Netizens: An Anthology

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Foreword

Netizens: On the Impact and History of Usenet and the Internet is an ambitious look at the social aspects of computer networking. It examines the present and the turbulent future, and especially it explores the technical and social roots of the "Net." A well-told history can be entertaining, and an accurately told history can provide us valuable lessons. Here follow three lessons for inventors and a fourth for social engineers. Please test them out when reading the book.

The first lesson is to keep projects simple at the beginning. Projects tend to fail so the more one can squeeze into a year the better the chance of stumbling onto a success. Big projects do happen, but there is not enough time in life for very many of them, so choose carefully.

The second lesson is to innovate by taking something old and something new and putting them together in a new way. In this book the "something new" is invariably the use of a computer network. For example, ancient timesharing computer systems had local "mail" services so its users could communicate. But the real power of e-mail was when mail could be distributed to distant computers and all the networked users could communicate. Similarly, Usenet is a distributed version of preexisting bulletin-board-like systems. The spectacularly successful World Wide Web is just a distributed version of a hypertext document system. It was remarkably simple, and seemingly obvious, yet it caught the world by complete surprise. Here is another way to state this lesson: "If a feature is good, then a distributed version of the feature is good. And vice versa."

The third lesson is to keep on the lookout for "something new," or for something improved enough to make a qualitative difference. For example, in the future we will have home computers that are always on and connected to the Net. That is a qualitative difference that will trigger numerous innovations.

The fourth lesson is that we learn valuable lessons by trying out new innovations. Neither the original ARPAnet nor Usenet would have been commercially viable. Today there are great forces battling to structure and control the information superhighway, and it is invaluable that the Internet and Usenet exist as working models. Without them it would be quite easy to argue that the information superhighway should have a top-down hierarchical command and control structure. After all there are numerous working models for that.

It seems inevitable that new innovations will continue to make the future so bright that it hurts. And it also seems inevitable that as innovations permeate society the rules for them will change. I am confident that Michael Hauben and Ronda Hauben will be there to chronicle the rapidly receding history and the new future, as "Netizens" increasingly becomes more than a title for a book.

Thomas Truscott
Durham
December 1995

Preface

What is a Netizen?

The story of Netizens is an important one. In conducting research four years ago online to determine people's uses for the global computer communications network, I became aware that there was a new social institution, an electronic commons, developing. It was exciting to explore this new social institution. Others online shared this excitement. I discovered from those who wrote me that the people I was writing about were citizens of the Net, or Netizens.

I started using local bbses in Michigan in 1985. After seven years of participation on both local hobbyist-run computer bulletin boards systems, and global Usenet, I began to research Usenet and the Internet. I found these on-line discussions to be mentally invigorating and welcoming of thoughtful comments, questions and discussion. People were also friendly and considerate of others and their questions. This was a new environment for me. Little thoughtful conversation was encouraged in my high school. Since my daily life did not provide places and people to talk with about real issues and real world topics, I wondered why the online experience encouraged such discussions and consideration of others. Where did such a culture spring from, and how did it arise? During my sophomore year of college in 1992, I was curious to explore and better understand this new on-line world.

As part of course work at Columbia University, I explored these questions. One professor's encouragement helped me to use Usenet and the Internet as places to conduct research. My research was real participation in the online community by exploring how and why these communications forums functioned. I posed questions on Usenet, mailing lists and Freenets. Along with these questions, I would attach some worthwhile preliminary research. People respected my questions and found the preliminary research helpful. The entire process was one of mutual respect and sharing of research and ideas. A real notion of 'community' and 'participation' takes place. I found that on the Net people willingly help each other and work together to define and address issues important to them. These are often important issues which the conventional media would never cover.

My initial research concerned the origins and development of the global discussion forum Usenet. For my second paper, I wanted to explore the larger Net and what it was and its significance. This is when my research uncovered the remaining details that helped me to recognize the emergence of Netizens. There are people online who actively contribute toward the development of the Net. These people understand the value of collective work and the communal aspects of public communications. These are the people who discuss and debate topics in a constructive manner, who e-mail answers to people and provide help to newcomers, who maintain FAQ files and other public information repositories, who maintain mailing lists, and so on. These are people who discuss the nature and role of this new communications medium. These are the people who as citizens of the Net, I realized were Netizens. However, these are not all people. Netizens are not just anyone who comes online, and they are especially not people who come online for individual gain or profit. They are not people who come to the Net thinking it is a service. Rather they are people who understand it takes effort and action on each and everyone's part to make the Net a regenerative and vibrant community and resource. Netizens are people who decide to devote time and effort into making the Net, this new part of our world, a better place. Lurkers are not Netizens, and vanity home pages are not the work of Netizens. While lurking or trivial home pages do not harm the Net, they do not

contribute either.

The term Netizen has spread widely since it was first coined. The genesis comes from net culture based on the original newsgroup naming conventions. Network wide Usenet newsgroups included net.general for general discussion, net.auto for discussion of autos, net.bugs for discussion of Unix bug reports, and so on. People who used Usenet would prefix terms related to the online world with the word NET similar to the newsgroup terminology. So there would be references to net.gods, net.cops or net.citizens. My research demonstrated that there were people active as members of the network, which the term net citizen does not precisely represent. The word citizen suggests a geographic or national definition of social membership. The word Netizen reflects the new nongeographically based social membership. So I contracted the phrase net.citizen to Netizen.

Two general uses of the term Netizen have developed. The first is a broad usage to refer to anyone who uses the Net, for whatever purpose. Thus, the term netizen has been prefixed in some uses with the adjectives good or bad. The second usage is closer to my understanding. This definition is used to describe people who care about Usenet and the bigger Net and work toward building the cooperative and collective nature which benefits the larger world. These are people who work toward developing the Net. In this second case, Netizen represents positive activity, and no adjective need be used. Both uses have spread from the online community, appearing in newspapers, magazines, television, books and other off-line media. As more and more people join the online community and contribute toward the nurturing of the Net and toward the development of a great shared social wealth, the ideas and values of Netizenship spread. But with the increasing commercialization and privatization of the Net, Netizenship is being challenged. During such a period it is valuable to look back at the pioneering vision and actions that have helped make the Net possible and examine what lessons they provide. That is what we have tried to do in these chapters.

Michael Hauben
New York
November 1995

Introduction
On the Development and Significance of the Participatory Global Computer Networks

A new millennium is approaching. To welcome this transition to a new era, computers and people around the world are interconnecting and interacting in a manner that is unprecedented. There are modest estimates that as many as 25 million people and a million computers are being connected via the Net. And the number is growing every day. Yet very few people know how the Net has evolved, and only a few have a perspective as to what its future direction should be.

This is a book about the creation and development of this participatory global computer network. It is about the history of the Net and the impact it is having on the lives of people today. The goal of this book is to provide needed perspective to make it possible to understand what impact the Net can have on the present and on the future of our society.

The following questions have been helpful to this research:

1) What is the vision that inspired or guided people at each step?

2) What was the social or technical problem or need that they were trying to solve?

3) What can be done to help to nourish the further extension and development of the Net and the social advance that the Net represents?

4) How can the Net be made available to a broader set of people?

One of the pioneers recently described how those who were involved in the early days of networking did not understand what particular changes their work would lead to, but they did understand that what they were doing would fundamentally change the world. He described how he realized that once two people across the continent could communicate via this new technology, then it would be possible for people around the world to communicate.

For those who are just becoming acquainted with Usenet and the Internet, beginning with Part I will provide an introduction to the on-line world and to some of the advantages of this new world. A glossary will be provided with brief definitions of technical terms and acronyms for those new to the Net. Readers already familiar with the Net may want to start with Part II, "The Past." All readers should find Part III, "The Future" and Part IV, "Contributions Toward a Theoretical Framework" useful. Also, though, readers can choose to begin with any particular section or article that is of interest, since these have been written to be read independently. These articles are intended as a contribution toward documenting the significance and nature of this eighth wonder of the world and the global communication it makes possible.

Today people around the world are communicating via these new technologies, and this communication is having a profound impact on people's lives. Knowing the details of how this participatory global computer network has been built will make it possible to build on the achievement that it represents. Knowing where these developments have come from can help to judge what is the next step forward. The creation of time-sharing and of packet switching and of the Global Computer Network they have made possible are providing a powerful thrust forward for those who understand and are able to implement these new communication technologies.

Ronda Hauben

Part I - The Present:
What Has Been Created and How?

Chapter 1
The Net and Netizens:
The Impact the Net has on People's Lives

by Michael Hauben

Preface

Welcome to the 21st Century. You are a Netizen (a Net Citizen), and you exist as a citizen of the world thanks to the global connectivity that the Net makes possible. You consider everyone as your compatriot. You physically live in one country but you are in contact with much of the world via the global computer network. Virtually you live next door to every other single Netizen in the world. Geographical separation is replaced by existence in the same virtual space.

The situation I describe is only a prediction of the future, but a large part of the necessary infrastructure currently exists. The Net – or the Internet, BITNET, FIDOnet, other physical networks, Usenet, VMSnet, and other logical networks and so on – has rapidly grown to cover all of the developed countries in the world.[1] Every day more computers attach to the existing networks and every new computer adds to the user base at least twenty seven-million people are interconnected today.

We are seeing a revitalization of society. The frameworks are being redesigned from the bottom up. A new more democratic world is becoming possible. As one user observed, the Net has "immeasurably increased the quality of…life." The Net seems to open a new lease on life for people. Social connections which never before were possible, or relatively hard to achieve, are now facilitated by the Net. Geography and time are no longer boundaries. Social limitations and conventions no longer prevent potential friendships or partnerships. In this manner Netizens are meeting other Netizens from far away and close by that they might never have met without the Net.

A new world of connections between people – either privately from individual to individual or publicly from individuals to the collective mass of many on the Net is possible. The old model of distribution of information from the central Network Broadcasting Company is being questioned and challenged. The top-down model of information being distributed by a few for mass-consumption is no longer the only news. Netnews brings the power of the reporter to the Netizen. People now have the ability to broadcast their observations or questions around the world and have other people respond. The computer networks form a new grassroots connection that allows the excluded sections of society to have a voice. This new medium is unprecedented. Previous grassroots media have existed for much smaller-sized selections of people. The model of the Net proves the old way does not have to be the only way of networking. The Net extends the idea of networking – of making connections with strangers that prove to be advantageous to one or both parties.

The complete connection of the body of citizens of the world that the Net makes possible does not yet exist, and it will be a struggle to make access to the Net open and available to all. However, in the future we might be seeing the possible expansion of what it means to be a social

animal. Practically every single individual on the Net today is available to every other person on the Net. International connection coexists on the same level with local connection. Also the computer networks allow a more advanced connection between the people who are communicating. With computer-communication systems, information or thoughts are connected to people's names and electronic-mail addresses. On the Net, one can connect to others who have similar interests or whose thought processes they enjoy.

Netizens make it a point to be helpful and friendly – if they feel it to be worthwhile. Many Netizens feel they have an obligation to be helpful and answer queries and followup on discussions to put their opinion into the pot of opinions. Over a period of time the voluntary contributions to the Net have built it into a useful connection to other people around the world. When I posted the question, "Is the Net a Source of Social/Economic Wealth?" many people responded. Several corrected my calling the net a source of accurate information. They pointed out that it was also a source of opinions. However, the reader can train himself to figure out the accurate information from the breadth of opinions. Presented here is an example of the broadness of views and opinion which I was able to gather from my research on the Net. The Net can be a helpful medium to understand the world. Only by seeing all points of view can anyone attempt to figure out his or her position on a topic.

Net society differs from off-line society by welcoming intellectual activity. People are encouraged to have things on their mind and to present those ideas to the Net. People are allowed to be intellectually interesting and interested. This intellectual activity forms a major part of the on-line information that is carried by the various computer networks. Netizens can interact with other people to help add to or alter that information. Brainstorming between varieties of people produces robust thinking. Information is no longer a fixed commodity or resource on the Nets. It is constantly being added to and improved collectively. The Net is a grand intellectual and social commune in the spirit of the collective nature present at the origins of human society. Netizens working together continually expand the store of information worldwide. One person called the Net an untapped resource because it provides an alternative to the normal channels and ways of doing things. The Net allows for the meeting of minds to form and develop ideas. It brings people's thinking processes out of isolation and into the open. Every user of the Net gains the role of being special and useful. The fact that every user has his or her own opinions and interests add to the general body of specialized knowledge on the Net. Each Netizen thus becomes a special resource valuable to the Net. Each user contributes to the whole intellectual and social value and possibilities of the Net.

Introduction

The world of the Netizen was envisioned more than twenty-five years ago by J. C. R. Licklider. Licklider brought to his leadership of the Department of Defense's ARPA Information Processing Techniques Office (IPTO) a vision of "the intergalactic computer network." Whenever he would speak from ARPA, he would mention this vision. J. C. R. Licklider was a prophet of the Net. In the paper, "The Computer as a Communication Device," which Licklider wrote with Robert Taylor, they established several principles from their observations of how the computer would play a helpful role in human communication.[2] They clarified their definition of communication as a creative process differentiating between communication and the sending and receiving of information. When two tape recorders send or receive information to each other that is not

communication. They wrote: "We believe that communicators have to do something nontrivial with the information they send and receive. And to interact with the richness of living information – not merely in the passive way that we have become accustomed to using books and libraries, but as active participants in an ongoing process, bringing something to it through our interaction with it, and not simply receiving from it by our connection to it. We want to emphasize something beyond its one-way transfer: the increasing significance of the jointly constructive, the mutually reinforcing aspect of communication – the part that transcends 'now we both know a fact that only one of us knew before.' When minds interact, new ideas emerge. We want to talk about the creative aspect of communication."[3]

Licklider and Taylor defined four principles for computers to make a contribution toward human communication. They are:
1. Communication is defined as an interactive creative process.
2. Response times need to be short to make the "conversation" free and easy.
3. Larger networks would form out of smaller regional networks.
4. Communities would form out of affinity and common interests.

Licklider and Taylor's understandings from their 1968 paper have stood the test of time, and do represent the Net today. In a later paper Licklider co-wrote with Albert Vezza, "Applications of Information Networks"[4], they explore the possible business applications of information networks. Licklider and Vezza's survey of business applications in 1978 come short of the possibilities Licklider and Taylor outlined in their 1968 paper, and represent but a tiny fraction of the resources the Net currently embodies.

In the 1968 paper, Licklider and Taylor focused on the Net being comprised of a network of networks. While other researchers of the time focused on the sharing of computing resources, Licklider and Taylor kept an open mind and wrote: "The collection of people, hardware, and software – the multiaccess computer together with its local community of users – will become a node in a geographically distributed computer network. Let us assume for a moment that such a network has been formed. Through the network of message processors, therefore, all the large computers can communicate with one another. And through them, all the members of the super community can communicate – with other people, with programs, with data, or with a selected combinations of those resources."[5]

Their concept of the sharing of both computing and human resources together matches the modern Net. The networking of various human connections quickly forms, changes its goals, disbands and reforms into new collaborations. The fluidity of such group dynamics leads to a quickening of the creation of new ideas. Groups can form to discuss an idea, focus in or broaden out and reform to fit the new ideas that have been worked out.

Netnews, IRC, mailing lists and mud/mush/moo/m** (various of the available discussion tools on the Net) are extremely dynamic. Most can be formed immediately for either short or long term use. As interests or events form, discussion groups can be created. (e.g., The mailing list 9NOV89-L about Germany after the fall of the Berlin Wall in November 1989, and about German unification.)

The virtual space created on noncommercial computer networks is accessible universally. The content on commercial networks, like Compuserve or America On-Line, is only accessible by those who pay to belong to that particular network. The space on noncommercial networks is

accessible from the connections that exist, whereas social networks in the physical world generally are connected by limited gateways. So the capability of networking on computer nets overcomes limitations inherent in noncomputer social networks. This is important because it reduces the problems of population growth. Population growth need not mean limited resources any more – rather that very growth of population now means an improvement of resources. Thus growth of population can be seen as a positive asset. This is a new way of looking at people in our society. Every new person can mean a new set of perspectives and specialties to add to the wealth of knowledge of the world. This new view of people could help improve the view of the future. The old model looks down on population growth and people as a strain on the environment rather than the increase of intellectual contribution these individuals can make. However, access to the Net needs to be universal for the Net to fully utilize the contribution each person can represent. As long as access is limited – the Net and those on the Net, lose the full advantages the Net can offer. Lastly the people on the Net need to be active in order to bring about the best possible use of the Net.

Licklider foresaw that the Net allows for people of common interests, who are otherwise strangers, to communicate. Much of the magic of the Net is the ability to make a contribution of your ideas, and then be connected to utter strangers. He saw that people would connect to others via this Net in ways that had been much harder in the past. Licklider observed as the ARPANET spanned two continents. This physical connection allowed for wider social collaborations to form. This was the beginning of computer data networks facilitating connections of people around the world.

My research on and about the Net was very exciting for me. When posting inquiries, I usually received the first reply within a couple of hours. The feeling of receiving that very first reply from a total stranger is always exhilarating! That set of first replies from people reminds me of the magic of e-mail. It is nice that there can be reminders of how exciting this new form of communication really is – so that the value of this new use of computers is never forgotten.

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Critical Mass

The Net has grown so much in the since its birth in the 1960's that a critical mass of people and interests has been reached. This collection of individuals adds to the interests and specialties of the whole community. Most people can now gain something from the Net, while at the same time helping it out. There are enough people on-line now that anyone coming on-line will find something of interest. People are meshing intellects and knowledge to form new ideas. Larry Press made this clear by writing, "I now work on the Net at least two hours per day. I've had an account since around 1975 but it has only become super important in the last couple of years because a critical mass of membership was reached. I no longer work in L.A., but in cyberspace."

While the original users of the Net were from exclusively technical and scientific communities, many of them found it a valuable experience to explore the Net for more than just technical reasons. Today, many different kinds of people are connected to the Net. The original users of the Net (then several test-beds of network research) were from only a few parts of the world. Now people of all ages, from most parts of the globe, and of many professions, make up the Net. The original prototype networks (e.g., ARPANET in the USA, the network of the National Physical Laboratory in the United Kingdom, CYCLADES in France and other networks around the world) developed the necessary physical infrastructure for a fertile social network to develop. Einar

Stefferud wrote of this social connection in an article, "The ARPANET has produced several monumental results. First, it provided the physical and electrical communications backbone for development of the latent social infrastructure we now call 'THE INTERNET COMMUNITY.'"[6]

Many different kinds of people comprise the Net. The university community sponsors access for a broad range of people (i.e., students, professors, staff, professor emeritus, etc.). Many businesses are also connected. A "K-12 Net" exists which invites younger people to be a part of the online community. Special bulletin board software exists to connect personal computer users to the Net. Various Unix bulletin board systems exist to connect other users. It is virtually impossible to tell what kinds of people connect to public bulletin board systems, as only a computer (or terminal) and modem are the prerequisites to connect. Many if not all Fidonet BBS's (a very common BBS type) have at least e-mail and many also participate through a gateway to Netnews. Prototype community network systems are forming around the world (e.g., Cleveland Free-Net, Wellington Citynet, Santa Monica Public Electronic Network (PEN), Berkeley Community Memory Project, Hawaii FYI, National Capitol Free-Net and others in Canada, etc.). Access via these community systems can be as easy as visiting the community library and membership is open to all who live in the community.

In addition to the living body of resources this diversity of Netizens represents, there is also a continual growing body of digitized data that forms another body of resources. Whether it is Netizens digitizing great literature of the past (e.g., the Gutenberg Project, Project Bartleby), or it is people gathering otherwise obscure or nonmainstream material (e.g., various religions, unusual hobbies, gay lifestyle, fringe.), or if it is Netizens contributing new and original material, the Net follows in the great tradition of other public institutions, such as the public library or the principle behind public education. The Net shares with these institutions that they serve the general populace. This data is just part of the treasure. Often living Netizens provide pointers to this digitized store of publicly available information. Many of the network access tools have been created with the principle of being available to everyone. The best example is the method of connecting to file repositories via FTP (file transfer protocol) by logging in as an "anonymous" user. Most, if not all, World Wide Web Sites, Wide Area Information Systems (WAIS), and gopher sites are open for all users of the Net. It is true that the Net Community is smaller than it will be, but the Net has reached a point of general usefulness no matter who you are.

All of this evidence is exactly why it is a problem for the Net to come under the control of commercial entities. Once commercial interests gain control, the Net will be much less powerful for the ordinary person than it is currently. Commercial interests vary from those of the common person. They attempt to make profit from any available means. Compuserve is an example of one current commercial network. A user of Compuserve pays for access by the hour. If this scenario would be extended to the Net of which I speak, the Netiquette of being helpful would have a price tag attached to it. If people had to pay by the minute during the Net's development, very few would have been able to afford the network time needed to be helpful to others.

The Net has only developed because of the hard work and voluntary dedication of many people. It has grown because the Net is in the control and power of the people at the grassroots level, and because these people developed it. People's posts and contributions to the Net have been the developing forces.

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Grassroots

The Net brings people together. People put into connection with other people can be powerful. There is power in numbers. The Net allows an individual to realize his power. The Net, uncontrolled by commercial entities, becomes the gathering, discussion and planning center for many people.

The combined efforts of people interested in communication has led to the development and expansion of the global communications system. What's on the Net? Well – Usenet, Free-Net, e-mail, library catalogs, ftp sites, free software, electronic newsletters and journals, Multi-User Domain/Dungeon (mud)/mush/moo, Internet Relay Chat (IRC), the multimedia world wide web (WWW) and many kinds of data banks. Different servers, like WWW, WAIS, and gophers attempt to order and make utilizing the vast varieties and widespread information easier. There exist both public and private services and sources of information. The public and free services often come about through the voluntary efforts of one or a few people. These technologies allow a person to help make the world a better place by making his or her unique contribution available to the rest of the world. People who have been overlooked or have felt unable to contribute to the world, now can. Also, these networks allow much more open and public interaction over a much larger body of people than available before. The common people have a unique voice which is now being aired in a new way.

The emphasis is that this new machine introduces every single person as someone special and in possession of a useful resource.

Netizen Comments on Grassroots:

"Simple by access to a vast amount of information and an enormous number of brains!" Brian May

"For a geographically sparse group as it is, MU* allows people to get to know one another, the relevant newsgroup gives a sense that there's a community out there and things are happening, and an associated ftp site allows art and writing to be distributed." Simon Raboczi

"In summary, nets have helped enormously in the dissemination of information from people knowledgeable in certain areas which would be difficult to obtain otherwise." Brent Edwards

"I get to communicate rapidly and cheaply with zillions of people around the world." Rosemary Warren

The following examples help to show how this is possible. People are normally unprotected from the profit desires of large companies. Steven Alexander from California was using the Net to try to prevent over charging at gas stations. This is an example of the power of connecting people to uphold what is fair and in the best interest of the common person in this society.

From: Steven Alexander
"I have started compiling and distributing (on the newsgroup ca.driving) a list of gas prices at particular stations in California to which many people will contribute and keep up to date, and which, I hope, will allow consumers to counteract what many of us suspect is the collusive (or in any case, price-gouging) behavior of the oil companies."

A user from Germany also reported using the Net to muckrake. He writes: "A company said they were a [nonprofit organization]. Someone looked them up in the [nonprofit] Register, and they did not exist there. Someone else said that he had contact with the person who sent the letter, only under another company-name, and that he simply ignored this person since he looked like a swindler. So they are swindlers, and people from the Net proved it to us, we then of course did not engage with them at all."

The Net has proven its importance in other contemporary critical situations. As the only available line of communications with the rest of the world, the Net helped defeat the attempted coup in the ex-Soviet Union in 1990. The members of the coup either did not know about or understand the role the Russian RELCOM network could play or the connections proved resilient enough for information about the coup to be communicated inside and out of the country in time to inform the world and encourage resistance to the coup.[7]

The Net has also proven its value by providing an important medium for students. Students participating in the Chinese Pro-Democracy movement have kept in touch with others around the world via their fragile connection to the Net. The Net provided an easy way of evading government censors to get news around the world about events in China and to receive back encouraging feedback. Such feedback is vital support to keep the fight on when it seems impossible or wrong to do so. In a similar way, students in France used the French Minitel system to organize a successful fight against plans by the French government to restrict admission to government subsidized universities.

The information flow on the Net is controlled by those who use the Net. People actively provide the information that they personally and other people want. There is a much more active form of participation than what is provided for by other forms of mass media. Television, radio, magazines are all driven by those who own and determine who will write for them. The Net gives people a media they can control. This control of information is a great power that has not been available before to the common everyday person. For example, Declan McCreesh describes how this makes possible access to the most up to date information.

From: Declan McCreesh
"You get the most up to date info. that people around the world can get their hands on, which is great. For instance, the media report who wins a Grand Prix, what happened and not a great deal more. On the net, however, you can get top speeds, latest car and technology developments, latest rumors, major debates as to whether Formula 1 or Indy cars are better etc."

The Net helps to make the information available more accurate because of the many-to-many or broadcast and read and write capability. That new capability, which is not normally very prevalent in our society, allows an actual participant or observer to report something. This capability gives the power of journalism or the reporter to the individual. This new medium allows the source to report. This is true because the medium allows everyone on-line to make a contribution. The old media instead controls who reports and what they say. The possibility of eyewitness accounts via the net can make the information more accurate. Also, this opens up the possibility for a grassroots network. Information is passed from person to person around the world. Thus German citizens could learn about the Chernobyl explosion from the Net before the government decided to release the information to the public via the media. The connection is people to people rather than governments

to governments. Citizen Journalists can now distribute to more than those they know personally. The distribution of the writings of ordinary people is the second step after the advent of the inexpensive personal computer in the early 1980s. The personal computer and printer allowed anyone to produce mass quantities of documents. Personal publishing is now joined by wide personal distribution.

Not only is there grassroots reporting, but the assumption that filtering is necessary has been challenged. People can learn to sort through the various opinions themselves. Steve Welch disagreed that the Net is a source of more accurate information, but agreed that people develop discriminatory reading skills.

From: Steve Welch:
"When you get more information from diverse sources, you don't always get more accurate information. However, you do develop skills in discerning accurate information. Or rather, you do if you want to come out of the infoglut jungle alive."

Governments that rule based on control of information will succumb eventually to the tides of democracy. As Dr. Sun Yat-Sen of the Chinese Democracy Movement once said, "The worldwide democratic trend is mighty. Those who submit to it will prosper and those who resist it will perish." The Net reintroduces the basic idea of democracy as the grassroots people power of Netizens. Governments can no longer easily keep information from their people.

Many groups which do not have an established form of communications available to them have found the Net to be a powerful tool. For example, for people far away from their homeland, the Net provides a new link.

From: Godfrey Nolan
"The Net has immeasurably increased the quality of my life. I am Irish, but I have been living in England for the past five years. It is a lot more difficult to get information about Ireland than you would expect. However a man called Liam Ferrie who works in Digital in Galway, compiles a newspaper on the weeks events in Ireland and so I can now easily keep abreast of most developments in Irish current affairs, which helps me feel like I'm not losing touch when I go home about twice a year. It is also transmitted to about 2000 Irish people all over the first and third worlds."

From: Madhur K. Limdi
"I read your above posting and wanted to share my experience with you. I have been a frequent reader of news in Usenet groups, such as soc.culture.indian, misc.news.southasia. Both of these keep me reasonably informed about the happenings in my home country India."

Also, in the United States, the Net has provide stable communications for people of various religious and sexual persuasions. Many other communities have also found the Net to be a excellent medium to help increase communications:

From: Gregory G. Woodbury
"We will be going to a march on Washington and are coordinating our plans and travel with a large number of other folks around the country via e-mail and conversations on Usenet."

From: Jann VanOver

"I'm a member of a Buddhist organization and just found a man in Berkeley who keeps a Mailing List that sends daily guidance and discussions for this group. So I get a little religious boost when I log on each day."

From: Carole E. Mah
"For me and for many of my friends, the Net is our main form of communication. Almost every aspect of interpersonal communication on the network has a gay/lesbian/bi aspect to it that forms a tight and intimate acquaintanceship which sometimes even boils over into arguments and enmities. This network of connections, friends, enemies, lovers, etc. facilitates political goals that would not otherwise be possible (organizing letter-writing campaigns about the Gays in the Military Ban via the ACT-UP list, being able to send e-mail directly to the White House, finding out about activism, bashing, etc. in other states and around the world, etc.)."

From: Robert Dean
"As a member of the science fiction community, I've met quite a few people on the net, and then in person."

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Communication with New People

In many Netizens' lives the Net has alleviated feelings of loneliness, which seem common in today's society. The Net's ability to help people network both socially and intellectually makes the Net valuable and irreplaceable in people's lives. This is forming a group of people who want to keep the Net accessible and open to all.

The Net brings together people from diverse walks of life, and makes it easier for these people to communicate. It brings them all together into the same virtual space and removes the impact or influence of first impressions.

Malcolm Humes writes, "I'm in awe of the power and energy linking thousands into a virtual intellectual coffeehouse, where strangers can connect without the formalities of face to face rituals (hello, how are you today) to allow a direct-connect style of communication that seems to transcend the 'how's the weather' kind of conversation to just let us connect without the bullshit."

Strangers are no longer strange on the Net. People are free to communicate without limits, fears or apprehension. It used to be that there was a rather generous atmosphere that thrived on the Net and that welcomed new users. People were happy to help others, often as a return for the help they had received. Things have changed, and the general welcome to a newcomer is not as universally friendly, but there are many on-line who still try and help new people. Others are nasty, but the goodwill still overpowers the unfriendly comments.

From: Jean-Francois Messier
"My use of the Net is to get in touch with more people around the world. I don't know for what, when, how, but that's important for me. Not that I'm in a small town, far from everybody, but that I want to be able to establish links with others. In fact, because of those nets I use, I would !NOT! want to go to a small town, just because the phone calls would be too expensive. I've to say that I'm not an expressive person. I'm not a great talker, nor somebody who could make shows. I'm

more an 'introvert'."

Yet Jean-Francois wrote me. This is just one example of the social power of the Net. Another Netizen comments on how the Net helped her befriend strangers.

From: Laura Goodin

"Last summer I was traveling to Denver and I used a listserv mailing list to find out whether a particular running group I run with had a branch there. They did, and I had a wonderful time meeting people with a common interest (and drinking beer with them); I was no longer a stranger."

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Broadened and Worldly Prospective:

Easy connection to people and ideas from around the world has a powerful effect. Awareness that we are members of the human species which spans the entire globe changes a person's point of view. It is a broadening perspective. It is very easy for people to assume a limited point of view if they are only exposed to certain ideas. The Net brings the isolated individual into contact with other people, experiences, and views from the rest of the world. Exposure to many opinions gives the reader a chance to actually consider multiple views before settling on a specific opinion. Having access to the "Marketplace of Ideas" allows a person to make a reasoned judgment.

For example, from Jean-Francois Messier "My attitudes to other peoples, races and religions changed, since I had more chances to talk with other peoples around the world. When first exchanging mail with people from Yellowknife, Yukon, I had a real strange feeling: Getting messages and chatting with people that far from me. I noticed around me that a lot of people have opinions and positions about politics that are for themselves, without knowing others." He continues: "Because I have a much broader view of the world now, I changed and am more conciliatory and peaceful with other people. Writing to someone you never saw, changes the way you write, also, the instancy of the transmission makes the conversation much more 'live' than waiting for the damn slow paper mail. Telecommunications opened the world to me and changed my visions of people and countries."

From: Anthony Berno

"I could not begin to tell you how different my life would be without the Net. My life would be short about a dozen people, some of them central, I would be wallowing in ignorance on several significant subjects, and my mind would be lacking many broadening and enlightening influences."

From: Henry Choy

" More things to look at. Increased perspective on life. The computer network brings people closer together, and permits them to speak at will to a large audience. I recommend that the telecommunications and computer industry make large scale computer networking accessible to the general public. It's like making places accessible to the handicapped. People brought closer together will release some existing social tensions. People need to be heard, and they need to hear."

From: Paul Ready

"You don't have to go to another country to meet people from there. It is not the same as

personally knowing them, but I always pay special attention to information from people outside the States. They are likely to have a different perspective on things."

From: Leandra Dean
"I love to study people, and the Net has been the best possible resource to this end. The Net is truly a window to the world, and without it we could only hope to physically meet virtually thousands of people every day to gain the same insights. I shudder to think about how different and closed in my life would be without the Net."

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Material Changes to People's Lives and Lifestyles.

The time spent on-line can affect the rest of a person's life. The connections, interfaces or collaborations between times on and off line form an interesting area of study. Netizens attest to the power of the Net by explaining the effect the Net has had on their lives. Because of the information available and the new connections possible, people have changed the way they live their lives. There are examples of both changes in the material possessions and changes in lifestyle. The changes in lifestyle are probably the more profound changes, but the new connections made possible are important. Often the material gains are not financial. Rather worthwhile goods can be redistributed from those to whom the goods might have lost personal value to those who would value the goods.

Netizen Comments on Material Changes:
From: William Carroll
"Primarily because of the information and support from rec.bikes, three years ago I gave up driving to work and started riding my bike. It's one of the best decisions I've ever made."
A Response I received via e-Mail: "When I started using ForumNet (a chat program similar to irc, but smaller – [Now called icb]) back in January 1990, I was fairly shy and insecure. I had a few close friends but was slow at making new ones. Within a few weeks, on ForumNet, I found myself able to be open, articulate, and well-liked in this virtual environment. Soon, this discovery began to affect my behavior in "real" face-to-face interaction. I met some of my computer friends in person and they made me feel so good about myself, like I really could be myself and converse and be liked and wanted."
"Of course, computer-mediated social interaction is not properly a crutch to substitute for face-to-face encounters, but the ability to converse via keyboard and modem with real people at the other end of the line has translated into the real-life ability for me to reach out to people without the mediating use of a computer. My life has improved. I wouldn't trade my experience with the Net for anything."

From: Jack Frisch
"I must begin my comments on the Internet with one simple yet significant statement: the availability and use of the Internet is changing my life profoundly."

From: Carole E. Mah
"I also used to facilitate a vegetarian list, which radically altered many people's lives,

offering them access to mail-order foods, recipes, and friendship via net-contact with people who live in areas where nonmeat alternatives are readily available."

From: Jann VanOver

"Well, the first thing I thought of is purchases I've made through the Net which have "changed my life" I drove my Subaru Station wagon until last fall when I acquired a VW Camper van that I saw on a local Net ad. I wasn't looking for a van, wasn't even shopping for another vehicle, but the second time this ad scrolled by me, I looked into it and eventually bought it. I will certainly say that driving a 23-year-old VW camper van has changed my life! I thought I would be ridiculed, but have found that people have a lot of respect and admiration for this car!" Jann goes on to write "Through the Net, I heard that Roger Waters was going to perform "The Wall" again, an event I had promised myself not to miss, so I made a trip to Berlin (East and West) in 1990 to see this concert. This was CERTAINLY a life changing event, seeing Berlin less than one week after the roads were open with no checkpoints required. I don't think I would have known about it soon enough if not for the Net."

From: Robert Dean

"As for me, my main hobby is and was playing war games and role-playing games. Net access has allowed me to discuss these games with players across the world, picking up new ideas, and gathering opinions on new games before spending money on them. In addition, I've been able to buy and sell games via Net connections, allowing me to adjust my collection of games to meet my current interests, and get games that I no longer wanted to people who do want them, whether they live down the road from me in Maryland, or in Canada, Austria, Finland, Germany or Israel. I have also taken an Esperanto course via e-mail, and correspond irregularly in Esperanto with interested parties world wide."

From: Caryn K. Roberts

"Usenet & Internet are available to me at work and by dial-up connection to work from home. I have been materially enriched by the use of the Net. I have managed to sell items I no longer needed. I have been able to purchase items from others for good prices. I have saved money and am doing my part to recycle technology instead of adding burdens to the municipal waste disposal service." Caryn continues: "Using the Net I have also been enriched by discussions and information found in numerous newsgroups from sci.med to sci.skeptic to many of the comp.* groups. I have offered advice to solve problems and have been able to solve problems I had by using information in these forums."

The Net as a Source of Enormous Resources

Before the Net was widely seen as an enormous social network, some were experimenting with the sharing of computing resources. The following are some examples of ways Netizens utilize the information resources available on the Net.

From: Tim North

"I'm faculty here at University and I use the Net as a major source of technical information for my lectures, up-to-date product information, and informed opinion. As such I find that I am constantly better informed than the people around me. (That sounds vain, but it's not meant to be. It's simply meant to emphasize how strongly I feel that the Net is a superb information resource.)"

From: R. J. White
"I used the Net to find parts for my 1971 Opel GT. I was living in North America at the time, and going through the normal channels, like GM, are no good. The Net was like an untapped resource."

From: John Harper
"[My] uses of the network [1] I once asked a question about an obscure point in history of math. on the sci.math newsgroup and got a useful answer from Exeter, UK. Beforehand I had no idea where anyone knowing the answer might be. I had drawn a blank in Oxford. [2] I asked a question about a slightly less obscure point on comp.lang.fortran which generated a long (and helpful) discussion on the Net for a week or two."

From: Paul Ready
"Yes, it is a worldwide rapid distribution center of information, on topics both popular and obscure. It may not make the information more valuable, but it certainly increases the information, and the propagation of information. To those connected, it is a valuable resource. Flame wars aside, a lot of generally inaccessible information is readily available."

From: Lee Rothstein
"Usenet and mailing lists create a group of people who are motivated and capable of talking about a specific topic. The software allows deeply contextual conversations to occur with a minimum of rehash. As experience develops with the medium, each user realizes that the other that he talks to or will talk to generally help him/her, and can do him/her no harm because of the remoteness imposed by the cable."

From: Lu Ann Johnson
"Hi! Usenet came to my rescue I'm a librarian and was working with a group of students on a marketing project. They were marketing a make-believe product a compact disc of "music hits of the 70's." They needed a source to tell them how much it cost to produce a CD without mastering, etc. I exhausted all my print resources so I posted the question in a business newsgroup. Within hours I learned from several companies that it cost about $1.50 to produce a CD :) The students were very grateful to get the information."

From: Laura Goodin
"I teach self-defense, and in rec.martial-art someone posted information about a study on the effectiveness of Mace for self-defense that I had been looking for for years."

From: Cliff Roberts

"I have been using Internet through a program in New Jersey to bring the fields of Science and Math to grammar school children grades K-8. We have implemented a system where the class rooms are equipped with PC's and are able to dial into a UNIX system. There they can send e-mail and post questions to a KidsQuest ID. The ID then routes the questions to volunteers with accounts on UNIX. The scientists then answer or give advice of where to find the information they want. Another well-accepted feature is to list out the soc.penpals list and e-mail people in different countries that are being studied in the schools."

From: Joe Farrenkopf
"I think Usenet is a very interesting thing. For me, it's mostly just a way to pass time when bored. However, I have gotten some very useful things from it. There is one group in particular called comp.lang.fortran, and on several occasions when I've had a problem writing a program, I was able to post to this group to get some help to find out what I was doing wrong. In these cases, it was an invaluable resource."

Collective Work

As new connections are made between people more ideas travel over greater distances. This allows either like-minded people or complementary people to come in touch with each other. The varied resources of the networks allow these same people to keep in touch even if they would not have been able to be in touch before. Electronic mail allows enough detail to be contained in a message that most if not all communications can take place entirely electronically. This medium allows for new forms of collaborative work to form and thrive. New forms of research will probably arise from such possibilities. Here are some examples:

From: Wayne Hathaway
"One 'unusual' use I made of the Net happened in 1977. Along with five other 'Net Folks' I wrote the following paper: 'The ARPANET Telnet Protocol: Its Purpose, Principles, Implementation, and Impact on Host Operating System Design,' with Davidson, Postel, Mimno, Thomas, and Walden: Fifth Data Communications Symposium, Snowbird, UT; September 27-29, 1977. What's so unusual about a collaborative paper, you ask? Simply that the six of us never even made a TELEPHONE call about the paper, much less had a meeting or anything. Literally EVERYTHING – from the first ideas in a 'broadcast' mail to the distribution of the final 'troff-ready' version – was done with e-mail. These days this might not be such a deal, but it was interesting back then."

From: Paul Gillingwater
"...in Vienna was an on-line computer mediated art forum, with video conferencing between two cities, plus an on-line discussion in a virtual MUD-type conference later that evening."
A Response I received via e-mail: "In response to your question about having fun on the net, and being creative, one incident comes to mind. I had met a woman on ForumNet (a system like IRC). She and I talked and talked about all sorts of things. One night, we felt especially artistic. We co-wrote a poem over the computer. I'd type a few words, she'd pick up where I left off (in the middle of sentences or wherever) and on and on. I don't think we had any idea what it was going to be in

the end, thematically or structurally. In the end, we had a very good poem, one that I would try to publish if I knew her whereabouts anymore "

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Improving Quality of Everyday Life

Information flow can take various shapes. The strangest and perhaps most interesting one is how emotion can be attached to information flow. They often seem like two very different things. I received a large number of responses that reported real-life marriages arising from Net meetings. The Net facilitates the meeting of people of like interests. The newness of the Net means we cannot fully understand it as of yet. However, it is worth noting that people have also broken up on-line. So while it is a new social medium, a range of dynamics will exist.

From: Caryn K. Roberts
"I have found friends on the Net. A lover. And two of the friends I met, also met online and got married. I attended the wedding (in California)."

From: Scott Kitchen
"I think I can add something for your paper. I met my fiancee four years ago over the net. I was at Ohio State, and she was in Princeton, and we started talking about an article of hers I'd read in rec.games.frp. We got to talking, eventually met, found we liked each other, and the rest is history. We were married 31 December 1994."

From: Gregory G. Woodbury
"I met the woman who became my wife when I started talking to the folks at "phs" (the third site of the original Usenet) during the development of Netnews. I would not have been wandering around that area if I hadn't been interested in the development of the net."

From: Laura Goodin
"And now, the BEST story: about eight months ago I was browsing soc.culture.australia and I noticed a message from an Australian composer studying in the US about an alternative tune to "Waltzing Matilda." I was curious, so I responded in e-mail, requesting the tune and just sort of shooting the breeze. We began an e-mail correspondence that soon incorporated voice calls as well. One thing led inexorably to another and we fell in love (before we met face to face, actually). We did eventually meet face to face. Last month he proposed over the Internet (in soc.culture.australia) and I accepted. Congratulatory messages came in from all over the United States, Australia, and New Zealand. Houston (that's his name) and I keep our phone bills from resembling the national debt by sending 10 or 12 e-mails a day (we're well over 1400 for eight months now), and chatting using IRC. A long-distance relationship is hellish, but the pain is eased somewhat by the Internet."

From: Chuq Von Rospach
"(oh, and in the "how the Net made my nonnet life better" category, I met my wife via the net. Does that count?)"

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Work

The fluid connections and the rapidly changing nature of the networks make the Net a welcome media for those who are job hunting and for those who have jobs to offer. The networks have a large turnover of people who are looking for jobs. The placement of job announcements is easy and can be kept available for as long as the job is offered. E-mail allows for the quick and easy applications by sending resumes in the e-mail. Companies can respond quickly and easy to such submissions, also by e-mail. Besides finding work, the Net helps people who are currently working perform their job in the best manner. Many people utilize the Net to assist them with their jobs. Several examples of both follow:

From: Laura Goodin

" My division successfully recruited a highly-qualified consultant (a Finn living in Tasmania) to do some work for us; the initial announcement was over Usenet; subsequent negotiations were through e-mail."

From: jj

"I've hired people off the net, and from meeting them in muds, when I find somebody who can THINK. People who can think are hard to find anywhere."

From: Diana Gregory

"I have learned to use UNIX, and as a result may be able to keep/advance in my job due to the 'net." From: Neil Galarneau "It helps me do my job (MS Windows programming) and it helps me learn new things (like C++)."

From: Kieran Clulow

"The Internet access provided me by the university has greatly facilitated my ability to both use and program computers and this has had the direct result of improving my grades as well as gaining me a good job in the computer field. Long live the Internet (and make it possible for private citizens to get access!)"

From: Mark Gooley

"I got my job by answering a posting to a newsgroup."

From: Anthony Berno

"I develop for NEXTSTEP, and the Net is very useful in getting useful programming hints, info on product releases, rumors, etcetera."

From: Gregory G. Woodbury

"Due to contacts made via Usenet and e-mail, I got a job as a consultant at BTL in 1981 after I lost my job at Duke. Part of the qualifications that got me in the door was experience with Usenet."

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Improved Communications with Friends

Another way of improving daily life is by making communications with friends easier. The ease of sending e-mail is bringing back letter writing. However, the immediacy of e-mail means less care can be made in the process of writing. E-mail, IRC and Netnews make it much easier to keep in touch with friends outside one's local area.

Netizen Comments on Improved Communications:
From: Bill Walker
"I also have an old and dear friend (from high school) who lives in the San Francisco area. After I moved to San Diego, we didn't do very well at keeping in touch. She and I talked on the phone a couple of times a year. After we discovered we were both on the net, we started corresponding via e-mail, and we now exchange mail several times a week. So, the Net has allowed me to keep in much closer touch with a good friend. It's nothing that couldn't be done by phone, or snail mail, but somehow we never got around to doing those things. E-mail is quick, easy and fun enough that we don't put it off."

From: Anthony Berno
"Incidentally, it is also one of my primary modes of communication with my sister (who lives in N.Z.) It's more meditative than a phone call, faster than a letter, and cheaper than either of them."

From: Carole E. Mah
"It also facilitates great friendships. Most of my friends, even in my own town, I met on the network. This can often alleviate feelings of loneliness and "I'm the only one, I must be a pervert" feelings among queer people just coming out of the closet. They have a whole world of like-minded people to turn to on Usenet, on Bitnet lists, on IRC, in personal e-mail, on BBSs and AOL type conferences, etc."

From: Jann VanOver
"Apart from purchases, I have been contacted by:
1.a very good friend from college who I'd lost track of. She got married to a man she met in a singles newsgroup (they've been married two years+)
2.someone who went to my high school, knew a lot of the same people I did, but we didn't know each other. We are now 'mail buddies'
3. an old girlfriend of my brothers. They went out for eight years, but I learned more about her from ONE e-mail letter than I had ever learned when meeting her in person."

From: Godfrey Nolan
"Above all it helps me keep in touch with friends who I would inevitably lose otherwise. The Net helps those that move around for economic reasons to lessen the worst aspects of leaving your friends in the series of places that you once called home. It's the best thing since sliced bread."

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Problems

With all of the positive uses and advantages of the Net, it is still not perfect. The blind-view

of people on the Net seems to shield everyone, but women. There is a relatively large male to female percentage population on the Net. Women on-line can feel the effects of this difference. Women who have easily identifiable user names or IDs are prone to be the center of much attention. While that might be good in itself, much of that attention can be of a hostile or negative nature. This attention might be detrimental to women being active on the Net. Net harassment can spread against other users too. People with unpopular ideas need to be strong to withstand the outlash of abuse they might receive from others.

The worst nonpeople problem seems to be information overflow. Information adds up very quickly and it can be hard to organize it all and sort through. This problem should be solvable as technology is now being developed to handle it.

From: Scott Hatton

"There is a problem with this brave new world in that a lot of people don't appreciate there's another human being at the other keyboard. Flaming is a real problem – especially in comp.misc. This is all a new facet of the technology as well. People rarely trade insults in real life like they do on Internet. There's a tendency to stereotype your opponent into categories. I think this is because you're not around to witness the results. I find this more on Internet newsgroups than on CompuServe. I think this is down to maturity – a lot of folk on the Internet are students who aren't paying for their time on the system. Those on CompuServe are normally slightly older, not so hot-headed and are paying for their time. Damn. Now I'm at stereotyping now. It just goes to show "

From: Joe Farrenkopf

"There is something else I've discovered that is really rather fascinating. People can be incredibly rude when communicating through this medium. For example, some time ago, I posted a question to lots of different newsgroups, and many people felt my question was inappropriate to their particular group. They wrote to me and told me so, using amazingly nasty words. I guess it's easier to be rude if you don't have to face a person, but can say whatever you want over a computer."
From: Brad Kepley "I get a little irritated with people always claiming someone else is 'wasting bandwidth' because they disagree with them. About half the time it turns out that the person being told to shut up was right after all. Then again, when you look at things like alt.binaries.pictures.erotica and other 'non-bandwidth-wasting' activities, it seems almost comical to me when someone says this. There is nothing more wasteful than 95% of what Usenet is used for. It's a joke to say that a particular person is 'wasting' it. To say that they are off-topic makes more sense. I guess this is just a gripe rather than what you are looking for. Wasting bandwidth again. :)"

Conclusion

For the people of the world, the Net provides a powerful means for peaceful assembly. Peaceful assembly allows for people to take control over their lives, rather than that control being in the hands of others. This power deserves to be appreciated and protected. Any medium or tool that helps people to hold or gain power is something that is special and has to be protected.

The Net has made a valuable impact on human society. As my research has demonstrated, people's lives have been substantially improved via their connection to the Net. This sets the basis

for providing access to all in society. Using similar reasoning, J. C. R. Licklider and Robert Taylor believed that access to the then growing information network should be made ubiquitous. They felt that the Net's value would depend on high connectivity. In their article, "The Computer as a Communication Device," they argued that the impact upon society depends on how available the network is to the society as a whole.[8]

Society will improve if Net access is made available to people as a whole. Only if access is universal will the Net itself advance. The ubiquitous connection is necessary for the Net to encompass all possible resources. One Net visionary responded to my research by calling for universal access. Steve Welch writes: "If we can get to the point where anyone who gets out of high school alive has used computers to communicate on the Net or a reasonable facsimile or successor to it, then we as a society will benefit in ways not currently understandable. When access to information is as ubiquitous as access to the phone system, all Hell will break loose. Bet on it." Steve is right, "all Hell will break loose" in the most positive of ways imaginable. The philosopher's Thomas Paine, Jean Jacques Rousseau, and all other fighters for democracy would have been proud.

Similar to past communications advances such as the printing press, mail, and the telephone, the Global Computer Communications Network has already fundamentally changed our lives. Licklider predicted that the Net would fundamentally change the way people live and work. It is important to try to understand this impact, so as to help further this advance.

Notes for Chapter 1

1. See the *Internet Society News*, vol. 2 no. 1, Spring 1993, inside back cover for map.

2. J. C. R. Licklider and Robert W. Taylor, "The Computer as a Communication Device," reprinted in "In Memoriam: J. C. R. Licklider 1915-1990," Digital Research Center, August 7, 1990; originally published in *Science and Technology*, April, 1968.

3. Ibid., p. 32.

4. *Proceedings of IEEE*, vol. 66 no. 11, November, 1978.

5. J. C. R. Licklider and Robert W. Taylor, p.32.

6. Stefferud, Einar et. al., "Quotes from Some of the Players," *ConneXions – The Interoperability Report*, vol. 3 no. 10, Foster City, California. October, 1989, p. 21.

7. See article by Larry Press posted on the comp.risks newsgroup, September 6, 1991.

8. J. C. R. Licklider and Robert W. Taylor, p. 40.

Kieran Clulow u1036254@vmsuser.acsu.unsw.edu.au
Robert Dean robdean@access.digex.net
Jack Frisch frischj@gbms01.uwgb.edu
Scott Hatton 100114.1650@compuserve.com
Lu Ann Johnson ai411@yfn.ysu.edu
Jean-Francois Messier messier@igs.net
Larry Press lpress@isi.edu
Chuq Von Rospach chuqui@plaidworks.com
Gregory G. Woodbury news@wolves.durham.nc.us

Chapter 2
The Evolution of Usenet: the Poor Man's ARPANET

by Ronda Hauben
rh120@columbia.edu

Part I

In Fall of 1992, an undergraduate college student had a term project to do. The assignment required that the project be the result of using resources beyond research from books. His professor proposed that students consider interviewing people, sending letters, etc.

The student had done some reading and found a source that claimed computer networks had become "the largest machine that man has ever constructed – the global telecommunications network"[1]

The student decided that he would do his research on this international computer network that now spans the globe and that many computer users have access to. He planned to use the network as much as possible to conduct his research.

After reading some of the few books and articles that he could find to describe the global computer network, he gathered a few significant quotes and wrote a brief introduction stating that he was trying to determine the subject for a term paper. He asked if the quotes seemed accurate and if readers had any advice. Some of the quotes were from a journal article discussing how the disintegration of Eastern Europe was in part due to the lack of free speech impeding computer development.[2] Also, the student asked if there was any evidence that the Berlin Wall had fallen because of new developments in computer communications. He raised several other questions and included quotes from his reading.

Then he took this research proposal and posted it on the computer network news system called Usenet. Posting is the word used to indicate that one has sent an article to be propagated around the world.

Usenet is like an electronic news magazine or a world town meeting. It has various newsgroups organized by different topic areas, in a variety of languages and on many different subjects. And the number of all is continually growing. Net users can post articles to any of the newsgroups, can respond to someone elses article or can send a message in response to the author of an article via e-mail.

The student posted his questions to a number of newsgroups. In his post, he wrote: "'The Largest Machine': Where it came from and its importance to Society"

He explained: "I propose to write a paper concerning the development of 'The Net.' I am interested in exploring the forces behind its development and the fundamental change it represents over previous communications media. I will consult with people who have been involved with Usenet from its beginnings, and the various networks that comprise the Computer Network around the world. I wish to come to some understanding of where the Net has come from, so as to be helpful in figuring out where it is going to."[3]

Within a few hours, responses began to arrive via electronic mail to him. Among the responses he received was one from a teacher in Russia who explained how pressure for the free flow of information was a force for change in Russia.

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"Hello," the teacher wrote, "I would also consider another side of the coin: the world is divided on people who use the possibility of computer-mediated communications and the ones who do not. But I am not a specialist in your field."

"And as one from the East," he continued, "I know well that the Internet is the first and only connection to the rest of the world for us in Russia. But unfortunately," he reported "to get it there is not too easy…. If you have some questions you think I could answer – please send me e-mail…."[4]

The student sent the Russian teacher some excerpts from an article about the lack of free speech in Eastern Europe and its effects on computer development. And he asked the teacher some questions about the excerpts. In response to the questions, the teacher from Russia answered: "[The] first time I saw a computer was in 1985, when our institute got one. It was [an] Apple II. At that time, I had no idea about what a network is, and it was a time when PCs just started to appear in the environment of [the] 'normal Russian'…. As you can see, it was already Gorbachev's time, and communists were stopping (or already were unable) to keep a very strong control on information flow in the society. So it was easier to access the PC in our institute than to get permission to use photocopy devices. Then the number of PCs was fast growing, and now we have more then 15 PCs, but still no Internet connection…. Most scientific institutes now have access to the net. But usually it is restricted to the possibility of using the electronic mail system."

"I would say," observed the teacher, "that in the past networks had no direct effect on the life of people there, and now they become more and more important. One of the points is that it is practically the only way to communicate with the West. Telephone lines are so bad that to send a FAX message is almost impossible, conventional mail will reach the address with [a] probability of 50% and it will take at least one month," but the teacher wrote, "e-mail…will be received in 12-24 (!) hours. I have used it for the last year and never had any problems. I am lucky that one of my relatives has e-mail! I guess, you understand how the possibility to communicate is important for [the] scientific community…," the Russian teacher ended.

The student received many other responses. One from a German student who described how the Berlin Wall had fallen because of the increased communication made possible by computer networks. The German student pointed out that accurate information about events like the Chernobyl nuclear power plant explosion had become available to people who were no longer dependent upon government channels as their only source of information. Also, there were responses from a teacher in Australia, a businessman in California, a net pioneer, and many others.

The student decided to prepare another post. He had become interested in how far and wide the network reached and who would have access to the post he was making. He posted the following message:

Subject: I want to hear from the four corners of the Net – that means YOU!
I would like to hear from EVERYONE on the Net-Frontier.
If you think you are weird or abnormal (or special) in terms of
net-connections or Usenet connections, please tell me about it….
To the further expansion of the Net! :)

He received answers from over 50 people around the world from France to India and Africa. A response from Japan explained: "Yes, I believe I'm connected through some sort of hokey mechanism, but that's just because I'm in Japan. Connectivity doesn't register highly on the

importance scale here. Takes a few hours for mail to get from one side of Tokyo to the other."

"So what makes me so 'special'," wrote the correspondent from Japan, "as far as net connections go? A few things. I can not receive most newsgroups and can not post to any. Yet a friend of mine in the same building as me (on another floor) receives a mostly different set of newsgroups and can post to a few. The interesting bit about any group we both get is that we don't always get the same articles. Japan," he explained, "the 'leader' of technology, doesn't know a thing about actually using computers. Just my opinion, of course – my company won't listen to me anyway! Hope this adds to your research…."

The student received a response from an employee in a large American company. The writer explained: "Not too strange, but I work for a big company that leeches off two small `service providers' for free mail and news feeds. Kind of funny, really…. Hey, Usenet broke…and I can't receive mail from the Internet anymore, although I can send it." He described how the company told him 'Sorry…the problem is with our feeds. We'll try to get them to fix it.' "Strange enough," the writer sarcastically reported "these small services…[a medical school and a public access Usenet site] wouldn't drop everything to fix our problem. How dare they! Of course MY suggestion," he explained, 'PAY THEM SOME MONEY,' was completely ignored." He went on to explain that he had been told that his company "won't let us have a direct connection to the Internet for security concerns. I understand, but it doesn't make me happy," he ended.

A response from Krakow, Poland explained that their site in the Department of Physics at Warsaw University was one of the first four sites in Poland to have access to Usenet.

A response from a French user explained how the government charged a lot of money for an Internet connection in France and thus discouraged usage: "It's cheaper to send a 'hello' to someone in the US than to someone 5 kilometers from my desk!," the French user wrote, "If you have a 'stupidity chapter' in your paper, this could fill a few lines."

From Wellington, New Zealand, the student learned that there was a "burgeoning Net Community in Wellington, as there were two Internet connections, one by a private net.enthusiast, and another run by the Wellington City Council on an old PDP-11 computer." They offered the citizens of Wellington "free ftp, telnet, IRC, archie, gopher, E-mail, and Usenet - and all the 1935 locally carried newsgroups."

A response from someone who works for Bell Telephone Laboratories wrote: "Some people say that many of us at Bell are on the fringe, but we're probably in the core of things in the Internet. :-)"

Other responses came from university students and hobbyists in the U.S., from Net users in Germany, Italy, India, etc.

The student also got offers of help finding information, suggestions of books to look at, and offers to send him articles or reports that would be helpful with his research.

Also many people wrote describing the unusual or interesting net connections they used to connect to Usenet, A user in South Africa told how he distributed news and e-mail and was trying to gain access to a satellite in order to set connections up with the interior of Africa that lacked the otherwise needed infrastructure. There were many other stories of unusual or pioneering efforts to make connections possible for people to Usenet.

Many people wrote asking for a copy of the paper when it was written. In response to requests that he post the draft of the paper before it was completed, the student wrote a draft and

posted it on Usenet. He received several helpful comments. He wrote the final draft and handed it in to his teacher and posted it on Usenet. A lively discussion ensued because the student's paper had maintained that the ability of users to post on Usenet was a sign that Usenet was democratic, whereas a document describing Usenet to new users which was posted in the new users newsgroup, maintained that Usenet is an anarchy. The discussion raised the question of whether there can be an official statement maintaining that something is an anarchy.

Also, a number of people wrote the student asking him if they could distribute the paper more broadly, quote the paper in their upcoming book, etc. Another student who was writing a proposal for his Master's thesis cited the paper as an important source in his proposal. This all occurred within two weeks of the paper being posted.

This experience is but one example of the important educational possibilities represented by Usenet and the worldwide communications network it is part of. Yet there are many people who still know nothing of Usenet, and many who are on Usenet do not realize the important potential it makes possible. In a similar way, many people do not know how Usenet developed or the obstacles the pioneers were continually faced with in their efforts to create and nourish Usenet. Since the details of how Usenet was created can provide helpful insight into how to deal with the problems one encounters today, following is an account of how Usenet was created.

Part II

Usenet was born in 1979 when Tom Truscott and Jim Ellis, graduate students at Duke University, conceived of creating a computer network to link together those in the Unix community. They met and discussed their idea with other interested students, including Steve Bellovin, who was a graduate student at the neighboring University of North Carolina at Chapel Hill. Using homemade auto dial modems and the Unix to Unix copy program (called UUCP), the Unix shell and the find command that were being distributed with the Unix operating system, Version 7, Bellovin, wrote some simple shell scripts to have the computers automatically call each other up and search for changes in the date stamps of the files. If there were such changes, the changed files were copied from one computer to the other.

Soon three computer sites, "duke" at Duke University, "unc" at the University of North Carolina at Chapel Hill and "phs" at the Physiology Department of the Duke Medical School, were hooked together and a simple program was running connecting the three sites.

Gregory G. Woodbury, a Usenet pioneer from Duke University, describes how "News allowed all interested persons to read the discussion, and to (relatively) easily inject a comment and to make sure that all participants saw it."[5]

The program was slow so the students enlisted Stephen Daniel, also a graduate student at Duke, to rewrite the program code in the C programming language. Stephen Daniel writes that "a news program written I believe by Steve Bellovin as a collection of shell scripts was already working, but it was slow, taking upwards of a minute of time on an unloaded PDP 11/70 to receive an article. I got involved when I happened to drop in on a conversation between Tom Truscott and Jim Ellis who were complaining about how slow this news program was. I suggested that if it was so slow it could easily be rewritten in C to run faster. I soon found myself volunteering to do just that."[6] Daniel agreed to write the program in C with help from Tom Truscott. This became the first released version of Usenet in the C programming language, which came to be known as A News.

Other people at Duke and the University of North Carolina took part in getting the network debugged. Once the program was functioning on their respective machines, Jim Ellis went to a meeting of what was then the academic Unix users group known as USENIX. In the following account, Tom Truscott describes what happened: "James Ellis (jte) gave a short talk and handed out a 5 page `Invitation to a General Access UNIX Network' at the January 1980 Usenix Conference in Boulder Colorado. We made up 80 copies and they were gobbled up (not surprising, there were a record-smashing 400 attendees)…. Afterwards, jte mentioned that the audience particularly enjoyed his description of Duke's two home-built 300 baud autodialers."[7]

The invitation they distributed explains: "The initially most significant service will be to provide a rapid access newsletter. Any node can submit an article, which will in due course propagate to all nodes. A 'news' program has been designed which can perform this service. The first articles will probably concern bug fixes, trouble reports, and general cries for help. Certain categories of news, such as 'have/want' articles, may become sufficiently popular as to warrant separate newsgroups. (The news program mentioned above supports newsgroups.)"[8]

The Invitation urged: "This is a sloppy proposal. Let's start a committee. No thanks! Yes, there are problems. Several amateurs collaborated on this plan. But let's get started now. Once the net is in place, we can start a committee. And they will actually use the net, so they will know what the real problems are."

Several months later, the software for the A News program for Usenet was put on the conference tape for general distribution at the Delaware Summer 1980 USENIX meeting. The handout distributed at the conference explained, "A goal of Usenet has been to give every UNIX system the opportunity to join and benefit from a computer network (a poor man's ARPANET, if you will)…."[9]

Daniel explains why the term "poor man's ARPANET" was used.

He writes, "I don't remember when the phrase was coined, but to me it expressed exactly what was going on. We (or at least I) had little idea of what was really going on on the ARPANET, but we knew we were excluded. Even if we had been allowed to join, there was no way of coming up with the money. It was commonly accepted at the time that to join the ARPANET took political connections and $100,000. I don't know if that assumption was true, but we were so far from having either connections or $$ that we didn't even try. The 'Poor man's ARPANET' was our way of joining the Computer Science community and we made a deliberate attempt to extend it to other not-well-endowed members of the community. It is hard to believe in retrospect," he concludes, "but we were initially disappointed at how few people joined us. We attributed this lack more to the cost of autodialers than lack of desire."[10]

The ARPANET that Daniel is referring to pioneered the networking technology that serves as the foundation of today's global Internet. The first host connected to the ARPANET was the SDS Sigma-7 on Sept. 2, 1969 at the U.C.L.A. (University of California in Los Angeles) site. It began passing bits to other sites at SRI (SDS-940 at Stanford Research Institute), UCSB (IBM 360/75 at University of California Santa Barbara), and Utah (Dec PDP-10 at the University of Utah). There were many unexpected problems and obstacles, but through the collaborative work by the participants using the network they were creating, the number of sites steadily expanded and by 1977 the ARPANET extended to more than 50 sites from Hawaii to Norway. Originally funded under the U.S. Department of Defense's (DoD) program for Advanced Research Projects Agency (ARPA),

however, only those academic computer science departments with DoD funding had the possibility of access to the ARPANET.

Usenet, however, was available to all who were interested as long as they had access to the Unix operating system (which in those days was available at a very low cost to the academic and research computer community.) And posting and participating in the network was possible at no cost to the individuals who participated, besides the cost of their own equipment and the telephone calls to receive or send Netnews (as Usenet was called). Therefore, the joys and challenges of being a participant in the creation of an ever expanding network, the experience available to an exclusive few via the ARPANET, was available via Usenet to those without political or financial connections – to the commonfolk of the computer science community.

As Daniel notes, Usenet pioneers report that they were surprised at how slowly Usenet sites expanded at first. But when the University of California at Berkeley (UCB) joined Usenet, links began to be created between Usenet and the ARPANET. The University of California at Berkeley was a site on the ARPANET. At first, it is reported, mailing lists of discussions among Arpanauts (as ARPANET users were called by those on Usenet) were poured into Usenet.(10) This first connection between the ARPANET and Usenet, Daniel reports, only contributed to "the sense of being poor cousins." Daniel explains: "It was initially very hard to contribute to those lists, and when you did you were more likely to get a response to your return address than to the content of your letter. It definitely felt second class to be in read-only mode on human-nets and sf-lovers, which were two popular ARPANET mailing lists."[12]

Daniel also clarifies the different philosophy guiding the development of Usenet as opposed to that of the ARPANET. He explains that "Usenet was organized around netnews, where the receiver controls what is received. The ARPANET lists were organized around mailing lists, where there is a central control for each list that potentially controls who receives the material and what material can be transmitted. I still strongly prefer the reader-centered view," he concludes.

With the increasing connections to the ARPANET from Usenet, the number of sites on Usenet grew.

A map from June 1981 shows the number of different sites on Usenet during this early period:
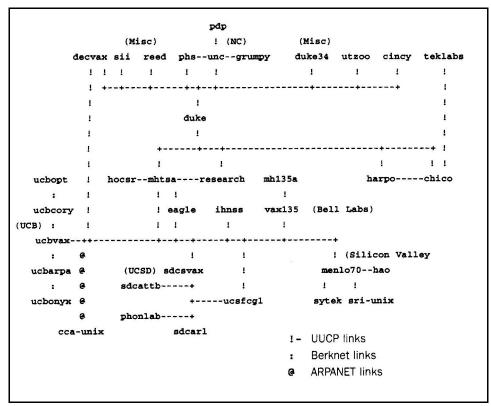
```
                                pdp
            (Misc)              ! (NC)           (Misc)
        decvax sii   reed   phs--unc--grumpy    duke34  utzoo  cincy  teklabs
          ! !  !     !       !    !                !      !      !       !
          ! +--+----+-----+-+--+----------------+-------+------+        !
          !                !                                           !
          !              duke                                          !
          !                !                                           !
          !      +------+---+----------------------------+--------+ !
          !      !          !                            !        ! !
      ucbopt  !  hocsr--mhtsa----research   mh135a          harpo-----chico
        :     !     !      ! !                 !
      ucbcory !     ! eagle  ihnss         vax135  (Bell Labs)
    (UCB) :   !     ! !      !               !
        ucbvax--+-----------+--+--+-----+--+------+--------+
          :     @              !        !              ! (Silicon Valley
      ucbarpa @      (UCSD) sdcsvax     !          menlo70--hao
          :     @      sdcattb-----+    !            !    !
      ucbonyx @                 +-----ucsfcgl       sytek sri-unix
              @      phonlab-----+
          cca-unix            sdcarl
                                          !-  UUCP links
                                          :   Berknet links
                                          @   ARPANET links
```

Figure 1. Map of Usenet sites June 1981 (Source: Usenet History Archive)

There are many stories of frustrations as Usenet developed.[13] Despite such frustrations, there were many who helped Usenet to grow and develop. Unix enthusiasts and pioneers at some large organizations like AT&T's Bell Labs did whatever they could to provide support for Usenet. At one point, AT&T realized that it would save millions of dollars if it worked out the bugs to have internal e-mail. In the process it gave support to the pioneers of Usenet who were trying to develop more efficient e-mail routing programs. Also, Digital Equipment Corporation (DEC) supported Usenet in various ways and the spread of Usenet and Unix encouraged the sale of the Unix based computers from DEC. And, Usenet newsgroups provided much needed technical help for the folks using Unix and Unix based computers.

By 1982, the continuing explosion of Usenet surprised even its most dedicated fans. One of those active on Usenet from its earliest days to the present, Gregory G. Woodbury, describes the shock that was experienced when the pioneers realized how Usenet was taking a totally unexpected course of development. He writes: "I do not recall that anyone was quite expecting the explosion that followed," recounts Woodbury, "What developed took everybody by surprise. When the direction of evolution took an unexpected turn, and a continental network emerged, spanning the continent from California to North Carolina, and Toronto to San Diego, it was sort of a shock to realize what had happened."[14]

Statistics another Usenet pioneer, Gene Spafford presented at an IETF (Internet Engineering Task Force) meeting in 1988 showed the tremendous growth and development that Usenet

experienced. Usenet developed from 2 articles a day posted at three sites in 1979 to 1800 articles a day posted at 11,000 sites by 1988.[15]

Year	Number of Sites	Articles/Day	Megabytes/Day
1979	3	~2	-
1980	15	~10	-
1981	150	~20	-
1982	400	~50	-
1983	600	~120	-
1984	900	~225	-
1985	1,300	~375	1+
1986	2,500	~500	2+
1987	5,000	~1000	2.5+
1988	11,000	~1800	4+

Today Usenet continues to grow in the number of sites participating and in the number of posts it carries and in the number of newsgroups. Usenet is transported by uucp connections and via nntp (Netnews Transfer Protocol) along the Internet, which is the child of the old ARPANET.

Many times, pioneers of Usenet have been convinced that the load of posts or the number of sites was becoming too great and that further growth couldn't be sustained. The fear is now facetiously referred to as the "imminent death of the net is predicted." Although each time the problems have seemed insurmountable, they have been investigated and solutions found to deal with them through the hard work of many net participants (referred to on Usenet as "net.citizens" or netizens).

In the past few years a system of Free-Nets and community networks has begun to develop, many utilizing the Netnews software to make Usenet available to community people for free or at a very low cost. Cleveland Free-Net, sponsored by Case Western Reserve University and other community organizations in Cleveland, Ohio, was the first Free-Net. It used the Netnews software to create a set of local newsgroups reflecting the different community services in the Cleveland area like the hospitals, public schools, public libraries, museums, etc. Cleveland Free-Net users also have access to the worldwide newsgroups of Usenet. The software used by such community networks makes it relatively easy to read and post on Usenet and in a variety of local discussion groups. A number of community networks have come online around the U.S. and in Canada. Many others are in the planning stages. Also there is a Free-Net in Erlangen, Germany and in Finland. And people with telnet access can join many of these free of charge and thus have e-mail and Usenet access through these community networks.

The ARPANET pioneered important breakthroughs in computer networking technology. It also pioneered the ability to collaborate and to utilize dispersed resources – both people and computers. Usenet represents the continuation of this tradition by making access to these collaborative research relationships available to the commonfolk. The extension of Usenet has also required a great deal of pioneering effort and technical development, but the folks participating in Usenet have been there to solve the problems.

Writing in 1968 before the ARPANET network began, J. C. R. Licklider, who has been

called the Father of the ARPANET, and Robert W. Taylor predicted the challenge that would face society with the development of computer networks.

"First, life will be happier for the on-line individual because the people with whom one interacts most strongly will be selected more by commonality of interests and goals than by accidents of proximity. Second, communication will be more effective and productive, and therefore more enjoyable. Third, much communication and interaction will be with programs and programming models, which will be…both challenging and rewarding. And, fourth, there will be plenty of opportunity for everyone (who can afford a console) to find his calling, for the whole world of information, with all its fields and disciplines, will be open to him, with programs ready to guide him or to help him explore."

"For the society, the impact will be good or bad depending mainly on the question: Will 'to be on line' be a privilege or a right? If only a favored segment of the population gets a chance to enjoy the advantage of 'intelligence amplification,' the network may exaggerate the discontinuity in the spectrum of intellectual opportunity."

"On the other hand, if the network idea should prove to do for education what a few have envisioned in hope, if not in concrete detailed plan, and if all minds should prove to be responsive, surely the boon to humankind would be beyond measure."

"Unemployment would disappear from the face of the earth forever, for consider the magnitude of the task of adapting the networks software to all the new generations of computers coming closer and closer upon the heels of their predecessors until the entire population of the world is caught up in an infinite crescendo of on-line interactive debugging."[16]

Their vision of an ever growing part of the population of the world being needed to participate in the debugging and development of the network that will make a new world possible is still a helpful vision. Thus I want to invite you all to help to contribute to the spread of the Wonderful World of Usenet news. It is a world that needs and will reward your participation.

Notes for Chapter 2

1. From Ithiel de Sola Pool, Technology Without Boundaries, edited by Eli Noam, Cambridge, Massachusetts, 1990, p. 56.

2. See for example "The Information Technologies and East European Society" by Gary L. Geipel, A. Tomatz Jarmoszko, and Seymour Goodman, in *East European Politics and Society*, vol. 5 no. 3, pp. 394-438.

3. Michael Hauben, post November, 1992.

4. E-mail correspondence from Dima

5. Gregory G. Woodbury, "Net Cultural Assumptions," reprinted in *Amateur Computerist*, vol. 6 no. 2/3, Fall/Winter 1994-5.

6. E-mail correspondence from Stephen Daniel.

7. From Usenet History Archives, October 12, 1990, ftp://weber.ucsd.edu/pub/usenet.hist/nethist.901012.Z

8. From "Invitation to a General Access Unix Network" by Tom Truscott, Duke University, Durham, North Carolina.

(Copy made available by B. Jones.)

9. Copy from Usenet History Archives. ftp://weber.ucsd.edu/pub/usenet.hist/

10. Usenet History Archives, January 26, 1993. See nethist.930126.Z. Also by 1979-80, UCB was under contract to ARPA to provide a version of Unix (Berkeley Systems Distribution) for the ARPA contractors that were going to be upgraded to VAX computers.

11. E-mail correspondence from Stephen Daniel.

12. E-mail correspondence from Stephen Daniel.

13. One of the most outstanding is told by Amanda Walker who remembered how it was necessary to send an e-mail message across the continent twice using three networks to get it from the Computer Science Department to the Computer Center on the Case Western Reserve University campus. Usenet History Archives, October 16, 1990. See nethist.901016.Z.

14. Gregory G. Woodbury in "Net Cultural Assumptions."

15. From Gene Spafford, Usenet History Archives, nethist.901011.Z from the Mailing List, Gene Spafford, October 11, 1990 based on data from Adams, Spencer, Horton, Bellovin and Reid. Updating these statistics in 1993, David Lawrence estimates that in a two week period ending March 9, 1993, about 26,000 articles per day were posted to 4902 groups for 65 total megabytes (52 without headers).

16. In Memoriam: J. C. R. Licklider 1915-1990, Aug. 7, 1990, p. 40, reprinted by Digital Research Center; originally published as "The Computer as a Communication Device," in *Science and Technology*, April, 1968.

Special thanks to the Usenet pioneers and to Bruce Jones
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Chapter 3
The Social Forces Behind the Development of Usenet
by Michael Hauben

Right at this moment someplace in the world, someone is being helpful (or someone is being helped.) At the same time, others are participating in various discussions and debates. A new communications medium is currently in its infancy. Over the past two decades the global computer telecommunications network has been developing. One element of this network is called Usenet (also known as Netnews). The original carrier of this news was called UUCPnet (or just UUCP). The rawest principle of Usenet is its importance. In its simplest form, Usenet represents democracy. The basic element of Usenet is a post. Each individual post consists of a unique contribution from some user placed in a subject area, called a newsgroup. In Usenet's very beginning (and still to some extent today), posts were transferred using the UUCP utility distributed with Unix. This utility allows the use of phone lines to transmit computer data among separate computers. Usenet grew from the ground up in a grassroots manner. Originally, there was no official structure. What began as two or three sites on the network in 1979 expanded to 15 in 1980. From 150 in 1981 to 400 in 1982. The very nature of Usenet is communication. Usenet greatly facilitates interhuman communication among a large group of users.

Inherent in most mass media is central control of content. Many people are influenced by the decisions of a few. Television programming, for example, is controlled by a small group of people compared to the size of the audience. In this way, the audience has very little choice over what is emphasized by most mass media. However, Usenet is controlled by its audience. Usenet should be seen as a promising successor to other people's presses, such as broadsides at the time of the American Revolution and the Penny Presses in England at the turn of the 19th Century. Most of the material written to Usenet is by the same people who actively read Usenet. Thus, the audience of Usenet decides the content and subject matter to be thought about, presented and debated. The ideas that exist on Usenet come from the mass of people who participate in it. In this way, Usenet is an uncensored forum for debate – where many sides of an issue come into view. Instead of being force-fed by an uncontrollable source of information, the participants set the tone and emphasis on Usenet. People control what happens on Usenet. In this rare situation, issues and concerns that are of interest and thus important to the participants, are brought up. In the tradition of Amateur Radio and Citizen's Band Radio, Usenet is the product of the users' ideas and will. Amateur Radio and CB, however, are more restricted then Usenet. Currently the range of Usenet connectivity is international and quickly expanding around the world into every nook and cranny. This explosive expansion allows growing communication among people around the world.

In the 1960s, the Advanced Research Projects Agency (ARPA) of the Department of Defense began research of fundamental importance to the development and testing of computer communications networks. ARPA research laid the groundwork for the development of other networks such as UUCPnet. ARPA conducted an experiment in attempting to connect incompatible mainframe computers.[1] This experimental connection of computers was called the ARPA Computer Network (ARPANET). ARPA's stated objectives were:

"1) To develop techniques and obtain experience on interconnecting computers in such a way

that a very broad class of interactions were possible and

     2) To improve and increase computer research productivity through resource sharing."[2]

     ARPA was both conducting communications research and trying to study how to conserve funds by avoiding duplication of computer resources.[3] Bolt, Beranek and Newman, Inc. (BBN), a Cambridge, Massachusetts company, was chosen to construct the network, and AT&T was chosen to provide the communications lines. The ARPANET was needed because it was found that a data connection over existing telephone voice lines was too slow and not reliable enough to have a useful connection.[4] Packet switching was developed for use as the protocol of exchanging information over the lines. Packet switching is a communications process in which all messages are broken up into equal size packets which are transmitted interspersed and then reassembled. In this way, short, medium and long messages get transferred with minimum delay.[5]

     The ARPANET was a success. ARPA provided several advances to communications research. ARPANET researchers were surprised at the enthusiastic adoption of electronic mail (e-mail) as the primary source of communication early on. E-mail was a source of major productivity increase through the use of the ARPANET.[6] By 1983, the ARPANET officially shifted from using NCP (Network Control Program) to TCP/IP (Transmission Control Protocol/Internet Protocol.) A key point to TCP/IP's success is in its simplicity. It is very easy to implement over various platforms, and this simplicity has accounted for its continued existence as a de facto standard of the Internet up to the present. ARPANET's lasting contribution was demonstrating how a backbone infrastructure can serve as a connection between gateways. A gateway is a computer or part of a computer programmed to receive messages from one network and transfer them onto another network.

     ARPANET grew quickly to more than 50 nodes between Hawaii and Norway.[7] However, it did not extend to all who could utilize it. Computer scientists at universities without Department of Defense contracts noticed the advantages and petitioned the National Science Foundation (NSF) for similar connectivity. CSnet was formed to service these computer scientists. CSnet was initially financed by the NSF. Very quickly the desire for interconnection spread to other members of the university community and CSnet grew to serve more scientists than just computer scientists at universities. CSnet became known as "Computer 'and' Science Network" rather than just "Computer Science network."[8]

     By the mid 1980s, ARPANET was phased out by the Department of Defense, and was replaced by various internal networks (such as MILnet). The role of connecting university communities and regional networks was taken over by the NSF funded NSFnet, which originated as a connection for university researchers to the five National Supercomputer Centers. CSnet and NSFnet were made possible by the research on ARPANET. The NSFnet became the U.S. backbone for the global network known as the Internet.

     ARPANET research was pioneering for communications research.[9] Researchers discovered the link between computer interconnection and increased productivity from human communication. The sharing of resources was proven to save money and increase computer use and productivity. The development of packet switching revolutionized the basic methodology of connecting computers. The source of these discoveries were the people involved. The personnel involved in the ARPANET project were very intelligent and forward looking. They recognized their position of developing future technologies, and thus did not develop products that commercial industry could (and would) develop. Instead they understood that the communications technologies they were developing had

to come from a not-for-profit body. ARPA researchers had no proprietary products to support, and no commercial deadlines to meet. Either would have tainted, or made developing networks of incompatible computers impossible or limited. Current users of international computer networks are in debt to the pioneers of ARPANET.

The ARPANET was successful in its attempt to connect various spatially remote computers, and thus more importantly the people who used those computers. However, these people were either professors at universities that had Department of Defense research grants or employees of a limited number of Defense Industry companies. There were still a mass of people who wanted a connection, but were not in a position to gain one. Duke University and the University of North Carolina at Chapel Hill were two such locations. It was in these underprivileged fertile grounds where the grassroots computer communications breakthrough of Usenet originated and developed.

The Unix operating system provides the basic tools needed to share information between computers. Unix[10] was developed as "a system around which a fellowship would form."[11] One of the programmers of Unix, Dennis Ritchie, wrote that the intended purpose of Unix was to "encourage close communication."[12] Unix's general principles thus conceptually foreshadowed the basic tenet of Usenet. How else should one go about designing communications programs, but on an operating system which was designed with a basic principle of encouraging communication? The Unix utility UUCP was created at Bell Labs in 1976 by Mike Lesk. It was further developed by David Nowitz and later by Nowitz, Peter Honeyman and Brian E. Redman. UUCP provided a simple way of passing files between any two computers running Unix and UUCP. One of the motivations for AT&T developing Unix was to make software production cheaper in order to bring down the cost of telephone service. Unix's popularity also arose from AT&T's prohibition to profit from other than their main business, phone services, under the terms of the 1956 Consent Decree. Unix was thus available on a "no cost" (or very low cost) basis. The operating system was seen as an "in-house" tool on DEC and other computers and was in use throughout Bell Labs. Many universities used the same type of computer and were licensed by AT&T to utilize Unix. It was thus easily accessible. Schools picked it up, and computer science students used it to learn about operating systems, as Unix was a model of elegance and simplicity compared to most operating systems of the time. Unix became a widely used operating system in the academic world. This paved the way for an international public communications system to form.

When Usenet was developed in 1979, it was created to form a `Unix Users Network'. The developers thought Usenet would be used to discuss problems and to share experiences about Unix. Usenet provided a forum for people to solve problems with Unix, as AT&T initially provided little external support for Unix. In an early handout, Usenet was originally referred to as a "poor man's ARPANET."[13] In an e-mail message, Stephen Daniel explained that people who didn't have access to the ARPANET were hungry for similar opportunities to communicate.[14]

Usenet has been full of surprises from the beginning. The originators of Usenet underestimated the hunger of the people. As the initial intentions were to produce an easy method of communicating with other users at the same site, the programmers thought people would want to have local bulletin boards.[15] However, people were attracted by the possibility of communicating with others outside the local community as well. Even today, the global communication it makes possible is part of what makes Usenet so enticing. It was also thought Netnews would be useful as a method of communications at individual locations, and between sites close to each other.[16] Usenet

grew as a grassroots connection of people. The people who utilized Netnews wanted to communicate, and communicate they did! People have a fundamental need to communicate and Usenet aptly fills the bill.[17]

Early in 1981 the gap between ARPANET and Usenet was bridged. The University of California at Berkeley had connections to both ARPANET and Usenet. This allowed Usenet pioneer, Mark Horton, to bring mailing list discussions from ARPANET mailing lists into Usenet newsgroups.[18] This was a significant achievement. Communities other than ARPA sponsored researchers were finally able to see what the ARPANET had made possible. The gatewaying of ARPANET mailing lists into Usenet attracted a wave of people. These people became attracted to Usenet when two ARPANET mailing lists (SF-LOVERS and HUMAN-NETS) began to appear on Usenet. These lists provided interesting material and discussions. The size of the news feed (i.e., the raw data of Usenet) thus became larger and provided more for people to read. Later other sites would serve as gateways to even more discussion lists from the ARPANET. Netnews was also seen as a superior method of holding discussions. Gatewaying these FA (From ARPANET) newsgroups proved to be politically courageous. The ARPANET was accessible by only a certain group of people, and these gateways challenged that notion. The effect on the ARPANET was important as Steve Bellovin, another of the Usenet pioneers, wrote: "The impact of Usenet on the ARPANET was more as a (strong) catalyst to force reexamination (and benign neglect) on the strict policies against interconnection. Uucp mail into the ARPANET became a major force long before it was legit. And it was obviously known to, and ignored by, many of the Powers that Were."[19]

Usenet, a network made possible by UUCP, expanded to connect people across the entire continent. Rather early UUCP expanded across the continent when the University of Toronto Zoology Department joined the Net in May of 1981.[20] Two companies proved helpful to this communication by distributing Netnews and electronic mail long distance. Each UUCP site had to either pay the phone bill to connect to the next system, or arrange for the other system to make the phone call. System administrators at AT&T and DEC did the footwork in order to take e-mail and news where it might not have reached. These people went through the trouble in order to try to see the system work. However, easy connections were not always available. In one example, Case Western Reserve University graduate students had to route mail across the continent twice in order to send mail through UUCP to reach their professors who were connected to the ARPANET next door.[21] Usenet encouraged the idea of connectivity to the ARPANET. Gradually the ARPANET was interconnected with other networks eventually functioning more as a backbone to other networks than a self-contained network.[22]

Contributed effort is the crucial foundation of UUCPnet and Usenet. On one side, there are those who donate time and energy by contributing to Usenet's content – writing messages and answering messages or participating in a debate. Without the time and effort put in by its users, Usenet would not be what it is today. Also important to Usenet's success are the system administrators who make the functioning of Usenet possible. Resourcewise, Netnews takes up disk space on computers throughout Usenet, and phone calls in some cases must be made to transfer the raw data of the news. In particular, system administrators at AT&T and DEC found it worthwhile to transport Netnews across the country. Certain sites emerged as clearing houses for Usenet and UUCP e-mail.[23] These machines served as major relay stations of both news and e-mail. A structure grew that was considered the "backbone" of "the net." Backbone sites formed the trunk of the

circulatory system of news and e-mail. A backbone site would connect to other central distribution computers and to numerous smaller sites. These central backbone sites provided a crucial organization to the Usenet communications skeleton. People formed the center of these connections. For example, 'ihnp4' at AT&T existed mainly because of Gary Murakami's effort and only partially from management support. Usenet services and support were not officially part of Murakami's job description. After Gary left Bell Labs Indian Hill Laboratory (Naperville, Illinois), Doug Price put time and effort to keep things running smoothly. Certain system administrators in universities also picked up the responsibility for distributing Netnews and e-mail widely. Often these individuals would find ways of having their site pick up the phone bill. Sometimes sites would bill the recipients. Also, those who received a free connection were obliged to provide the same to others for no charge.[24]

Initially, expansion of sites receiving Usenet was slow.[25] Why did this happen? Initially Usenet was only transported via UUCP connections. Soon, besides UUCP, other resources were used, such as weekly airmailing of magtape data to Australia to provide connectivity.[26] Today, Usenet travels over all types of connections. The evolving ARPANET (and now the Internet) provided a faster way of transporting Netnews. However, a large number of Usenet recipients only have connectivity via UUCP. Universities and certain businesses can afford to connect to the Internet, but many individuals also want a connection. Even as late as 1992 when 60% of Usenet traffic was carried over the Internet via the instantaneous Network Transport Protocol (NNTP), 40% of Usenet was still carried through the slower UUCP connections. There are still many examples of various types of connections using UUCP. These representatives of the "fringe" give a clue to what the origins of this communication must have been like.[27]

The number of sites receiving Usenet continually increased, demonstrating its popularity. People were attracted to Usenet because of what it made possible. People want to communicate and enjoy the thrill of finding others across the country (or today across the world) who share a common interest or just to be in touch with. Besides the common thrill, it is possible to form serious relationships online. Usenet makes this discovery possible because it is a public forum. People expose their ideas broadly. This wide exposure makes it possible to find compatriots in thought. The same physical connections which carry Usenet often also transport electronic mail. Interactions and discoveries are only made possible by the public aspect of Usenet. Mailing Lists have as wide a range of discussion, but are available to a much smaller sized group. The appeal of Usenet can become tiresome at times[28], but it is rare that anyone leaves Usenet permanently. Unless, of course, someone can't find the time to fit Usenet into his or her life. As more universities, schools, libraries, businesses, and individuals connect, the value of Usenet grows. Each new person eventually can add his or her unique opinion to the collection of thoughts and information that Usenet already has. Each new connection also increases the area where new connections can be made through cheap local phone calls. The potential for inexpensive expansion is limited only by the oceans, other natural barriers or perhaps mistaken government policies.

The ARPANET was supplemented by CSnet and eventually replaced by U.S. government funding of its successor, NSFnet. Both CSnet and NSFnet were created by the U.S. Government in response to research scientists' and professors' pleas to have a similar connection to the ARPANET. The NSFnet was also created to provide access to the five supercomputer computing centers around the country. The NSFnet, as the backbone of the U.S. portion of the Internet, provided another route

for the distribution of Usenet. Similar to the ARPANET, NSFnet was a constant connection run over leased lines. One of the ways Netnews is distributed is using the NNTP protocol over Internet connections. This allows for Netnews and e-mail to be distributed quickly over a large area. Internet connections also assist in carrying Usenet and e-mail internationally. The Internet class networks and connections include the established government and university sponsored connections. However some of the way individuals are connected at home is via phone lines and various versions of UUCP. There are also commercial services that, for a fee, provide connections for electronic mail and Usenet access, as well as access to the Internet.

Much of the development of Usenet owes a big thanks to the early restrictions on commercial uses. Where else in our society has the commercial element been so clearly separated from any entity? Forums of discussion and communication become clogged and congested when advertisements use space. Because of the voluntary actions of those who use and redistribute Netnews and e-mail, people on Usenet feel it wrong to assist commercial ventures. When people feel someone is abusing the nature of Usenet, they let the offender know through e-mail and in public messages. In this manner users work to keep Usenet as a forum that is free from commercial exploitation. Usenet is not allowed to be abused as a profit making venture for any one individual or group. Rather, people fight to keep it a resource that is helpful to society as a whole.

On what was the ARPANET and what was afterward the NSFnet portion of the Internet, there were Acceptable Use Policies (AUP) that existed because these networks were initially set up, founded and financed by public money. On these networks, commercial usage was prohibited, which meant it was also discouraged on other networks that gatewayed into the NSFnet. Unfortunately, the NSF encouraged privatization of the NSFnet backbone.[29] However, the discouragement of commercial usage of the global Usenet is separate and developed differently from the AUP.

The social network that Usenet represents supersedes the physical connection it rides on. The current Netnews rides on many of the physical networks that exist today. However, if ever there were the need, Usenet could reestablish itself outside of the current physically organized networks. Usenet's quality is such that it will survive because of its users' determination. Usenet draws its strength from being a peer to peer network. People who use Usenet do so because they wish to communicate with others. This communal wish means that people on Usenet find it in their own and in the community's interest to be helpful. In this way, Usenet exists as a worldwide community of resources ready to be shared. Where else today is there so much knowledge that is freely available? Usenet represents a living library. Usenet is an important part of the worldwide computer networks.

The very nature of Usenet promotes change. Usenet was born outside of established "networks", and transcends any one physical network. Currently, at this time, it exists of itself and via other networks. It makes possible the distribution of information that might otherwise not be heard through "official channels." This role makes Usenet a herald for social change. Because of the inherent will to communicate, people who don't have access to Usenet will want access when they become exposed to what it is, and people who currently have access will want Usenet to expand its reach so as to further even more communication. Usenet might grow to provide a forum for people to influence their governments allowing for the discussion and debate of issues in a mode that facilitates mass participation. This becomes a source of independent information. An independent source is helpful in the search for the truth.

Administrators and individuals who handle the flow of information have been predicting the

"imminent death of the net" since 1982.[30] The software that handles the distribution of Netnews has gone through several versions to handle the ever increasing amount of information. People who receive Netnews have either had to decrease 1) the number of days individual messages stay at the site or 2) the number of newsgroups they receive; or they have had to allocate more disk space for the storage of Netnews. Despite all the predictions and worries, people's desire for this communication have helped this social network develop and expand. Brad Templeton once wrote, "If there is a gigabit network with bandwidth to spare that is willing to carry Usenet, it has plenty more growth left."[31] Various research labs have been working on producing usable gigabit networks.

Usenet is a democratic and technological breakthrough. The computer networks and Usenet are still developing. People need to work towards keeping connections available and inexpensive, if not free, so as to encourage the body of users to grow. There are several cities and governments across the world where the public has access to network services as a civic service. This direction is to be encouraged. Exclusive arrangements for access are to be discouraged. The very nature of Usenet means people are going to be working for its expansion. Others will be working for the expansion for their own gain, and some forces will be an active force against expansion of Usenet. I can only ask that people attempt to spread this book in an attempt to popularize and encourage the use and fight for Usenet.

Notes for Chapter 3

1. "In September 1969, the embryonic one-node(!) ARPANET came to life when the first packet-switching computer was connected to the Sigma 7 computer at UCLA. Shortly thereafter began the interconnection of many main processors (referred to as HOSTs) at various university, industrial, and government research centers across the United States." (Leonard Kleinrock, "On Communications and Networks," *IEEE Transactions on Computers*, vol. C-25 no. 12, December, 1976, p. 1328).

2. F. Heart, A. McKenzie, J. McQuillan, and D. Walden, ARPANET Completion Report, Washington, 1978, p. II-2.

3. Alexander McKenzie and David C. Walden, "ARPANET, the Defense Data Network, and Internet" in *The Froehlich/Kent Encyclopedia of Telecommunications*, vol. 1, New York, 1991, p. 346.

4. Lawrence G. Roberts, "The ARPANET and Computer Networks," in A History of Personal Workstations, ed. Adele Goldberg, ACM Press, New York, 1988, p. 145.

5. Leonard Kleinrock, "On Communications and Networks"*, IEEE Transactions on Computers*, vol. C-25 no. 12, December, 1976, p. 1327.

6. Alexander McKenzie and David C. Walden, p. 357.

7. F. Heart et al, p. II-25.

8. Alexander McKenzie and David C. Walden, p. 369.

9. "For many of the people in government, at the major contractors, and in the participating universities and research centers the development of the ARPANET has been an exciting time which will rank as a high point in their professional careers. In 1969 the ARPANET project represented a high risk, potentially high impact research effort. The existence of the net in practical useful form has not only provided communications technology to meet any short term needs, but

it represents a formidable communications technology and experience base on which the Defense Department as well as the entire public and private sectors will depend for advanced communications needs. The strong and diverse experience base generated by the ARPANET project has placed this country ahead of all others in advanced digital communications science and technology." (ARPANET Completion Report, p. II-109.)

10. Unix was born in 1969, the same year as the ARPANET.

11. Dennis. M. Ritchie, "The UNIX System: The Evolution of the UNIX Time-sharing System," *Bell Systems Technical Journal*, vol. 63 no. 8, October, 1984, p. 1578.

12. Ibid.

13. Stephen Daniel, James Ellis, and Tom Truscott, "USENET - A General Access UNIX Network," Duke University, Durham, North Carolina, Summer 1980.

14. Stephen Daniel, a personal communication, November 1992.

15. Steve M. Bellovin and Mark Horton, "USENET - A Distributed Decentralized News System", an unpublished manuscript, 1985.

16. Ibid.

17. See, e.g., Gregory G. Woodbury's "Net Cultural Assumptions," reprinted in *Amateur Computerist*, vol. 6 no. 2/3, Winter/Spring, 1994-5.

18. Comment from Steve Bellovin, October 10, 1990, Usenet History Archive: "Correct. The original concept was that most of the traffic would be the form now known as UNIX wizards (or whatever it's called this week). Growth was slow until Mark started feeding the mailing lists in because there was nothing to offer prospective customers. Given a ready source of material, people were attracted." (ftp://weber.ucsd.edu/pub/usenet.hist/nethist.901010.Z)

19. Steve Bellovin, October 10, 1990 - Usenet History Archive. (ftp://weber.ucsd.edu/pub/usenet.hist/nethist.901010.Z)

20. Henry Spencer, Usenet History Archives, ftp://weber.ucsd.edu/pub/usenet.hist/history.Z.

21. From Amanda Walker, Tue, Oct. 16, 09:11 PDT, 1990, Usenet History Archives, ftp://weber.ucsd.edu/pub/usenet.hist/nethist.901016.Z

22. Alexander McKenzie and David C. Walden, "Indeed, during a typical measurement period in June 1988, over 50% of the active ARPANET hosts were gateways, and they accounted for over 80% of the traffic." p. 369.

23. At AT&T, the computers 'research', then 'allegra', then 'ihnp4' served as major mail and/or news distribution sites. At DEC - 'decvax' gradually increased its role (e.g., 'decvax' in New Hampshire would call long distance to San Diego across the country.)

24. E.g., Duke University fed Usenet files to Greg Woodbury who in turn gave "feeds" as they are called to others who requested them from him. See "Net Cultural Assumptions."

25. See table of site growth in Chapter 2.

26. Andrew Tanenbaum is quoted as saying something similar to "Never underestimate the bandwidth of a station wagon full of 9 track tape (or magnetic tape)."

27. Usenet began with the spirit that still exists today. On several newsgroups I posted a message with the following subject: "I want to hear from the four corners of the Net - That means YOU!" In return I received numerous wonderful answers. One new pioneer was going to use packet radio to send e-mail up to the CIS's orbiting Mir Space Station in the heavens. Others in Krakow, Poland, in Australia and in the ex-USSR sent me information about their connection. Some told me of how they made other connections possible. One user in South Africa told me how he distributed news and e-mail and was trying to gain access to a satellite in order to set connections up with the interior of Africa that lacks the otherwise needed infrastructure. The world is still in the infancy of this communications inter-connectivity! See description of this result in Chapter 1.

28. "Flame Wars" (highly emotional attacks) can become annoying. There are ebbs and flows of interesting posts. Even though Usenet is addicting, it can also be overwhelming.

29. See e.g., the U.S. Office of Inspector General's Report of April, 1993, for documentation of the process set in motion to implement the privatization of the NSFnet.

30. From the Usenet History Archives, ftp://weber.ucsd.edu/pub/usenet.hist/

31. From Usenet History Archives, ftp://weber.ucsd.edu/pub/usenet.hist/posthist.Z

Chapter 4
The World of Usenet

by Ronda Hauben
rh120@columbia.edu

During the past several decades there have been important technological breakthroughs. The personal computer, a science fiction dream for generations, is now available as a household appliance in a way that the typewriter or TV were just a few years ago. Also, a public conferencing network called Usenet transported via physical networks like the Internet, UUCP, and others, encourages public discussion and the free exchange of ideas on a world wide scale.

Usenet is a world wide public conferencing network that makes it possible for computer users around the world to have public discussions, raise questions or problems so they can get help, or send e-mail to each other often instanteously. One user explains that it is like a newspaper where "everyone's letter to the editor is printed."[1] Usenet has also been described as a series of electronic magazines. "These magazines, called 'newsgroups,' are devoted to particular topics, ranging from questions about UNIX, programming languages, and computer systems to discussions of politics, philosophy, science, and recreational activities."[2] Usenet has been compared to an electronic town meeting of the world or to a series of electronic soap boxes. Others have observed that "It's now as if everyone owns a printing press" or even better "a publishing house."

Computer users with access to Usenet can read articles on a broad range of topics. They can contribute their responses or post articles of their own on any subject in an appropriate newsgroup. Their submissions are then copied electronically to computers around the world which are also part of the Usenet network. Usenet demonstrates what happens when people are encouraged and allowed to develop computer technology.

An important element, according to Gregory G. Woodbury, who has written an account of the early days of Usenet, is that the Usenet software was created under the conditions of the academic Unix license which then provided that the program be put into the public domain. And since everyone involved at the time was working in an academic environment (including Bell Labs which Woodbury notes was "academic really") where information was shared, the emphasis was on communication, not on copyright or other proprietary rights. "Everyone wanted to be on the Net," he notes, "and it was clear they were cooperating in doing so."[3]

The phenomenal growth of Usenet during the early 1980's was an acknowledgment that it was a superior means of dealing with the growing mailing lists on various subjects that had developed on the early ARPANET network. The original script files had been rewritten in C by Steve Bellovin for use at "unc" and "duke", according to Gene Spafford's history of the period. Stephen Daniel, Spafford explains, "did another implementation in C for public distribution."[4] After Tom Truscott made modifications in this program, the software became known as the A News release of Netnews.

"Under the strain of being an international network," Woodbury explains, "with several new machines being added daily, certain limitations in the basic assumptions made themselves painfully obvious." The continuing expansion led to a rewriting of the software in 1981 by Mark Horton, a graduate student at the University of California at Berkeley, and Matt Glickman, a high school

student. This version was released to the public as B News, version 2.1 in 1982. Then in 1985, the still ever expanding nature of Usenet led Henry Spencer and Geoff Collyer at the University of Toronto to set to work on what is now known as C News which they released in 1989. Spencer and Collyer paid very careful attention to the performance aspects of C News. The result is that the software was able to handle the phenomenal expansion of Usenet.[5] A subsequent version of the Netnews software known as INN was created and used to transport Usenet.

The administration and coordination of this world wide network depends to a great extent on the cooperation and diligent work of the system administrators at the participating sites. In the early development of Usenet, some of these administrators knew each other and worked together to establish a series of general procedures for processes like adding newsgroups. Known as the "backbone cabal", this group worked together to hash out ways to deal with problems that threatened the voluntary, cooperative nature of the Net.

Those who were part of this informal structure would contact new site administrators who joined the Net. The character of the Net as a voluntary association of people who posted because they wanted to communicate was conveyed. And the fact that posts were entered into the "public domain" was established as an essential principle of the Net.[6]

Usenet is now made up of thousands of newsgroups organized around different topics. The number of groups is constantly growing as there is a procedure established to provide for new groups. If 100 more users vote for a new group than vote against it, the group can be started.[7] This procedure governs new groups in what is known as the "Seven Sisters" hierarchy, which was the collection of the seven newsgroups at one point known as Usenet. Some people have defined Usenet as those sites receiving the seven main groups; comp, misc, news, rec, sci, soc, and talk newsgroups, and the group news.announce.important. Others have defined Usenet as those sites that receive at least one of the newsgroups that appears on the list of Usenet newsgroups. There are also alternate hierarchies which includes alt, gnu, bit and others. A more informal procedure is used for creating for example an alt newsgroup than that used to create a newsgroup in one of the "Seven Sisters" hierarchies. The guidelines provide for posting a proposal or charter for the new newsgroup to the alt.config newsgroup. The proposal is discussed and then the newsgroup can be set up as an alt group when a new newsgroup control message is posted to the control newsgroup.

Many of the people using and contributing to Usenet are people who work with computer technology. Many of these people have a need for Usenet to help with problems they encounter with computer technology. One of the early functions of Usenet was to help identify bugs in new technology and to identify and propagate ways to deal with such problems.[8]

My experience using Usenet has been inspiring. I was interested in discussions involving economics and the history of economic thought. When I first got onto Usenet, I couldn't figure out where such discussions would take place. I managed to get access to the misc.books.technical newsgroup. I didn't know what the other newsgroups were or how to find out. Not knowing how to proceed I entered the following post:

From: au329@cleveland.Freenet.Edu (Ronda Hauben)
Newsgroups: misc.books.technical
Date: 10 Jan 92 07:48:58 GMT
Organization: Case Western Reserve University, Cleveland, Ohio, (USA)

Nntp-Posting-Host: cwns9.ins.cwru.edu

I am interested in discussing the history of economics -- i.e.
mercantilists, physiocrats, adam smith, ricardo, marx, marshall,
keynes etc. With the world in such a turmoil it would seem that
the science of economics needs to be reinvigorated.
   Is there anyplace on Usenet News where this kind of discussion
is taking place? If not is there anyone else interested in
starting a conference .economics and how would I go about doing
this. This is my first time on Usenet News.
   Ronda
   au329@cleveland.freenet.edu

   One of the many responses I received said: "Start discussing on sci.econ. We're all ears."[9]
   I received several other responses via e-mail also pointing me to the sci.econ newsgroup or
indicating interest in the topic. Also, a computer user from California sent me e-mail with a list of
all the newsgroups that existed. Another user from Scotland wrote telling me the name of the news
file which listed the names of all of the other newsgroups. It is considered good NETIQUETTE (i.e.
Network Etiquette) to help new users and many of the experienced users are very willing to do so.
   A few users suggested that I might want to try to start a newsgroup for the history of
economics, but that it would probably be a wise idea to either wait awhile until I got used to Netnews
before trying to initiate a group, or suggesting I try to get a user with more experience to help.
   The list of newsgroups posted on Usenet in newsgroups like news.misc contains descriptions
of each group. For example, the newsgroup "sci.econ" is described as "the science of economics."
   I have found the discussions in sci.econ very valuable. There are often debates over important
economic questions. Many of the questions discussed concern broad social issues – for example, the
development of different social forms of society, whether economics is a science, whether the so
called "free market" has ever existed to regulate production, etc. There has been discussion of a
variety of economic and political issues – like social security, rent control, strikes in Germany,
national health care reform, the need for shorter hours of work, plant closures, taxes, the economic
programs of presidential candidates, the role of markets in setting prices, the economic program of
Henry George, etc.
   Many newsgroups on Usenet are related to computers and computer subjects. There are
newsgroups where one can ask questions regarding access to Usenet or about books that are
recommended for people who want to learn more about Unix or any other area of computer usage,
etc. It is also possible to write to someone who has posted a question and ask them to forward a copy
or summary of the responses they receive so the post doesn't have to be duplicated. There are also
newsgroups dealing with political issues, social issues, current events, hobbies, science, education,
etc.
   When a critique of GM plant closures was posted after GM announced that it would lay off
70,000 people, several people sent e-mail saying that it was good to see the post. Thus when
someone makes an interesting post, it is possible to send e-mail to the person and begin to
correspond, or just encourage the user to continue.

Also, there are political components being developed. For example, there was an announcement that a vote was in progress to determine whether or not there should be a classics newsgroup. If one wrote voting "yes" or "no", the user would then be told to verify that the vote was accurately recorded when the list was posted announcing the final totals. Thus a procedure has been worked out on Usenet acknowledging that votes can't be by secret ballot, but must be open and posted, with the person voting having the ability to verify the outcome.

Unfortunately, there are also frustrating aspects of Usenet. The great variety and number of posts can take considerable time to survey and it is often difficult to keep up with the volume. A variety of software readers have been created, to help deal with this problem.[10] Though these readers have been copyrighted, many are freely available as long as they are being used for personal use, not for profit. Despite the difficulty keeping up with the volume of posts and other problems that have developed in the course of building the Netnews network[11], many of the users on Usenet are willing to be active participants in the development and working out of the content and form of the network. Many people send e-mail or post public responses when they have something to say about a post. In this way, communication is encouraged, as one person builds on another's contribution, and all become more knowledgeable through the process of democratic discussion and debate.

Usenet has thus evolved a functioning governing structure that is democratic and open in ways that have only been dreamed of in the past. Many of the details of the copying, distribution and propagation of Usenet are done via automatic machinery and programs which require that the system administrators who make the system function work together to solve their common problems. This same kind of cooperative relationship has been encouraged by these system administrators among the users of Usenet and this cooperative standard of activity is known as Netiquette.

Many on Usenet call the structure which functions anarchy. But, Jean Jacques Rousseau, in A Discourse on Political Economy, explains that the best laws are those which the population implements voluntarily rather than via force. "Netiquette" is a system of rules or standards that users on the Net are encouraged to follow. Also, throughout the development of Usenet, commercial traffic and commercial uses of Netnews have been strictly limited and circumscribed for several reasons. Among these have been the need since the early days of Usenet to keep commercial traffic from both escalating the phone costs and the noise (i.e. proportion of useless information to useful information) of Usenet. When the Internet became one of the major transport mechanisms of Usenet traffic, the prohibitions against commercial traffic arising from the public funding of the NSF backbone became a factor.[12] This restriction of commercial purposes has resulted in the open communication and cooperation which commercial agendas make difficult. Thus the governing laws (Netiquette) and structures (cooperative and helpful) are the demonstration that more democratic government is now possible and can achieve significant social advances. On the Net, participants gain from being active and from helping each other. People who post or send e-mail are contributors to the culture and all gain from each other's efforts. A vibrant and informative bottom up, interactive grassroots culture has been created and a broad, worldwide, informative and functioning telecommunications network is the product of their labors.

Because those who are able to connect to Usenet are connected to people all around the world, an exciting world of people and computers is available to a user who has access to Usenet.[13] Also, the achievement of Usenet demonstrates the importance of facilitating the development of uncensored speech and communication – there is debate and discussion – one person influences

another – people build on each other's strengths and interests, differences, etc.

Traditionally, it would require the labor of many people, much paper, ink, and other supplies to accomplish such a massive communication network via traditional means of newspapers or magazines, etc. With Usenet, however, this communication among people and computers is accomplished via a high degree of automation. By participating in Usenet, millions of people and their computers are connected into – the global telecommunications network. Also, Usenet makes it possible for people to print up their own copies of what is available online, without using all the paper or ink that has traditionally been required for a press. So welcome to the World of Usenet – something very special is happening and it is one of the important achievements of the 20th Century.

Notes for Chapter 4

1. See "Interview with Staff member," *Amateur Computerist*, Vol. 4 no. 2/3, Winter/Spring, 1992, p. 10.

2. Unix Communications, by Bart Anderson, Brian Costales, and Hart Henderson, Camel, Indiana, 1991, p.213.

3. Gregory G. Woodbury, "Net Cultural Assumptions," reprinted in *Amateur computerist*, vol. 6 no. 2/3, Winter/Spring, 1994-5. But he does take note of the concern of some people at Bell Labs that AT&T's rights in and to Unix source code and proprietary information be protected. Greg however emphasizes that individual posters were concerned with the ability to communicate, not with copyright protection.

4. Gene Spafford, "Usenet Software: History and Sources".

5. Details are described in the article "News Need Not Be Slow", by Geoff Collyer and Henry Spencer, USENIX Conference Proceedings, Winter 1987.

6. Gregory Woodbury's article "Net Cultural Assumptions" describes how the 'public domain assumption' changed when the U.S. government revised its copyright law and became a Berne signatory in the late 1980s. The implications of this change have been debated on Usenet in the past year.

7. But whether the new newsgroup will be carried has traditionally depended upon the system administrators of the largest systems and the new group's inclusion in the list of newsgroups.

8. Conversation in August, 1992, with Henry Spencer about the early days of the Net.

9. E-mail from Adam Grossman.

10. See Gene Spafford's "Usenet Software: History and Sources" for a history and description of many of the software readers now available.

11. Various problems have developed that users need to deal with. Some involve the efforts to impose copyright restrictions on posts on Usenet which would make the copying and propagation impossible; there are some users who try to intimidate people who post by attacking them (called 'flaming'), etc. But these problems must be looked at in the context of the significant advance that this Netnews network represents.

12. The National Science Foundation (NSF) had an Appropriate Use Policy (AUP) governing what was allowed to be transported across the nets that it funded with public moneys. It limited usage basically to research and education activities. As Usenet was transported across the NSFNet backbone, this policy of the NSF helped Usenet to develop as an educational rather than commercial network. (It is questionable whether a commercial network could have been

developed, given the secret and proprietary activities of commercial enterprises.) However the AUP restriction is being challenged now by the growing commercial use of networks like ANS (Advanced Networks and Services) a company founded by MCI and IBM that is now part of the MERIT, NSF, ANS organizational chain, which is opening up access to commercial traffic endangering the development and education and research function that the net thus far has achieved. Also, many large corporations, though seemingly restricted in their use of the net to educational and research purposes, are also the backbone sites along which Netnews is transferred. Some corporations use Usenet for their research and educational functions, but run a separate private net alongside of their Usenet operation for their commercial purposes.

13. For a discussion of the value of Usenet, see for example, the article "Interview with a Staff Member" which appeared in the *Amateur Computerist*, Vol. 4 no. 4, Summer, 1992, p. 22.

Chapter 18
The Computer as a Democratizer

by Michael Hauben

"...only through diversity of opinion is there, in the existing state of human intellect, a chance of fair play to all sides of the truth."
　　John Stuart Mill, "On Liberty"

"In a very real sense, Usenet is a marketplace of ideas."
　　Bart Anderson, Bryan Costales, and Harry Henderson, Unix Communications

Political thought has developed as writers presented the theoretical basis behind the various class structures from aristocracy to democracy. Plato wrote of the rule of the elite Guardians. Thomas Paine wrote why people need control of their governments. The computer and the Net connect to this democratizing trend through facilitating wider communications from individual citizens to the whole body of citizens.

James Mill (1773-1836), the Scottish philosopher, who was the father of John Stuart Mill, took a look at the principles of democratic government in his article "Liberty of the Press" in the Supplement to the *Encyclopedia Britannica* (1825). He wrote about the question of a government that works as it should – or the advantage and gain of the people instead of the advantage and gain for those in control. Mill saw that the government will be necessarily corrupted if the chance exists. Those in the position to rule would abuse their power for their own advantage. Mill felt, "If one man saw that he might promote misrule for his own advantage, so would another; so, of course would they all."[1] Mill believed that people needed a check on those in government. People need to keep watch on their government in order to make sure that it is working in the interest of the many. This led Mill to conclude that there is a crucial need for a press to watchdog over government. "There can be no adequate check without the freedom of the press," he wrote. "The evidence of this is irresistible."[2]

What Mill often phrased as freedom of the press, or liberty of the press, is more precisely defined as an uncensored press. The uncensored press provides for the dissemination of information that allows the reader or thinker to do two things. First, a person can size up the issue and honestly decide his or her own position. Second, as the press is uncensored, this person can make his or her distinctive contribution available for other people to consider and appreciate. Thus what Mill calls "freedom of the press" makes possible the free flow and exchange of different ideas.

Thomas Paine, in The Rights of Man, describes a fundamental principle of democracy. Paine writes, "that the right of altering the government was a national right, and not a right of the government."[3] Mill also expresses that active participation by the populace is a necessary principle of democracy. He writes: "Unless a door is left open to the resistance of the government, in the largest sense of the word, the doctrine of passive obedience is adopted; and the consequence is, the universal prevalence of the misgovernment, ensuring the misery and degradation of the people."[4]

Another principle to which Mill links democracy is the right of the people to define who can responsibly represent their will. However, this right requires information to make a proper decision.

Mill declares: "We may then ask, if there are any possible means by which the people can make a good choice, besides liberty of the press? The very foundation of a good choice is knowledge. The fuller and more perfect the knowledge, the better the chance, where all sinister interest is absent, of a good choice. How can the people receive the most perfect knowledge relative to the characters of those who present themselves to their choice, but by information conveyed freely, and without reserve, from one to another?"[5]

Without information being available to the people the candidates for office can be either as bad as the incumbents or worse. Therefore there is a need to prevent the government from censoring the information available to people. Mill explains: "If it is in the power of their rulers to permit one person and forbid another, the people may be sure that a false report, – a report calculated to make them believe that they are well governed, when they are ill-governed, will be often presented to them."[6]

After electing their representatives, democracy gives the public the right to evaluate their representatives in office. The public continually needs accurate information as to how their representatives are fulfilling their role. Once these representatives have abused their power, the principles established by Paine and Mill require the public to replace those abusers. Mill also clarifies that free use of the means of communication is an extremely important principle in order for democratic government to exist.

"That an accurate report of what is done by each of the representatives, a transcript of his speeches, and a statement of his propositions and votes," Mill writes, "is necessary to be laid before the people, to enable them to judge of his conduct, nobody, we presume, will deny. This requires the use of the cheapest means of communication, and, we add, the free use of those means. Unless every man has the liberty of publishing the proceedings of the Legislative Assembly, the people can have no security that they are fairly published."[7]

Ignorance, Paine calls the absence of knowledge and says that man with knowledge cannot be returned to a state of ignorance.[8] Mill shows how the knowledge man thirsts after leads to a communal feeling. General conformity of opinion seeds resistance against misgovernment. Both conformity of opinion and resistance require general information or knowledge. Mill explains: "In all countries people have either a power legally and peaceably of removing their governors, or they have not that power. If they have not that power, they can only obtain very considerable ameliorations of their governments by resistance, by applying physical force to their rulers, or, at least, by threats so likely to be followed by performance, as may frighten their rulers into compliance. But resistance, to have this effect, must be general. To be general, it must spring from a general conformity of opinion, and a general knowledge of that conformity. How is this effect to be produced, but by some means, fully enjoyed by the people of communicating their sentiments to one another? Unless the people can all meet in general assembly, there is no other means, known to the world, of attaining this object, to be compared with freedom of the press."[9]

Mill champions freedom of press as a realistic alternative to Rousseau's general assembly, which is not possible most of the time. Mill expands on the freedom of the press by establishing the criteria that an opinion cannot be well founded until its converse is also present. Here he sets forth the importance of developing one's own opinion from those that exist. Mill writes: "We have then arrived at the following important conclusions, – that there is no safety to the people in allowing anybody to choose opinions for them; that there are no marks by which it can be decided beforehand,

what opinions are true and what are false; that there must, therefore, be equal freedom of declaring all opinions both true and false; and that, when all opinions, true and false, are equally declared, the assent of the greater number, when their interests are not opposed to them, may always be expected to be given to the true. These principles, the foundation of which appears to be impregnable, suffice for the speedy determination of every practical question."[10]

The technology of the personal computer, of international computer networks, and of other recent contributions embodies and makes it feasible to implement James Mill's theory of liberty of the press. The personal computer makes it affordable for most people to have an information access and broadcast station in their very own home. The international computer networks that exist make it possible for people to have debates with others around the world, to search for data in various data banks, and to allow people to post an opinion or criticism for the whole world to see.

If a person is affiliated with a university community, works at a business which pays to connect to the Internet, is connected to a community network or Free-Net, or pays a fee to a commercial access provider, he or she can connect to an internetwork of computer networks around the world. A connection to this international network empowers a person by giving him or her access to e-mail, Usenet news and perhaps ftp and telnet capabilities. E-mail makes it possible to send and receive messages electronically to and from people around the world who have electronic mail boxes. Usenet is the public message and news posting system that allows its users to be part of world wide debates and discussions.[11] These systems begin to make possible some of the activity James Mill saw as necessary for democracy to function.

The importance of Usenet also exists in that it is an improvement in communications technology from that of previous telecommunications. The predecessors to computer networks were the Ham Radio and Citizen Band Radio (CB). The computer network is an advance in that it is easier to store, reproduce and utilize the communications. It is easier to continue a prolonged question and answer session or debate. The newsgroups on Usenet have a distribution designation which allows them to be available to a variety of areas - local, city, national, or international. This allows for the person posting the message to determine how broadly or narrowly it will be available. The problem with the Internet is that in a sense it is only open to those who either have it provided to them by a university or company that they are affiliated with, or who pay for it. This limits part of the current development of the computer networks. Until free or very low cost access is universally available, the Net will be short of its potential.

An example of a step toward universally available and affordable access is the community computing system called Free-Net in Cleveland, Ohio. Cleveland Free-Net is operated by Case Western Reserve University as a community service.[12] Anyone with a personal computer and a modem (a device to connect to other computers over existing phone lines) can call a local phone number to connect to the Free-Net without charge accept for the phone call. If members of the public do not own computers, they can use the Free-Net at some branches of the Cleveland Public Library. Besides Usenet, Cleveland Free-Net provides free access to a variety of community information and local discussion forums. Cleveland Free-Net is just one example of the community computer networks that are becoming much more readily available to broad sectors of society. As part of its newsgroups and discussion forums Cleveland Free-Net offers Supreme Court decisions, discussion of political issues and candidates, and debate over contemporary laws. Free-Nets like the one in Cleveland demonstrate that it is now possible to meet the requirements of more democracy which

include the "use of the cheapest means of communication, and, we add, the free use of those means."[13]

This is an exciting time to see the democratic ideas of some great political thinkers beginning to be practical. James Mill wrote that for government to serve the people, it must be watched over by the people utilizing an uncensored press. Freedom of the press also makes possible the debate necessary for people to form well founded opinions. Usenet and e.g., Cleveland Free-Net are contemporary examples of the uncensored accessible press required by Mill. These networks are also the result of hard work by many people aspiring for more democracy. However, to keep these forms developing and spreadinq requires constant work from those dedicated to the hard fight for democracy.

Notes for Chapter 18

1. "Essay on Liberty of the Press, Essays on Government, Jurisprudence, Liberty of the Press, and Law of Nations, (reprint) New York, 1967, p. 20.

2. Ibid., p. 18.

3. "The Rights of Man" in Two Classics of the French Revolution, New York, 1989, p. 341.

4. "Essay on Liberty of the Press," p. 13.

5. Ibid., p. 19.

6. Ibid., p. 20.

7. Ibid.

8. "The Rights of Man," p. 357.

9. "Essay on Liberty of the Press," p. 18.

10. Ibid., p. 23.

11. Usenet consists of many newsgroups which each cover a broad, yet specific set of topics. People who utilize Usenet typically pick certain newsgroups or topics to focus on. Every group has several items of discussion going on at the same time. Some examples of newsgroups include serious topics such as talk.politics.theory, – people "talking" about current issues and political theory, sci.econ – people discussing the science of economics, soc.culture.usa – people debating questions of Unites States society; and recreational topics (which might also be serious) such as alt.rock-n-roll – discussing various aspects of rock music, rec.sport.hockey – a discussion of hockey and rec.humor - jokes and humor. The discussions are very active and provide a source of information that makes it possible to meet James Mill's criteria for both more oversight over government and a more informed population. In a sense, what was once impossible, is now possible; everyone's letter to the editor is published. What is important is that Usenet is conducted publicly, and is mostly uncensored. This means that everyone can both contribute and gain from everyone else's opinion.

12. See for example, "Freenet helps Case Western fulfill its Community-Service Mission," by Beverly T. Watkins in Chronicle of Higher Education, April 29, 1992, p. A21.
13. "Essay on Liberty of the Press," p. 20

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Glossary of Acronyms

AFIPS	American Federation of Information Processing Societies
ANS	Advanced Networks and Services
ARPA	Advanced Research Projects Agency
ARPANET	Advanced Research Projects Agency Network
AT&T	American Telephone and Telegraph Company
AUP	Acceptable Use Policy
AVAIL	Availability of network access
AWK	Aho, Weinberger, Kernighan (Unix Utility)
BASIC	Beginners All Purpose Symbolic Instruction Code
BBN	Bolt, Beranek and Newman, Inc.
BBS	Bulletin Board System
Berknet	Berkeley Network
BESYS	Bell Operating System
BIS	Business Information Systems (At Bell Labs)
BITnet	Because It's Time Network
BLN	Bell Labs Network
BRL	Ballistics Research Laboratory
BSD	Berkeley Systems Distribution of Unix
BTL	Bell Telephone Laboratories
CBI	Charles Babbage Institute
CCC	Computer Chess Competition
CCN	College Campus Net (UCLA)
CCR	Command and Control Research
CPU	Central Processing Unit
CS	Computer Science
Csnet	Computer Science Network (later Computer and Science Network)
CTSS	Compatible Time-Sharing System
DEC	Digital Equipment Corporation
DEL	Decode-Encode Language
DoD	United States Department of Defense
E-mail	Electronic Mail
EUUG	European Unix Users Group
FA	From ARPANET
FCC	Federal Communications Commission
FJCC	Fall Joint Computer Conference (AFIPS)
FIDOnet	FIDO Bulletin Board System Network

Free-Net	Free access community Network (now a registered trademark of the National Public Telecommunications Network)
ftp	file transfer protocol
GECOS	General Electric Comprehensive Operating System (later GCOS)
grep	global/regular expression/print (Unix command)
honeydanber	Honeyman, David A. Nowitz, Brian E. Redman's Version of UUCP
IAB	Internet Activities Board
IBM	International Business Machines Corporation
IETF	Internet Engineering Task Force
IMP	Interface Message Processor
INWG	International Network Working Group
IPTO	Information Processing Techniques Office
Internet	Internetwork of Networks
IRC	Internet Relay Chat
JCL	Job Control Language
K-12 Net	Kindergarten to 12th grade Network
listserv	Electronic mailing list server
MAC	Man And Computer, Multi-Access Computer
MC	Mathematisch Centrum (Amsterdam, The Netherlands)
MERIT	Michigan Education Research Instruction Triade
MILnet	Military Network
MIT	Massachusetts Institute of Technology
MOO	MUD, Object Oriented
MUD	Multi-User Dungeon
MULTICS	MULtiplexed Information and Computing Service
MUSH	Multi-User Shared Hallucinations
NAC	Network Analysis Corporation
NCP	Network Control Program or Network Control Protocol
Netiquette	Network users etiquette
Netnews	Network news
Netizen	Network Citizen, net.citizen
NII	National Information Infrastructure
NIL	Network Interchange Language
NNTP	Network News Transfer Protocol
NREN	National Education and Research Network

NSF	National Science Foundation
NSFnet	National Science Foundation Network
NTIA	National Telecommunications Information Administration
NWG	Network Working Group
NYPSC	New York Public Service Commission
PWB	Programmer's Workbench
REDEFUS	Redefine Universal Access
RFC	Request For Comment
RFP	Request For Proposal
RFQ	Request For Quotation
RJE	Remote Job Entry
RLE	Research Laboratory for Electronics
rn	read news
SDC	System Development Corporation
SJCC	Spring Joint Computer Conference (AFIPS)
SRI	Stanford Research Institute
TCP/IP	Transmission Control Protocol/Internet Protocol
TIP	Terminal IMP
UCB	University of California at Berkeley
UCLA	University of California at Los Angeles
UCSD	University of California at San Diego
UCSB	University of California at Santa Barbara
UNC	University of North Carolina
UNSW	University of New South Wales
Usenet	Users network
USG	Unix Support Group
UUCP	Unix to Unix CoPy
V6	Version 6 (Unix)
V7	Version 7 (Unix)
VMSnet	Virtual Memory System network
WWW	World Wide Web