

# Communication and Information: Alternative Uses of the Internet in Households

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## ABSTRACT

The Internet has been characterized as a superhighway to information and as a high-tech extension of the home telephone. How are people really using the Internet? The history of previous technologies that support interpersonal communication suggests that communication may be a more important use and determinant of participants' commitment to the Internet than is information acquisition and entertainment. Operationalizing interpersonal communication as the use of electronic mail and information acquisition and entertainment as the use of the World Wide Web, we analyzed longitudinal data from a field trial of 229 individuals in 110 households during their first year on the Internet. The results show that interpersonal communication is a stronger driver of Internet use than are information and entertainment applications.

**Keywords:** interpersonal communication, family communication, social impact, computer-mediated communication, Internet, World Wide Web, online services, user studies, technology adoption, Email

## INTRODUCTION

Before the 1990s, few households had computers, and home computers were used primarily by white collar men to do office work (Venkatesh & Vitalari, 1992). Today, computers have diffused much more widely, as measured by the number of households that own a computer, the number of people within households who use a computer, and the number of different tasks to which home computers are applied (Venkatesh, 1996). In 1993, a third of all US households owned a computer and over 60% of the richest quartile did so (Anderson, Bikson, Law, & Mitchell, 1995). By 1996, a significant proportion of these home computers were being used for online connections to the Internet. One estimate puts Internet penetration in 1996 at about 12% of U.S. households (NPD Group, 1996). The Internet is a

new household technology, and, if the public press is to be believed, it portends large changes in the ways people live their lives.

More so than with other technologies, the impact of the Internet will not simply flow from features of the technology. Computers and the Internet are highly adaptable and can support many different kinds of use. Since the Internet could provide very different kinds of services to citizens, its effects will depend on which ones they use. This paper is an attempt to understand how people use the Internet at home.

### Contrasting information and entertainment with interpersonal communication

In this paper, we make a primary distinction between Internet services primarily used for *interpersonal communication* as compared with those used for *information and entertainment*. If the history of the telephone, radio, and television is any guide, either communication or information and entertainment could dominate residential use of the Internet and, accordingly, will influence how the Internet develops and what social impact it has. Both communication and information uses of the Internet have the potential to open up relatively encapsulated households to influences from the larger society and to bind households to it, although in quite different ways. Even if both categories of use are embraced, each may appeal to different types of people, may engage people differently, may offer different satisfactions and rewards, and, as a result, may have different effects on society and different implications for technology and policy development.

This paper operationalizes the distinction between information and entertainment as compared with interpersonal communication by comparing how people differentially use the World Wide Web and personal electronic mail, the two most popular of all Internet resources. We recognize that this operationalization is not perfect. Motives for using any Internet service may be mixed, and different software can be used for several services. Nonetheless, it is the case that electronic mail and the World Wide Web have a history of supporting

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"interpersonal communication" and "information and entertainment" applications, respectively.

Although data networking technology was not initially built for the purpose of connecting people, electronic mail (Email) was an early innovation in these networks; the first messages were sent over the precursor to the Internet in 1969 (Leiner et al., 1997), and Email as a communication medium has undergone only minor changes since its inception. Communication through Email is personalized, spontaneous, and interactive; senders can specify who they want their recipients to be and tailor their messages to them, taking into account their prior interactions and the nature of the relationship. These conversational and relationship-oriented attributes of Email make it engaging. Historical accounts of the telephone suggest that demand for interpersonal communication is highly elastic. Whenever inter-personal communication becomes easier or cheaper, people communicate more (Mayer, 1977).

Contrasted with Email, the World Wide Web (the Web) is a relatively new technology and is still rapidly evolving. The basic software behind the Web was created in 1992 in a high energy physics research laboratory so scientists could offer data and results to others (Leiner et al., 1997). In comparison to Email, the Web is more like broadcast media—billboards, magazines, radio, and television—although on the Web, almost anyone can publish. Information and entertainment on the Web are generally posted in a public place and available to anyone who happens by. The postings are minimally interactive. If their content is tailored to recipients at all, it is typically to broad audience characteristics, not to particular people. These features of the Web may make information and entertainment services less engaging and less important to people than interpersonal communication services. Historical evidence suggests that consumer demand for information and entertainment is comparatively flat, at least as compared to interpersonal communication. When a new broadcast medium, like the video cassette player, becomes available, people tend to decrease the amount of time they devote to older media, such as theaters, for acquiring the same information (Carey, 1989).

If either interpersonal communication or information and entertainment dominate people's use of the Internet, one would expect this preference to be reflected in several measures of usage—popularity of one type over the other, priority of access within sessions, consistent use over time, generalization to other uses, and continuation of usage rather than dropping service. Based on the history of the residential telephone (e.g., Fischer, 1992) and the use of the Internet in organizational settings (e.g., Sproull and Kiesler, 1991), we expect that people will have a preference to use the Internet for interpersonal communication.

We tested these ideas with computer-generated usage records from the HomeNet field trial. We also tested predictions about variation among people suggested by demographic differences in the use of the residential telephone. Adult women and teenagers of both genders are the heaviest users of the residential telephone (Brandon, 1980). Both

preference and opportunity may account for these demographic correlates of telephone use. Women, as part of their sex-role obligations, often take responsibility for maintaining the family's social networks; women also say they enjoy talking on the phone and think the phone is especially helpful for socializing (Dimmick, Sikand, & Patterson, 1994). Also, because women are less likely than men to work outside of the household, they may find more opportunities to talk on the phone. Teenagers are at a life stage when they are developing their personal social networks and have substantial free time. These same factors—the value placed on sociability and the availability of free time—may cause women and teenagers to be heavier users of the Internet for interpersonal communication than adult men.

#### The effects of experience

Peoples' overall preferences for Email or the Web could be examined by simply averaging their usage of each service over a year's time. However, doing so would obscure the dynamics of usage over time—i.e., of the early experiences that may lead to later uses and the influence of one type of use on the other. Are the people who experiment with Email in their first months of Internet use the same people who are using Email at the end of the year? Does their use become routinized and less variable? This pattern (that early use predicts later use) is true of many innovations, but it may be especially true of the Internet because the technology is both more adaptable and more complex than many household devices. The most useful applications of the Internet often must be discovered by those who use them. Many consumer products, such as the electric toothbrush or VCR, have a narrow range of uses that are relatively easy to envision before purchase. By contrast, the protean character of the computer, with its large number of computing applications, variety of Internet information, and global reach to people, contributes to a relative ambiguity about what home computers are good for. It is perhaps for these reasons that many people cannot accurately predict how they will use their computer at the time they first get one for their home (Kraut et al., 1996).

Under these circumstances, people's early successes using home computers and the Internet are likely to have substantial impact on their later use. They will begin using them, we think, by exploring a few applications (perhaps those easiest to use or those recommended by others). In organizational settings, the introduction of new technology often leads some employees to commit substantial time and attention to investigating the possibilities of the technology, and it is often an event that disrupts ongoing routines. But exploration is relatively short-lived, as new routines come to assert themselves (e.g., Eveland & Bikson, 1987; Tyre & Orlikowski, 1994). In households, one or more family members might devote time to getting their computer set up and learning how to connect to the Internet. Success in doing so and interesting outcomes would reinforce some continued usage. Eventually, however, the demands of family, work, school, and household chores should reclaim some of the time that had been allocated to learning the computer and exploring

Internet possibilities, and old diversions—favorite TV shows, hobbies, and socializing—would reassert themselves.

To examine whether peoples' use of the Internet would crystallize with experience, we included a time dimension in all of our analyses. We expected variability in Internet use to decrease with experience, predictability of use to increase with experience, and that the influence of external influences on use (such as the degree to which other family members are using the Internet) would decrease with experience. Our hypotheses suggest all of these patterns may be stronger when people discover Email early.

#### METHOD

The data analyzed here come from HomeNet, a field trial of residential Internet use, in which a sample of 110 demographically diverse households (229 individuals)<sup>0</sup> were given Internet access during 1995 and 1996 in exchange for providing a variety of data about their use of the Internet and their beliefs about it. When the present analyses were conducted, all participants had received access to the Internet for at least a year. Details of the field trial and the sample are available in Kraut et al., 1996.

#### Data collection

The data we report on for this paper come from four sources: (a) computer-generated usage records of Internet use, (b) questionnaires completed approximately every three months, (c) an archive of public news group messages, and (d) videotaped home interviews with 25 households. Kraut et al (1996) provides more detail about data collection.

##### (1) Computer-generated usage records

Households were given access to the Internet on a staggered schedule. (The first family received an Internet account in March, 1995, and the last family received an account in March, 1996.) To allow for comparisons across the entire sample, the data reported here encompass the first 52 weeks after the Internet accounts in any household first became operational. The usage data have been summed on a weekly basis to increase reliability.

We derived the following metrics from the usage records:

**Sessions:** The number of discrete sessions per week a participant logged into the Internet. A session is the interval between an authentication to our Internet server and a log out.

<sup>0</sup> The 110 households contained 386 individuals but only 258 were over 10 years old, requested an Internet account, and agreed to participate in the data collection. Of these, only 229 actually filled out the pretest questionnaire and used the Internet at any time during the trial. The number of respondents fluctuates with analyses because people moved into and out of households (e.g., students who went away to college) and some participants sometimes failed to complete questionnaires.

**Internet hours:** The total hours in a week in which a participant logged into the Internet. It is the sum of the length of the sessions in a week.

**Electronic mail use:** We recorded the sessions in which participants sent or read electronic mail and the number of Email messages they sent and received.

Because our concern in this analysis was to contrast interpersonal communication with information and entertainment, we included only messages in which a participant was an explicit recipient. The excluded messages were typically ones broadcast to a distribution list to which the participant had subscribed and which did not address the recipient by name. We believe these messages reflect a mix of interpersonal communication and information distribution. For the same reason, we excluded reads and posts to computer bulletin boards and news groups.

**World Wide Web use:** We recorded the number of unique World Wide Web domains or sites visited per week (a domain or site is an Internet protocol address, such as www.disney.com). Our metric for total volume of World Wide Web use is the number of different domains accessed during the week. The average number of weekly domains visited and the average number of weekly html pages visited were very highly correlated ( $r=.96$ ).

##### (2) Social influences on use

We included two factors that might expose participants to other people's use of the Internet and, by this route, influence participants' amount and style of use. One is a measure of Internet use by other household members; the second indicates the percentage of time that schools were in session.

**Other household members' usage:** We expected family members would influence one another but did not predict the direction of this influence. Modeling could lead to a positive influence, whereas competition for the computer or family specialization could lead to a negative influence. We included measures of the extent to which other participant members of the household used the Internet during a particular week in terms of the number of hours they were connected, the number of Web sites they accessed, and the number of personal electronic messages they sent and received.

**School days:** The school year schedule has a large impact on how students and their parents spend their time, so we included a measure of the percentage of days during the week that were school days. Since business holidays are often geared to school vacations, this measure is also a proxy for vacations for non-school households. This measure was 0 for weeks during summer vacation and ranged from 0 to 100 during the academic year.

##### (3) Additional measures

**Early vs. late time period:** We included an index that represented the number of weeks that a participant had access to the Internet and dichotomized it so that 0 indicates the first 26 weeks of the trial and 1 represents weeks 27

through 52. Conclusions about the importance of time, however, were the same whether we treated week or half year as the unit.

*Individual differences and other control variables:* Previous literature and exploratory analyses of our own data suggested additional variables that might predict the extent to which people would use the Internet. To evaluate alternative explanations, we included the following variables when creating models estimating Internet usage in a particular week: *gender* (female versus male), *generation* (< 19 versus  $\geq$ 19 years old), *race* (minority versus white), and self-reported *computer skill*.

*Sample type:* This dummy variable specifies how the household was recruited. HomeNet's first sample of families was selected after contacting students in high school journalism programs; the second sample of families included members of local community activist groups.

## RESULTS

To examine how use changes with time, we will first present descriptive statistics showing the amount and variability of total Internet usage during participants' first year in the trial. The primary dependent measure is the number of hours each week that participants used the Internet (which is an index of aggregate Internet use). Next, we will differentiate electronic mail and World Wide Web use to test hypotheses that compare participants' use of the Internet for inter-personal communication versus for information and entertainment.

### Interrelationships among measures of Internet use

To determine if our differentiation of electronic mail from web use was sensible, we correlated our three major usage variables with the unit of analysis being an individual's behavior during a week. Internet hours during a week correlated highly with both personal electronic mail messages sent and received ( $r=.81$ ) and with Web sites visited ( $r=.73$ ). However, Email use was only moderately correlated with Web use ( $r=.53$ ). These two services have

enough independence so that they could have different causes and different effects.

### Preference for Email versus the Web

The most direct way of demonstrating the relative preferences for interpersonal communication versus information and entertainment is to see whether people used their Email application more than they used their Web browser<sup>1</sup>. Overall, participants preferred using Email to the Web. Participants used Email in 44% of their Internet sessions,<sup>2</sup> but used the Web in only 25% of the sessions. Within sessions involving both Email and the Web, participants accessed their Email before they accessed the Web 75% of the time. These analyses support our predictions that Email is more popular than the Web and that Email takes priority in Internet sessions. In only one respect did indicators favor the Web; sessions involving the Web (including downloading) were longer than sessions involving Email. (Means are 40 minutes for Web sessions versus 34 minutes for Email sessions.)

### Predicting hours of Internet use

Figure 1 shows demographic differences in Internet usage and an overall decline in weekly use after the first weeks. We analyze these time trends in more detail below.

We used time series regression analyses to examine the influences on a participant's hours of Internet use each week. We used a Mixed Model regression, available from the SAS Institute (Littell et al., 1996), to carry out a panel design. The dependent variable was the hours that a participant was connected to the Internet during a week. Both participant and week were repeated factors modeled as random effects; week was a repeated variable with an autoregressive component of order one. Independent variables included: race, gender, generation, the gender x generation interaction, sociability, computer skill, school days, other household members' hours of use, time period, lagged connect hours, and the interaction of time period with computer skill, household, and lagged connect hours. Individual differences and period were modeled as fixed effects. This design is equivalent to a random effects model for an unbalanced panel. To allow comparisons between size of effects, all variables were standardized to a mean of zero and a standard deviation of one.

Our major goal in this analysis was to understand what influence participants' use of the Internet at one week had on their use in a subsequent week, holding constant a

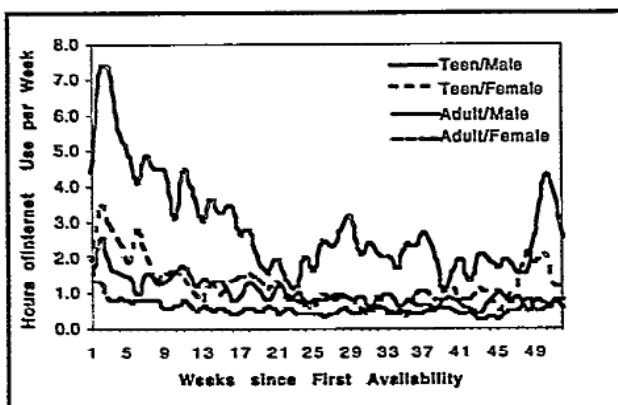


Figure 1: Weekly hours of Internet use by demographic group.

Note: To compensate for skewed data, entries are Winsorized means of data from the middle 80% of the sample.

<sup>1</sup> Note that participants in this field trial could neither send nor retrieve electronic mail via their Netscape browser.

<sup>2</sup> This estimate of Email use is systematically low. Because of the peculiarities of the mail package participants used, our probes recorded electronic mail use only if participants opened their mailboxes to read or send messages. If participants connected to the Internet but discovered that they had no mail waiting and then disconnected, the probes would not record their use of electronic mail in that session.

number of control variables. The coefficient for lagged hours of Internet use represents a stability coefficient, which summarizes the week-to-week predictability over a year of use. To examine whether stability increased with time, we included the interaction of the lagged hours of use with the early-late period variable. We expected that the stability coefficient would be larger in the second half of the year than the first.

The results for the control variables were similar to those we found in earlier research with a smaller sample (Kraut et al., 1996). Males used the Internet for more hours per week than females ( $\beta=.06, p<.05$ ), and teenagers used it more than adults ( $\beta=.08, p<.01$ ). The effects of gender did not differ for teens and adults ( $\beta=.02, p>.10$ ). Race and sociability did not significantly predict computer use.

Participants who possessed more computer skill before the field trial started were heavier users of the Internet throughout the trial ( $\beta=.09, p<.01$ ). Surprisingly the effect of self-reported pre-existing skill did not decline with time period ( $\beta=.01, p>.10$ ). The positive coefficient, although not significant, shows that the difference between skillful and less skillful people in weekly usage of the Internet was at least as large in the second half of the trial as it was initially.

Participants used the Internet more during weeks when other members of their households were also using the it, suggesting moderate social influence ( $\beta=.04, p<.01$ ). The coefficient for time period shows that on average participants' level of use dropped during the course of the year (See Figure 1;  $\beta=-.02, p<.05$ ).

As one would expect, heavy Internet use was habitual. By far the strongest predictor of week-to-week variation in the numbers of hours a participant devoted to Internet use one week was the number of hours that the participant spent on the Internet the preceding week ( $\beta=.48, p<.001$ ). However, the absence of a significant interaction between time period and lagged connect hours suggests that participants were not gradually developing stable patterns of Internet usage ( $\beta=-.00, p<.50$ ). The week-to-week predictability of Internet use was equally strong in the first and last 6 months of the trial period.<sup>3</sup>

#### Stability of Email and Web use

To determine the relative stability of Email and Web use, we conducted time series analyses similar to the one we just described, but using the number of personal Email messages each week and number of Web sites visited each week as dependent variables. We included Email and Web usage measures lagged at a one week interval. To test comparative stability, we examined whether the stability coefficient (i.e., the standardized beta weights showing whether use in one week predicted use in a subsequent week) was larger for Email or for the Web.

<sup>3</sup> The interaction of time period with lagged connect hours also remained nonsignificant when we used a finer granularity for time—a week rather than 26 weeks.

Both Email use and Web use were stable over time, but stability was substantially greater for Email ( $\beta=.62, p<.001$ ) than for the Web ( $\beta=.26, p<.001$ ). That is, one can predict a participant's current Email use from his or her use in the prior week much better than one can predict a participant's current Web use from his or her prior Web use (for the difference  $t=11.0, p<.001$ ).

#### Generalizability of Email and Web use

To examine generalization (i.e., whether use of Email or the Web leads to greater overall use of the Internet), we added Email and Web usage measures lagged at a one week interval to the model predicting weekly hours of Internet use. While controlling for hours using the Internet in a prior week and other variables, this analysis estimates whether exceptionally heavy or light Email or Web use in a prior week changes the total number of hours participants use the Internet in the current week.

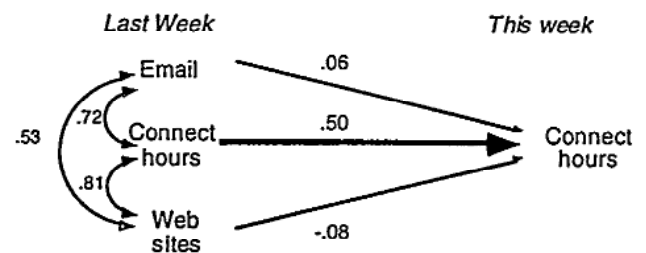


Figure 2: Influence of electronic mail use and World Wide Web use on subsequent Internet use.

Note: Numbers are standardized beta weights.

Figure 2 summarizes the relevant coefficients. When participants sent or received more Email than their average during one week, the next week they logged into the Internet for more time than than was usual for them. In contrast, following weeks in which they used the Web more than average, they decreased their subsequent hours of Internet use. ( $\beta_{\text{Email}}=.06$  versus  $\beta_{\text{Web}}=-.08$ ; for the difference  $t=2.8, p<.05$ ).

#### Survival analysis

We conducted a survival analysis to examine how long people who heavily used Email relative to the Web continued to use the Internet. This analysis uses data from 179 individuals—all respondents who filled out a pretest questionnaire, who used the Internet at least once, and who remained in the field trial for at least 52 weeks with a HomeNet computer in the household.<sup>4</sup>

The dependent variable in this analysis is duration of Internet use, i.e., the number of weeks from participants' first use of the Internet to their last use. We considered a participant to have stopped using the Internet if we recorded

<sup>4</sup> We cannot test for survival on the Internet among participants who never used it. Other participants were dropped from this analysis because they left their household (e.g., through marital separation or going to college) or because the household computer left the household (e.g., a student taking the computer to college).

no Internet activity during weeks 49 through 52. Because the data are right censored at 52 weeks, we used a survival analysis with the Kaplan-Meier method to examine whether greater relative Email use (vs. Web use) led to longer survival on the Internet. To measure Email use relative to Web use, we created a ratio: We standardized Email use (number of messages sent and received) and Web use (the number of web sites visited), divided the former by the sum of both (Email and Web), and then separated participants into low and high relative Email users on the basis of a median split.

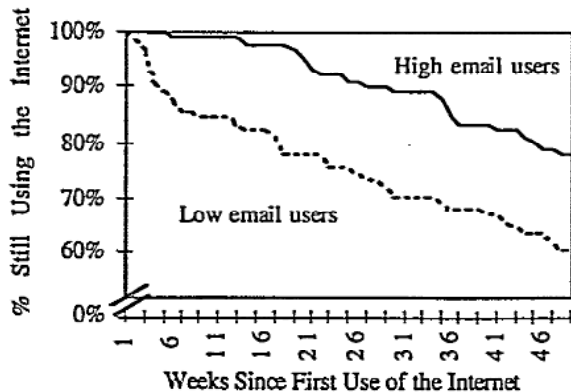


Figure 3. Internet survival by relative Email use

Note: The sample has been divided by median split into those for whom Email is a relatively high or low percentage of all Internet use.

N = 179

Figure 3 shows a plot over time of the proportion of high and low relative Email users who continued to use the Internet during the first year of their Internet subscription. People who use Email more than they use the Web were more likely to continue using the Internet over the course of a year than were people who use the Web more than Email. Seventy-eight percent of the participants with the high Email ratio were continuing to log on to the Internet after a year, compared with only 60% of participants with a low Email ratio (Log-rank chi-square = 8.6,  $df = 1$ ,  $p = .003$ ). The high Email users had an average duration on the Internet of 44.5 weeks, compared with 37.8 weeks for the low Email users. Note that the differences in survival come about because a disproportionate number of low Email users dropped out early, within two or three months of first logging on. After four months, the gap between low and high Email users stays constant. The implicit decision to stay or quit seems to have been made early during participants' experience with the Internet. Presumably, the relatively low Email users may not have had enough contact with the Internet early on to discover a sustaining use.

## DISCUSSION

Analyses of the HomeNet data provide strong support for the importance of interpersonal communication as compared to information and entertainment in driving people's use of the Internet at home. First, participants preferred Email over the Web. They used Email in more

Internet sessions and used Email first in sessions where they used both Email and the Web. Second, participants' use of Email was more stable from week to week than was their Web use. Third, use of Email at one time seemed to increase overall Internet use at a subsequent time, but use of the Web seemed to depress it. Finally, those who used Email more heavily than they used the Web were more committed to the Internet in general. That is, a smaller proportion of them discontinued Internet use during the first year.

Our expectation that early use of the Internet would shape later use was not supported. While we found strong evidence that Internet use became habitual, we found no evidence that predictability in use increased with time.

### Why is Email important to people?

One explanation for this pattern of results is that the messages people send and receive by Email sustain dialogues and ongoing relationships with family, friends, and coworkers. These dialogues and relationships tend to be unbounded; that is, they often extend beyond the electronic medium and have no *a priori* stopping time. Participants described a variety of people with whom they had relationships—grandparents, members of the soccer team, teachers, people they met in chat groups. Even in the absence of standing relationships, dialogues conducted by Email have an obligatory character that helps to make them self-perpetuating. It is considered rude to fail to respond to a message.

By contrast, using the Web often satisfies a bounded goal, and may even exert negative pressure for revisits, as when a game is already downloaded, a weather report is obtained, or a homework assignment is completed. In analyses not reported in this paper, we tested this idea by examining participants' loyalty to Email addresses and Web domains over time and found that people were two or three times more likely to reuse an Email address than they were to revisit a Web domain, even a year after its first use.

Interviews with participants in the trial suggest that most (but not all) of the time Email relationships preceded participants' use of the Internet, and Email was just one mechanism that they used to maintain them. For example, we frequently heard of teenagers sending Email to friends whom they have just seen at school.

In other cases, Email energized a pre-existing relationship that had languished. These were ongoing personal relationships that became more intense because of the convenience of electronic communication.

The analyses we report here did not explicitly examine group communication through listservs, news groups, chat services, MUDs or IRCs (Internet Relay Chat). Our interviews, however, suggest that electronic groups may be the primary mechanism by which people start new relationships online. Unlike telephones and more like face-to-face interactions in public settings, electronic groups on the Internet comprise semi-public places where strangers can observe each other privately for awhile ("lurk") and strike up conversations either in the same forum or more

privately through Email to particular discussants with whom they identify. Hence, electronic groups provide safe places in which to strike up relationships.

Our analyses do not imply that interpersonal communication is the only resource of value on the Internet. Certainly, a number of participants in our study continued to use the Internet for over a year while sending or receiving virtually no electronic mail. We think of the Internet as a portal through which people have access to a rich array of other people, information, and experience. The depth and diversity of the resources available there mean that virtually anyone could potentially find something or someone to interest him or her. However, finding the most personally relevant resources often requires skills, guidance, and perseverance. Email activity may be one factor that increases the perseverance that allows individuals to find personally relevant resources on the Internet. This speculation is consistent with our finding that the gap in Internet survival between relatively high and low Email users does not increase after four months. It is as if electronic mail keeps people coming back to the Internet until they discover some interest that will sustain their use.

#### **Implications for social impact, technology design, and policy**

Our analyses suggest that interpersonal communication does and will continue to dominate residential use of the Internet. If this proves to be the case, then implications for understanding the social impact of the Internet, of providing useful Internet applications, and for public policy choices are large. The commercial development of Internet services and public policy initiatives to date have probably over-emphasized information and entertainment and under-emphasized interpersonal communication.

Computer scientists see the most challenges and most opportunities for the Internet in the burgeoning amount of multimedia data that the Internet makes available to its users; entrepreneurs see them in the Internet's potential as a vehicle for retail sales. Currently on the Internet, applications for finding people are far less common, sophisticated, or accurate than applications for finding information and products. Online directories of Email addresses are far less comprehensive than online directories of telephone numbers. Search services on the Internet, like Yahoo, Alta Vista, InfoSeek, and Lycos, grew from sophisticated industrial and government-funded research programs in information retrieval; they are well known and heavily used. The initiative on digital libraries, funded by the National Science Foundation and DARPA, has a goal of making pictures, graphs, and video images as easy to search and retrieve as text. Comparable search capabilities for finding people based on their attributes are far less well supported. (See the research on collaborative filtering, e.g., Resnick & Varian, 1997, for an interesting exception.) Our data suggest that current design initiatives are imbalanced with respect to what people really want.

Information and entertainment perspectives have also dominated most policy debates about the Internet. For

instance, the Federal Communications Decency Act of 1996—struck down by the US Supreme Court (1997)—reflected a widespread concern over children's possible exposure to pornography over the Internet. In contrast, public policy discussion about issues relevant to interpersonal communication has been scant. Consider, for example, the issue of universal access. In the first half of the twentieth century, both industry and the federal government instituted policies to foster universal access to telephone service, subsidizing residential and rural phone subscribers through subscription revenues from businesses or urban areas. One goal was to make the telephone network more useful for the nation as a whole by capitalizing on network externalities (Katz & Shapiro, 1994). We do not prejudge whether universal electronic mail is critical, but believe that a public debate about the desirability of universal access and the policy initiatives necessary to achieve it would be very useful.<sup>5</sup> Universal email access might have benefits to the nation comparable to those of universal phone service.

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<sup>5</sup> Anderson et al. (1996) represents one of the few policy analyses of this issue insofar as we are aware.

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