate virtual room called the *swap shed*, in which physical goods were offered for free or for barter. One interesting aspect of the swap shed is that a physical version exists in the town as part of the recycling center. In some ways this is a virtualization of what others have called important town landmarks or sacred places [7].

Other long threads included one person searching for players for a bridge foursome, and a banjo player looking for fellow musicians. Both threads involved forming multiperson groups, which may account for the length and the number of exchanges. This is probably similar to negotiating groups and meeting dates with work groups. While these threads may not be of widespread interest, they contribute to the conversation mix and signal interest in social connectedness among members of the community. Both the musicians and the bridge group are examples of how community networks can help form social relationships that carry over into the physical world. These two examples offer hope that community networks can help revitalize social interaction and increase social capital [17].

GENERAL DISCUSSION

In this paper we have investigated determinants of social interaction in one community network, using a variety of data sources. The results are important and relevant for designers of community software, as well as for the leaders and facilitators of community networks.

The results of this research suggest that designers consider support for common spaces, with *channeling* mechanisms to encourage members to observe the general activities of the community. In addition, there should be support for notification services, to bring new material to the attention of members through other communications tools such as email.

There are several results reported here that are important for community organizers and leaders. It may be helpful to recruit members who are experienced in various online communications environments. Experienced online communicators may help increase interactivity, especially

during the early, start-up phase of a community network. It is also important to recruit and support members who have time available for social interaction.

And finally, community facilitators should consider guiding the conversation to stimulate interactivity. Topic seeds could be planted that are politically important, local, and controversial. Topics high in human-interest combined with an element of danger or risk may encourage conversation. By all means, look for opportunities to encourage and support barter and people searching for other community members.

ACKNOWLEDGMENTS

Thanks to Matthew Simpson, Michael Muller, and Cory Costanzo for many provocative discussions about the CCC in particular and online communities in general.

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