

Systers: Contradictions in Community

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ABSTRACT

Systers is a 13-year old online community for technical women. Substantial growth in the membership (from an initial group of 12 to over 2300 today), and of the Internet generally, has changed the nature of this community. We report empirical research leading to redesign of Systers' online community resources. Systers must serve an increasingly diverse membership. Newcomers desire more and broader discussion and services whereas long-time members tend to prefer limited interaction. Redesign must grapple with a fundamental tension between the goals of successful members who act as mentors and community leaders, and those needing support, who tend to participate more actively in the community.

Keywords

Electronic communities, diversity, networks (social), networks (digital), web technology, computer-mediated communication, electronic mail

INTRODUCTION

Despite programs and legislation that have opened professional opportunities to women, women accounted for just 11% of the Ph.D. degrees in computer science in 1998. Of full professors in computer science, just 8% were women. These statistics reflect trends in the hard sciences and engineering more generally; women have comparatively low participation rates and professional mobility. Online interactions with other technical women may help address problems related to isolation and adverse attitudes. Online interactions may serve as a source of job information and contacts, as a source of support and work advice, as a peer group, and even as a means to mobilize change.

The electronic community of Systers [1] was begun to encourage technical women's persistence and advancement by helping technical women help one

another. Systers was started in 1987 as a small electronic mailing list for 12 women who met at an academic conference on operating systems, thus the name "Systers." Today Systers is maintained by the Institute for Women and Technology, headed by Anita Borg, the founder of Systers.

The current technical infrastructure of Systers began as a research project in the use of databases for collaboration. With the growth of the Internet and the Web, this infrastructure supported a substantial growth of Systers to its current membership of over 2300 members from 38 countries including Niger, Bolivia, and Russia. With growth came diversity of interests and varying access to computer resources and colleagues. Growth also altered the sense of close community that existed when members were few in number, met face-to-face at meetings, and knew one another well. Norms of communication changed. Almost all Systers members read all posted messages in email as they come to their mailboxes. Today these messages arrive in a context of heavy Internet traffic. Systers members we sampled receive on average 268 email messages each week and send nearly 80. As a result of increasing communications and members, Systers has had a policy of limiting discussion messages and topics. Limiting communication, however, also constrains what a virtual community can do, since all transactions are based on communication.

A redesign project is currently underway to improve the experience of community within Systers. As part of the redesign, we have been conducting research with Systers members to learn better who the members are, what leads them to Systers, and what they need and want. We began with a random sample cross-sectional survey of Systers members. We next instituted a survey of new members as they subscribed to Systers. We plan to follow up with these newcomers in a year. We also plan an exit survey of those who leave Systers. We report here what we have learned about the Systers community and its members thus far and describe initial requirements for the redesign.

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THE SYSTEMS COMMUNITY

Although the business community today is interested in creating "electronic communities" for the purpose of increasing revenue [2], a successful electronic community promotes the welfare of members [e.g., 3, 4]. The introduction to Systems explains that, "Systems [is] a safe and comfortable place [for its members] to discuss important issues."

All electronic communities create and maintain territorial boundaries to signal who is and is not welcome. Systems maintains strong community boundaries through its membership rules. As it describes itself:

Systems is a private organization of professional women in technical areas of the field of computing--i.e., with a degree (or currently a student) in Computer Science or Computer Engineering, or holding an equivalent technical position in industry, academia, or government. This group is not intended for those in marketing, writing, or administrative positions within a computer company, or studying or reporting about women in the computer industry, or just interested in the problems of female computer professionals. It is for technical women. It is not intended for men, however sympathetic, as experience has shown this tends to dilute the purpose of a special forum just-for-us, where we don't have to spend energy explaining issues to a different point of view.

A feature distinguishing electronic communities from narrower electronic groups is that the former have more varied and differentiated functions and activities than the latter. Systems organizes a weekly job postings compilation. Occasionally, members in a particular geographic location (e.g., Bay Area Systems) or members attending a particular conference arrange face-to-face get-togethers. Three, now separate, electronic groups first "met" and coalesced on Systems: Systems-Students, Systems-Academia, and Systems-Out. Much of the work organizing the first Grace Murray Hopper conference was done via Systems.

Community norms and "rules of the road" create and reinforce behavioral boundaries, signaling the kinds of behaviors that the community encourages or discourages. Because the behavioral repertoire in electronic communities is limited mostly to written communication, most of the norms and rules are also related to written communication: What are appropriate (and inappropriate) topics? Styles of discourse? Styles of interaction? Systems is explicit about its rules for internal communication, as evidenced by guidelines posted in its introduction:

DO NOT FORWARD Systems list mailings without first obtaining permission from the originator of a message.

DO NOT USE OR DISSEMINATE information in Systems messages without permission of the original sender.

Personal defamation or character assassination of individuals or by name is an inappropriate use of the list. Information that is possibly libelous or slanderous may not be posted.

With the exception of the posting of resumes and certain job opportunities, Systems may not be used for any advertising or commercial purposes.

Frequently Systems ask for opinions over the list, collect them and then collect or summarize and redistribute them to the list. Collections should not be sent beyond the list unless the collector states that the message can be disseminated. The collector should get permission from every contributor before indicating that the message can be passed along.

(<http://www.Systems.org/mecca/cgi-bin/new-req.tcl>. Visited 3/3/00.)

As Systems and the Internet grew, the community adopted two important normative mechanisms to organize and control communication. Both norms are conveyed primarily by example. The first norm is to answer requests for advice by replying to the sender alone, who then collects and sends a summary of replies to the community as a whole. This practice is also common in technical and scientific distribution list groups, in which members post technical questions or questions about the literature of the field. They then create summaries of the replies they receive and post them to the entire list. This practice for disseminating information contrasts with the social discussion and give-and-take one finds in many Usenet and Web support, political, hobby groups, where discussion appears as threaded responses to a posted message. Nearly 50 years ago, experimental laboratory comparisons of analogous structures were a hot scientific topic. So-called "wheel" or "star" networks often proved to be efficient, but member satisfaction was highest in "all-channel" networks [e.g., 5].

A second important norm is that Systems topics should be limited to issues related to being a technical woman. The following gives a flavor of appropriate topics:

1. How to negotiate a good maternity leave arrangement, if your company doesn't have an official policy.
2. Barbie software, and what it implies for getting girls interested in computing.
3. I'm thinking of going back to school. These are my goals. What kind of program will help me meet them?
4. Here is a situation I am having with a male colleague at work; how do I deal with it?

- Let's create women-oriented versions of "real engineer" jokes. An example: Real engineers figure out algorithms to minimize thread usage when doing counted cross stitch.
- Keeping up with technology vs. time off for family.

Off topic messages include such items as, "How do I do X in perl?" (technical questions), "Why do guys do X?" (male-bashing), and "Should I send my kid to private school?" (general child care). When off-topic messages are posted, a member or, occasionally, the founder, will post a response reminding the poster as well as the entire community of topic norms.

Systers' discourse norms substantially reduce daily message traffic in comparison with that of groups whose norms are to tolerate more digression and/or replies to the group as a whole. Systers' daily message traffic ranges from 0 to 20, a comparatively small number compared to that of many electronic groups and communities. Systers members in our survey reported posting significantly more messages to other favorite electronic groups, even to technical distribution lists. The externally visible structures and processes of Systers described above comprise the context for community interaction. The life of the community is to be found in its interacting members, at least some of whom feel emotional affiliation,

a sense of identity, and a sense of obligation to the community. Our survey was meant in part to capture these feelings and perceptions.

SURVEY OF MEMBERS

We obtained systematic information about Systers members through a random sample survey. In December 1998, after obtaining permission from the Systers membership, we randomly selected 1000 subscribers from the rolls of Systers members. We obtained usable email addresses and successfully sent email to 819 of these members, asking them to participate in an online survey contained in the message. The survey consisted of 80 items, nearly all presented in checkbox format. The survey requested information on the member's demographic attributes, technical environment, online groups, social ties, work situation, and preferences on the redesign of Systers.

We received 367 completed surveys, a 45% response rate. The respondents include women who were members at Systers' inception as well as women who joined through 1998; median tenure in Systers in the sample was 3 years (mean = 3.8). We next report the demographic attributes of respondents.

Mainstream with Diversity

Figure 1 shows how Systers in the sample were distributed

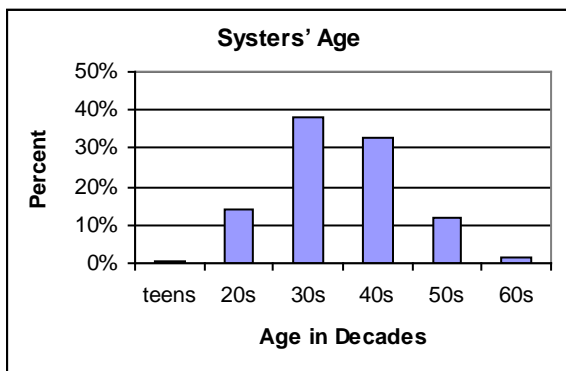


Figure 1a. Age distribution of the samples.

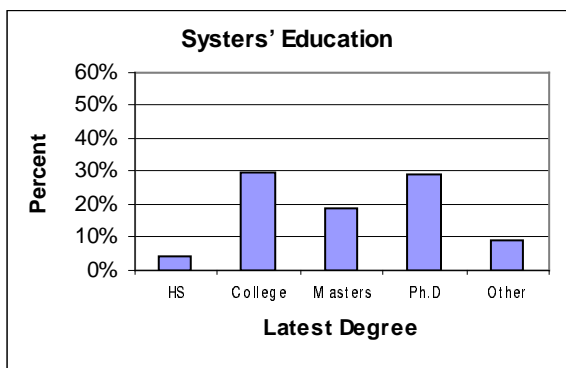
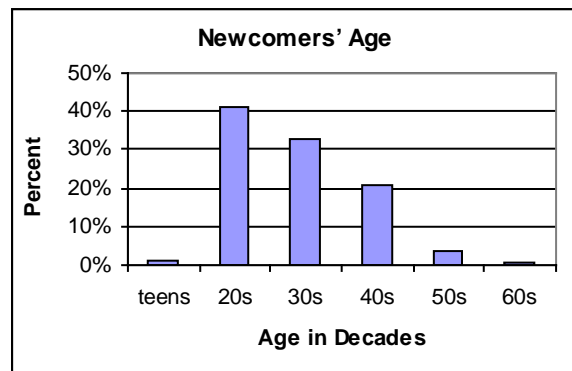
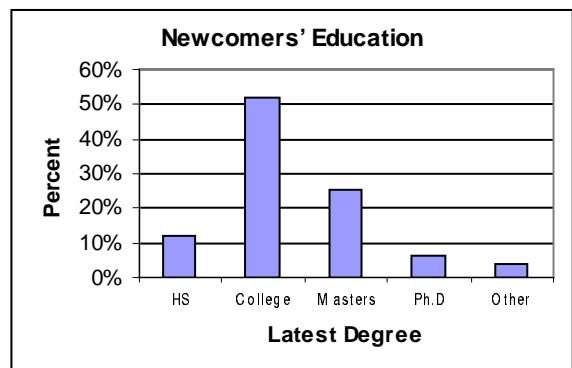


Figure 1b. Educational levels of the samples.



by age and education; the median age was 38 years. Most Systems were employed full time, married, white, U.S. professionals. As would be expected, older, married, better educated, fully employed Systems tend to have higher household incomes ($r_s = .16$ to $.28$). A large minority (42%) had household incomes above \$100,000. However, some lived in households earning less than \$25,000 per year (5%), were students (15%), single (25%), nonwhite (13%), or non-U.S. based (13%). These demographic patterns were useful in predicting certain work situations and preferences of Systems members, as we show below.

Social Ties

We measured Systems' social ties using 5 survey items: size of one's local social circle, number of friends one talks with about work, number of email messages received and sent per day, and number of online groups. These factors were highly correlated ($r_s = .36$ to $.45$). They were also independent of demographic factors and work situation factors. Those who are sociable and have many friends and colleagues would be likely to enjoy communication, have more communication partners, and be exposed to more opportunities for communication whether in the real world or online. There is some evidence that those with fewer social ties in the real world seek them online [7]. If so, more real world social ties might be unrelated or negatively correlated with online communication, and posting should be predicted by an absence of real world ties. This may be true in other cases, but we did not see it in our data. Having more social ties and talking with more friends about work was correlated modestly but positively with posting in Systems and in other online groups ($r_s = .12$ to $.15$). As we see below, posting in Systems is indeed motivated by problems, but they are work situation problems rather than an absence of people to talk with that seems to spur more communication in Systems.

Work Situation

We measured four attributes of the work situation of Systems members: size of the work group, percentage of female coworkers, rated work satisfaction, and rated equity of the work environment using 4 items adapted from the Equitable Work Environment scale [6]. Work environment equity was strongly correlated with more work satisfaction ($r = .40$). Though having more female coworkers was associated with higher ratings of perceived equity ($r = .18$), a higher percentage of female coworkers also was characteristic of older Systems and those having less education and lower income (see Figure 2). The statistical regression model using all demographic variables to predict the percentage of women, and controlling for size of workgroup, is a significant model: $R^2 = .15$, $df [240]$, $p < .001$; where [less] education ($F[1,240] = 10.7$, $p < .01$), [greater] age ($F[1,240] = 20.1$, $p < .001$); [less] income ($F[1,240]=6.9$, $p < .01$) predict a higher percentage of women in the workplace. In sum, our measures of the

work situation tap two contradictory facets of work situation quality. A higher percentage of women coworkers is associated with higher perceived equity, but also with lower job salary.

Participation in Systems

Systems exists as an active community insofar as members communicate. Among respondents, just 38% had posted at least one message to the community in the past year; the mean was 1 message and the range was 1 to 20 posts. We tested a hypothesis that active participation would be motivated by work-related needs, that is, a more negative work situation or junior status in the profession. We used a series of regression equations that also included demographic and social variables as controls, successively deleting insignificant variables. A significant predictive regression model of posting frequency in Systems ($R^2 = .04$, $F[4,293] = 3$, $p = .05$) included (lower) age (n.s.), (higher) number of people one talks with about work ($F[1,293] = 2.7$, $p < .10$), (higher) percent female coworkers ($F[1,293] = 5.8$, $p < .05$), and (more) work environment inequity ($F[1,293] = 4$, $p < .05$). See Figure 3 for a summary of the results across models we explored. Our results are consistent with the hypothesis that more active participation in the online community is motivated by work-related needs—by an inequitable work environment or by lower salary.

Attitudes about Systems

We asked respondents whether they felt Systems was interesting, helpful, supportive, and a community. Respondents answered on 3-point scales (e.g., not interesting, somewhat interesting, very interesting). Answers were heavily skewed towards the positive side of these scales, leaving little variance. Those in a less equitable work environment tended to say that Systems is more helpful ($F[1, 327] = 5.3$, $p < .05$); controlling for education, those more junior in their career tended to feel Systems is more of a community ($F[2,311] = 3.1$, $p < .05$).

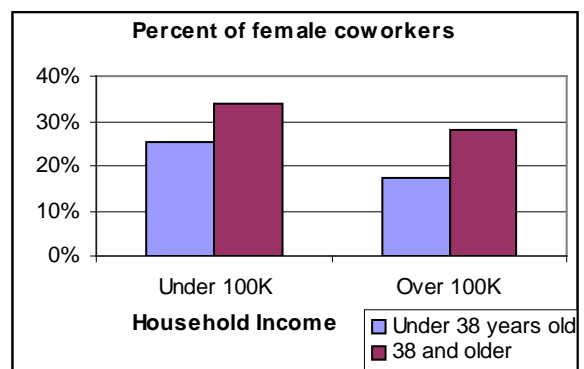


Figure 2. Percentage of female coworkers as a function of age and household income. (Note: This figure shows results for full-time employed respondents only.)

Systers members with children felt less positively about Systers on all these measures ($ps < .10$ to $.001$), possibly because broad discussions of child raising and child care not closely related to being a technical woman have been discouraged in the group.

Preferences for Systers Online Resources

We assessed preferences and goals for Systers through ratings of 26 preferred activities in using Systers. We examined each item’s distribution, setting aside those that were skewed. We evaluated the remainder using principal components analysis and varimax factor analysis constrained to three factors, accounting for more than 75% of the variance. Factor 1 consists of the items related to interaction, such as “find women to communicate with from all over the world.” Factor 2 consists of broadcast information, such as “keep up with or make job/position announcements.” We could not interpret the third factor, and did not use it. We grouped remaining items logically: see Figures 4a-4f for details. Correlations within the groupings ranged from .3 to .75.

The same work situation variables that predicted posting in Systers also predicted preferences. Those having more female coworkers and those in a more inequitable work environment preferred more functionality for Systers and had stronger preferences than other Systers for virtually all of the activities listed. These trends were especially strong (statistically) when predicting mentoring activities ($R^2 = .12$, $F[4,313] = 10.6$, $p < .001$). This model, predicting who preferred to give or receive mentoring within Systers, included a (higher) number of people you talk with about work, (younger) age, (more) work environment inequity, and (higher) percent female coworkers. Thus, age was negatively related to a desire for mentoring activities ($F[1,313] = 32$, $p < .001$); work environment inequity and more female coworkers were positively related to a desire for mentoring activities ($Fs[1,313] = 11.1$ and 8.6 respectively, $ps < .01$).

Long-time Systers

A quarter of the respondents of Systers had subscribed for more than 5 years. Since sustaining a community requires not only active participation but also some stability in the membership, we compared the behavior and preferences of long-timers with those of other members. Long-time Systers are older, better off financially and better educated than other Systers. Long-timers work in larger groups but with fewer female coworkers. They rated their work environment as more equitable than other Systers did. They read Systers as frequently and posted about average for the community as a whole. However, their preferences and goals for Systers were significantly more efficiency-oriented than those of the membership as a whole. These data are exemplified in Figure 4, where we show the role of Systers tenure on preferences about the redesign of Systers. All Systers rate communication and interaction highly, as well as the exchange of news and information about jobs and technical meetings. However, across all of these categories, long-timers were less likely to rate these functions highly.

SURVEY OF NEWCOMERS

Recently, Systers has been inundated with new members. Since June 1999, over 900 women have joined. It was our hunch that these newcomers would hold stronger expectations of the group to provide support. However, we did not know whether newcomers would be looking mainly for broadcasts of job postings and information or for more discussion and interactive communication. To investigate these alternatives, we sent email surveys to 951 new members soon after they joined Systers. We received 420 valid responses; a response rate of 44%. The survey was similar to that of the original, but we added a few measures and modified question wording to improve our response accuracy. We added questions on health and stress levels as well as more measures to assess how respondents’ perceived their social ties and interactions at

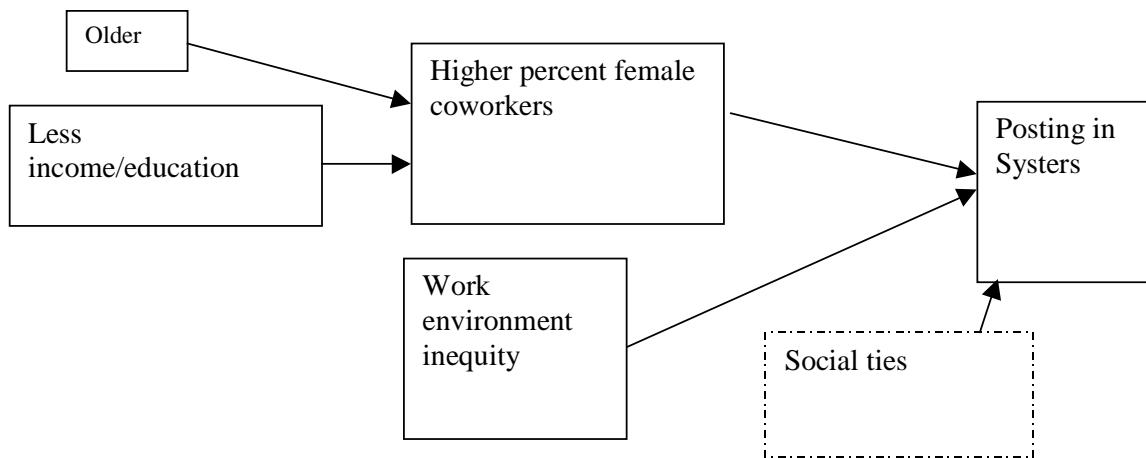


Figure 3. Model of Posting on Systers

home and work.

How Newcomers Compare

In comparison to the cross-sectional sample, newcomers to the Sisters community are younger, less well-educated, and more junior in their careers. Like their counterpart Sisters, they are predominantly full-time, white, U.S. professionals. However, larger minorities of newcomers are unmarried (37%), are non-white (18%), and are non-US based (20%). The median age of newcomers in the sample is 32 years old, but the distribution in the right panel of Figure 1a shows us that a large minority of newcomers (41%) are in their twenties. More than 50% of newcomers have college degrees and 25% hold masters degrees, but very few have Ph.D. degrees (see Figure 1b).

To measure women's income outcomes separately from that of their spouses, we added a new measure for personal income to the measure of household income. Personal income correlated highly with household income, however ($r = .78$) and, like household income, was positively correlated with being older, married, better educated, and fully employed ($r_s = .15$ to $.26$).

Newcomers earn less on average than the cross-sectional sample. Thirty-three percent of newcomers reported household income over \$100,000 as compared with 42% of the cross-sectional sample. Newcomers with household incomes less than \$25,000 were also more numerous (11%) than in the cross-sectional survey (5%). The personal income measure provides us with a better estimate of women's levels of success in the job; 9% had personal incomes over \$100,000; 22% had personal incomes less than \$25,000, which is understandable given that 26% were full or part-time students.

Work Situation

Although the newcomers differed demographically from our cross-sectional sample, we obtained similar statistical results. The correlation between work environment inequity and work satisfaction was still strong ($r = .40$). The newcomer data also showed that higher numbers of female coworkers is associated with higher ratings of equity ($r = .22$) despite the fact that a higher percentage of female coworkers is indicative of lower incomes despite older age. A statistical model controlled for size of work group and used all demographic variables to predict percentage of women coworkers at a significant level. (The $R^2 = .09$, $df = 295$, $p < .001$ where [greater] age ($F[1,295] = 6.9$, $p < .01$) and [less] income ($F[1,295] = 6.9$, $p < .01$) predict a higher percentage of women in the workplace.

Newcomers' Preferences

The newcomers were asked to rate the same 26 preferred activities for using Sisters. We grouped items as we did for the cross-sectional sample. We used a multivariate analysis of variance to examine comparative preferences of

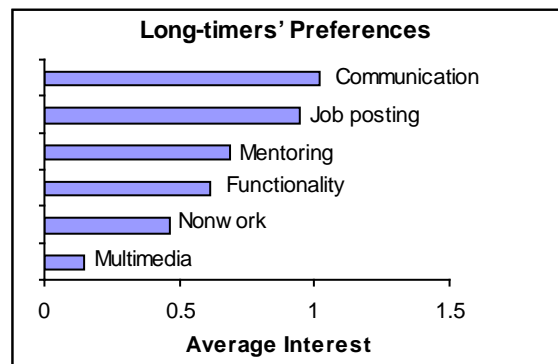
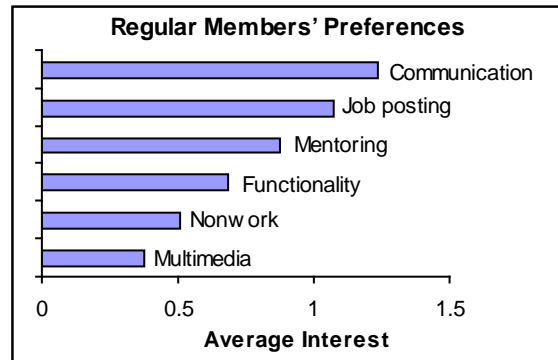
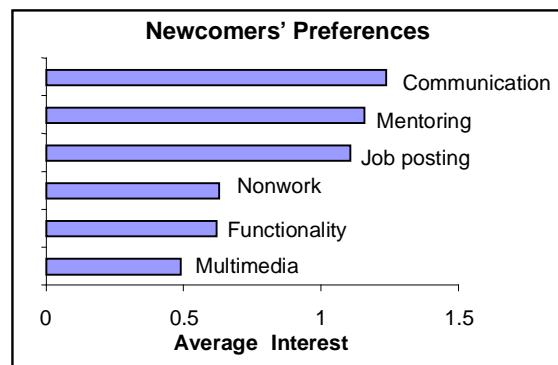


Figure 4. Sisters' Preferences (see Appendix A).

newcomers, long-timers, and other Sisters. The mixed model test compared all preference types at once (within-subjects), and controlled for age. This analysis showed a significant effect of tenure in Sisters across all preferences even controlling for age ($F[2,728] = 3.03$, $p < .05$). Newcomers were more enthusiastic generally. There was also a tenure X preference interaction indicating that newcomers are especially looking for mentoring [$t(1,649) = 4.4$, $p < .001$], multimedia functionality [$t(1,649) = 3.2$, $p < .01$], and discussing nonwork topics [$t(1,649) = 2.7$, $p < .01$]. Newcomers who expressed interest in being mentored also said they would want to mentor a less-experienced woman ($r = .38$).

Technical Environment

Another area where we find interesting contrasts between the original cross-sectional sample and the newcomers is in their technical environment. These differences seem to reflect both trends in the industry and seniority differences between the two groups. The Systems in the original sample are primarily Windows users (56%) with a significant minority (36%) using Unix. The newcomers are overwhelmingly Windows users (84%), with only 8% using Unix. Nine percent of the original sample and 5% of the newcomers use Macintosh computers.

Systems in the original sample are more likely to have fast Internet connections, with 74% of them connecting via a direct gateway vs. 52% of the newcomers. In fact, 39% of the newcomers make their only Internet connection via telephone modem, whereas only 15% of the original sample connects that way. However, the newcomers have somewhat better modem connections, with two-thirds of them having 56K modems, whereas the Systems in the original sample who do use modems are about equally split between 56K and 28k modems.

Systems members use many different email clients. Only four different clients, including Pine, a terminal-based mail client, were mentioned by more than 15% of the original sample. Almost half the newcomers use Microsoft Outlook, with Netscape Messenger the only other mail client mentioned by more than 15% of the Newcomers. Ninety percent of the original sample reported using the Netscape browser. Only half of the Newcomers report browsing the web with Netscape and a large group (40%) use Explorer.

The newcomers' technical environment reflects what we know of the recent technical environment of the general online population in the U.S. (e.g., overwhelming use of Windows). The original sample is much more diverse in the technology used by members, possibly due to their long-time use of computers and to the original roots of Systems as a collection of women academics. That technical diversity is a challenge for any infrastructure design. We have to assume a significant (in fact, increasing) fraction are on low bandwidth connections, and we can only make lowest common denominator assumptions about available applications, web browsers and mail clients.

DESIGN FOR THE FUTURE

The core goals of the Systems redesign are to:

- Address the growth of Systems. The current infrastructure was designed to cope with 500-1000 members; designs that may work well for 2500 Systems may similarly fail when Systems has 5000 or 10,000 members.
- Create a welcoming place for both junior and senior women. Their needs and desires are quite different, yet the community's core values are only

served when both groups are present and are contributing actively

- Not exclude any Systems due to assumptions about the availability of particular hardware or software, bandwidth levels, and ease of Web access (a particular issue for women in third world countries).

These goals, combined with the data from our survey research and with formal and informal interviews of Systems members, lead to the following design requirements:

- Provide Systems with ways to customize the information they receive, so that they receive a higher proportion of information that is of interest and value to them
- Provide both email and Web access to Systems.
- Ensure that the core communications of Systems are accessible to members with low bandwidth and limited Web access. We assume that everyone has access to email (possibly text only) and to a Web browser, although the Web access might be limited.
- Be very easy to use.
- Provide new functionality that enhances the sense of community.

Email and Web Access

An interesting dichotomy among Systems that seems to be correlated with age is whether a Syster prefers to get postings via email (a push technology) or via the Web (a pull technology). Younger Systems prefer the Web, whereas older Systems overwhelmingly prefer email. (A common quote is "if it didn't arrive in my mailbox, I know I would never make the time to check Systems out"). This difference may very well change, if more people find the Web to be the center of their on-line life. However, in this period of possible transition, we risk losing large numbers of our senior Systems if we do not provide email access. Furthermore, email is a more universally available technology than Web access for people in countries where connect time is charged by the minute. Email also is more amenable to solutions that span a wide range of bandwidth levels. On the other hand, some activities are either impossible or extremely difficult to do over email, yet are quite easy to provide on the Web. We can greatly improve the services Systems provides if we allow for Web access.

Ease of Use

Since all Systems' members consider themselves computer professionals, one might hypothesize that ease of use would be less important than in other populations. On the contrary, since Systems is an optional activity, users of the system have very little tolerance for capabilities that are not "obvious." Furthermore, since the technical

backgrounds of the Systems community are extremely diverse, ranging from COBOL programmers on mainframes to students at universities using futuristic technologies in their daily lives, there is almost no common set of conventions that we can expect everyone to know. Experience with the current Systems infrastructure has shown that any activity that requires learning or active intervention to get the desired result (e.g., the default setting is not the desired setting) is an impediment to use.

Volume and Customization

As Systems grows, either the restrictions on topics and volume must become even more stringent or the volume of postings will grow, probably exponentially. Right now, the current volume of Systems is an average of less than 1 posting per member per year. This volume is extremely low for a community of this type, and is primarily driven by the Systems norms of restricting topics and of sending responses to individual Systems and (sometimes) publicly summarizing the responses received. Recently, some Systems have posted public replies and encouraged what they consider to be important discussions. However, in informal discussions, the most common reason given for leaving Systems is that the individual cannot handle the volume of messages received.

We are contemplating several ways of enabling Systems to customize what postings they receive. All such solutions have advantages and drawbacks, and we will probably have to combine all three approaches to satisfy the full membership. The most obvious is to go to a Web-based, newsgroup-like format, where Systems can browse the topics that interest them. Because is it not email based, this solution would be unacceptable to many long-time Systems. It also removes the immediacy of the information, since most Systems would check the web site at most daily or weekly, which will certainly change the sense of community in some ways.

A second approach is to provide Systems with a low cost way of indicating interest or lack of interest in particular topics as the information comes in. Thus, if a posting about images of women in technical advertising arrives, a member who is not interested in the topic can indicate that lack of interest and would receive no further responses to this posting. This approach appeals to most Systems, but has a variety of technical challenges in its implementation.

A third approach is to create static subgroups of Systems interested in particular topics. There might be technical groups focused on Web design, groups discussing how to best deal with maternity leave, or even support groups for women in the final stages of their thesis. However, while a individual Syster may not be interested enough in maternity leave to join a group that discusses that exclusively, part of belonging to Systems is hearing about other women's issues in a wide range of areas (especially if

they might affect you in the future). Thus, completely eliminating the sharing of information about maternity leave with the broader group (unless someone seeks the information out in the archives) dilutes what Systems is about. In the limit, there would be no common discussion among the entire group, just a vast collection of special interests.

In all of these cases, the common core of discourse seen by everyone becomes less, and while we don't have empirical data to that effect, we suspect that seeing less communication lessens the feeling of community among the members. We need to find other ways to strengthen that sense of community.

Functionality to Enhance Sense of Community

As we change the ways that Systems communicate, we run the risk of lowering the sense of community within the larger group. We hope to provide new functionality that will increase the feeling of community in other ways. We believe that if we enroll a subset of the membership to play special roles in keeping the community alive, this will make Systems seem like a more intimate place for all members, and will increase the feeling of loyalty that the volunteer Systems have to the community. It will also provide valuable services. (See [2] for one discussion of diverse roles in electronic communities.) Currently Systems has one example of a special role—a member who collects job postings into a single message, organizes it in a useful way, and sends it to the list weekly. This activity cuts down on list traffic that is of interest only to a small (but ever changing) subset of the community, and also makes the larger community aware of the kinds of jobs available, what kinds of companies are actively recruiting women, how companies describe themselves, and so on.

We expect to have volunteers in three broad areas. One area is managing information resources. These volunteers might collect and categorize information pointers that Systems send to the community, or they might scour the Web on their own for information in a particular category. The second area is providing personal support in areas of special expertise. This might range from a mentoring matching service (where we think of both the matchmaker and the mentor as special roles) to 'greeters' who help new members learn the ropes and feel comfortable in the community, to someone who runs an 'electronic book club' for a set of Systems who want to read and discuss a particular book. The third area is support for the Systems infrastructure itself, ranging from adding new members to dealing with database backup and corruption to answering members' questions about how to use the system. A goal, once these roles are in place and supported by the Systems infrastructure, would be to have the majority of members volunteer in one or more roles during their first 3 years as a member.

We approach these design changes with great caution, knowing that anything we do is likely to be disruptive in the short run. We are respectful of the community bonds within Systems and would be loathe to disrupt them. The most important contradiction in community within Systems is that we must disrupt it through design changes in order to strengthen it.

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Appendix A. Preference Index Items

Individual items were rated on a scale of 0 = no interest; 1 = some interest; 2 = a lot of interest; 3 = wowee!

- 1) Communication: Find women to communicate with from all over the world, Find Systems to participate in "real world" events with (e.g., go to dinner, meet at a conference), Learn about women's problems and success stories in work or school, Learn about interesting groups or discussions to participate in, and Discuss technical issues with other Systems.
- 2) Job posting: Keep up with or make job/position announcements, Keep up with or make conference/meeting announcements, and Read or contribute to a technical advice column.
- 3) Mentoring: Electronically mentor a less-experienced woman, Be electronically-mentored by a more experienced woman, and Be an electronic advisor for high school or college students.
- 4) Functionality: Look up Systems members in a directory, Browse previous discussions, and Start new discussions or subgroups within Systems.
- 5) Nonwork: Keep up with friends and colleagues, Discuss political issues with other Systems, and Discuss nonwork or nontechnical issues with other Systems.
- 6) Multimedia: See pictures of Systems members, Hear/view audio/video clips of Systems members, Participate in same time "chat sessions" with several other Systems, and Participate in same time "private chats" with one other System.