Community Effort in Online Groups: Who Does the Work and Why?

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Summary

As in any social organization, people need to invest effort in the health of their online groups. Listservs and other such groups need people to maintain the technology infrastructure, carry out social management tasks, and recruit new members. Members must read and contribute to discussion. Here, we ask why people do this. In many online groups, preexisting social ties and material benefits for contributions are weak or nonexistent. In this chapter, we consider how the formal leadership role, personal and community benefits, and community characteristics influence the effort members put into helping their online groups. Results from a survey of Internet listserv owners and other members suggest that though owners, who have a formal leadership role, do more of the effortful community building work than do regular members, other members also take on some of the work. Moreover, members who value different benefits are likely to contribute to the development on an online community in different ways.

Every day millions of people log on to the Internet to talk with other people. From its earliest days, the Internet has been used for social interaction as much as for intellectual or economic purposes (Sproull & Kiesler, 1991; Sproull and Faraj, 1995). Social electronic interaction can have serious or frivolous goals. We use the phrase, "social interaction," to mean interacting with other people rather than interacting with impersonal databases or programs. Much social interaction on the Internet occurs among those with preexisting social ties. Far-flung friends and family members use the Internet to sustain relationships with one another (Kraut et al., 2000; Wellman et al., 2001). In these cases, family and friendship ties are the foundation for continued online interaction. Employees use corporate networks to organize work, ask for help, or exchange advice (Bell et al., 1998; Constant, Sproull, and Kiesler, 1996; Finholt and Sproull, 1990). In these cases, corporate ties are the foundation for continued online interaction. Even if employees do not know one another personally, their shared employer is a real-world bond. Yet a great deal of interaction in online social groups occurs among strangers without pre-existing family, friendship, or corporate ties.

Some of these online social groups resemble street corner settings or park squares where practically anyone may show up. In these settings, there is little expectation of personal commitment or sustained interaction. Other online groups exhibit some properties of long-lived social groups or communities. Some have been in existence for close to twenty years (e.g., Rheingold, 2000). They may have hundreds or even thousands of members who return to them repeatedly and feel psychological commitment both to specific other members and to the group as a whole. Some larger online groups have a complex internal structure, roles, and explicit conventions, whereas others seem more ad-hoc and informal. The diversity of structure and form leads to interesting questions about the nature of online community. However, in all cases

these groups are faced with the communal challenge of developing and maintaining their existence as an identifiable social entity.

Within the past few years some online groups have been supported by commercial ventures using paid employees. Even in these cases, volunteers do much of the community work. In the real world, volunteers may be motivated to serve a group out of a wish to make friends and have companions, or because they feel commitment to the local neighborhood, church, work organization, or cause for which they volunteer (Callero, Howard, & Piliavin, 1987; Deaux & Stark, 1996; Grube & Piliavin, 1996; Omoto & Snyder, 1995; Omoto, Snyder, & Berghuis, 1993; Snyder & Omoto, 1992). In the online world, these opportunities for real world contact and local impact may be rare or absent. What, then, explains the continued existence and vitality of online groups?

How Are Online Groups Sustained?

Technology itself provides a part of the answer. The Internet offers a variety of technical tools and mechanisms to support online social interaction in groups. Centralized mailing lists, which are maintained and managed on list server software,[1] allow members to send email messages to all group members. Electronic bulletin boards such as Freenets and Usenet allow anyone with Internet access to post to a designated group location where others can read and comment on those messages. Commercial service providers like AOL support forums for their members. Other tools support real-time chat, group message archives, and links to related groups and members' individual web pages.

Tools and technical infrastructure make online group communication possible and support the group's interactions with the outside world. Social behavior sustains these groups over time. At least four kinds of social behavior are necessary. First, people must tend the tools

themselves by managing software versions, keeping address files up to date, and so on. People also must recruit members to replace those who leave. They must manage social dynamics. They must participate. Without these group maintenance activities, even sophisticated tools and infrastructure will not sustain viable online groups. Indeed, Butler (1999, reported in Cummings, Butler & Kraut, in press) showed that in a random sample of list servers in 1997, 16% were defunct and 33% of the remainder distributed no messages during a 130-day period.

Infrastructure administration involves installing and maintaining the basic systems that enable group communication--setting up and operating software, hardware, and telecommunications systems. This aspect of infrastructure administration typically requires special technical expertise as well as investment in (or at least trusted access to) computer systems. Infrastructure administration also involves developing and maintaining components that are unique to the needs of the particular group, such as an up-to-date content archive, ancillary files such as group descriptions and lists of frequently asked questions (FAQs), and the list of people who have access to the group. Even in cases where core technological systems are provided by a designated technology support staff or a commercial service, some community member typically invests substantial effort in infrastructure administration. This effort is needed to maintain the basic communication infrastructure used by group members to communicate with one another.

Technological infrastructure establishes a public space for the group. Online public spaces, like physical public spaces, are subject to a variety of problems arising from how people use or misuse community resources (Kollock and Smith, 1996). Hence not just technical but also social management also is needed to control detrimental use and encourage appropriate use of the communication infrastructure. Social control includes letting newcomers know the norms of

the group, managing disputes, discouraging use of the infrastructure to discuss topics that are outside the community's interests (i.e. off-topic messages), preventing exploitation of individual members, as through "junk email," explicitly chastising those who engage in inappropriate behavior, and, denying access to the community's communication infrastructure, usually as a last resort. Social encouragement entails promoting desirable behavior by recognizing people who contribute especially informative or supporting messages, and people who create interesting or useful group activities. Together, these control and encouragement activities serve to ensure that the group does not collapse due to abuse of the public space created by the communications infrastructure, and to render the group a comfortable and enjoyable place to interact. Unlike real world groups and neighborhoods whose members may not be able to leave easily, members can abandon online communities easily. Social management is therefore essential to the health of these groups.

External promotion is another needed community building activity. Online groups die without new members to replace those who leave. Butler (1999) documented an annual drop-out rate of 22% in the list servers that he studied, but double this number joined each year. Someone or something must have attracted people to these online groups. Since online group interactions typically are invisible to the outside world, explicit effort must be made to attract and inform people outside about the benefits of becoming involved. People recruit new members through world-of-mouth and more explicit promotion, including creating and maintaining a group-specific web site, posting references to the group on related web sites (or in other online groups), and publicizing the group in personal documents such as email signatures and personal web pages. All of these activities can increase the salience of the community among potential members.

Perhaps the most basic type of investment in an online group is active participation, in the form of creating content and consuming it. Participation may seem a nonobvious aspect of community building effort. Yet, as in real world communities, without participation, few of the beneficial characteristics of most online groups would come about. In the real world volunteer group, participation means showing up, talking, listening, raising money, baking cookies, serving on committees, and organizing activities. In online groups, participation means generating messages, responding to messages, organizing discussion, and offering other online activities of interest to member. If members do not create relevant content, other community building activities are largely irrelevant. Participation also means consuming content; if members do not regularly read the material that others provide, the online group will not remain viable. Group identity and personal relationships are constructed through the messages that members send and read. Attending to and reading messages is a prerequisite for others to provide them. Thus, active participation by providing and consuming content plays a crucial role in sustaining an online group.

Who Does the Work?

A major challenge in sustaining an online group is inducing people to devote the time and effort needed to perform these community maintenance activities. Members who regularly read messages or provide content for others expend real time and attention doing so. People who seek to mange group interaction find that controlling and encouraging members' behavior takes time, demands attention, and, in some cases, exacts an emotional toll. Promoting the community and maintaining its infrastructure also require that people take time from other activities. Thus, a key challenge in developing viable online community involves inducing people to perform these activities.

Most software created to run an online group requires a person to take a formal leadership role, often called an owner, administrator, host, or wizard. In some cases, the role exists because setting up the technical infrastructure requires someone with high-level administrator privileges on a server. Even in cases where the core technology is administered by an outside agency, the distributed nature of online groups usually means there is a need for a formal position in community administration. As with a formal position of administrator in a traditional organization, the owner (or administrator, host or wizard) of an online group is a role that is formally named and characterized by distinctive rights and responsibilities. The role is defined and reinforced through community structure and rules. Owners are typically assigned special email addresses, are prominently identified in the description of the community, and have special privileges. They can add or remove members from the community and, in the case of an infrastructure that provides archival capabilities, they can add or remove items from the archive. In cases of moderated groups, they can allow or reject posting, or can delegate these rights to particular others.

In real world organizations, a formal administrative role and in-role administrative behavior creates further administrative competence and psychological role identity, which encourages further commitment to the group and more role activity (Organ, 1994; Piliavin & Callero, 1991). Likewise, in online groups, competence and role identity should lead owners to engage in more community building activities than other members. Because owners typically have special access to the technical infrastructure, they are often held responsible for infrastructure management. By virtue of the legitimacy that arises from their role, owners also have an increased authority and responsibility for the social activity in the group, particularly

when it involves taking action to limit undesirable behavior. Although it is not necessarily inherent in the infrastructure or facilitated by the formal role, owners' role identity and commitment to the group would lead them to promote the community externally and provide more content than other participants. It is less clear whether owners would be expected to show greater audience engagement than any involved group member. On the one hand, owners might be more vigilant in reading content than would be other members. On the other hand, to the degree that owners create content themselves, they can spend less time reading it. Taken all together, however, we expect that owners will do significantly more community building work than will other members of the community.

Why Do People Do the Work?

Whether people are formally-designated leaders or not, presumably they do community building work because they expect to derive benefits from it, either directly or through the benefits they provide the group. In real-world communities, volunteers have differing motivations for volunteer work (e.g., Omoto & Snyder, 1995). Some people seek escape, sociable interaction, self-esteem, or future employment, whereas others are highly altruistic and contribute in order to help a group or cause. Many people who identify with a group, feel personally gratified when the group benefits. The benefits people expect influence the types of community building work that they do, the effort they expend, and how long they continue to do volunteer work (e.g., Deaux & Stark, 1996; Penner & Finkelstein, 1998).

Although online groups do not offer all of the potential benefits for community participation offered by real world communities, they offer some benefits particular to the electronic domain. Prior studies of online groups suggest that people often participate as a way to gain access to otherwise obscure or inaccessible information that is relevant to their work,

hobbies, health, and other topics in which they are personally interested (Ogan, 1993; von Hippel, 2001; Galegher, Sproull, & Kiesler, 1998). This information benefit may come in the form of receiving answers to specific questions or general knowledge arising from exposure to group communications. People who value information benefits should be engaged as an audience.

People also benefit from participating in social relationships (Baym, 1999; Cummings, Sproull and Kiesler, 2001; Galegher, Sproull and Kiesler, 1998). Online groups can provide a place to build and maintain social ties with people already known offline as well as those first met online. Social relationships provide camaraderie and social support. Social relationships also create trust and increase the credibility of the information that the group exchanges. People who value these social benefits are likely to do the work of providing content and managing social behavior (particularly by encouraging others). They are also likely to be more engaged in reading and posting, because following others' social exchanges and online conversations can provide a basis for their own participation.

In addition to providing information and social benefits, online groups also provide opportunities for people to be visible beyond the boundaries of their local work or geographical community (Lerner and Tirole, 2000). Becoming visible may be most important for work-related online groups, because in these settings visibility may have direct economic and professional payoffs. Even in online groups dealing with topics of personal interest, being seen as skilled, knowledgeable or respected may have psychic payoffs. In contrast to informational benefits that can come from the typically invisible work of audience engagement, the benefits of personal visibility accrue to those who provide content, and those who do social encouragement and external promotion.

To this point we have focused on the personal benefits one expects to receive from the information, social relationships, and visibility one gains from contributing to an online group. As with voluntary associations in general, however, people also contribute because they are trying to help the group itself or a larger community of people that the online group is part of. That is, the motivation is an altruistic one, in which contributors value the opportunity to benefit others. Together expectation of these four types of benefits: informational, social, visibility, and altruistic, provide a range of motivations for why people do the work of online community building.[2]

What Contextual Factors Affect Community Building?

Although people must do community building work in all online groups, the amount they do of different types of work may be related to the characteristics of the group itself. In traditional organizations, many of the activities described above increase in importance and complexity as the number of community members increases. Larger organizations, groups, and associations require more effort to maintain. However, one of the features of online communities is that its population size does not matter in the conduct of many activities; for example, it is just as easy to post a message to a community of several thousand as to a group of several (Sproull & Kiesler, 1991). On the other hand, some maintenance work may be related to the size of the group. For example, the needs for encouraging proper behavior and controlling undesirable behavior are likely to grow with the number of members in an online community.

In contrast to sheer size, the amount of activity in the group may be related significantly to other types of work that must be done. The time and attention needed to process content is likely to be higher in online groups where the volume of activity is greater.

The type of group also may affect community-building work. Online groups organized around career and other work-related topics are in some ways the online equivalent of professional associations. Members in work-related online groups may hold membership in analogous real world professional associations and maintain ties through these associations. In contrast, groups that focus on non-work activities, such as hobbies, political causes, and other personal interests are more likely to behave like clubs or informal social groups. Following this reasoning, in work-related online groups, information and visibility benefits might be more important to those who do community-maintenance work, whereas in non-work groups, social benefits might be more important. Altruism could be important to members in both kinds of groups. Those with a strong professional identification may be highly committed to their online work-related groups. Those with a strong political, charitable, or avocation identification may be highly committed to their online non-work -related groups.

METHOD

To examine the determinants and consequences of community building work, we conducted an electronic survey of members in a sample of Internet list servers. We drew upon prior research conducted in 1997 that characterized topic, message volume, and membership size in a sample of 284 unmoderated, unrestricted public list servers (see Butler, 2000). The sample included work-related and non-work groups. Groups whose focus was medical or psychological support were excluded due to the possible sensitivity of these groups to an unsolicited survey.

In the fall of 1998, we sent email surveys to a stratified sample of members drawn from the online listservs characterized by Butler in 1997. We sent a survey to the list owner for each group. In cases where the owner could not be personally identified, we sent a survey to the

designated owner address for the community. When a person owned more than one list, and could be identified as such, one list was randomly selected as the target of the survey. In cases where a person was identified as an owner of multiple lists after responding, one response was randomly chosen for inclusion in the final dataset. The survey also was sent to two samples of members from each community, that is, active participants and silent participants, or "lurkers." Active participants were defined as the top 20 most active posters, selected from people who had contributed messages to the group in the time period covered by the first stage of data collection. When the number of active contributors was fewer than 20, they were all included in the sample. In addition, up to 20 members were selected from the set of members who had not contributed a message during a 130 day period, in the first stage of data collection.

The sample selection process resulted in a three-level sample of 2992 people consisting of owners, active participants, and silent participants from 212 different lists. The survey was sent via email to all people in the initial sample. One month later a second round of surveys was sent to non-respondents. In the two rounds 573 surveys were not deliverable due to invalid email addresses, resulting in an effective sample of 2419 people from 147 different lists. Significantly incomplete responses and duplication (arising primarily from owners who were sent two surveys) were removed to create a dataset comprised of responses from 385 people from 121 different lists. This sample represents 16% of the total list members and 82% of the lists sampled.

The dataset contained responses from 25 listowners (6.5%), 273 active participants (70.9%), and 87 silent participants (22.6%). Respondents were on average 41 years old. Fifty-six percent were male, 65% had some graduate school education, 69% were employed full time, and 43% had income of more than $60,000. Chi-squared tests of gender, income, occupational level

and analysis of variance of respondent age indicate that, with one exception, there was no significant demographic difference across the respondent subsamples. Owners were significantly more likely to have some graduate education (84% of owners vs. 61% of active participants and 70% of silent participants).

Measures

Basing their judgments on brief online descriptions of the lists, two codes rated the extent to which each list was about non-work or work-related topics. Cronbach's alphas, measuring the reliability of the judgments, were .88 and .79 respectively. We classified each group based on its highest rating. For example, lists for a folk-dance society, botany club, and environmentalist information were classified as personal and non-work, while those focused on copy-editing and computer-aided design systems were classified as work-related.

Survey respondents were distributed between non-work and work-related groups in the same proportion as in the sample. Chi-squared tests indicated that there was no significant difference in the distribution of member types (owner, active participant, silent participant) across the group types (non-work vs. work). The total percentage of owners in the response set (6.5%) matched that in the sample (6.6%). However, active participants, people who contributed at least one message to the community, were a higher proportion of the response set than in the sample (71% vs. 54%).

The subsamples did not differ on whether they were members of work or non-work groups, but they did differences with respect to size, measured in terms of the number of individuals on a list's mailing list on November 30, 1997, and content volume, measured in terms of mean number of message posted per day. Analysis of variance shows that compared to the sample of active readers, the owner and silent participant-samples were from lists that were

smaller ($p < .10$) and that exchanged fewer messages ($p < .001$). Because of these sample, differences we include list size and volume as control variables in the analyses.

Group size was operationalized as the number of people on each list server's mailing list at the end of November 1997. To address non-normality, we used a log (base 10) transformation of the list server size. Content volume was measured by calculating the mean number of messages sent to the list server each day during a 130-day observation-period starting in the end of November, 1997. Again, we applied a log (base 10) transformation to address non-normality. Before taking the log we added 0.01 to each case to handle cases with a value of 0. (The value of 0.01 was selected to place the 0 valued case at just beyond the lowest transformed value.)

Respondents' community building work was measured with survey question that asked respondents to indicate how many hours per week they spent performing activities such as reading messages, composing messages, and maintaining the mailing list and whether or not they cross-posted messages to other groups, mentioned their member in their email signature file, or sent messages to other participants in order to reduce "off-topic" messages. We carried out an exploratory factor analysis to identify the structure of these items. Using standardized values for each of the items, principal component analysis of the community building activities, with Varimax rotation and pairwise exclusion of missing values, resulted in 5 factors explaining 60% of the variance. One somewhat unexpected outcome of the factor analysis was that items related to content provision loaded on a factor with infrastructure maintenance items. However, these are conceptually distinct activities, and it is likely that many people who provide content lack the technical capability to maintain a community's infrastructure. Therefore, these items were placed in separate indices. The means of each item set were then used to construct six indices of community building activity (See Table 1).

Index	Items*	Alpha
Content Provision	How many hours per week do you spend composing and posting list msgs [messages]? How many hours per week do you spend corresponding in private email with list members?	0.73
Infrastructure Maintenance	How many hours per week do you spend maintaining list address files? How many hours per week do you spend maintaining, posting, publicizing ancillary files?	0.82
Social Encouragement	(Prompt) Please check each of the following activities that you do: Cross-post messages from this list to other lists (Prompt) Regarding messages you post to the list or send as private email, please check if any have as their purpose to: Praise someone's informative message Praise someone's supportive message style Encourage people to tell others about the list	0.66
Social Control	(Prompt) Regarding messages you post to the list or send as private email, please check if any have as their purpose to: Encourage people to introduce themselves Adjudicate disputes Reduce "off-topic" messages Chastise someone's inappropriate behavior Remove someone from the list	0.73
External Promotion	(Prompt) Please check each of the following activities you do: Maintain a web site for the list. Post links to related web sites. Identify your self as a list server member in your sig [signature] file Give information about the list on your home page.	0.70
Audience Engagement	How many hours per week do you spend reading list messages?	NA

* All items are standardized

Table 1: Measures of community building work.

Similar analyses were conducted for 14 items related to motivations and expected benefits of contributing to these groups. Respondents were asked to indicate, on a 7-point scale, "How important is each of the following as a benefit you receive from participating in this listserv?" Principal component analysis of the standardized values, with Varimax rotation and pairwise exclusion of missing values, resulted in four factors explaining 64% of the variance. The means of each item set were then used to construct four measures of respondents' perceptions of benefits to contributing to the community (see Table 2).

Index	Items*	Alpha
Visibility Benefits	Career advancement or professional visibility.	NA
Information Benefits	Learn more about or keep up with the topic. Get my questions answered.	0.60
Social Benefits	Meet people and make friends. Have fun. Have others appreciate my participation. Gain a sense of accomplishment. Become known to list members. Build relationships with list members.	0.84
Altruistic Benefits	Help other people. Think about others instead of myself. Support the real world community associated with this topic. Support this list community. Promote the topic or issue of the group.	0.77

* All items followed the prompt: "How important is each of the following as a benefit you receive from participating in this list server (1=not at all important, 7=extremely important)?". All values are standardized.

Table 2: Measures of community benefit expectations.

Preliminary Analysis

The correlations among the main constructs indicate that many of the items are correlated (see Table 3). On average, people who said they contributed to one community building activity, contributed to several. Similarly, respondents who expected one benefit from contributing to the group tend perceived several benefits. Those who perceived there to be important benefits from participating in an online group were more likely to contribute to community building activities.

The remainder of this paper examines these relationships in more detail, and asks whether contributions, perceived benefits, and the relationships among them were different for owners of the lists (formal leaders), active posters, and lurkers of the groups, and for nonwork-related and work related groups. To test our hypotheses, we conducted repeated measures ANOVAs with respondent role (owner or other member) and group type (non-work or work-related) as fixed effects, and group size and content volume as covariates.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Total Time	1.00													
2. Infrastructure Maintenance	.68**	1.00												
3. Social Control	.29**	.28**	1.00											
4. Social Encouragement	.42**	.29**	.47**	1.00										
5. External Promotion	.31**	.33**	.29**	.32**	1.00									
6. Content Provision	.87**	.65**	.29**	.36**	.28**	1.00								
7. Audience Engagement	.39**	.11*	.12*	.16**	.06	. 24**	1.00							
8. Visibility Benefits	.18**	.16**	.03	.17**	.16**	.20**	.01	1.00						
9. Information Benefits	.16**	.05	-.10	.13*	.00	.06	.15**	.24**	1.00					
10. Social Benefits	.33**	.17**	.20**	.35**	.22**	.28**	.17**	.30**	.30**	1.00				
11. Altruistic Benefits	.28**	.23**	.10	.34**	.15**	.26**	.13*	.32**	.28**	.49**	1.00			
12. Work-Related Group	-.06	.07	-.09	.04	-.02	-.03	-.02	.28**	.08	-.12*	.09	1.00		
13. Log (Group Size)	-.01	-.11	-.02	.02	-.09	-.11*	.10	.07	.20**	-.08	-.05	.17**	1.00	
14. Log (Message Volume + .01)	.19**	-.04	.08	.13*	-.03	.08	.13*	.06	.21**	.08	.09	-.18**	.52**	1.00
15. # of Members Known Outside the Group	.14**	.20**	.06	.08	.07	.31**	-.01	.06	-.06	.02	.12*	.05	-.07	.01

Pairwise Ns range from 325 to 385
* p <= 0.05; ** p <= 0.01

Table 3: Correlations among measures

RESULTS

A premise of this research is that community building requires significant expenditures of time and effort on the part of members. The descriptive analysis presented below shows that members reported investing significant amounts of time in community building work, with an average of almost four hours a week and a maximum of 31 hours (see Table 4).

	All Responses			*Respondents Reporting Activity*	
	N	Range (hrs/weeks)	Mean (hrs/weeks)	N	Mean (hrs/weeks)
Reading list messages	368	0 – 14	1.99	356	2.06
Composing and posting list messages	359	0 – 10	0.8239	291	1.02
Corresponding in private email with list members	351	0 – 15	0.789	255	1.08
Maintaining list address files	340	0 – 3	0.16	90	0.58
Maintaining, posting, and publicizing ancillary files (e.g. FAQs, "rules of the road", etc.)	340	0 – 7	0.22	70	1.045
Total time:	371	0 - 31	3.85	363	3.94

% of respondents who report having sent messages (privately or publicly) to:	*N = 384*
Praise someone's informative message	68%
Encourage people to tell others about the list	25%
Praise someone's supportive message style	24%
Adjudicate disputes	22%
Reduce "off-topic" messages	16%
Encourage people to introduce themselves	13%
Chastise someone's inappropriate behavior	12%
Remove someone from the list	6%

% of respondents who report that they:	*N = 384*
Post messages from the list to other lists	32%
Post links to related web sites	22%
Provide information about the list on their personal home page	16%
Maintain a web site for the list	10%
Identify themselves as list members in their email signature files	7%

Table 4: The nature and extent of community building work

We had reasoned that owners, in their role as formal administrators, would contribute more to community building work than would their members. We found, however, that owners did not did not differ significantly from either silent or active participants on the total time they

expended in community building work**.** Owners did significantly more of the active work of infrastructure maintenance, social control, and external promotion work than did other members (see Table 5 and Figure 1). They did not differ from other members, however, in the time they devoted to reading messages and encouraging other members. By definition, owners contributed more content than silent participants ($p < .05$). However, there was no difference in the level of content provision of owners and active participants. Overall, the control variables of group type (non-work vs. work-related) and group size were not significant. As we expected, group activity as measured by the volume of content did have a significant influence on the level of community work, with an overall significant effect ($F = 11$, $p < .001$) and a significant effect for social control, social encouragement, and content provision.

	Community Building Work						
	Total Time	**Infrastructure Maintenance**	**Social Control**	**Social Encouragement**	**External Promotion**	**Content Provision**	**Audience Engagement**
Intercept	7.073***	1.410***	.459^{+}	.391	.564*	.828*	-.481
Silent Participants[1]	-1.429	-.953***	-.597***	-.303	-.487**	-.436	.123
Active Participants[2]	-.986	-.818***	-.510***	-.207	-.511**	-.185	.175
Work-Related Group	-2.090	-.908^{+}	.352	-.076	.179	-.175	-.189
Log(Size)	-.953	-.252^{+}	-.003	-.050	-.059	-.285**	.145
Log (Volume + 0.01)	1.190***	.057	.073	.135*	.010	.120^{+}	.090
Group Type x Silent Participant	3.158	.982^{+}	-.209	-.181	-.317	.434	.332
Group Type x Active Participant	1.975	.677	-.228	-.063	-.124	.081	.236

N = 334 +: p <= 0.1; *:p <= 0.05; **:p<= 0.01; ***:p <= 0.001

[1:]Coefficients indicate the results of comparing silent participants to owners

[2:]Coefficients indicate the results of comparing active participants to owners

Table 5: ANOVA parameter estimates for community building activity

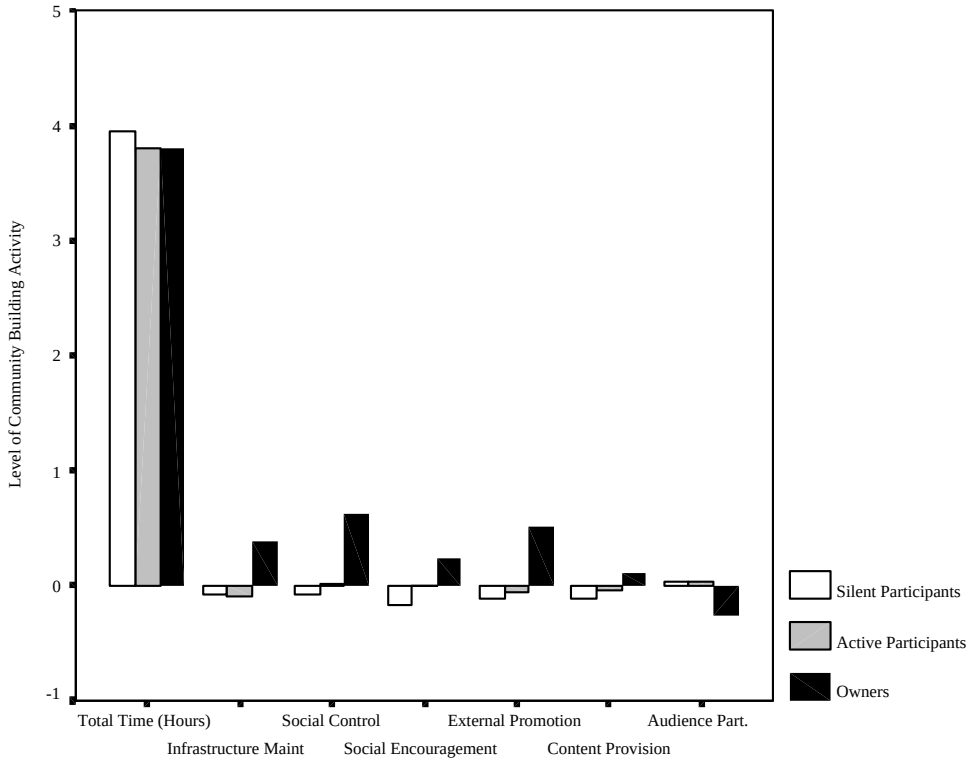

Figure 1: Relative levels of community building work for owners and other members.

To examine the motivations of owners in comparison to other members, we carried out repeated measures analyses of the importance of community benefits to both groups. These analyses showed that owners valued different community benefits than did other members (see Table 6 and Figure 2). Owners perceived altruistic benefits to be significantly more important and information benefits to be significantly less important than did other members. This finding is as we expected and is consistent with the role identity theory and research by Piliavin and her colleagues. They suggest that in-role volunteer activity encourages an altruistic self image and commitment to the community (see, for example, Callero et al, 1987; Piliavin & Callero, 1991).

	Benefits from Community Participation			
	Visibility	**Information**	**Social**	**Altruistic**
Intercept	.258	-1.054***	.080	.974***
Silent Participants[1]	-.170	.947***	.196	-.692***
Active Participants[2]	.022	.870***	.345+	-.423*
Work-Related Group	-.749	.054	1.204***	-.099
Log (Size)	-.031	.147	-.167	-.198*
Log (Volume+0.01)	.127	.215*	.068	.126*
Group Type x Silent Participants	.003	-.257	-1.554**	-.297
Group Type x Active Participants	.040	-.299	-1.003**	-.122

N = 343 +: p <= 0.1; *:p <= 0.05; **:p<= 0.01; ***:p <= 0.001

[1]Coefficients indicate the results of comparing silent participants to owners

[2]Coefficients indicate the results of comparing active participants to owners

Table 6: ANOVA parameter estimates for community benefit expectations

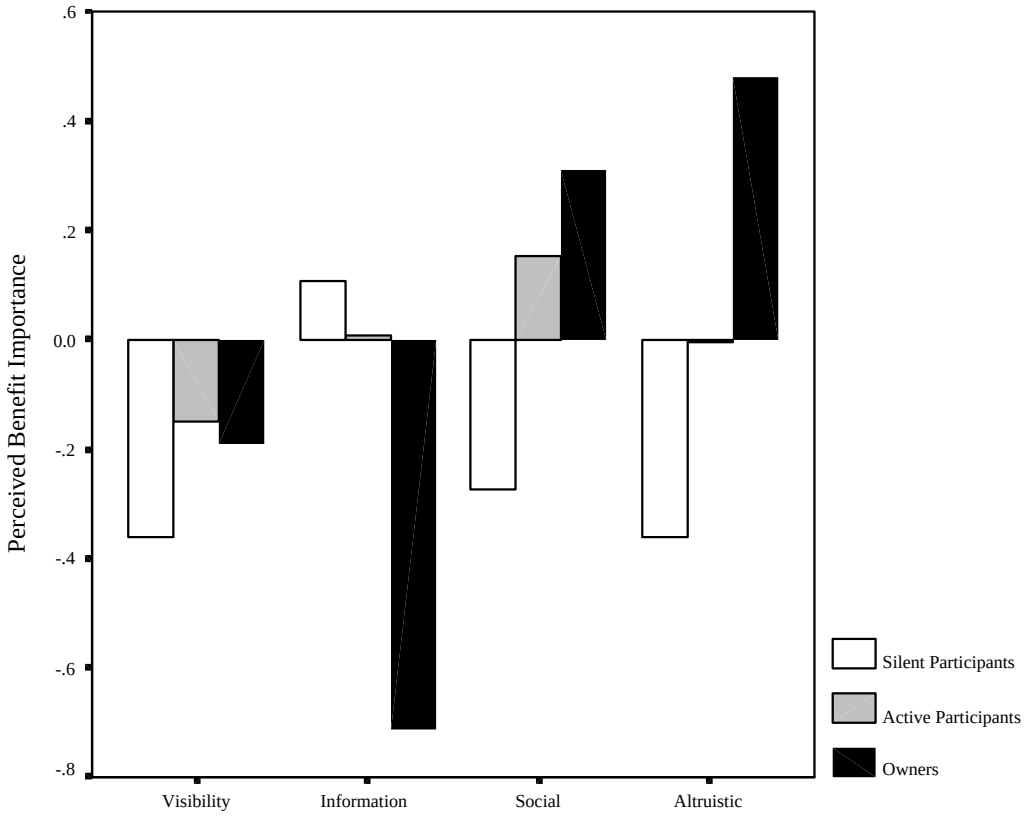

Figure 2: Owners' and members' relative benefit importance perceptions

The analyses presented above suggest that owners engaged in different types and amounts of community building work and valued different benefits than did other members. The repeated measures ANOVA results presented in Table 7 examine the link between benefits and community building work. This analysis, when compared with that in Table 5, show whether perceived benefits mediate the degree to which owners and other members engage in community building work. If the benefits of participation drive community building, then differences between owners and other members will be reduced when benefits are entered into the models. The analysis in Table 7 shows that including benefits in the model does not reduce the impact of the owner role; indeed in comparison to active participants it is slightly strengthened. That is, the

analysis shows that owners invest more hours than other members in community building work, and the difference between owners and members is especially strong for non-work-related groups. This analysis suggests that the leadership role, itself, accounts for some of the additional effort that owners contribute in active community building.

	Community Building Work						
	Total Time	**Infrastructure Maintenance**	**Social Control**	**Social Encouragement**	**External Promotion**	**Content Provision**	**Audience Engagement**
Intercept	7.744***	1.180***	.505	.270	.705*	.876**	-.301
Visibility	.341	.060	.008	.031	.101*	.078^{+}	-.094
Information	.376	.069	-.107^{+}	-.027	-.020	-.014	.102
Social	1.478***	.126^{+}	.191**	.257***	.198**	.197**	.214*
Altruistic	.145	.011	-.035	.149*	-.046	.028	.105
# of Members KnownOutside	.024*	.007***	.001	.004*	.002	.005**	-.001
Silent Participants[1]	-1.294	-.963***	-.577**	-.033	-.483*	-.363^{+}	.030
Active Participants[2]	-2.069^{+}	-1.062***	-.565**	-.164	-.643***	-.326^{+}	.028
Work-Related Group	-4.145*	-1.189**	.036	-.392	-.103	-.464	-.521
Log(Size)	-1.140^{+}	-.143	.003	-.058	-.089	-.310**	.133
Log(Volume + 0.01)	1.188**	-.007	.099	.121^{+}	-.004	.133*	.063
Group Type x Silent Participants	4.958*	1.238**	.106	.201	-.038	.769^{+}	.583
Group Type x Active Participants	4.351*	1.150**	.035	.282	.191	.460	.481

N = 296 +: p <= 0.1; *:p <= 0.05; **:p<= 0.01; ***:p <= 0.001
1: Coefficients indicate the results of comparing silent participants to owners
2: Coefficients indicate the results of comparing active participants to owners

Table 7: The relationship between benefit perceptions and community building work

The degree to which participants' valued benefits from the groups also predicted their community-building work, over and above their type of membership and group attributes (group type, size, and content volume). People who valued social benefits reported performing more community building work of all types. Because social benefits include making friends and interacting socially, we also considered whether experiences outside of the list server were related to these motivations and to community work. In particular, we added respondents'

estimates of the number of people on the list whom they knew in the real world[3] to the analysis. This analysis showed that the more people that members of the online community knew in the real world, the more time they invested in community building work, controlling for community benefits ($p < .05$). Knowing more list members in the real world was associated with higher levels of infrastructure maintenance, social encouragement, and content provision.

Other benefits were more narrowly associated with particular types of community building work. People who valued altruistic benefits were more like to encourage others. People who valued personal visibility were more likely to promote the group externally.

DISCUSSION

Online community building entails work. In the case of a list server, this work involves infrastructure maintenance, social control and encouragement, external promotion, writing and reading messages. We have shown that members of list servers report spending substantial time each week doing this work. People with a formal leadership role--owners of the list servers--did more community-building work than others did. But other members also invested time to make their groups successful. Moreover owners and other members who valued different benefits contributed to the online group in different ways. Social benefits were especially powerful in driving community building work and led to a wide range of community-building activities, but other benefits were important as well.

The work presented here is subject to many limitations. We sampled only from unmoderated, unrestricted public list servers. We did not sample support groups. Thus we cannot estimate the extent to which our findings generalize to other types of online groups and communities. Moreover, our survey respondents may not be representative of the entire population of all list server members. Although the proportion of owners and other members

responding to the survey were comparable to those in the population, the absolute number of owners, as well as the overall response rate, was low. All of the individual-level measures were based on self-report and may be subject to reporting biases.

Despite these limitations, our analyses suggest an interesting perspective on leadership in online groups. The formal leader role in online communities is the role of owner, administrator, or host. This role was originally defined with special access privileges so that the technical tools and network infrastructure of the online group could be maintained. However, unlike what seems to happen in many real world groups and organizations, technical responsibility in online groups goes hand in hand with social responsibility. Historically, owners often have had the original idea to start their online groups, or they have taken over the role after being active members. Owners therefore probably acquired their technical role with more community commitment than the typical online group member, and, as our data show, they have taken on broad social responsibilities and social community building work as well. Thus list owners not only do the work of maintaining the infrastructure, but they also take on tasks such as promoting the group, sending messages to other members to encourage them or moderate their behavior, and posting messages. Thus, the role definition of owner seems to include social as well as technical tasks.

As we noted earlier, this evidence of in-role volunteer participation and community commitment by owners is consistent with the theory and research of Piliavin and her colleagues, who have studied real world volunteers. Owners are motivated more by altruistic motives than other members are. And owners are putting in substantial amounts of time on both technical and social tasks, and differentiating themselves from other members in their degree of active as compared with passive participation. In comparison with other members, they spend more time contributing content and composing messages than reading messages.

Despite this evidence that the formal leadership role is important, our data also show that other members also engage in time-consuming, community building work. Our analyses showed that the perception of community benefits predicted how much community building work members of the group did. One of the interesting personal benefits offered by an online community that may be less prominent in most real-world communities is personal visibility. Our data showed that those who valued this benefit were likely to do the work of external promotion of the community (and probably of themselves as well), such as cross-posting messages to other groups and websites.

For all members, and especially for owners of non-work-related lists, social behaviors seemed to motivate a wide range of community-building effort. In addition, the more people that they knew in the real world, the more time they spent in community building work, controlling for community benefits. Of course, this significant association does not tell us about causality. It is possible that online community members got to know other members in the real world as a result of their interactions in the online community, or that they already knew these people outside the online group. However, this finding is consistent with other work we have done, showing that participation in an online group can be stronger for those with real world group ties (Cummings, Sproull, & Kiesler, in press). Real world community leadership also predicted some kinds of online community building work: Those who had taken on real world community leadership roles were more likely to engage in social encouragement and external promotion in the online community. Again, it is possible that real world ties were partly implicated in this activity.

In conclusion, our data suggest that if leaders want to increase community building work done by other members, they can focus on increasing the social benefits and relationships that members derive from the group.

Online communities are interesting in large part because they are emergent. The more centralized and formalized community building work becomes, the more "community" begins to resemble traditional formal organizations, or in the extreme traditional mass media. For this reason it is important to understand why people, on their own initiative, invest their time, energy, and attention in the activities of community building.

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[1] A list server is an electronic mail distribution list, in which messages sent to the list are forwarded to members who have subscribed to the list. Contents are often archived. Typical list server software provides commands for people to post, read, and reply to messages and to subscribe, unsubscribe, or receive digests of messages sent to the list. Listserv and Majordomo are the names of two major brands of list server software. We use "list server" to refer generally to all list management software.

[2] We initially derived these categories from items used in previous research on volunteer motivations, particularly Omoto & Snyder (1995), as well as from items more suited to online community. Omoto & Snyder's scales of volunteer motivation included: personal development (e.g., making friends), esteem enhancement (e.g., escaping stress), understanding (e.g., learning more about the problem), values (e.g., helping others), and community concern (e.g., sense of obligation to the community). Our category, social benefit, overlaps with their category, personal development. Our category, information benefit, overlaps with their category, understanding, and

our category, altruism, overlaps with their categories, values and community concern. Our category, visibility benefit, perhaps is especially pertinent to online communities, where contributions can make one known to hundreds or thousands of others, and perhaps less so in real-world communities, where even highly involved volunteers are likely to toil in comparative obscurity.

[3] Several respondents reported that they knew in excess of 200 list members outside the context of this list. To prevent undue influence of these outliers on the results, these responses were dropped from the analysis presented in Table 7.