

## Community Computer Networks: Building Electronic Greenbelts

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What are community networks? What sorts of information and services can you find on these systems? What groups are starting and running community networks? How costly are the systems, and what are the sources of funding? This essay will discuss a number of current models for community networks, examine what impact they can have on the environment in which they grow, and make a few wild guesses about the future of such networks given the changes in computing and telecommunications technologies.

I am writing as a librarian and network user who has been involved in using telecommunications to communicate with other people, provide information on a wide range of subjects, and who has encouraged people in various towns and counties to use this technology to start and use networks which can strengthen the community. Many individuals, organizations, and institutions are becoming involved in these networks. Whether you are a technical expert, information professional, government official, businessperson, or interested citizen, there is a role for you to play in incubating, growing, maintaining, and using these systems.

A community network consists of one or more computers providing services to people using computers and terminals to gain access to those services and to each other. While many of these networks tie together geographically separated individuals linked by a common interest or profession (senior citizens, pilots, ecologists, librarians), this essay will not cover scholarly or affinity group networks. Other models and systems exist but have been described elsewhere.<sup>1</sup> Instead, community will be used in the sense of a municipality, county, regional area, or Indian nation. The information contained in such networks as well as the relationships that form between the participants make up what I call an electronic greenbelt to reinforce and add value to the community. These communities do include a variety of other interest groups whose needs and interests transcend the geographic boundaries of the town, region, or state. The decisions these communities have made are similar, in some ways, to what happened with the spread of electrical networks a century ago.

### The Past

As David Nye explains in *Electrifying America*<sup>2</sup>, a great discussion took place in American society between 1890 and 1920 about the role of electricity, its benefits, how it should spread throughout the land, what standards should apply, and who should own or control the electrical plants once they were established. Nye, a Danish researcher, notes that in America each community has the right to grant

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<sup>1</sup>Rheingold, Howard. *Virtual Communities*. Addison-Wesley 1993

<sup>2</sup>Nye, David. *Electrifying America*. Cambridge, MIT Press. 1992.

charters and franchises to utilities, so the electrical infrastructure developed along two basic models: a power grid confined to a geographical area controlled by a local government or a system developed by private corporations whose operations usually crossed city and state boundaries. The latter entities were usually larger than the former. The consolidation of small private utilities produced an enormous production and distribution grid which was efficient but served the populace unequally. These systems produced more electricity than any other in the world, but there was little rural service, special considerations for large customers, and the public utilities commissions were influenced by the power of the holding companies and the publicity campaigns that they were able to mount. This difference between the electrified urban landscape and the under-served rural area contrasted with Europe and New Zealand where there was almost universal service.<sup>3</sup> In America the electrical networks were a business, whereas in Scandinavia they were also seen as an instrument of social policy. In Europe, for example, electric streetcars were viewed as an essential service and were operated at a loss. In America they were treated as a business.

As American businesses supplied or used electricity, changes were rapid. Samuel Insull, one of the great utility czars, found that streetcar companies needed electricity at a different time than the rest of his customers, so he could build a larger central power source, place it near the streetcar companies, and sell power to them less than they could provide it for themselves. The trolley companies, in turn, built amusement parks as the end of their lines to encourage off-peak use of their lines, and a whole new industry of electric entertainment began to flourish. In Muncie, Indiana, movie theaters sprang up near the intersection of the trolley lines, and when the glass jar plant 'electrified' eight men could produce as many jars as 210 men did in the old factory.

These development models, the past effects of new technologies on society, labor, the shape of the city and its commerce, and the new forms of entertainment are being repeated now as we ponder the effects of computing technology, new entertainment and education media, and the restructuring of education and government to make use of the changing telecommunications infrastructure. What each group or city or region decides about its computing infrastructure, if they decide anything at all, will encompass variations on the models that worked or failed for previous systems such as the local phone system, the cable television companies, public transport, water treatment, or other social services such as schools, libraries, and museums. In many cases, one or more of these businesses or agencies will take the initiative and offer some of the network and information services that will be described in this paper.

## **The Present**

Just as electrical systems began to transform urban and small town America a century ago, community computer networks will do so in the 1990's. The present situation is that few people are aware of the concept of community computing networks, any more than people understood much at all about electricity in 1890. Most of the attention has been paid to national research networks such as the Internet and the commercial consumer services such as Compuserve, GENie, Prodigy or business services such as MCI Mail or Dialcom. On a local level, thousands of electronic bulletin boards have been started by dedicated individual hobbyists, small business people, non-profits, corporations, federal agencies, other governments and educational institutions. What is striking about many of these ventures is that each group is relatively unaware of the activities by the other groups. Database providers such as Dialog and Mead Data stay out of the messaging business except for narrow uses; business mail systems are just beginning to make links to bulletin board networks, and the BBS networks are just learning about the Internet. The Internet is going through an explosive growth process that has attracted new commercial

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<sup>3</sup>*Ibid.* , pp. 387-8.

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and non-academic users who are making new demands on the infrastructure and are in need of better security, more connectivity, and easier-to-use interfaces. However, there is the start of a convergence for many of these services and systems. Through the Internet one can send mail to many large and small services and BBSes; Dialog can be reached by Internet users, as can such commercial services as The WELL and Delphi. Some researchers are experimenting with audio and video transmissions on the Internet. Today's gimmicks may be tomorrow's services.

Some community networks are bulletin boards; others are based on large commercial services, and some are Unix-based systems with connections to the Internet. These latter systems provide their users with an electronic on-ramp to a myriad of services all over the world, not usually available outside of government laboratories, computer firms, and academic sites. Other systems have no connectivity outside of the town or area that they serve. Many unaffiliated users and former university students become interested in community networks for the connectivity to the Internet that some systems promise to provide.

*What sorts of unique information and services are found on community networks?* The key word is *local*. They provide electronic mail and discussion groups for local users. Local civic groups and local businesses provide information from the town or region in which the system is located such as, (and this list is not exhaustive): bus schedules, life long learning class schedules, job opportunities, city or county legislation and regulations, calendar of events, school lunch menus, homework help lines, advice from local professionals and tradespeople such as auto mechanics, lawyers, librarians, and law enforcement personnel, electronic catalogs for libraries, restaurant listings, tourist attractions, drafts of strategic plans, motor vehicle renewals, energy conservation aids, health information, index to local newspapers, reports from members of Congress who represent the area. There is a variety of activities besides electronic mail, searching databases, and reading text files. Some systems allow for real-time chat between users or interactive games or the sharing of sound and graphics files. In addition, most systems provide information of more general interest, such as world and national news, and discussion groups with participants from all over the U.S. and other countries as well. Very few systems provide the type of commercial transaction services which will be needed if files, services, and small info-nuggets are sold over these systems.

*What sorts of connections do these systems use?* Every system allows local users to connect to the host computer(s) using a personal computer or public terminal and modem or, in some cases, a dedicated line or wide area network. Generally, each system has a bank of modems to handle multiple callers at one time at speeds of 300, 1200, 2400, 9600 or more bits per second. A few systems only have a couple of phone lines, while others have broadband Ethernet (nominally 10 million bits per second) connections for some users and dialup for the rest. New systems such as the TeleCommUNITY Network in San Marcos, Texas, employ fiber optic links running at 45 million bits per second between a few school and training sites and offer two-way video, audio, and data networking for the participants. The goal of this effort is to move information and not people and to involve more parts of the community than just the school systems. Many of these systems have terminals or personal computers in public places such as school classrooms, public libraries, laundromats, and government offices. Some systems are experimenting with new wireless radio networks as a way of providing less expensive links between community information providers, and the field trials of this technology are encouraging.

*Who starts and runs these systems?* This is as varied as the services offered by them. Sometimes a computer enthusiast will start an electronic bulletin board (BBS) with one or two phone lines, invite other groups to disseminate their information on a dedicated part of the system, and then grow the

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service into a community information system. Other systems have been started by some part of a university. The Cleveland Free-Net began as an Apple II BBS under the wing of the Case Western Reserve University Medical School. Through publicity and effective fund-raising efforts by Dr. Tom Grundner and others in the community, it has grown to a large distributed Unix system with dozens of dialup lines and Internet connections for those users outside of the Cleveland calling area. Other key sponsors of such systems have included hospitals, local phone companies, non-profit institutes, and specially formed not-for-profit corporations. In some places such as Chicago, Illinois, and San Jose, California, America OnLine has teamed up with the local newspaper to offer information services to the community as a new business. Much of the current activity has attracted a spectrum of local citizens from all parts of the community who think a citizen-run network sounds like a good idea, and want to make it happen.

This can be difficult for many reasons. Community networks are new beasts with few people who know how they are conceived, what to feed them, how to make them flourish and spread. There are at present three organizations that can provide some assistance for groups that don't know where to start. Heartland Free-Net in Peoria, Illinois, sells several packets of information and consulting time. The Center for Civic Networking in Charlestown, Massachusetts, works with groups planning such networks. Fees for their services are negotiable and can sometimes be included in funding requests. Tom Grundner's National Public Telecomputing Network is a non-profit with some similarities to the Public Broadcasting System in that networks and users are solicited for support.

*Where does funding come from?* In some cases these networks can be started with available hardware and software and local technical assistance, but sources for startup funds depend on the talents of the organizing group as well as clarity of their vision for the future of their network. This has never been simple, nor is there one model that will work for every locale. Some systems are dependent on the owner/entrepreneur, the school, or the business; most depend on grants from foundations, computer firms, local businesses, and a few have funds from local government. Many government institutions are severely constrained by taxpayer revolts, increasing overhead, budget cuts, and the current (1992-3) recession, so few organizers expect that these systems will be started and supported by taxpayers alone. There are some whose funds come from the government, and others who depend on subscribers. Most depend upon a constantly changing group of partners, corporate angels, foundations, and user fees and donations to keep going. Steady funding is a serious problem even with outwardly popular and successful systems. In the online world there are a number of services that everyone admits are useful and productive, but nobody has figured out an easy way to support them. Most community networks are hunting for stable support. Up to now, the users have not been willing to support these systems through substantial donations or fees.

The following systems are representative of some of the more popular community systems. These may be called directly or reached by the telnet function on the Internet. There are others which have no link to the Internet and are open to just the residents and property owners of the town.

### **HAWAII FYI**

Hawaii Inc. was created in 1988 after the state House of Representatives Telecommunications Work Group issued a report exploring the business opportunities for telecommunications networks and gateways in Hawaii. The Capitol BBS, running on an IBM-XT, was used to gather data about the public's needs and interests for a larger system. I was able to gather information on HAWAII FYI while I was on vacation in Kona, Hawaii. The local library had a dedicated phone line to Honolulu and terminal

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which could display the text files as well as the graphics files that use the format known as NAPLPS (North American Presentation Level Protocol Syntax). NAPLPS grew out of the Telidon program in Canada but never achieved the grand vision of penetrating to 50% of the households by 1990.<sup>4</sup> Discussions, sometimes very critical, about the shape and future of the Hawaii FYI system were available for people to read and print out, even if they did not own a computer. The Kailua Kona library uses a Northern Telecom terminal that costs \$350. Their dedicated line to the Honolulu central server comes out of the branch library budget. The HAWAII FYI service was opened in June 1991; by December 1991 usage increased from 127,000 minutes per month to 1,232,000 minutes per month.

The range of information provided by HAWAII FYI is shown in the following edited lists of topics taken from the menus:

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Information Services Directory
LEGISLATIVE INFO SERVICES      ACTION LINE - KHON-TV
BOARDS AND COMMISSIONS        BUSINESS REGISTRATION
SCHOOL/SCHOLARSHIP INFO      CHILD LABOR CERTIFICATES
COLLEGE & CAREER INFO         CIVIL DEFENSE

DISHING UP LEAD                JOB DISCRIMINATION
NEED A JOB?                     GETTING PAID
DRIVER'S RENWL TEST Q&A        EFFICIENT LIGHTING
HAWAII VOTER'S GUIDE           HI. DBED ENERGY DIV.
ENERGY INFORMATION SVC         ENERGY TIPS
FACTS & FIGURES 1990           FISH OF HAWAII
HAWAII'S FISHING LIMITS        FYI BULLETIN BOARD
FYI CHATLINE SERVICE           DBED MONTHLY GAS WATCH REPT
GEOTHERMAL ENERGY            GET MORE HAWAII
HEPATITIS B                    HAWAII INC BBS
HOKULE'A INFORMATION SERVICE    SAVING ENERGY
PUBLIC LIBRARY SYSTEM          INTERACT!
LANDLORD-TENANT CODE           PRPSD COMM LAUNCH FCLTY
DIR OF ST/CNTY/FED OFFS        MALUHIA PROJECT
HAWAIIAN HOSPITALITY           BACKYARD OIL BARRELS
PUBLIC HEALTH NURSING          PVS INFORMATION SERVICE
ENERGY RESEARCH                SEPTIC TANKS
STATE ENERGY COORD. RPT.      SOLAR TAX CREDITS
STATE PARK INFORMATION         SCIENCE TECH.-SOCIETY
SOLAR WATER HEATING/SUNMAP     TAX INFORMATION SERVICE
TEEN FORUM-KITV4              ENRGY PRJCT SITE GUIDE
UH CARL SYSTEM                 INSTITUTE FOR PEACE
PEACE EVENTS CALENDAR          U.S. DEPT OF ENRGY INFO
YO! KIDS      YO! FYI RAPS
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Hawaii State Public Library System  
Hawaii Newspaper Index

This database is a subject index to articles on Hawaii and the Pacific region published in the Honolulu Advertiser and Honolulu Star Bulletin newspapers. Copies of the articles are available on microfilm in most of the larger public libraries. Please ask your librarian for assistance.

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<sup>4</sup>Godfrey, David and Ernest Chang. *The Teledon Book*. Toronto, Porcépic Press, 1981.

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Hawaii FYI has expanded its fee-based services to provide entertainment and Internet connectivity as an option to subscribers in 1993. Besides funds taken in from other information providers the state provides about \$500,000 annually to the not-for-profit corporation, making this the community system with the most financial support of any operating in North America.

Each year Hawaii INC sponsors a conference in Honolulu, comprised of speakers from the islands as well as visitors from the mainland. The diverse nature of the information providers and attendees makes it a model for other states that are thinking about building a state infrastructure. At the March, 1993 conference there were speakers from schools, satellite companies, the Maui supercomputer center, University of Hawaii, private firms offering services on Hawaii FYI, and Hawaiians interested in using the network for cultural preservation and language instruction.

## National Capital Free-Net, Ottawa, Canada

The Free-Net model, started at Case Western Reserve University by Tom Grundner, has spread around North America and beyond. In fact, Free-net has almost become a generic term for a community network, but it does apply to a unix-based system using the FreePort software developed by Grundner's team or other homebrew software from NPTN. Grundner says,

" The unifying factor is not software or hardware; it is conceptual in nature. All Free-Net's are: 1) Free to the user; 2) are primarily dedicated to the development of *local* information resources (supplemented by national-level feeds from NPTN); and 3) are dedicated to opening up the information age to as broad a spectrum of people as possible. That defines a 'Free-Net' a lot more than mere software or hardware."<sup>5</sup>

The National Capital Freenet (NCF) in Canada was started in November 1991 by George Frajkor and Jay Weston of the Carleton University School of Journalism. Besides receiving assistance from the university, they have received support from Gandolph Technologies, Sun Microsystems, 125 organizations and more than 500 people who have given time and money. More than the developers of other systems, the organizers have stated their vision about the growth of Free-nets in Canada, as evidenced by documents residing on the system:

"Because a Free-Net is run by the community and for the community, it helps to encourage and to revitalize community involvement. It creates a partnership, a shared responsibility between the community and existing social institutions for developing and providing timely information. Many people are recognizing that traditional ways of sustaining a community are no longer working well. They are beginning to accept the idea that greater voluntary donations of time and energy are required if their community is to be maintained. The information offered on a Free-Net is provided as a voluntary effort by private citizens and community agencies. A Free-Net thus offers new opportunities for citizens to become more involved in their community, and for groups, institutions and governments to become more visible and accessible."<sup>6</sup>

NCF uses the metaphor of an electronic city but allows for variation depending on the participating agencies and individuals in different locales. Below is the top level menu:

<<< Main Menu >>>

- 1 The National Capital Freenet...
- 2 Administration...
- 3 Post Office...
- 4 Public Discussion...
- 5 Social Services, Health, & Environment Centre...

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<sup>5</sup>Personal communication from Tom Grundner, May 17, 1993

<sup>6</sup>"The Context of Public Access Community Networks" National Capital FreeNet

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- 6 Community Associations...
- 7 The Government Centre...
- 8 Science, Engineering and Technology Centre...
- 9 Schools, Colleges and Universities...
- 10 Daily Newspaper...
- 11 Libraries...
- 12 Special Interest Groups...
- 13 Communications...
- 14 Help Desk...

Each item has one or more levels that provide access to discussions, documents, and listings of the information that each interest group or organization has agreed to provide. The degree of involvement by each volunteer determines the timeliness and accuracy of the information provided. Access is free to the citizens and, indeed, to anyone with Internet access or to modem users willing to pay the long distance charges.

NCF is developing a "Community Free-Net Kit" containing software, training manuals, publicity tips, and system advice to bring any community in Canada online as efficiently as possible. They predict that there will be at least 100 Free-Nets in Canada by the year 2000. In some towns the lack of personnel skilled in Unix system administration will prove be a hindrance to the effective operation of these complex hardware configurations. Talented volunteer help from distant university computer centers may get these systems up and running, but the day-to-day operations necessitate skilled on-site workers, if the Free-Nets are going to be run as reliable networks that the local citizens depend on. Few novices or experienced users will tolerate constant service interruptions, mail that can't reach its destination, and inability to easily transfer files without corruption.

There are Free-Nets operating or starting up many areas of the United States; a partial list includes Tallahassee, Florida; Columbia, Missouri; Denver, Colorado; Buffalo, New York; Peoria, Illinois; and Youngstown, Ohio. The number continues to grow as the idea of community networks spreads.

## **Wellington (New Zealand) City Council's Community Computer Network**

The Santa Monica (California) Public Electronic Network was one of the first community system supported by a local government. Its use of online discussion groups and databases of local information has generated an enormous amount of interest. The Wellington city council was partly inspired by Ken Phillips of Santa Monica, California, and all the publicity surrounding the Santa Monica municipal PEN system.

Richard Naylor, a computer systems expert with the City Council has been instrumental in putting this city online and allowing a student in Amsterdam or Austin to read the city council minutes. 65 percent of New Zealand households have computers, and of those 5 percent have modems. That is about 3,500 households in the Wellington area, but because the network is available as a gopher hole (server) on the Internet, it is accessible at no charge to thousands of other users.

Naylor started the New Zealand system about three years ago. For awhile the information systems was merged with the city library system but that was seen as too radical so it split. The development of the City Network continued, and today the public has access to one of the DEC Vaxes which has the Usenet News system, Vax Notes (an old computer conferencing system), and files including ordinances, images, and information about Wellington and New Zealand. At present they have 500 to 600 users, mainly from the BBS community, and they are trying to extend access into the schools. Users have access to the Internet and telnet (login remotely) and ftp (transfer files between one Internet host and their own)

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without charge. Because of the speed of connections between New Zealand and the rest of the world, they try to limit local users' file transfers to New Zealand sites. Pictured in Figure 1 are two screens as viewed from GopherApp, a Macintosh client for gopher servers. New Zealand users can dialup using a modem as well. Gopher is an exciting application, freely available for non-profit uses, which has been widely deployed by more than 1300 academic sites around the world. Wellington is the first city to do so. There is client software available for various computers, and the server software is constantly being enhanced and updated by a team at the University of Minnesota and their collaborators around the world.

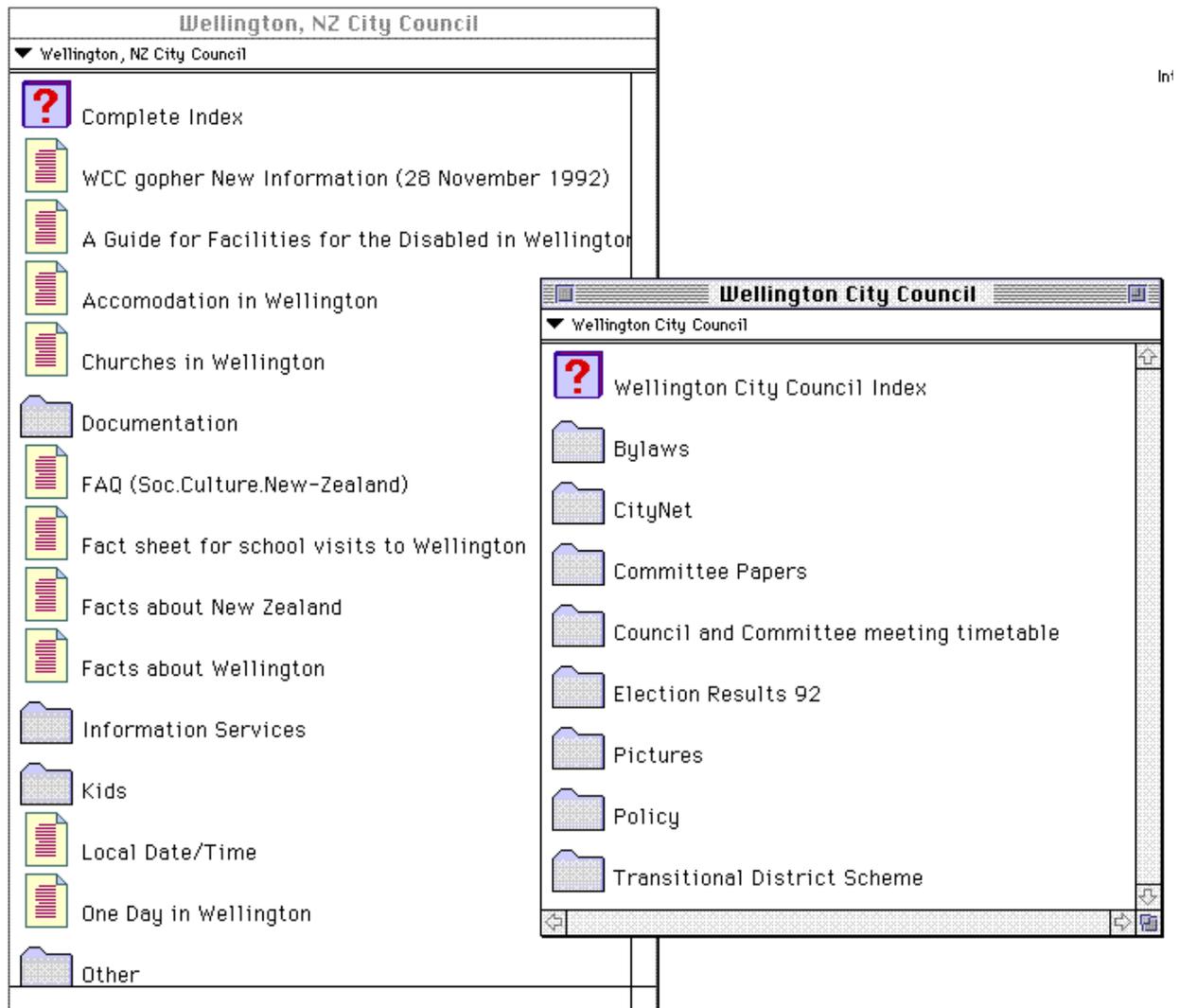


Figure 1: Wellington, New Zealand Information on Gopher using GopherApp

## Big Sky Telegraph, Dillon, Montana

The Western Montana College of the University of Montana runs a multi-faceted system that was started in 1988 by Frank and Regina Odasz, with help from the M.J. Murdock Charitable Trust and US WEST. In the early days it provided access to teachers in one-room schools throughout rural Montana. The teachers took an online course in telecommunications and then used Big Sky for collaboration and other distance learning experiences. Other groups such as the Montana Women for Economic Development began using the system to teach small groups of rural entrepreneurs telecommunications basics. The

library at Western Montana College has provided free ERIC searches and hard copy library materials to remote users. The online community extends beyond Dillon, Montana, and is, in a sense, a model for other rural communities in the state and elsewhere, due mainly to the evangelistic skills of Frank Odasz whose writings and presentations have inspired many others interested in community networks. Odasz must, for the most part, depend on soft funding from various foundations. Though he requests a \$50 subscriber fee from individuals interested in using the system, in reality, anyone can use the system at no charge. The lack of modems, poor phone lines in rural areas, and long distance charges has limited growth. Big Sky runs on a unix-based 386 system using a home-grown amalgamation of BBS software assembled by Dave Hughes of Old Colorado Communications <dave@oldcolo.com> and they now have full Internet connectivity as well as the ability to receive messages from UUCP and Fidonet systems. Telnet to bigsky.dillon.mt.us for a trial run.

Big Sky Telegraph has received a great deal of publicity and has attracted the attention and participation of Senator Conrad Burns of Montana as well as other politicians and writers. One of the more interesting studies of the effects of this community network is Willard Uncapher's *Rural Grassroots Telecommunication: Big Sky Telegraph and its Community*.<sup>7</sup> Uncapher studied the effects of Big Sky Telegraph in Dillon, as well as Dell Valley and Wisdom, Montana, a small ranching community about 70 miles from Dillon, by interviewing teachers and other academics, ranchers, farmers, agricultural extension agents, forestry service officials, women, children, and people working in the service sector. The ranchers and farmers generally believed that support for education and telecommunications experiments would come out of their pockets, in the form of new taxes. Because there was so little opportunity for returning students, most were "exported" to other states to follow a new career. The community network was seen by this group as contributing to this outflow of young people. As these systems proliferate, they will be the subject of other theses and popular studies that will examine them in more depth than is possible in this brief survey.

### **Social Aspects and New Projects**

Many writers, online enthusiasts, and researchers have commented on the promise of using the new communications technologies to reinforce communities, to invigorate the democratic process, and to redefine parts of society. Ithiel de Sola Pool's writings are particularly useful, and though he died in 1984, his works do not seem dated or out of sync with the events we are experiencing in the 1990's. In *Forecasting the Telephone*, Pool describes how farmers in rural areas banded together to form telephone cooperatives, sometimes stringing wire on fence posts and even using barbed wire as a transport medium. He also describes an early use of the party line by farmers that seems to offer some advantages over the single household system that most of us use: At a specific time in the evening, after chores were done, the farmers would gather online, and one who subscribed to a newspaper or magazine, would read to the others, some of whom could not read at all.<sup>8</sup>

In *Technologies Without Boundaries* Pool discusses a number of profound changes including:

The mass media revolution is being reversed; instead of identical messages being disseminated to millions of people, electronic technology permits the adaptation of electronic messages to the specialized or unique needs of individuals.<sup>9</sup>

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<sup>7</sup>Contact Uncapher at <willard@well.sf.ca.us> for an electronic copy.

<sup>8</sup>Pool, Ithiel de Sola. *Forecasting the Telephone*. Ablex, 1983. p. 50.

<sup>9</sup>Pool, Ithiel de Sola. *Technologies Without Boundaries: On Telecommunications in a Global Age*. Harvard University Press, 1990. p. 8.

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One of Pool's students was W. Russell Neuman whose *The Future of the Mass Audience* influenced me greatly as I studied these community systems. It is a study of how the new technology and changing economics of mass media will influence public communications. In the introduction Neuman observes,

"That would be something new indeed, a postindustrial society that would self-consciously use technology to return to smaller-scale institutions and a renewed commitment to the traditional norms of civic participation."<sup>10</sup>

He cites the study by Tetsuro Tomita of Japan's Ministry of Posts and Telecommunication in 1980. Tomita plotted out personal and mass communications in terms of size of audience and response time. Figure 2 is Neuman's reinterpretation of Tomita's model; it shows the gap between personal and mass media, and this gap is being filled by such technologies as community-produced cable television, electronically filtered news, computer discussion groups, and, I would argue, community networks.

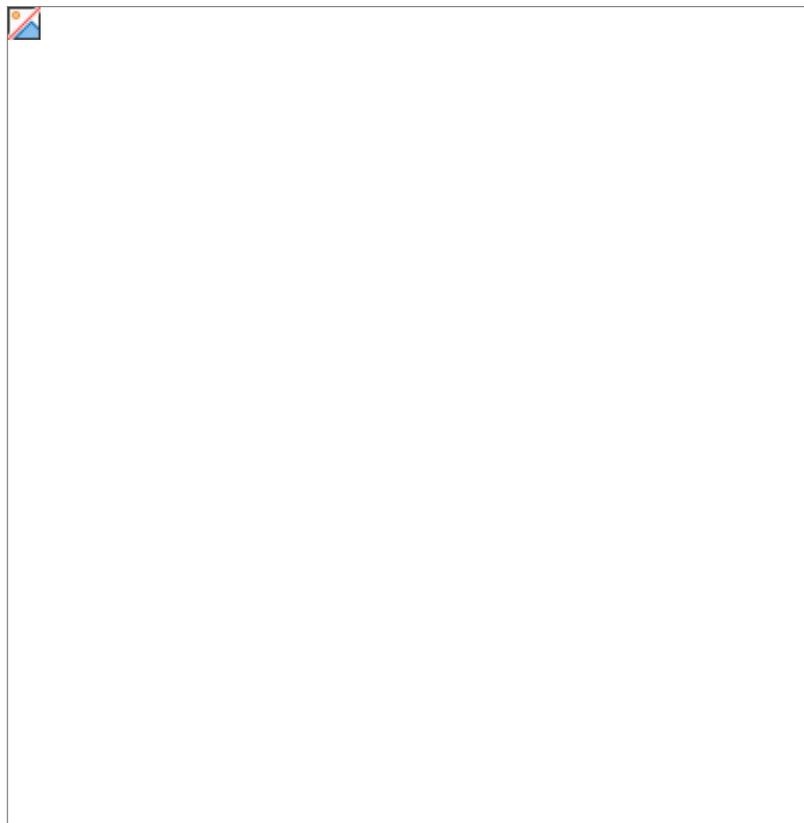


Figure 2: the gap between conversation and mass media

The origins of the data highway metaphor are not the speeches of Vice-President Al Gore. It was used as early as 1971 when Ralph Smith, writing in *The Nation*, also coined the term "The Wired Nation":

"...the nation provided large federal subsidies for a new interstate highway system to facilitate and modernize the flow of automotive traffic. It...should make a similar national commitment for an electronic highway system."<sup>11</sup>

In the article and the book Smith described how a variety of social objectives would be supported by the four kinds of broadband networks: telephone, cable, institutional, and community-owned. His vision

<sup>10</sup>Neuman, W. Russell. *The Future of the Mass Audience*. Cambridge University Press. 1991.

<sup>11</sup>Smith, Ralph. *The Wired Nation: Cable TV: The Electronic Communications Highway*. Harper & Row, 1972. p. 83.

convinced people at the FCC to lower the regulatory barriers to the development of cable. What took place was a variety of interactive cable experiments in Europe, Japan, and the U.S. which are described in *Wired Cities*.<sup>12</sup> This volume is a retrospective look at the uneven success of the technology trials, the lack of real revolution in the way cities were run, elections held, and issues decided. Even though it deals primarily with analog technology, it is highly recommended for those of us challenged by the changing state, local, and national telecommunications policies in the digital age.

Because we have powerful personal computers added to the Wired Nation twenty years later, many people believe it will somehow be different this time. Many libertarians and computer enthusiasts see the power being decentralized, with unlimited computer cycles available very cheaply and within the reach of most consumers. While the computer companies believe the intelligence will reside in the machine and its software, many communications companies, especially the telephone companies, are adding value by adding intelligence to the network. Groups such as librarians and educators feel that the intelligence should be in the form of the users, moderators and other intermediaries who will populate the networks, alongside the software agents slowly emerging from labs and companies. These developments and the spread of the national infrastructure will heavily influence the choices cities and region have as they establish community networks.

### **Other Models for Community Networks**

The systems described earlier in the paper are not the only models. In Forsyth County North Carolina, the library and other agencies dealing in information have formed the Forsyth County Information Authority. What emerges as a result of that innovative concept bears watching. Besides the spread of Free-Nets, Meta-Systems Design Group in Washington, DC, is negotiating with a number of municipalities to use Caucus computer conferencing software in new networks. Caucus is being used in the well-known Santa Monica (CA) Public Electronic Network and one part of Hawaii FYI. Some planners have been looking at software developed in France for use on the Minitel system, and as we explored previously when describing Hawaii FYI, there are some strong advocates for the use of NAPLPS to integrate text and vector graphics. CIX is working with Cincinnati Bell on a community system similar to the Free-Nets.

There is a loose category of systems called pubnets or "grunge" networks. This is not a pejorative term. It means that the networks were assembled with low cost materials, a lot of sweat equity, and innovative designs that made do with available materials. Little Garden in the San Francisco Bay Area has 30 customers who use their services to hook subnetworks up to the Internet at dialup phone line speeds as well as T1 speeds (approximately 1.5 million bits per second). M-Net and grex in Ann Arbor, Michigan, also offer low cost solutions for people who do not need a lot of assistance and want access to electronic mail and Usenet news groups at a very low cost. For several years Phil Eschallier <phil@jabber.ls.com> has maintained an ever-growing list of public access unix sites around the world. The January 1993 list included more than 130 sites primarily in the United States but also Europe and the Pacific.

The interfaces for all of these systems can be improved, and while some believe that a command line interface is better because it is faster for some experienced users or it builds character in the struggling novice user, most network managers want to make their systems as easy as possible to use. This usually means a graphic interface of some sort, but many systems must make do with hierarchical menus for beginners and experienced users alike. A serious issue is how many users are left behind when new interfaces are developed which will not work on underpowered, older computers or terminals. For some,

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<sup>12</sup>Dutton, William et al. *Wired Cities: Shaping the Future of Communications*. G.K. Hall, 1986.

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the opposite is true: how the installed base of older machines can thwart technological progress because of an unwillingness or inability to upgrade equipment and software. Setting the bar too high when deciding on an interface and the platforms it will run on, denies users the ability to use their old machines. Setting the bar too low and only providing a command line text interface will exclude users who have come to expect an online system that resembles the GUI computer interface they already use offline. The best systems will permit you to use the computer or interface of your choice. However, few developers have the resources to provide this sort of flexibility.

America Online (AOL) has been collaborating with the San Jose Mercury News, the flagship of the Knight-Ridder chain of newspapers. With the readership (and advertising revenues) for many newspaper in decline, some newspaper are looking at new business models. Extending the newspaper business to users of online services is a natural, if difficult, move. The Merc, as the paper is known locally, has set up the Mercury Center on AOL that provides the full text of articles in the paper, a way of corresponding with columnists and editors, searchable classified ads, in addition to extra new material plus years of archived articles using a fairly attractive and easy to use graphic interface. The service began in the Spring of 1993, and the testing period for new users is still in effect. With twelve full-time staff plus the involvement of many of the print-based staffers, this new business bears watching. Users pay \$9.95 per month and receive 5 hours of use (at 2400 bps access speed) in the monthly fee. Extra hours cost \$3.50. Besides the Mercury Center, subscribers can use the other America Online departments, and can subscribe to the San Jose Mercury News at a 45% discount. At this time most of the information originates from the newspaper and its readers. There is some information for towns and suburbs of San Jose which can be accessed by browsing or by doing a text search, but these systems may never be more than an electronic extension to the newspaper and want ad services that account for so much of the revenue for publishing firms.

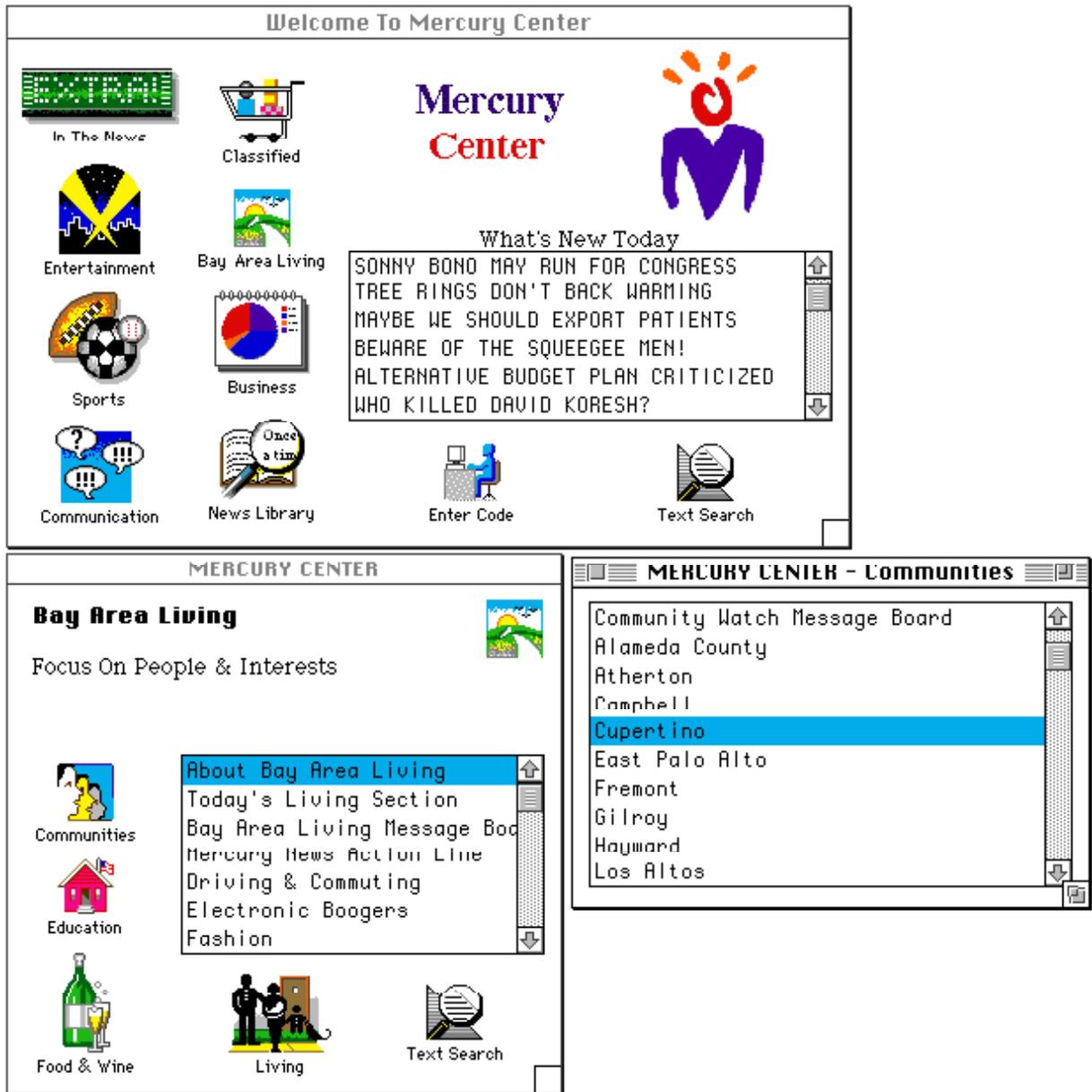


Figure 3: Mercury Center (American Online)

Some of these communities are starting their own systems. A group of five citizens in Mountain View, California, are planning a community system, and the nearby city of Cupertino is much further along. Cupertino City Net is a new effort by city officials, educators, and community participants, including computer companies in town, to allow residents access to community information and electronic mail for \$20 per year. City hall plans to provide meeting agendas, minutes of meetings, and a city calendar. School district officials plan to post registration information and school board news. However, at the brainstorming sessions it was clear that the participants want much more--at a time when municipal budget constraints lead people to make statements such as "City Net is a great idea and I support it--but not with the use of city funds."<sup>13</sup> In this case the person is the Nick Szabo, the mayor of Cupertino, and if he is not convinced that public monies should be used to run such a system, there will be less willingness by schools and corporations to lend support. Pictured in Figure 4 is the Macintosh screen

<sup>13</sup>"Citywide computer net in works" *San Jose Mercury News*. March 1, 1993.

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for City Net. VT-100 terminal emulation can be used to display text menus, and client software is available for Microsoft Windows as well.

Note that the Cupertino City Net is, at this time, a section of a larger bulletin board system that also includes Small Business Administration information as well as items about other cities in the Silicon Valley. The software is FirstClass from SoftArc in Canada and runs on the Macintosh over modem or AppleShare local area networks. There are gateways available for other mail systems such as Fidonet, UUCP, and the Internet. Later in 1993, additional software will allow a FirstClass BBS to serve as an Internet host, along with gateways into relational databases. Another interesting feature of FirstClass is the ability to use foreign language fonts in messages, so text is no longer restricted to ASCII but can also include, for instance, Indian languages for use in the reservation network that the Zuni Middle School in Zuni, New Mexico, is designing. The use of these networks for the purpose of cultural preservation is a topic for another paper.

Res-Nova in Huntington Beach, California, is setting up a large system in Lansing, Michigan using their Nova-Link Professional software. It offers a graphic interface for Windows and Macintosh users, has complete integration of TCP/IP protocols as an option, and can also communicate with UUCP and Fido networks. Res-Nova is also developing billing software for commercial applications.



Figure 4: Client software (FirstClass) for Cupertino City Net

With many sectors in education, society, business, and government pushing for broadband connections and communications pipes, the users who are teething on our text-based systems will demand and eventually receive information systems that can deliver reliable and secure transactional information, both sound and full motion digital video, and high resolution images for use in purchasing goods, making medical diagnoses, and for pure entertainment. It is unclear how the community networks of today, which have not found stable funding models yet, will meet the challenge to provide high-end technology. Commercial enterprises have the resources for well-supported trials of systems that can provide a wide-range of services they hope will bring people online and into the stores to buy new equipment to handle the sophisticated graphic interfaces.

With interest by commercial firms in these networks, what effects will under-funded grass roots efforts have over the next ten years? If Apple, or US West, or Time-Warner, or America Online comes to your town, will there be a place for a strong voice and some control by local organizations rather than the

"invisible hand" of market forces? If no group has already started a community network, the commercial firms will be able to write more of the ground rules and grow a system designed primarily to achieve their business goals. This is less likely to occur if they offer services in an area where there is a healthy network with a broad range of volunteers and community expertise. Any system, commercial or otherwise, must meet the needs of many different users. If a commercial system can do that better, it will prevail. If the system is just strip-mining the disposable income of affluent telecommuters, it may not last as long as the more equitable network that meets the needs of more citizens for a wider range of uses. As new uses emerge, the network will grow and expand in functionality. If the network is viewed (or ignored) as the domain of a few groups of users or if the discussion sections are dominated by a handful of verbose contributors, broad public support is unlikely. The role of the commercial community, beyond that of marginally-involved donors, has not developed yet. One system where they are planning for this is the Glendale, California, LNX network which uses Coconut's software as a back-end. It is due online in August 1993.<sup>14</sup> Expect other new ventures from small and large entrepreneurs in various urban and suburban markets.

## **Designing a System for the 1990's**

What if there were government funding for five years to carry out the development, distribution, and support of software for a new community information system that could then be used across the country? The potential operators might be a school, an energetic individual, a library, a business, a local government, a hospital, a phone company, a consortium or cooperative, an information authority, a non-profit organization, or an ad-hoc citizens group. Given the complexity of a full-featured community system, it is clear that this would be an expensive and management-intensive development project. Nevertheless, let us speculate how it might that be used, and how it would benefit commercial and non-commercial enterprises.

The back-end system should run on various platforms: DOS, Unix, Macintosh, as well as the future operating systems from Next, Microsoft, and Taligent. It should, therefore, be scalable (functioning on simple operating system but able to migrate to more powerful ones), and it should be extensible (new components can be added to it for increased functionality). A system that handles text and binary files would later be adaptable to new input technologies and new sorts of information flow. For example, changes could be made to work with speech input and provision of full-motion video and other time-based data. People with low-end computers would have a basic level of access; those with more powerful and newer models could take advantage of more features.

The system should be easy to administer, with tasks and operating permissions easily delegated to people other than the system administrator. Unix-based systems should be turnkey with no full-time Unix wizard needed on site. Special care should be given to the design of utilities for local operators to re-configure the system, its interfaces, for maintaining the accounts including moving user directories from one kind system to another. Users should have a similar ability to change their own client software which should run on a variety of terminals, computers, hand-held devices, and workstations. Thought must be given to the installed base of older computers, but the power of the system cannot be crippled because of the meager capabilities of devices that cannot emulate a VT100 terminal.

The source code and the binaries for the systems and clients should be available through an organization such as CNIDR (see the appendix) or the National Center for Supercomputing Applications (NCSA) for

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<sup>14</sup>Contact Ruth Thompson, LNX System Directory (818) 548-2126.

the cost of distribution. Technical support would be provided within the five year funding period. This is ample time to see whether or not these systems will take root and flourish in a variety of communities. While any group should be able to use it for any purpose, including adding value and re-sale or bundling with equipment, its no-cost availability in a more generic form from a clearinghouse will assure that many groups with many needs will be able to use it, enhance it, and experiment with it.

Some writers have envisioned even more complex systems. Looking years into the future, David Gelertner, Associate Professor of Computer Science at Yale University, describes the framework for a system he calls *Mirror Worlds*:

"What are they? They are software models of some chunk of reality, some piece of the real world going on outside your window. Oceans of information pour endlessly into the model (through a vast maze of software pipes and hoses): so much information that *the model* can mimic *the reality's* every move, moment by moment. ...A Mirror World is some huge institution's moving, true-to-life mirror image trapped inside a computer--where you can see and grasp it as a whole."<sup>15</sup>

In the first part of the book he describes the richness of a community or institutional network where all activity is mapped to the computer, he explains the significance of many users having access to all this information and how it will affect relationships, business, elections, and public government. He argues that such a system would give us 'whole-sightedness', the ability to see the whole operation, object, or community and thereby, presumably, make the right decisions when we wish to change or interact with the system. It seemed that many people would be tempted to interact more with the richly detailed computer model and not the community it represented.

Other experiments will combine existing forms of computer interaction to form a new class of infotainment networks. The Internet includes a variety of unsanctioned services such Internet Relay Chat (IRC) and MUDs (Multi User Dimension, Multi User Dungeon, or Multiple User Dialog). A MUD is a construct that simulates a fictitious or fantasy world. Users wander about, conversing, examining the text simulations, and even constructing other areas or rooms. In some systems volunteers have re-constructed textual versions of Disneyland, Oz, Narnia, and popular science fiction locales. The system at Mankato State University in Minnesota has integrated a gopher service into the interactive role playing aspect, so a player can visit the gopher hole or even carry a gopher "slate" during the MUD interactions. Visitors to the gopher hole can receive real-time assistance from other participants who are more experienced. It is an idea that was suggested to the programmers by librarians. This unusual mixing of information and amusement is one the current mutations that have appeared in the low bandwidth text-based networks. The new forms of interaction and new vessels for holding and displaying information will continue to emerge, and some will not have real world equivalents, but they should be used to enhance real world participation.

Computers and community networks will change the way we do business, govern, and relate to one another. I support the idea that the computer systems we design are meant to facilitate and enhance the business or social relations we have with other people, not to supplant them. Keeping in mind that electronic networks can empower many on the fringes of our community because of age, handicap, physical appearance, or race, I recommend that any community network that is being designed or already exists, not only include face-to-face meetings of the board and technical staff but also regular meetings or social events to involve the users and the volunteers and information providers. A community computing network must be integrated into the real world community that it serves. This would hold true whether you are running a small electronic bulletin board system, a large Free-Net, or a

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<sup>15</sup>Gelertner, David. *Mirror Worlds*. Oxford University Press 1991. p. 3.

Mirror World in the year 2000.

## **Further Information**

Coconut Computing, Inc, 7946 Ivanhoe Ave. Suite 303, La Jolla, CA 92037 Phone: 619-456-2002.  
Internet info@coconut.com.

Cupertino City Net. John Statton, Apple Computer, Inc. 20525 Mariani Dr. MS 38J, Cupertino, CA 95014. (408) 996 1010. Internet: statton@applelink.apple.com

Community Information Exchange, Inc. (CIX). 9513) 321-7463. Internet: sales@ix.net. This company set up Cincinnati Bell's TriState Online community system that serves 12,000 registered users. They sell turnkey Unix-based systems.

Karen S. Eggert, Heartland Free-Net, Jobst North Technology Center, Peoria, Illinois 61625 (309) 677-2544. Internet - xxadm@heartland.bradley.edu Heartland offers for sale guides and telephone consultation for groups planning a Free-Net.

Miles Fidelman, Center for Civic Networking, 91 Baldwin Street, Charlestown, MA 02129 (617) 241-5064. Internet: mfidelman@world.std.com

FirstClass BBS, SoftArc Inc., 805 Middlefield Road, Scarborough, Ontario M1V2T9, Canada. (416) 299-4723 BBS: 416 609 2250. Free client software may be downloaded from this or from the info-mac archive at sumex.stanford.edu

Dr. Tom Grundner, National Public Telecomputing Network, Box 1987, Cleveland, OH 44106; (216) 247-5800; Internet tmg@nptn.org

Dave Hughes, Old Colorado Communications, 6 North 24th St., Colorado Springs, Colorado 80904 (719) 632 4848. Internet: dave@oldcolo.com

Metasystems Design Group, Inc., 2000 N. 15th St., Suite 103, Arlington, Virginia 22201. Phone: 703-243-6622 Fax: 703 844 9798. Internet info@tmn.com

Richard Naylor, IT Manager, Wellington City Council, P O Box 2199, Wellington, New Zealand. Phone: 64 4 801-3302 Fax: 64 4 801-3020 Internet: rich@tosh.wcc.govt.nz

Frank Odasz, Big Sky Telegraph, Western Montana State College, Dillon, MT  
voice: (406) 683 7338 Internet: franko@bigsky.dillon.mt.us

ResNova Software, Inc., 5011 Argosy Ave. #13, Huntington Beach, CA 92649  
Phone: (714)-379-9000.

Dorianne Thompson, Hawaii Information Network Corporation, 201 Merchant Street, Suite 1500, Honolulu, Hawaii 96813 (808) 586-4636. Internet: dlthawaii@aol.com

For those with access to electronic mail, this discussion group on community networks is recommended. There are more than 500 contributors from many different backgrounds who have joined since it began

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in early 1993.

ANNOUNCING COMMUNET - A Community and Civic Networks Discussion List

[] Postings to : Communet@UvmVM.Uvm.Edu

[] Subscriptions to : Listserv@UvmVM.Uvm.Edu

The Community and Civic Networks Discussion list has been set up to explore the issues, technologies, and implications of widely available computer based networking. The focus of our attention is on the sorts of networks exemplified by - the Free-Nets; - City BBSes; - Information Kiosks and Downtown Information Systems; - Indian Reservation networks; - community computer conferencing systems such as Santa Monica PEN interactive systems run by newspapers (Chicago, Kansas City, Ft. Worth) rural and regional area networks. Discussion of K12 or academic networks that focus on how these constituencies can collaborate in community issues is welcome, but K12 or academic network discussions should take place in other lists.

Appropriate topics include, in addition to news about specific networking activities - collaboration issues: how academic, commercial, government groups pull together to make such a network happen; - role of the Internet in community networking; - computers in public spaces for access to community networks; - funding models for networks; - legislation (state, local, federal, and international); - consortia and network support groups; - hardware and software; - interface issues; - data gathering and dissemination; - future services (beyond text); - books and articles and network information; - conferences, workshops, and online events related to community networks;

[] subscription: open

[] moderation: unmoderated

[] list maintenance:

rain@phaedrus.ece.ucsb.edu (Timothy Tyndall, Santa Barbara RAIN net)

sjc@uvmvm.uvm.edu (Steve Cavrak, University of Vermont)

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*The views and ideas presented in this paper are those of the author and not his employer, Apple Computer, Inc. This essay is*

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*available for anonymous ftp from ftp.apple.com in the alug/commnet directory in ascii, Word, and PostScript. The ascii version contains no illustrations of graphic interfaces to community networks. These files may be put on educational and non-profit BBSes, gophers, and ftp sites. All other online services and publishers must contact the author.*