ESST

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THE FOURTH STAGE OF INTERNET

or the future of the Net

Dissertation in ESST

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CONTENTS

1. **INTRODUCTION**

The Internet is a hot topic. It has been seen on the front page of all sorts of newspapers and on the covers of magazines. But what is the Internet, really? Does it have value as a business tool? Should you use it? Will Internet be the Information Superhighway of tomorrow? What will be the impacts on our society?

The Internet is a loose collection of millions of computers at thousands of sites around the world whose users can pass along information and share files no matter which of those computers they are using. Imagine an office network on a grand scale with thousands of computers and terabytes[1] of data instead of merely megabytes. But unlike an office network, there is no central authority on the Internet. The administrators have simply agreed to have their computers speak the same transmission language: Transmission Control Protocol/Internet Protocol (TCP/IP). That agreement has spawned a worldwide web of computers that are all connected.

The Internet was not designed to become the Information Superhighway of today but was intended to serve the research communities, this was what we call in this dissertation. “The first stage of Internet." Lately, though, academic communities as well as government workers, educators, and just casual computer enthusiasts have been traversing this web, this was “the second stage of Internet." And now we are in “the third stage of Internet” where everybody can use it everywhere. In this stage Internet links government, university, college, research, commercial sites and ordinary people, and is known around the world simply as the Internet. Users of the three stages have at least one thing in common : they search among the millions of pages of electronic data for the few bits that they want or need. But what will be the next stage and the impacts on society?

The aim of this thesis is to analyse these impacts. For this we will talk of the different stages of Internet and see the evolution of the users and the impacts on society. Our hypothesis is:

“ Internet has been largely influenced and modified by its users in the first and second stage, less in the third stage and in the fourth stage Internet will influence his users. ”

Of course the dominance of an overarching belief in scientific rationality has influenced Internet in the beginning but we will see in this thesis how the users have deeply modified Internet.

We can describe the plan of this dissertation as follows:

[1] a terabyte equals million megabytes

In the introduction part, we will develop the concept of the information society. It is important to give a precise definition of different terms so we can reduce the risk of ambiguity. We will also present, technical terms, acronyms, and Internet's jargon in the Glossary at page 56.

In the main part we will present the different stage and focus on specific impacts in order to avoid a too wide topic. We could talk about a lot of impacts like impact on business, on sport, on music, ... We have decided to choose impact on democracy, on culture and on the coming Information Superhighway. Besides we will talk about direct impacts and not indirect, so direct impacts are more likely to happen in the fourth stage where "everybody has" to use Internet. For this we will try to answer at three questions for the fourth stage :

- Will Internet be the Information Superhighway?
- Will Internet be good for democracy?
- Will Internet bring a new culture?

1.1 Information society

What is the information society? For Daniel Bell[2] and Touraine[3], it is a modern form of the post-industrial society; for Manuel Castells it is something different : "it is no more post-industrial than the industrial society was post-agrarian"[4]. Nevertheless all agree upon the priority accorded to the knowledge and information as the central value of the coming society. What is important for our study is that Internet could bring the information society real. Let see now how it could bring it[5]?

While difficult to foresee an invention that might change political circumstances and reshape mankind, it is less arduous a task to identify some recent development whose consequences are not yet fully or recognised by the vast majority of society. There is such a development. It's called the Internet. To begin to understand the ramifications, the advent of the computer seemed to be an invention that would strengthen the parasitic stranglehold governments had on societies. This is because the first computers were massive and expensive. IBM was the pioneer in the marketplace. They developed machines capable of performing vast calculations at blinding speed. However, their price was out of reach to all but large, government-bureaucratic-like businesses and governments. The effect was increased centralisation to go along with increased information. This was a form of power, as put it Lyotard for instance: "Knowledge in the form of an informational commodity

[2] Bell, D. , "The social framework of the information society" in Forester, T. (ed.) *The Microelectronics Revolution*

[3] Touraine, A., *The Post-Industrial Society*,

[4] Castells, M. , *The Informational City*, P.367

[5] According to Bell, Touraine and Castells and some other writers

indispensable to productive power is already, and will continue to be, a major-perhaps the major-stake in the world-wide competition for power. It is conceivable that the nation-states will one day fight for control of information, just as they battled in the past for control over territory, and afterwards for control over access to and exploitation of raw materials and cheap labour"[6].

This would appear to further monopolise the government's position as oppressor. Who could compete? Who could wield enough power to destabilise the equilibrium and topple big governments? The answer is that one can now obtain even greater computing power in the size of a pizza box for an affordable price.

Most have already identified and integrated the knowledge that society is moving into an information versus industrial economy. The information society allows for the employ of fewer and fewer skilled workers in the production of consumer goods. In an agrarian economy, fully two-thirds of the population can be employed in the farming and distribution of food. In an industrial society, men move from the farms to the factories. Not only are they able to manufacture machinery to reduce the number of people required to farm, but they can also manufacture all manners of goods to enhance the survival, prosperity, and happiness of the average man.

The Information Revolution changes all of this. It even changes the relationship between farming and industry. It has been estimated that when our information economy is in full swing, fewer than five percent of the entire population will be employed in agriculture and industry combined, at least if we consider only the northern hemisphere (our working class disappearing not only because of increase in automation, but also of unequal international division of labour, our working class operating now more and more down south).

In short, within the northern hemisphere, the information society appears as being decentralising[7], with an anti-coercive trend from government point of view, for its nature serves to bring information and other forms of power to the individual in the widest possible way. Furthermore, government is powerless to stop it without destabilising its foundations. What's more, the information society will make obsolete much of what's currently manufactured.

Another reason why the information society is decentralising is that big coercive governments rely on big industry. They can hold them hostage owing to their inability to be mobile. What if big businesses could readily move to another state? What then? Could we envision that states would begin to compete for businesses as never before? We can, and we

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[6] Jean François Lyotard (b. 1924), French philosopher. The Postmodern Condition: A Report on Knowledge, Introduction (1979)

[7] Negroponte, N., *Being Digital*, London, Hodder&Stoughton, 1995, pp.157-159

have been seeing it on a small scale recently. The Dr Gubler's book on President Mitterand's early diagnosis of cancer has been prohibited in France but everyone who can have access to Internet can read it because it has been relocated into a digit form on the Net. The possibilities for individuals are mind-boggling. The individual writer, software developer, consultant, information service provider, etc. can operate from anywhere geographically. Technology is rapidly making one's physical location less relevant in business. Video conference, networking, and virtual reality is said to eventually reduce the need for the businessman of the future to ever travel away from home or office to attend meetings and perform other business functions.

The result, already occurring, is that the production in society will naturally move assets and relocate to geographical locations where they are most appreciated for their contribution. "A future interface agent is often seen as some centralised and omniscient machine of Orwellian character. A much more likely outcome is a collection of computer programs and personal appliances, each of which is pretty good at one thing and very good at communicating with the others"[8]. So the future is likely to be decentralised and governments, out of necessity, may well have no choice but beginning treating their productive citizens as customers rather than as subjects. " Virtual communities " are already being set up all over the world. A virtual community is a free association between individuals, which takes place in " cyberspace. " In other words, there are no physical, geographic or otherwise arbitrary boundaries. Anyone anywhere can be a citizen of a virtual community (outside of exclusion considerations that we shall explore further). All that is required is a computer, modem, and phone line and a connection to Internet by a service provider (we voluntarily simplify at this stage). Religion, race, gender, lifestyle, age, weight, appearance, physical location are in this sense all-irrelevant. The only relevant feature is the individual's ability to exchange value with other members of his/her community.

2. THE FIRST STAGE: THE PIONEERS

First, we will answer at a commonly asked question " What is the Internet? ". It is not easy to answer to such question because it has not been no agreed upon answer what neatly sums up the Internet.

We can describe Internet as a network of networks (based on the TCP/IP protocol) which means those different networks are connected together. A network is best illustrated by imagining the system of roads and highways. You can get from anywhere to anywhere on this network. In our context of time, we usually find it beneficial to travel the shortest or quickest route possible.

[8] Negroponte, N., *Being Digital*, London, Hodder&Stoughton, 1995, p.157

In fact no one person or group runs the Internet. Much of its direction, however, comes from a group of volunteers called the Internet Society, which is run more like a council of elders than a business. Two major subgroups of the Society are the Internet Architecture Board (IAB), which focuses on producing interconnection standards, and the Internet Engineering Task Force (IETF)[9], which concerns itself with technological developments and their impact on the Internet. These volunteer groups hold public on-line discussions, where Internet users register their opinions and try to create standards for the Internet community.

Similarly, no one organisation collects fees from Internet users or networks. Each individual user and service pays its own way. The NSF still pays for NSFnet, and NASA pays for the NASA Science Internet. Many university and commercial sites maintain their own computer systems; some pay a regional network or national provider for their data connections. Some sites are supported by private grants, others by government funding. Somehow it all works. And it all grows, too. In fact, Internet growth is phenomenal.

In order to have a better idea about Internet let us talk briefly about history. It is always difficult for an invention or a technology to give a precise date because it is often the result of complicated interactions. If we take the case of Internet, so the launching of the USSR Sputnik in 1957 is very important. The USA had lost the race for launching the first artificial satellite and was upset by the Russian success. In response, US formed the Defense Advanced Research Project Agency (DARPA) to establish US lead in science and technology applicable to the military.[10]

The Pentagon's Advanced Research Projects Agency decided to fund a larger, more ambitious project in the USA. The nodes of the network were to be high-speed supercomputers (or what passed for supercomputers at that time). These were rare and valuable machines, which were in real need of good solid networking, for the sake of national research-and-development projects. In 1969, this agency conducted a research for a safety network called ARPANET[11]. This network was designed to support military research and the legend said "it could withstand partial outrages by bomb attacks". The philosophy was that every computer on the network could talk, as a peer, with any other computer. To send a message on the network, a computer only had to put its data in an envelope, called IP (Internet Protocol) packet, and " address " the packets correctly.

In fall 1969, the first node was installed in UCLA. By December 1969, there were four nodes on the infant network, which was named ARPANET, after its Pentagon sponsor. The four computers could transfer data on dedicated high-speed transmission lines. They could

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[9] Cronin, Mary J., *Doing more business on the Internet,* New York, Van Nostrand Reinhold, 1995, p.41.

[10] Rheingolg, H., *The virtual community, Surfing the Internet*, Minerva, 1995, p. 71.

[11] Rheingold, H. , *The virtual community, Surfing the Internet,* Minerva , 1995, pp. 7-8

even be programmed remotely from the other nodes. Thanks to ARPANET, scientists and researchers could share one another computer facilities by long-distance. This was a very handy service, for computer-time was precious in the early '70s. In 1971 there were fifteen nodes in ARPANET ; by 1972, thirty-seven. The fathers of the Internet concept were Vint Cerf and Bob Kahn[12].

"Bob Kahn described the packet radio and satellite systems, and the Internet problem, which was to get host computers to communicate across multiple packet networks without knowing the network technology underneath...

The very earliest work on the TCP protocols was done at three places. The initial design work was done in my lab at Stanford. The first draft came out in the fall of 1973 for review by INWG at a meeting at University of Sussex (September 1973). A paper by Bob Kahn and me appeared in May 1974 in IEEE Transactions on Communications and the first specification of the TCP protocol was published as an Internet Experiment Note in December 1974.We began doing concurrent implementations at Stanford, BBN, and University College London. So effort at developing the Internet protocols was international from the beginning. In July 1975, the ARPANET was transferred by DARPA to the Defense Communications Agency (now the Defense Information Systems Agency) as an operational network."[13]

By the years of operation, however, an odd fact became clear. ARPANET's users had warped the computer-sharing network into a dedicated, high-speed, federally subsidised electronic post-office. The main traffic on ARPANET was not long-distance computing. Instead, it was news and personal messages. Researchers were using ARPANET to collaborate on projects, to trade notes on work, and eventually, to downright gossip and schmooze. People had their own personal user accounts on the ARPANET computers, and their own personal addresses for electronic mail. Not only were they using ARPANET for person-to-person communication, but also they were very enthusiastic about this particular service, far more enthusiastic than they were about long-distance computation.

So we can say that users have modified the original purpose of ARPANET in their own interest and there are no rigid technologies determinism. That happened not long before the invention of the mailing list, an ARPANET broadcasting technique in which an identical message could be sent automatically to large numbers of network subscribers. Interestingly, one of the first really big mailing lists was "sf-lovers", for science fiction fans. Discussing science fiction on the network was not work-related and was frowned upon by many ARPANET computer administrators, but this did not stop it from happening.

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[12] Huitema, C., *Et Dieu créa l'Internet,* pp. 52-53

[13] Vinton Cerf, *How the Internet Came to Be,* in "The Online User's Encyclopaedia," by Bernard Aboba, Addison-Wesley, November 1993

Nevertheless it was a complete success and we can call this the first stage of Internet. In those early years, a relatively small closed community used ARPANET. The impacts on our society were indirect by helping the scientific researches. This network was not designed to become the Information Superhighway of today: “Back in the 1960s, the scientist and engineers involved in the creation of the precursors to the Internet were not interested in marketing or even in playback for their investments of time and energy. They did not care about entertainment or about ease-of-use. They simply wanted to communicate with each other”[14]

2.1 The tools of the first stage

2.1.1 E-mail

“Electronic mail service, the first and most widely used tool, is a set of programs that enables private mail among individuals and groups to be distributed within seconds to any site on the Internet backbone.”[15] In many ways electronic mail is comparable to sending an item through the regular postal service, as both services involve the exchange of information between one party and another. Electronic mail can be used to send the same message to several people, but it is most common use is to facilitate one-to-one communication.

When one is sending a letter through regular post the sender needs to know the address of the person to whom he is sending the letter. The same applies with electronic mail. Every computer on the Internet has a unique address called its Internet address or more informally its e-mail address.

A person’s Internet address consists of his or her user-name followed by the name of the computer at which the person works. The first part allows the Internet e-mail delivery systems to determine who the message is for, and the second part states where that person can be found on the network. Internet addresses have the following form:

user-name@computer-name

When E-mail was invented Fax did not exist but now we can wonder which one is the best, at least for some usages where graphics or signatures are not necessary . The answer is simple, E-mail has many advantages comparing with the Fax. It is cheaper, faster and easier to use. You can send hundred pages by E-mail and they can be modified what it impossible with the Fax, you need to rewrite them. However, E-mail is not problem free. The main problem is the security, your messages can be intercepted and read by someone else. “Because of E-mail security problems, encryption is one of the most hotly debated topics in the computer

[14] Sulivan-Trainor, M. *Detour : the truth about the Information Superhighway*, p. 174

[15] Rheingold, H., *The virtual community, Surfing the Internet*, Minerva, 1995, pp. 98-99

world."[16]. There is different technical process to encrypt a message like RSA[17] and DES (Data Encryption Standard) and you can find on Internet software like PGP (Pretty Good Privacy). If you encrypt your messages you do not need to bother about security, for it would be quite impossible to read your messages, unless somebody else is ready to pay a high price to read them. That is precisely the case for the state who would like to read such messages for security reasons. "Public-key encryption as it exists today is unbreakable by all but the most power computers, such as those owned by the National Security Agency. Policy debate and legal challenges have revolved around citizen right to use mathematically unbreakable encryption. The National Security Agency sees this as a security nightmare, when it can no longer do its job of picking strategic signals out of the ether and inspecting them for content that threatens the security of the United States. Certain discoveries in the mathematical foundations of cryptography are automatically classified as soon as mathematician happens upon them"[18]. In France for example, it is prohibited by law to encrypt a message. In USA, the government would like to impose its own technical process called "the Clipper Chip" :"The National Security Agency has developed an encryption method based on a tiny microprocessor called the Clipper chip, also called the Key Escrow chip. By using a personal computer, interactive television, or high-tech telephone that incorporates this chip, you would be assured of secure communications unless the government suspects you are engaged in an illegal activity. In this case, unlike with other encryption methods, the government would be able to listen in. But in order to do so, officials at two agencies would need to release their "keys", which would require a court order."[19] Users are not very satisfied with Clipper because they do not trust the government and besides they think that somebody else could find these "keys". See the chapter "Will Internet be good for democracy?" at page 33

2.1.2 **File transfer: FTP**

The Internet enables users to copy programs and data files between computers on the Internet. This process is called file transfer, and the program that is used to do this is called FTP. FTP enables the creation of FTP archives-repositories of programs and other information that can be freely accessed by anyone on the Internet.[20]

For example, if an Internet user writes a useful computer program and wishes to make it available to other people on the Internet, one way to distribute it would be to e-mail it to each

[16]Canter, L.A. and Martha S. Siedel, *How to make a fortune on the Information Superhighway*, London, Haper Collins, 1995, p. 93.

[17] By MM. Shamir, Rivest and Adleman (1983) in Huitema, C., *Et Dieu créa l'Internet*, Paris, Eyrolles. 1995, p. 116

[18] Rheingold, H., *The virtual community, Surfing the Internet*, Minerva, 1995, p.296.

[19] Goldsborought, R., *Sraight talk about the Information Superhighway : Hear what these industry leaders and experts have to say*, Indianapolis, Alpha Books, 1994, p.243

[20] Levine, R. and Carol Baroudi, *Internet pour les nuls*, Paris, Sybex, 1994, p.109

of his or her colleagues. However this way it would only reach a relatively small audience. A more efficient way to make it available to other people would be to make it available for FTP.

When a program (or some other part of information such as a report or a story) is made available for FTP this means that, although it is stored on a particular computer, it is in such a way that anyone else on the Internet, who happens to know that it is there, can transfer a copy of it to their own computer. The original is still untouched, but now the other person also has a copy of the resource. This is called " anonymous FTP " because you do not need an account of the computer you are accessing. "To access a computer that is a distance away and on a different network from yours usually requires you to get prior authorisation and a password from the owner of that computer. Most computers on Internet, however, allow others to log in through FTP simply by using the name Anonymous. This system is referred to, predictably enough, as Anonymous FTP"[21]

2.1.3 **Telnet**

Telnet is a program that allows a user to logging into other computers on the Internet . This means you can run programs that are residing on that computer. FTP and Telnet have quite different functions. FTP enables programs (and other files) to be copied from another computer, whereas Telnet enables programs that reside on another computer to be run without first having to make a copy of them. Many programs that are not available for FTP (either because they are too large or because they are copyrighted) are nonetheless available to be use via Telnet. It is used to access many public services, including library card catalogues and other kinds of databases.

3. THE SECOND STAGE: ACADEMIA TOOL

The second stage began in the mid-80s where ARPANET becomes Internet for technical reasons and stopped existing in 1990 : "ARPANET was honourably decommissioned in March 1990"[22]. In 1983[23], the ARPANET was split into two separate networks. Some of its computers were linked together to form a new network called MILNET (a non-classified military network) and the remaining machines stayed together as ARPANET.

After the split, a computer that was part of one network could still exchange information with a computer that was part of the other network by routing it through a gateway computer. So in addition to connecting together individual computers to form a network, the designers

[21]Canter, L.A. and Martha S. Siedel, *How to make a fortune on the Information Superhighway*, London, Haper Collins, 1995, p.140

[22] Rheingold, H., *The virtual community*, *Surfing the Internet*, Minerva, 1995, p.84.

[23] ibid. p.82.

of ARPANET and MILNET had progressed in connecting together entire networks of computers. In short, they had created a network of networks.

As early as 1977, TCP/IP was being used by other networks to link to ARPANET. ARPANET itself remained fairly tightly controlled, at least until 1983, when its military segment broke off and became MILNET. But TCP/IP linked them all. And ARPANET itself, though it was growing, became a smaller and smaller neighbourhood amid the vastly growing galaxy of other linked machines. As the '70s and '80s advanced, many very different social groups found themselves in possession of powerful computers. It was fairly easy to link these computers to the growing network-of-networks. As the use of TCP/IP became more common, other whole networks fell into the digital embrace of the Internet, and messily adhered. Since the software called TCP/IP was public domain, and the basic technology was decentralised and rather anarchic by its very nature, it was difficult to stop people from barging in and linking up somehow. In point of fact, nobody wanted to stop them from joining this branching complex of networks, which came to be known as the " Internet. "

A new term was coined to describe this notion : an internetwork meaning an interconnected set of networks. The term became shortened to Internet, and this particular Internet (formed from the ARPANET and MILNET networks) became known as the Internet.

In 1986[24] the US National Science Foundation (NSF) decided to fund the Internet in order to increase the number of US universities that had computers connected to it, and it was at this time that the Internet phenomenal growth began.

Connecting to the Internet costs the taxpayer little or nothing, since each node was independent, and had to handle its own financing and its own technical requirements. The more, the merrier. Like the phone network, the computer network became steadily more valuable as it embraced larger and larger territories of people and resources. ARPANET too was a curiosity for a while. Then computer-networking became an utter necessity.

In 1984[25] the National Science Foundation had begun acting, through its Office of Advanced Scientific Computing. The new NSFnet set a blistering pace for technical advancement, linking newer, faster, shinier supercomputers, through thicker, faster links, upgraded and expanded, again and again, in 1986, 1988, and 1990. And other government agencies leapt in : NASA, the National Institutes of Health, the Department of Energy, each of them maintaining a digital satrapy in the Internet confederation. The nodes in this growing network-of-networks were divided up into basic varieties. Foreign computers, and a few American ones, chose to be denoted by their geographical locations. The others were grouped by the six basic Internet " domains " : gov, mil, edu, com, org and net. (Graceless

[24]Huitema, C., *Et Dieu créa l'Internet*, Paris, Eyrolles. 1995, p.67.

[25] Rheingold, H., *The virtual community, Surfing the Internet*, Minerva, 1995, p.83.

abbreviations such as this are a standard feature of the TCP/IP protocols.) Gov, Mil, and Edu denoted governmental, military and educational institutions, which were, of course, the pioneers, since ARPANET had begun as a high-tech research exercise in national security. Com, however, stood for " commercial " institutions, which were soon bursting into the network like rodeo bulls, surrounded by a dust-cloud of eager non-profit " orgs. " (The " net " computers served as gateways between networks.)

As discussed ARPANET itself formally expired in 1990, a happy victim of its own overwhelming success. Its users scarcely noticed, for ARPANET's functions not only continued but steadily improved. The use of TCP/IP standards for computer networking is now global. In 1971, mere twenty-one years ago, there were only four nodes in the ARPANET network. Today there are thousands of nodes in the Internet, scattered over a majority of countries, with more coming on-line every day (now in the millions).

The Internet is especially popular among scientists, and is probably the most important scientific communication instrument of the later part twentieth century. The powerful, sophisticated access that it provides to specialised data and personal communication has speeded up the pace of scientific research enormously. But this is still to be qualified as indirect impacts of Internet on society, just as in the first stage.

3.1 The tools of the second stage

Internet is becoming more and more friendly and easy to use, especially with Gopher but at this stage you still need a good knowledge in the computer field to use it. Still, Internet is no more a tool for computer scientist only, and new users want something more accessible. So a lot of tools appear to find its way on Internet like Archie, Veronica and WAIS. Users have change Internet, let see how.

3.1.1 Listserv

The primary function of Listserv is to operate mailing lists (also referred to as " distribution lists "). Mailing lists are used to distribute the e-mail sent to them to a list recipient. They provide the means for a group of users to establish an e-mail forum on any topic or area of common interest. For example, quantum physicists who are interested in particle acceleration can request that a mailing list should be created for them at one of the Listserv servers. This request must be directed to the Listserv administrator at a computer site operating a server. Once the list has been established, any user from across the EARN / BITnet network, or from any other network that can reach the EARN / BITnet network, can apply to join it. Sending a list subscription request to the Listserv server managing the list may do this. Their name and e-mail address will subsequently be added to the list membership. Listserv will distribute copies of all e-mail sent to a mailing list to all of the members of that list. This service provides an extremely convenient means for the exchange

of ideas and information between list members since Listserv (and not the mail sender) manages the distribution of e-mail to all of its final recipients.

Users need only to remember a list address to which they send their mail in order to communicate it to a potentially large number of users. Due to the efficiency with which Listserv distributes e-mail to list members, discussions or debates with a worldwide audience may be conducted. Note that sending mail to a mailing list is not the same as sending mail to a Listserv server itself. To distribute mail to a mailing list, it should be sent to that list's address. Sending e-mail to a Listserv server is necessary only if it contains a series of Listserv commands you want to use. A Listserv server may manage any number of mailing lists. Each mailing list will have a " list name " of up to thirty-two characters in length. However, most lists have only eight characters in their name and these commonly end with '-L' (to readily identify them as Listserv mailing lists). A list's name goes to make up its "e-mail address". For example, the Biomechanics and Movement Science list has a list name of BIOMCH-L and is located at the node Hearn. The list therefore has an e-mail address of BIOMCH-L@Hearn, which should be used when sending mail to that list for distribution. The Listserv server at node Hearn will manage the list and it is to this server that all user commands related to the list (such as subscription requests) should be sent.

The developments of e-mail and Listserv have seriously affected group communication. The objectives and processes associated with group communication have undergone significant changes. Previously, when group communication took place through mass mailings and circulated memos, it was understood that communication would be slow. In addition, the geographic distribution of group members may have been limited to save on delay time and distribution costs. However, the use of Listserv now makes it possible to send large amounts of information around the globe in rapid fashion.

The availability of instantaneous electronic communication has changed expectations, leading participants to expect nearly instantaneous responses. Kiesler demonstrates this change, observing: "We have talked with a company president in Pittsburgh who sends mail at dinnertime asking his subordinates in Singapore for quarterly projections by breakfast"[26].

3.1.2 **Usenet**

Another significant facility available to most users of the Internet is Usenet news, also known as network news or just news. Unlike electronic mail, which allows a user to send a

[26] Kiesler, S., Jane Siegel and Timothy W. McGuire. "Social Psychological Aspects of Computer-Mediated Communication." 1984. in *Computerization and Controversy*, Ed. Charles Dunlop and Rob Kling, San Diego: Academic Press, Inc., 1991, p.333

message to one or two specific people, Usenet news enables one's messages[27] to be read by a potential audience of millions of people[28].

We can describe Usenet news as the world's largest bulletin board service. Any message posted to the Usenet bulletin board[29] can be seen by potentially everyone else on the network. This looks like a regular paper-and-thumbtacks bulletin board often seen in busy shopping centers. Messages posted on the board can be seen by anyone who is connected to this group and not addressed to individual people, but are visible to everyone. Bulletin boards, regular or electronic, are thus useful when a user wishes to broadcast a message to a large number of people. Electronic mail, on the other hand, is useful when sending a message to one or two specific people.

Not all sites on the Internet have access to the Usenet news service. Similarly, there are some sites that send and receive Usenet news which are not parts of the Internet.

Usenet is included in computer nodes located across different networks. Not all Internet nodes are part of Usenet, and similarly, not all Usenet nodes are part of the Internet. Imprecise use often blurs this subtle distinction between the terms Internet and Usenet.

The Internet is a wide-ranging network, parts of which are subsidised by various governments. It carries many kinds of traffic, of which Usenet is only one. And the Internet is only one of the various networks carrying Usenet traffic.

Messages sent to the Usenet bulletin board are made available to millions of people. To prevent readers having to wade through all this traffic in the search for the postings that interest them, the Usenet bulletin board is divided into a large number of different areas called newsgroups. Each newsgroup contains messages related to a single subject. Some newsgroups receive hundreds of posting per day, others only one or two a week-it depends on the subject .

The names of these newsgroups are chosen to give an indication of what is being discussed in the group, but with several thousand different newsgroups in existence thinking of different names for them all, could still be a difficult task. To make names easier to understand and create, newsgroup names are arranged in hierarchies. Only the following seven newsgroup hierarchies are carried by all Usenet sites : *comp, misc, news, rec, sci, soc.* and *talk*. These are sometimes referred to as " the big seven " hierarchies. All sites do not carry other newsgroup hierarchies, such as alt or aus.

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[27] commonly called postings

[28] Rheingold, H., *The virtual community, Surfing the Internet*, Minerva, 1995, p.69.

[29] i.e. sent via a computer

As there are several thousand newsgroups it is likely that there is a newsgroup dedicated to the discussion of most subjects of interest.

To use Usenet, you have to conform to an Internetiquette see appendix 1 “General strategies for using Usenet” at page 51

3.1.3 **IRC**

Users within the Internet community may communicate electronically with each other using several methods of communication. Electronic mail is one, another is through a “chat” program known as IRC.

IRC has the same function as the CB[30] (Citizen Band) radio in which it enables groups of people to chat together without having to be in the same place. The major distinction is that while CB radio provides verbal interaction, IRC provides a textual interaction amongst its users. Participants do not speak to each other, as such, but type in lines of dialogue at their computer terminal which then appear on the screens of all the other users. “Users may log onto the discussion with a handle or nickname instead of their real names, borrowing from the convention of CB radio”[31]

Participation in an IRC chat is like reading a script which is being written as you watch-a script in which you are one of the participants. With many thousands of people using IRC at any given moment, obviously not all can be participating to the same conversation at once or complete chaos would result ; rather, IRC consists of many parallel conversations called channels. When a user runs the IRC software they must select a channel in which they wish to participate. From that moment, or until they change channels, they only see the dialogue of those other users who are conversing on the same channel.

In summary, IRC is a medium for conducting informal group conversations over the Internet. It does not have normally the relative privacy of electronic mail or the huge readership of Usenet. Unlike those other media, however, it is live (phone also is live, of course). There is virtually no delay between a person in the UK typing a line of text and the receiver reaching it in the US.

However IRC can also be use for business or scientific meeting by using encryption tools. Because IRC is a text-based medium, physical and social dimensions are absent or best said, hidden. The removal of these cues may create some interesting problems, and resolve some others. The absence of regulating feedback, such as head nods and tone of voice may create co-ordination problems to express prior knowledge of a topic, something that can be done

[30] “CompuServe, for example, calls its chat feature CB” in Canter, L.A. and Martha S. Siegel, *How to make a fortune on the Information Superhighway*, p. 107

[31] Canter, L.A. and Martha S. Siegel, *How to make a fortune on the Information Superhighway*, p. 107.

with a simple cue in a face-to-face group meeting[32]. Social influences are also weakened with the use of IRC. Taking the head seat at a table, speaking in a loud voice, and gesturing are no longer explicitly possible when group meetings are conducted in a textual format. It is also no longer possible to hear the tone of someone's voice, or look them in the eye. The loss of this non-verbal behaviour, which is often important in bargaining situations, changes the way in which, and the extent to which, bargaining among group members occurs[33]. The loss of these non-verbal behaviour cues, however, may have a potentially positive effect on group behaviour, coupled with the removal of physical cues, especially those concerning status and position. Kiesler notes, "Software for electronic communication is blind regarding the vertical hierarchy in social relationships and organisations"[34]. To this end, it has been found that high status people do not dominate the discussion in electronic groups as much as they do in face-to-face groups[35]. No longer do "clothes make the man," and no longer is the meeting "turf" important. IRC allows meetings to continue in an egalitarian fashion, creating a situation in which all members may participate equally.

“The anonymity of interaction in IRC allows users to play games with their identities. The chance to escape the assumed boundaries of gender, race, and age create a game of interaction in which there are few rules but those that the users create themselves. IRC offers a chance to escape the language of culture and body and return to an idealised ‘source code’ of mind”[36]. Internet, here does not only change the way to attend a meeting but also the content of this meeting.

3.1.4 **Gopher**

The Gopher is a “ user-friendly ” lookup tool that lets you explore the Internet by selecting resources from menus. You can read or access resources through the Gopher without having to know domain names, URL, IP addresses. Rather than looking up addresses and telnetting to them, you find entries in a menu and select them. The Gopher then goes where you want whatever you have selected. A widely successful method of making menus of material available over the Internet. Gopher has also a search tool called Veronica. Although Gopher spread rapidly across the globe in only a couple of years, it is being largely supplanted by a hypertext development, also known as World Wide Web.

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[32] Kiesler, S., Jane Siegel and Timothy W. McGuire. "Social Psychological Aspects of Computer-Mediated Communication." 1984. in *Computerization and Controversy*, Ed. Charles Dunlop and Rob Kling, San Diego: Academic Press, Inc., 1991., p.333.

[33] ibid. p..334.

[34] ibid. p..334.

[35] Sproull, L. and Sara Kiesler, *Connections: New Ways of Working in the Internetworked Organization*, Cambridge, MA: The MIT Press, 1991, p.61

[36] Reid, Elizabeth M., *Electropolis : Communication and Community on Internet Relay Chat*, Unpublished paper, University Of Melbourne, Department Of History, 1991

But Gopher is not dead because “Gopher is extremely frugal on bandwidth : no large GIFs for the sake of it. As a result, Gopher searches are fast and efficient. Currently there are a few tastes of what Gopher servers and clients of the future may look like : and it seems likely they will all have some pretty snazzy graphical front-ends. Unlike the Web, the graphics will be part of the client and not necessarily transmitted from the server.”[37] Besides there are still thousands of Gopher Servers on the Internet and we can expect they will remain,

4. THE THIRD STAGE: THE EXPLOSION

The World Wild Web was invented by the CERN in 1991 and Mosaic (a browser that enables to use WWW) in 1993, so Internet went in his third stage of that evolution where “ everyone ”, everywhere could use it.

The Internet pace of growth in the early 1990s is spectacular, almost ferocious. It is spreading faster than cellular phones, faster than fax machines. The Internet is moving out of its original base in military and research institutions, into elementary and high schools, as well as into public libraries and the commercial sector.

The Internet “ anarchy ” may seem strange or even unnatural, but it makes a certain deep and basic sense. It is rather like the “ anarchy ” of the English language. Nobody rents English, and nobody owns English. As an English-speaking person, it is up to you to learn how to speak English properly and make any use you want of it (though the government provides certain subsidies to help you learn to read and write a bit). Though a lot of people earn their living from using and exploiting and teaching English, “ English ” as an institution is public property, a public good. Much the same goes for the Internet. Would English be improved if the “ The English Language, Inc. ” had a board of directors and a chief executive officer, or a President and a Congress? There should probably be a lot fewer new words in English, and a lot fewer new ideas. If we take the example of the French where the “ Académie française ” exists, less new words are invented than in English and it is difficult to speak only in French about new technologies, we have to mix it with some English words.

People on the Internet feel much the same way about their own institution. It is an institution that resists institutionalisation. The Internet belongs to everyone and no one. Still, its various interest groups have all a claim. Business people want the Internet to put on a financial sounder footing. Government people want the Internet more fully regulated. Academics want it dedicated exclusively to scholarly researches. Military people want it spy-proof and secure. And so on and so on. All these sources of conflict remain in a stumbling balance today, and the Internet, so far, remains in an anarchical condition. In the past, the

[37] Kennedy, J., “Gopher What?” in *NetUser*, Issue 3, September 1995, p.43

NSFnet's high-speed, high-capacity lines were known as the " Internet Backbone, " and their owners could rather lord it over the rest of the Internet ; but today there are " backbones " in Canada, Japan, and Europe, and even privately owned commercial Internet backbones especially created for supporting business traffic. Today, even privately owned desktop computers could become Internet nodes. You can carry one under your arm. Soon, perhaps, on your wrist.

But what does one do with the Internet? Six things, basically : mail, discussion groups, long-distance computing, file transfers, advertising and teaching (including co-operative work).

Both Netnews and e-mail are very widely available, even outside the high-speed core of the Internet itself. News and e-mail are easily available over common phone-lines, from Internet fringe-realms like BITnet, UUCP and Fidonet. The last two Internet services, long-distance computing and file transfer, require what is known as "direct Internet access" using TCP/IP. Long-distance computing was an original inspiration for ARPANET and is still a very useful service, at least for some.

Programmers can maintain accounts on distant, powerful computers, run programs there or write their own. Scientists can use powerful supercomputers on other continents. Libraries offer their electronic card catalogues for free search. Enormous CD-ROM catalogues are increasingly available through this service. And there are fantastic amounts of free software available. File transfers allow Internet users to access remote machines and retrieve programs or texts. Many Internet computers, about two thousand of them so far, allow any person to access them anonymously, and simply copy their public files, free of charge.

This is no small deal, since entire books can be transferred through direct Internet access in a matter of minutes. There are over a million such public files available to anyone who asks for them[38]. Internet file-transfers are becoming a new form of publishing, in which the reader simply electronically copies the work on demand, in any quantity he or she wants free of charge. New Internet programs, such as Archie, Gopher, WAIS and WWW have been developed to catalogue and explore these enormous archives of material.

Commercialisation of the Internet is a very hot topic today, with wild manners characterising most new commercial information, service included. Computer networks will feature worldwide-animated graphics, radio and cellular phone-links to portable computers, as well as fax, voice, and high-definition television. A multimedia global circus ! Or so it is hoped, and planned. Planning has never seemed to have much to do with the seething, frugal development of the Internet. After all, today's Internet bears little resemblance to those

[38] And many more millions of files are available to people through paying.

original grim plans for post-holocaust command grid. It is a fine and happy irony and this show how the users have modified the Internet during the three first stages. Of course Internet has had indirect impact and now it has even some direct impact on our society.

4.1 The tools of the third stage

4.1.1 World Wide Web

The World Wide Web or WWW or Web or W^3 is the newest and the most important development on the Internet. It represents the third stage of Internet, which through a browsing and searching system fitting a new hypertext format, enables users to explore efficiently information on Internet. The system links related documents using a powerful information presentation method called hypertext. In a Web document, many of the pieces of displayed information will be pointers or links to other information that can be accessed just by clicking on the link. This enables users to access information without needing to know its location in advance. Users need only know about a convenient starting point that is likely to have a link to the desired resource.

"Tim Berners-Lee could go down in history as the man who unified the world. He invented the World Wide Web, which is to say, he made the Internet usable and so helped launch what many believe to be the culmination of the communications revolution that began with the 19th century telegraph"[39]. In fact Tim Berners-Lee was helped by Robert Caillou in order to produce the first browser, both worked at the CERN. "The fist Unix line-mode WWW browser came out in 1991, and appeals went out for volunteers to write browsers as academic projects"[40].

Mosaic is one of the results of this appeal. Mark Andreesen at the National Centre wrote it for Supercomputing Applications in Illinois, in February 1993. It was by then the best known and most widespread WWW browser or customer software, until Netscape emerged. The source-code to Mosaic was licensed by several companies and there were several other pieces of software as good or better than Mosaic. Today (1996), Netscape seems to take over (but the war it not finished yet, and who knows how Microsoft might respond).

The Web is an ease-use interface that enables non-technician to use efficiently Internet. With a browser you can not only read pages written for the Web in http but also ftp, gophers and news[41] without bothering how to do it. If you need information on a special topic you can be sure to find it on the Web but this not problem free. First you do not know the quality of

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[39] Akass, C., "The whole world in his hands" (Interview with Tim Berners-Lee) in *Personal Computer World*, December 1994, p.380

[40] Akass, C., "The whole world in his hands" (Interview with Tim Berners-Lee) in *Personal Computer World*, December 1994, p.381

[41] Huitema, C., *Et Dieu créa l'Internet*, Paris, Eyrolles. 1995, p.44.

information and furthermore you may have too much information. “Information networks straddle the world. Nothing remains concealed. But the sheer volume of information dissolves the information. We are unable to take it all in.”[42] Nevertheless, the Web may have direct impact on people by changing the way to gather information if more than just 30 millions use it.

5. THE FOURTH STAGE: THE INTERNET CULTURE VS. EMERGING FUNCTIONALITIES

5.1 Will Internet be the Information Superhighway?

What is the Information Superhighway ? It is not easy to answer such a question because the definition itself is very important for the political and economical area, and therefore heavily marked by ideological twists. Nevertheless, we can already describe the most important characteristics of this upcoming tool. The Information Superhighway should enable to give its users access to vast amounts of information, much beyond what is known today. For this, it should quick and use a very wide bandwidth. And what for ? It remains to be verified by social history if it will be a real culture and economic convenience. And this is why it is a legitimate question to ask oneself if Internet will be the technology system pre- and configuring such mass communication tool.

There are risks and advantages in the Internet society, it depends of your point of view. Let see some of them. Already, customers in the Internet society are able, for a small fee, to have electronic mail addresses of prostitutes in his or her regional physical location. Encryption will enable such information to be exchanged in total privacy. Maybe the customer will want to know e-mail addresses for drug dealers. Though “reasonable” people do not advocate these activities, the illustration is helpful in that it demonstrates that people will always do what they wish to do and governments will always pillage the productive to finance illusory wars to stop the offenders.

In order to have a better view of Internet, we have interviewed users about its future. For this we have used Listserv and subscribed to different groups like “futurec”. Besides, in order to improve our chance to collect information, we have used subterfuge (see annexe “General strategies for using Usenet”) like not asking directly a question, answering more questions than asking, and guarantee anonymity. Of course, we have received some strange answers, but we have selected only the most useful ones for our study.

[42] Günther Grass (b. 1927), German author. Interview in New Statesman & Society (London, 22 June 1990).

"The Internet may well be part of the Information Superhighway but not nearly all of it. The Internet lacks a number of needed features: a proper security framework, multimedia and a much richer set of qualities of service. Also, middle ware is lacking significantly accounting, billing, name servers, directories and so forth. But these can be added to the Internet incrementally."[43]

It looks like a clever answer, since it is likely that Internet will never be all what we mean today by the Information Superhighways. Nevertheless, it might play an important role in it. But will it be the same Internet as today or will another media supplant Internet? What is the future of the Internet? In other words, will it evolve into the Information Superhighway of tomorrow, if that still fuzzy concept ever comes to life?

For Christian Huitema the answer is clearly positive because Internet is a decentralised network where the intelligence is not in the network but in the computers using it so Internet can involve without difficulty[44]. For others Internet is too slow and can not involve into the Information Superhighway[45].

"The Internet will be upgraded to ATM [Asynchronous Transfer Mode] as the base network to support the increased bandwidth. Today's voice net supports 600G bits, and the nation's data net will grow to 3,000G bits by 2020. Putting ATM under the Internet is very easy due to layered protocols and will be done within two years."[46]

"There is a stunning consensus that cell-switching, embodied in the emerging ATM standards, is the required infrastructure for this revolution. It is emerging as the appropriate backbone technology to support a variety of user services such as frame relay. Once corporations are connected to ATM backbones for inexpensive broadband data services, the [private branch exchange] vendors will provide ATM interfaces, allowing corporate voice traffic to transition. As Internet applications, cable and video-on-demand and telephone services all transition to ATM networks, the distinction between them disappears." [47]

ATM is the solution to increase the speed of Internet but not the form, for the users Internet will be the same to use. Of course it will offer other services that theoretically already exist but are too slow to put in practice. These new services and the increase of speed will be the only noticeable change for the users. Let see some remarks about this topic :

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[43] From Usenet

[44] Huitema, C., *Et Dieu créa l'Internet*, Paris, Eyrolles. 1995, pp.64-66

[45] Baran, N., *Inside the Information Superhighway revolution*, US, Coriolis Group Books, 1995, pp.35-60.

[46] From Usenet

[47] From Usenet

"There is a risk that the current Internet is over hyped for its current range of information services. I expect some dissatisfaction will result when other commercial services, such as America On-Line, provide a more reliable information source. But I am confident that 10 years from now we will still use the Internet. What else will be around in 10 years is the insight that makes millionaires." [48]

"The transition to the next generation [Internet Protocol] may be the dominant issue during this time. Part of the design of the new protocol includes attention to security, mobility, real time and multicast, so there are really several different capabilities wrapped up in this transition. Substantial evolution of products, services and organisations will be required." [49]

"It's not clear in the National Information Infrastructure there's going to be anyone around who knows enough about all the pieces to make something work or, if something goes wrong, to fix it. The challenge is how to prevent that scenario from becoming the showstopper." [50]

"All aspects of the Information Superhighway, whether it's 500-channel TV, movies on demand, interactive TV, multimedia applications on the Internet, require a great deal more bandwidth and switching capacity than the current infrastructure can support." [51]

"In order of importance: protection of resources from external access and destruction; security and privacy of information; methodology to increase bandwidth to accommodate growth; elimination of unwanted traffic or intrusion; and keeping the costs down." [52]

ATM seems to be the best solution available today to all these problems, and we can not seriously imagine Internet to become the Information Superhighway without it. In this case, an advantage of ATM it is that it will not change the habits of Internet's users, as it is not a revolution, but a transparent evolution, within a wider cultural change (that we speak about more in depth further on).

However, Internet might also bring benefits and change to our society. The Internet is a deeply social environment engendering a strong sense of community, virtual friendship and belonging. The idea of a community accessible only through a computer screen may have sounded cold to the user, at first, but he/she learned quickly how passionate people can feel about e-mail and computer conferences. He/she has become one of them. He/she cares about these people he/she met through his/her computer, and he/she cares deeply about the future of

[48] From Usenet

[49] From Usenet

[50] From Usenet

[51] From Usenet

[52] From Usenet

the medium. The problem of security can be solving by the use of very powerful encryption technology that will be done at a level that you are not aware of. In other words, tomorrow, applications may look the same, but transmission of data and communication will probably be done in an encrypted form.

As discussed, one might think of the Internet as a cold place, and yet it need not be, as we have already said before. In the impersonal isolation of our large cities, where people often live separated from kin or lonely amid multitudes, it seems that the Internet can become a surrogate social-life, a vital source of interpersonal contact despite its non-physical nature. The combination of community, humour and socialisation that is prevalent on the Internet makes it a far more appealing and gregarious place than it may at first appear from its barren textual interface. An appreciation of the Internet's " humanity " can help to reduce the apprehension that non-technically literate users often experience when using computers. Furthermore the Internet is becoming less and less technical, and more and more ease-to-use. and as Thierry Gaudin puts it, as it is technical system based upon network logic, it fosters more democratic spirit and potential than other standard media such a television for instance[53].

If Negroponte see some risks, Andrew Kupfer see also some benefit coming through the Internet. The industrial model of society that has shaped our perceptions and social habits for generations is now coming under attack by the network model, social scientists suggest. What this pretends is the subject of Andrew Kupfer's "Along Together"[54].

"Industrialisation moved people from a sun-based routine to one controlled by the time clock and characterised by a separate workplace, Kupfer explains. "Wired technology already is assaulting the industrial concept of the workday; as technology brings greater realism to electronic communications, the workplace for many will become untethered to geography, letting people live anywhere. The fear is that in liberating us from geography and the clock, networks will destroy intimacy, both by making solitude impossible and by making physical presence immaterial to communication."[55]

Kupfer goes on citing examples of how this is already happening and why such trends may accelerate: "Imagine a company with a task that needs urgent attention--say, designing a lawnmower or writing a computer program (of course, there activities more tele-workable than others). The company might not maintain a cadre within its ranks to do the job. Instead, it trolls the net for talent, sending out a bulletin that describes the tasks to be done and the

[53] Gaudin, T., *2100, Odysséee de l'Espèce*,Paris, Editions Payots&Rivages, 1993

[54] Andrew Kupfer's "Along Together" in *Fortune*, Mar. 20, 1995, pp. 94-104

[55] ibid. p.100.

skill required of team members."[56] Winning bidders would work together via video hook-up and then disband, vanishing once again into the global talent pool.

5.2 Will Internet be a commercial tool ?

Another very recent development is the invention of " digital cash. ". This new application of existing technology will allow any individual with a computer to open an account from anywhere, to sell and buy wares. The problem now is the security of these transactions because even with encrypted messages the security is not guarantee, this comes from the nature of Internet where the messages can be intercepted and decrypted. But this is not easy and it costs a lot of money to decrypt these messages. What we can say is that the security is growing and that the full security is an illusion.

"The network will be the medium of choice for communication within a single company. The network will also be used for inter enterprise and customer-to-merchant interactions. Some of these will involve delivery of goods and services directly over the Internet; other uses will be in support of goods and services delivered conventionally." [57]

"The corporate decision today should be: Forget building your own network. The Internet is by far the best buy for a commercial user. It offers the largest network; it has the lowest cost. Uses will be all voice, data and video communications including the listing of all products and services. These listings not advertisements will totally change the way industry and the public searches for and buys products. There will be a huge increase in video on the network. In the corporation, the emphasis will be on video messaging. Computers are currently used for two things: computing and non real-time messaging. In the future, they will be used for a third thing: real-time communications." [58]

"In three to five years, there will be millions of organisations, mostly small commercial organisations, doing their mainline business over the Internet as naturally as they use the fax today. In a couple of years, it will be the default expectation that the little restaurant on the corner will have an [Internet directory listing]. As the technology evolves to the point that this can be used to place take-out orders or make reservations, such connectivity will become a prerequisite to survival. The same argument applies to most any business. Add security, credit card charging and the L. L. Bean catalogue, and voila electronic commerce, "Yellow Pages" type advertising will be a very effective way of reaching prospects. For example, all those who sell widgets can list their up-to-the-minute pricing for various sizes and quantities of widgets. Those who want to buy widgets can find the best price or submit an offer at some lower price, much as the stock market works today, but based on a software package running

[56] ibid. p.101.

[57] From Usenet

[58] From Usenet

on an inexpensive workstation connected anywhere on the Internet. Temporary labour markets will emerge on the same basis. As corporations continue to downside and move toward virtual corporations, more and more of the work force will contract on a job basis using this sort of electronic market." [59]

And what can do the government? For the government to stop you from selling your wares to any location, they would have to shut down the entire network. If they disable only a portion, the information you are transmitting automatically takes another route to its destination, all at the speed of light. Of course, it would be more practical to lock you up as a means of preventing your particular brand of commerce. However, what if 100,000 people or more are doing the same thing? What if your physical location is unknown and can not be determined? In the near future, people will be able to connect to Internet, supply a credit card number (or other form of payment), and visit a virtual gambling casino from the comfort of their own homes. As we have seen before, the government is likely to be powerless to stop it because hardware can be located anywhere outside a coercive government's jurisdiction. All that is required is a connection to the Internet. Geography is little relevant.

Nicholas Negroponte sees other risks related with business on Internet : "The next decade will see cases of intellectual property abuse and invasion of our privacy. We will experience digital vandalism, software piracy, and data thievery. Worst of all, we will witness the loss of many jobs to wholly automated systems, which will soon change the white-collar workplace to the same degree that it has already transformed the factory floor. The notion of lifetime employment at one job has already started to disappear."[60]

"Protection of intellectual property is key. Companies won't try selling [electronic products] until they understand how they can survive in that world. If you get something over the Internet, how do you know that the person who gave it to you has a right to it? How do you know it's the real thing? If you scan in a photograph and use it in your newsletter, how do you know you are not going to be sued for $1 million by someone saying you didn't have permission to use it? These are really big-ticket items and serious questions."[61]

As discussed in the last chapter : if Internet wants to become the Information Superhighway of tomorrow, it has to increase both speed and bandwidth and this can be done with ATM, hopefully. Now we can say : if Internet wants to become the commercial tool of the future, it has to increase overall security, and this can be done through cryptography (this is already a major strategic debate).

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[59] From Usenet

[60] Negroponte, N., *Being Digital*, London, Hodder&Stoughton, 1995, p.227

[61] From Usenet

5.3 **Will Internet be good for democracy?**

The Internet represents important developments in technology that may affect human society and intellectual development. We are in an early stage of the development and distribution of these technologies, and it is important to look towards the future. Some areas of human society where these new communication technologies are likely to further develop include government, human communication and community formation. The impact of Internet on the workings of democracy is the subject of this chapter. More precisely the question is whether the Internet, in whatever form it takes, will enhance democracy by allowing more citizen participation, or damage it.

Modern Western democracies generally use a form of government called representative democracy, in which local groups of people choose one or more of their number to represent their interests. This is necessary due to the size and geographic dispersion of the population. It is feasible that the infrastructure of the Internet, having evolved into the Information Superhighway, may in the not-too-distant future be almost universally accessible in much the same way that the telephone and television are today in Europe or in US. Within such a scenario the Information Superhighway could serve as an instrument for enabling a change from representative democracy (with its infrequent elections and referendums) to participatory democracy, in which electronically conducted surveys of entire populations could become routine daily events. Even more, electronic democracy is not merely voting from home and more often, but to have a more thorough and transparent access to information and debates that will found voting capabilities.

Still, before computer networks can make it easier for people to participate in government affairs, though, users must have access to these networks, know more about them and understand their potential. It will be important to make sure public networks are accessible in remote areas. Of course they first need to understand democracy but that is another problem.

We can imagine that Internet can improve direct democracy by giving citizens more information about government for instance, and special-interest groups can use them to publicise their views, but we do not know yet if more direct democracy will be really good for democracy or might overload and therefore block the democratic process.

“Virtual communities could help citizen revitalise, or they could be luring us into an attractively packaged substitute for democratic discourse.”[62]

Democracy is government by the people, and Internet, thus, could allow everyone to speak without fear of not getting a chance to talk, which is an interesting step for democratic

[62] Rheingold, H., The virtual community, Surfing the Internet, Minerva, 1995, p.276.

decision making processes. In addition, other converging technologies might help to make a true participatory democracy possible (although we know that there are today already, some setbacks to this hypothesis, exclusion is still massive).

It is important for a democratic system that citizens living in rural areas, people with various handicaps, or of low-income have equal opportunity with everyone else to access and use the Internet. For example, let us mention the high prices involved in long distance phone rates which most rural inhabitants need to pay to communicate with other people. These rates would have to be paid to connect to the most likely closest Internet access phone number. So we can say that rural access would be expensive. Just the same, people with handicaps would need to buy expensive input/output devices to facilitate their individual disadvantage.

Formation of new political and special interest groups occur (extremes, for instance), meanwhile political wars continue to be fought on the battleground of conventional news media. The question is now: do these special interest groups have a weapon, thanks to the Internet, that that makes them more powerful each passing day? Grass-roots political movements, through their electronic interconnection on the Internet, may as a matter of fact more powerful than ever before. Supporters of candidates, as well as the candidates themselves, can now share information in a matter of minutes. The alt.politics newsgroup hierarchy is chock-full of people discussing politically related topics of all kinds. Discussions cover the spectrum, *alt.politics.radical-left* to *alt.politics.usa.republican*. *alt.politics.correct* allows the proponents and opponents of the political correctness movement to slug it out in a war of words. Let us mention the vast usage of Internet that Clinton did during his last two election campaigns (dedicated newsgroups, for instance), allowing people from around the world to watch the American political circus.

"Whereas it took years for information and ideas to circulate by hand and to arrange the face-to-face meetings that drafted the Declaration of Independence and the Constitution, computer networks can greatly speed up the process of people-to-people exchanges of information, ideas, and plans of actions. Of course, not only small or 'splinter' groups recognise this potential. By the 1980's in the United States, many presidential campaign organisations were using Internet to organise their nation-wide efforts. By the 1992 campaign, the Democratic candidate was uploading position papers directly into CompuServe, and Ross Perot was promising an 'electronic town hall' that would directly involve citizens in debates and preference votes, should he be elected"[63]

Political manoeuvres on a state level have prompted Internet based responses. The *amend2-discuss* and *amend2-info* mailing lists, both based at cs.colorado.edu, for instance, were created in response to Colorado's Amendment 2, which revoked any existing

[63] Newsweek, June 22, 1992

gay/lesbian/bisexual civil rights legislation, and prohibited the drafting of any new legislation. Members of the mailing lists discuss the implications and issued that surround the amendment. Internet political movements occur on a national level, as well. “This is a pivotal moment in history." begins a message entitled "Electronic Privacy -- A Call to Action,"[64] . It focuses on an announcement made by the Clinton administration on February 4, 1994, in which the administration expressed its support for the Clipper Chip (see chapter “E-mail”) and Skipjack encryption scheme as national standards. The message notes, "The proposed encryption scheme ... relies on a 'key escrow' system with a built-in 'back-door' so that security agents can decrypt and monitor even supposedly 'secure' communications". The on-line community is straightforward about its feelings for Clipper, stating, “The security agencies and the administration are involved in a stealth strike at our freedoms that could effectively abrogate the Bill of Rights in cyberspace, where we and our descendants will be spending increasingly larger parts of our lives". Wired On-line has joined together with the Electronic Frontier Foundation and the Computer Professionals for Social Responsibility in organising a campaign to fight the Clipper proposal. The CPSR put together an "electronic petition to oppose Clipper." The petition has been widely circulated across the Internet, on mailing lists, Usenet newsgroups, and gopher sites. To sign the petition, all one has to do is send e-mail to Clipper.petition@cpsr.org with the message "I oppose Clipper." A special edition of the "CPSR Alert" bulletin notes that over 10,000 responses were generated in the first two weeks, with daily signatures totals running at almost 2,000 per day. It also points out an interesting fact in that

The citizens of any country have often resisted when their rights were infringed upon, and the development of cyberspace opens a vast uncharted area in terms of rights and liberties. However, the advent of cyberspace also opens up new ways in which citizens can organise against these infringements, allowing them to fight in ways and numbers not before possible.

“The technology that makes virtual communities possible has the potential to bring enormous leverage to ordinary citizens at relatively little cost: intellectual leverage, social leverage, commercial leverage, and most important, political leverage. But the technology will not in itself fulfil that potential; this latent technical power must be used intelligently and deliberately by an informed population. More people must learn about that leverage and learn how to use it, while we still have the freedom to do so, if it is to live up to its potential"[65] .

There is thus the hope that political "think tanks" will not stay the exclusive domain of wealthy universities and government agencies. The fact that the Internet has become so widespread and easily accessible (in the upper middle class of the Northern Hemisphere, at least), allows layman and expert alike to collaborate on equal footing. The asynchronous facet

[64] by the staff at WIRED Online

[65] Rheingold, H., *The virtual community, Surfing the Internet*, , Minerva, 1995, pp. 4-5

of Internet permits people to participate at their convenience, and the high-speed nature of electronic communication allows quick turnabout for results, as the Clipper movement showed. In addition, the self-policing of the Internet allows discussion to be focused, so goals can be accomplished with a minimum of interference.

5.4 Will Internet bring a new culture?

What will be the impacts of Internet on the culture of computer people?

To talk about the impacts of Internet on the culture of computer people is a wide topic. As we have limited our studies at three global impacts, we will focus on the impacts coming through Usenet, Listserv, IRC and e-mail. The reason is that we can already see some clues of impacts on culture. For instance to foresee about teleworking by Internet will be pure science fiction because very few people use it for this. We will talk about facts that are now noticeable and try to answer different questions.

Do the users of Internet form a society with its own distinct culture?.

The Internet can not be viewed as an independent society, as the networks fail to provide many of the essential features that can be expected of a society ; for example, the provision of food and shelter for its members. Although not an independent society, we find that the Internet do constitute a superstructural society that spans many mainstream societies and is dependent upon them for its continued existence. While inheriting many cultural elements from the societies that it spans, this superstructure society nonetheless supports its own distinct culture.

What are the key aspects of the culture of the Internet ?

The culture of the Internet and Usenet global computer network owes much to that of the mainstream societies that it spans. In addition, the culture is strongly influenced by the computer hacker culture. “The lack of social context cues in computer-mediated communication obscures the boundaries that would generally separate acceptable and unacceptable forms of behaviour. Furthermore, the essential physical impression of each user that he is alone releases him from the social expectations incurred in-group interaction. Computer-mediated communication is less or at least differently bound by conventions than is face-to-face interaction. With little regulating feedback to govern behaviour, users behave in ways that would not generally be acceptable with people who are essentially total strangers”[66]

Key elements of the Internet culture are briefly noted below and will be developed in next sections :

[66] Reid, Elizabeth M., *Electropolis : Communication and Community on Internet Relay Chat*, Unpublished paper, University Of Melbourne, Department Of History, 1991

- Written adaptations to the text-only medium.
- Mythological themes, such as magic and pseudo-religious terminology, influence the hacker culture and through it, indirectly, the Internet culture.
- Prestige is acquired within the Internet culture primarily through what one writes or through philanthropic actions such as maintaining a mailing list or writing freely distributed software ("give" rather than "take" philosophy, at least for the time being).
- The Internet culture has a complex set of conventions to which users are expected to conform. Other users deal with transgressions of Internetiquette in various ways ranging from written chastisement to the invocation of police authorities of mainstream societies.
- Mechanisms exist within the Internet society to encourage social conformity and reduce conflict.
- Within the restricted "westernised" community of its users, of course, one could argue that limited social stratification is present within the Internet society ; for example, system administrators and newsgroup moderators have powers that most users do not. Similarly, due to technical and financial constraints, not all users have equal access to resources.
- Reciprocity is the dominant feature of the Internet's economy, except of course, with the latest developments, e.g. superhighways and business orientated activities.
- The Internet is viewed as an anarchy by most of its users ; however, there are strong elements of democracy in some of its operations, and again, not to give into ingenuity, a lot of its architecture and protocols serve as ordering forces.

5.4.1 **Empowering or supportive elements of the culture**

In this chapter we are going to answer the question : what elements of this culture have an empowering or supportive effect on new users of the networks?

When moving from one culture to another, certain element of the new culture will appear as hurdles to be overcome, or barriers preventing one from becoming enculturated. Other aspects of a new culture may offer support and aid enculturation. For example the need for, and assumption of, computer literacy throughout the Internet culture acts as a barrier to those with a non-technical background. Conversely the maintenance of FAQ's in many Usenet newsgroups is a cultural convention that can make entry into the culture easier for new members.

We find that the major supportive aspects of the Internet culture are as enumerated below:

1. The conventions of the culture are freely discussed.

2. The culture is not closed to outsiders and welcomes new members although within subtle boundaries as far as behaviours as concerned.

3. There is a strong sense of community within the Internet culture.

4. It's what you say, not who you are, although the "how you say it", within the Internet's culture and symbolic values, determines somehow who you are, but of course in a more limited sense than in the open social arena.

These factors will be described in more detail in the pages that follow.

1.The conventions of the culture are freely discussed

The Internet is not a secretive culture. Many cultures or secret societies withhold cultural lore from their members until the reach a certain age, or level of membership, or until they undergo painful initiation rituals[67].

The conventions of the Internet culture are not withheld, but freely discussed. Written sources, such as FAQ, clearly enumerate selected parts of the culture, and newsgroups such as news.newusers.questions exist for the explicit purpose of aiding the enculturation of new users.

Certainly there is technical lore that is understood by only a few, but such knowledge is not deliberately withheld—it is available to anyone able to undertake the necessary technical training. This sense of openness within the Internet society leads to a number of advantages. As stated, it eases the process of enculturation for new users. One is less likely to inadvertently violate a cultural convention when many of the conventions of the culture are clearly enumerated and widely available. When a transgression does occur, the offending individual can be easily referred to the appropriate written source for correction and guidance.

The Internet's openness also aims at encouraging social harmony. The presence of informational postings that clearly enumerate the culture's expectations and behavioural norms reduces the potential for conflict through ignorance of these norms.

2.The culture is not closed to outsiders and welcomes new members.

With the population of the Internet growing exponentially it is indeed fortunate that the Internet culture welcomes new members. Indeed, it could hardly do otherwise and survive.

This willingness of the culture to open its arms to all can be traced back to a number of causes. First, the underlying hacker culture is an open one. Raymond writes : "Hackers consider themselves something of an elite though one to which new members are gladly welcome." Furthermore, the increasing size of the Internet leads to an increased opportunity

[67] Barnouw, E., *Internatinal encyclopedia of communication*, New York, Oxford University Press, 1987, pp. 222-3

for the exchange of resources. The resources such as advice, graphics and software are most often traded on the Internet through a reciprocal exchange system (still, reciprocal means, as we have seen, "within the limits of the Internet insiders community"). Suppliers contribute resources with the understanding that they are supporting an institution that will likely reward them with a reciprocal benefit at some later time. With the increasing size of the Internet yielding a higher population of users available to supply resources it follows that there is a greater pool of resources from which to draw."[68]

This is a curiously inverted position to that of the mainstream society, in which, when a resource is shared amongst a number of people, the greater the population the more thinly the resource is distributed. On the Internet, however, if a resource is made available for FTP (i.e., available to be copied to other computers) then it can be copied by any number of people without reducing the share of the resource available to each.

The limit, for the time being, to this information accessibility seems to be mostly related to sturation problems, especially when America wakes up and gets on line (accessibility is restricted only in terms of speed and convenience, not in terms of content, though).

3.There is a strong sense of community within the Internet culture.

Engst makes the following observation about the Internet's appeal :

" ... if so many people from so many cultures and walks of life are connecting to the Internet, something has got to be there. Don't scoff ; no one makes all these people log on every day and spend time reading discussion lists and sending e-mail. People aren't forced to increase Internet traffic at a whopping rate of 20 percent per month. They use the Internet because they want to, and few people are happy when they lose Internet access for any reason.... People are connecting to the Internet because the Internet is becoming more than just an elite club of technoweenies it has become a virtual community in and of itself. "[69]

Let's make one thing precise right away: the community sense of the Internet users may well disappear in the future, especially if business activities become dominant, for instance. For the time being, we have nevertheless to acknowledge its existence and vitality.

As a matter of fact, while the Internet is popular for many reasons, another aspect of its appeal is the strong sense of community that it fosters. This sense of community that many users find in the Internet is demonstrated clearly in the following postings from the newsgroup alt.callahans. The participants in this newsgroup treat Callahans as if it were a

[68] Raymond, E.S., *The new hacker's dictionary*, London, MIT Press, 1993, p.218.

[69] Engst, A.C., *Internet starter kit for Macintosh*, Indianapolis, Hayden Books, 1994, pp.12-13.

tavern shared fantasy in which all the participants involve themselves. Some posters adopt fictional or fantasy identities and the shared virtual reality that results is a rich and colourful one with a strong sense of warmth and camaraderie.

The sense of community can also run to unusual forms of shared humour. For some, the sense of fellowship and belonging available on the Internet can lead to the Internet replacing a mainstream social-life.

The combination of community, humour and socialisation that is prevalent on the Internet makes it a far more appealing and gregarious place than it may at first appear from its barren textual interface. An appreciation of the Internet's " humanity " ; can help to reduce the apprehension that non-technically literate users often experience when using computers.

4.It's what you say, not who you are

In a mainstream society many factors determine how we judge, and are judged by, other people. Such factors include appearance, gender, race, wealth, dress and occupation. On the text-only channels of the Internet these factors are difficult to determine, and so one is left with far fewer criteria on which to judge the people with whom one interacts (one of the incoming problems, precisely, is for business orientated activities, to make themselves identified as such, and still respecting the Internet's implicit rules)..

If one is judged on the Internet primarily through what one says and what one does : philanthropic actions such as maintaining mailing lists or making resources available for use by others can lead to an increase in one's prestige and popularity. For new users of the Internet this can, potentially, make the process of enculturation easier ; as other users need not be made aware that one is new to the Internet.

Consider the case of a new user who is interested in, for example, middle-eastern politics. A new user should start by learning the basic mechanics of using the Internet ; for example, how to read Usenet newsgroups, how to post a message and how to send e-mail. Then he or she will find the relevant newsgroups (in this case talk.politics.mideast) and follow the conversations in these group for a few days, or weeks if necessary, to get a " ;feel" ; for the group. That is, to determine the tone of the group (for example, jocular, angry, etc.), to wait for the group's FAQ to be posted, and to find out what subjects are currently being discussed and have been discussed in the recent past.

Having read the group for a time, the new user can post a message to the group, reasonably secure that it will not violate any local customs and that it is not a subject that has been discussed in the last few days and is not in the group's FAQ. The significant point is this. Having followed these strategies, other readers of the newsgroup who see the posting

will be unlikely to determine whether it is a posting from a first-time user or an experienced Internet regular.

Though it may be a first ever post, if the new user has taken the elementary precautions discussed above other users are unlikely to realise that it is a first post. How could they? With several million people regularly using Usenet[70], it is highly unlikely that anyone could recognise that a posting originated from a first-time user.

People reading a new user's posting will not know that it is a first post. Neither wills they necessarily know whether the user is an undergraduate student, a PhD student or a professor[71]. Not having any such information, it is reasonable to assume that the posting will be judged on its content, rather than on any characteristic of the sender. Thus right from the beginning of one's use of the Internet one can achieve full "membership" of the society and have one's opinions subjected to the same level of attention as given to postings from seasoned users. It should be said that for those individuals who are relying on being judged by such factors as their appearance, gender or age, the text-only nature of th1e Internet might be an uncomfortable experience.

5.4.2 **Discouraging or negative elements of the culture**

In this chapter we are going to answer at the question : what elements of this culture (if any) have a discouraging or negative effect on new users of the networks?

When moving from one culture to another certain elements of the new culture will appear as hurdles to be overcome, or barriers preventing one from achieving enculturation. This section of the thesis addresses the second element of the third research question : What elements of this culture (if any) have a discouraging or negative effect on new users of the networks?

The study finds that the major discouraging aspects of the Internet culture are those enumerated on the following page.

1. Users need to be fluent in written English (which is by itself an exclusion factor).
2. Use of the Internet requires a high degree of computer literacy (ibid.).
3. The Internet culture uses language that may be confusing for new users.
4. Existing users can be hostile to new users.

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[70] Reid, Elizabeth M., *Electropolis : Communication and Community on Internet Relay Chat*, Unpublished paper, University Of Melbourne, Department Of History, 1991

[71] Concerning professors' involvement in the Net activity, outside of the generation gap that sometimes might play as an inhibiting factor, the fact is that the hard core of the Internet users belong to a category of people who have a lot of time and do not have to pay for telecommunication services: undergraduate and PhD students are therefore the most likely actors to fill this double requirement.

5. The consensus is difficult to reach.

The apparent contradiction between point 4 above and point 2 of the previous section[72] is easily resolved. New members are welcome; however those that do not know of, or chose to ignore, the conventions of the Internet culture can be a source of frustration to existing members of the society.

1. Users need to be fluent in written English

People in countries can access the Internet across the globe. In many of these the native language is not English. Yet if a person is posting a message to an international newsgroup (for example, any newsgroup in a hierarchy that is not geographically localised ; for example, the aus hierarchy) then the message should, by convention, be in English. Clearly this is an impediment to the use of the Internet by non-English speakers.

The conclusion seems to be that if you want to post in some other language than English in comp.lang.c, then a considerable number of readers will feel that you've acted improperly, while a considerable number of other readers (including me, by the way) will feel that you haven't, though clearly your article will have a smaller readership. There were a couple of suggestions that you should restrict distribution if you do this : you could post in French with distribution only to France,

As mentioned in the post above, this need to use English is alleviated in some circumstances : English need not be used in private e-mail or in local newsgroups. Thus if a French-speaking user is exchanging e-mail with another French-speaking user, or posting to a newsgroup that has a distribution limited to France, then the message can be composed in French. Since 1990 there is no more problems to represent accent or other special symbol, you just need to use MIME.

The requirement to be fluent in written English is also a severe impediment to those who suffer from poor reading or writing skills ; for example, dyslexic and illiterate individuals.

2. Use of the Internet requires a high degree of computer literacy

Many users with a non-technical background require extensive training to understand and make use of software and hardware that the hacker community takes for granted. The ARPANET, from which the Internet evolved, was created by computer scientists and engineers for academic and military use. Its design goals did not include ease of use, or use by a non-technical audience. It is only in recent years that technology has advanced to the point where the Internet can be easily accessed in the home or office for personal and business use.

[72] That the culture welcomes new members

Much work has been done in recent years to make the Internet more approachable by a non-technical audience. Traditional UNIX command-driven interfaces with their terse command structure have given way to “user friendly” Internet interfaces using software running on an Apple Macintosh or under Windows 95. Nonetheless these cannot fully insulate the user from the reality of needing to comprehend Internet address syntax.

Let us summarise this point by saying that for the time being, Internet affiliation implies participation to the activity of a new elite. In the medium term, though, technological culture is likely to be enhanced and this problem will probably evolve.

3. The Internet culture uses language that may be confusing for new users

When entering an unfamiliar society one of the greatest hurdles to be faced may be the acquisition of the native language. For example, a foreign student studying at an English speaking University who is not fluent in English is burdened, not only with the requirement of learning the tertiary level curriculum, but with the added difficulty of having to interpret an unfamiliar language.

New users of the Internet are in a similar situation. Even if their native language is English, much of the jargon used on the Internet will be impenetrable at first. Jargonistic words, phrases, abbreviations and acronyms will be met that describe hardware, software, behaviours, people, attitudes, ways of accessing information and in many other contexts.

The use of jargon on the Internet, combined with the necessary technical terminology, may make it seem to new users that experienced Internet users are speaking a different language.

4. Existing users can be hostile to new users

Some Internet users will react to postings in a hostile fashion. A new user who tentatively posts his first question to the Internet, but makes a mistake such as posting to the wrong newsgroup or typing in all capitals, may receive a number of savage replies “ flames ” that may discourage him from continued posting.

In defence of these flames, the respondents may not know that they are responding to a first-time user, or may simply be so frustrated from having seen so many similar mistakes in the past that they take out their frustration on the most recent instigator. The following postings discuss this response in more detail.

The oft-seen antagonism towards newbies should not be seen as a general antipathy to new users. We have already said that the Internet is an open culture to which new members are fairly welcome. Conflict between new and experienced users is generally the result of new users not knowing the expectations and norms of the culture, rather than a generalised

animosity from experienced users. As shown earlier, a new user who conforms to the dictates of Internetiquette is unlikely to be distinguished from an experienced user.

5.The consensus is difficult to reach

The introduction of Internet has increased the speed at which group members can communicate, but it has not necessarily increased the speed at which they are able to reach a consensus. In fact, certain factors associated with Internet may delay arrival at a consensus. Discussing a study they conducted in 1980, Sproull and Kiesler found an interesting effect, noting, "Groups usually take a position that is more extreme than the average of the positions held by group members before the meeting"[73]. When Internet is used, "flaming" is also common. "Flaming" is impulsive, highly emotional, and often rude behaviour that is rarely exhibited in a face-to-face setting. Sproull and Kiesler found that "tendencies to be argumentative and outspoken in electronic discussions sometimes lead to increased group conflict"[74]. The tendency towards polarisation of opinions in an electronic setting, coupled with the disruptive nature of flaming will certainly retard arrival at a consensus.

Sproull and Kiesler concur with this, stating, "If a decision requires consensus, an electronic group has to work harder to get to it than a comparable face-to-face group does"[75]. When a consensus is finally reached, is the quality of the decision good or poor? A question such as this is hard to answer, yet Sproull and Kiesler noticed a particular trend in decisions made by electronic groups. They noted, "Groups that met face-to-face were risk averse for gain choices and risk seeking for loss choices, just as most individuals are. Yet when the same groups met electronically, they were somewhat risk seeking in all circumstances". These riskier decisions may result from a number of factors. Increased conflict in solving problems, as discussed above, is one factor. Another is that electronic groups tend to consult more people before making a decision, thus increasing the number of alternatives being considered. A third is that electronic groups will more often ignore faulty reasoning put forth by members who would be respected in a face-to-face situation[76]. Group members must be conscious of this tendency towards riskier choices, and must remember that decisions made under Internet may not be valuable in all circumstances.

Summarising the preceding pages, it seems that through consensus, and risk-sharing communication patterns such as seen on the Internet sofar, one could say that there is a ongoing process of learning by doing and by interacting among a wide community of users, which goes everyday more and more beyond its original limits of scientific affiliates.

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[73] Sproull, L. and Sara Kiesler, *Connections: New Ways of Working in the Internetworked Organization*, Cambridge, MA: The MIT Press, 1991, p.64.

[74] Ibid. p.65.

[75].Ibid. p.65.

[76] Ibid. p.68.

As for the actors that at each stage played a specific and catalysing role in this development, one should refer back to the various stages presented in the first part of this study.

6. **CONCLUSION**

Internet is born as a military tool and it has been modified through 3 stages to become what it is today. In the first stage, it was used by the research communities and was not at all friendly to use. In the second stage the academic communities started to use it and also to add news tools to Internet. The third stage is now where theoretically everybody can use it everywhere. We think that for the upcoming stage, for the fourth, Internet could become the Information Superhighway of the future if it increases both speed and security, as well shows significant social mastering by most of its users, of technological complexity and societal consequences. This can be solve respectively by ATM technology and cryptography, as well, for the social and cultural dimensions, by forums, education, evaluation and corresponding policies. If so, Internet will have, as a matter of fact, a large impact on our society and will influence its users in an open way. Of course Internet have already change the habits of its users but, for the time being, we have seen that this is still a relatively small community. Besides, you do not need to use Internet now, you can live without it. In the fourth stage, if it appears, you may well have to use Internet like you have to use a phone now. It may prove to be difficult to live without it. The whole society is likely to be concerned, and modified. But how ?

Not only does the use of Internet suffer from a lack of social and physical cues, it also suffers from a lack of established conventions. Norms that are common in face-to-face communication are no longer valid, other conventions are taking place. There are few shared standards for salutations, be they for personal or official correspondence. Along these lines, there are also few shared standards for the structuring of formal and informal messages, and for adapting message content to both have an impact and be polite. Kiesler calls the use of Internet "a technology in cultural transition" [77] and asks how people will go about developing a communication network social structure for it. Internet will have dramatic psychological and sociological impacts in the fourth stage on group communication processes and objectives as discussed in chapter “Will Internet bring a new culture?” at page 38. Gone are social and physical cues that formerly provided for efficient group communication. Gone are the status and position cues that allowed a single person to dominate a meeting. Gone are established norms and conventions. Group users of Internet must learn to work around these losses, or find alternative ways of implementing them electronically. Because use of Internet is a relatively recent phenomenon, changes will continue to occur as cues and norms are further discarded, developed, and replaced.

[77] Kiesler, S., Jane Siegel and Timothy W. McGuire. "Social Psychological Aspects of Computer-Mediated Communication." 1984. in *Computerization and Controversy*, Ed. Charles Dunlop and Rob Kling, San Diego: Academic Press, Inc., 1991, pp..334-335.

As discussed (see “Will Internet be the Information Superhighway?”) the Internet society can be a very social environment. With its faceless textual interface, and sometimes malicious behaviour of its users, the Internet may be thought to be a cold, uninviting place ; but to those who have entered into it the Internet can become a central part of their social life, a wondrous community of people linked together across the globe. Its camaraderie and humour can make the Internet an appealing and gregarious place for those who can master its ways and expectations. And if Internet becomes the Information Superhighway (what it is likely to happen), it is certain that it will change the life of his users after they have changed it in the way we have discussed. The ultimate question if how it will negotiate its exclusion potential. “Ancient users’ rules vs. commercial and tele-services (telework, tele-teaching, tele-shopping, etc.)” will be the battleground where this issue will be decided.

7.APPENDIX

7.1 General strategies for using Usenet

This appendix distils, from the chapter “Will Internet bring a new culture?” and by two books : Shea’s book[78] and the first section of Mcfedries’s one[79], a repertoire of effective strategies that can be adopted by new users. These strategies are aimed at providing new users with the skills to : maximise the benefit that can be obtained from the empowering and supportive elements of the Internet culture; overcome, or reduce, the effect of the discouraging or negative aspects of the Internet culture; and conform to the conventions of the Internet culture. Thus reducing the conflict they experience with other members and aiding their ability to use their knowledge of the culture to acquire information, assistance and other resources.

Strategy : Acquire essential survival skills

New members of a mainstream society, whether they are children or immigrants to the society, need to acquire essential skills for survival in the society before they can become fully functioning members. New members of the Internet society need to be equipped with certain essential skills. These can be divided into two categories : general computer literacy skills and Internet-specific skills.

Before accessing the Internet, new users need to acquire the general skills of computer literacy ; for example, naming the components, operating a computer, and understanding the role of software.

After acquiring the general computer literacy skills new users need to obtain the specific skills for utilising the Internet. That is they need to understand the terminology of the Internet, Even if Internet is becoming more and more easy to use.

Strategy : Acquire cultural norms

We have already discussed the frustration that many experienced users suffer when newcomers violate the Internet’s cultural norms, and illustrated how ignorance of these norms can lead to new users being in writing abused. The acquisition of these cultural norms by new users is just as necessary a survival skill as is mastering the use of the computer hardware and software that supports the Internet.

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[78] Shea, V., *Internetiquette*, San Francisco, Albion Books, 1994.

[79] McFedries, P., The Complete Idiot’s Guide to Usenet Newsgroups, Alpha Book, 1995, first cover.

Fortunately the Internet is an open culture and its norms are clearly enumerated and available through mechanisms such as the FAQ. This should result in fewer breaches of the Internet's cultural norms and less discouraging abuse from other users. This simple strategy can be expected to lead quickly to more productive utilisation of the Internet.

Strategy : Learn to understand the Internet's emic terminology

The language of the Internet is replete with emic terminology not easily understood by outsiders. Much of this springs from, or has been incorporated into, the hacker culture and thus a valuable reference work for new users to acquire is Raymond's work[80] and Shea's book[81]. FAQ can also be a good source for understanding confusing language features ; particularly where a newsgroup employs its own local jargon.

Strategy : Acquire prestige through clear writing

Much of the information that is taken for granted in mainstream societies is not available when communicating on the Internet. For example, one cannot reliably know the age, gender, appearance or occupation of the people with whom one communicates. In such a situation the clarity of written communication is central to how one is judged by the other members of the Internet.

Internet users need to be able to communicate well. Thus the ability to create well written, attractively formatted and clearly argued prose is most important. Users who are not confident of producing such prose unassisted should be encouraged to create their postings and e-mail messages using word processing software, rather than the simpler editing software provided by news or e-mail software packages. By employing a sufficiently sophisticated word-processor, additional grammar and spelling checks can be applied to the text before it is sent.

Strategy : Remember the necessary reciprocity of economic exchanges

Economic exchange on the Internet is predominantly reciprocal. New users need to understand that this imposes an obligation on them to contribute to the Internet. New users would be well served by adopting a philosophy of answering a question or two for every one of their own that is answered, so that the Internet's reciprocal exchange economy is supported.

Strategy : Post to the correct newsgroup

Deciding which newsgroup to post a message to can be very confusing for new users, as there are there are thousands of newsgroups, and new newsgroups are constantly being

[80] Raymond, E.S., *The new hacker's dictionary*, London, MIT Press, 1993, p.218.

[81] Shea, V., *Internetiquette*, San Francisco, Albion Books, 1994.

created. Obtaining a listing of all newsgroup titles will make deciding an appropriate newsgroup easier. Most news reading software will provide such a list on demand.

Users can keep up-to-date on the creation of new newsgroups by reading the newsgroup news.announce.newgroups.

Strategy : Do not seek unnecessary assistance

Many users of the Internet are frustrated by postings that ask for assistance that posters could reasonably be expected to provide for themselves with a little bit of effort. Such questions will often be ignored, or will generate " flamage " ; (verbal abuse).

Do not post a question to millions of people on the net, if you can find the answer faster and better in your manuals. This refers to traditional manuals printed on paper as well as to information stored on-line on your computer.

Anything wrong with suggesting that people exhaust all OTHER ways of finding the answer before asking other people to do their work for them?

He did not say "Do not ask questions". He said "Do not ask questions until you look for yourself". It's a benefit to those new users out there to use the tools on hand locally to find their answers. Also, reading this group regularly will supply a large number of common questions and answers. If that does not do it THEN they should feel free to ask the net in this group.

Too many people do not learn how to research for themselves and choose the easy way out by asking others to do the job for them. As argued above, users should be encouraged to seek out answers themselves before unnecessarily posting a question to the Internet. For example, users can be encouraged to first read the FAQ's in any newsgroup that seems relevant, read past postings in such groups, ask people in their place of work or study, or visit their local library. Such actions will often yield faster and more comprehensive solutions than a posting to the Internet.

If such actions do not yield solutions then users can post the Internet without reproach. A posting worded as the one below will often yield a good result, as it clearly shows that the poster has expended effort to find a solution.

Strategy : Read the FAQ's before posting to a new newsgroup

It is sometimes not clear what matters should be discussed in a newsgroup. For example, a new user might mistakenly assume that the newsgroup named comp.sources is for discussing sources of computer equipment. In fact, it is for the discussion of source code (listings of computer programs).

Many newsgroups maintain a FAQ that describes what the newsgroup is for as well as answering frequently asked questions. This is generally posted to the group at least once a month. FAQ's are also posted to the newsgroup news.answers.

Strategy : Review earlier postings to avoid asking recently answered questions

Depending upon available disk space, users may be able to read a few days or a few months worth of past Usenet postings. New users should be encouraged to always review these earlier messages before posting a question to a newsgroup. If the question has been asked recently then reviewing past posting will be the quickest way to have the question answered.

Strategy : A local authority can sometimes resolve Conflict

Occasionally someone will post something, or take some action, that so deeply offend some users that they will wish to complain to someone about it. However the Internet is anarchy, so there is no central government or police force to complain to. There is often, however, a local authority that can be invoked called the " postmaster ".

Most Internet users gain access to the Internet through an educational institution, their place of work or through a commercial service provider. The management of these sites is unlikely to want their computers used for illegal or disruptive purposes and so will often react swiftly if abuse of the Internet occurs by one of their users. Finding the appropriate person to complain to is often quite simple. Mail sent to the account postmaster at any site, will generally arrive at the desk of someone "in authority" ; at that site, often the machine's system administrator.

There are two important cautions to be made regarding this tactic. First, it should not be overused. Complaints to postmasters should be reserved for only the most serious of offences ; for example, illegal entry into a computer system, unauthorised deletion of software or data, or the posting of copyrighted software to an FTP archive.

When can a net.community.member ethically get onto a site postmaster to complain about the behaviour of another user?

There are three situations in which it would consider it ethically possible to complain about another user :

1. if they disrupted or threatened to disrupt a site (mail bombings, etc.)
2. if they posted something that might, by its presence on our server, create legal problems for the university.
3. if they aimed an unambiguous threat in a particular direction

Users should be reminded that if someone says or does something that they disagree with then the correct response is, usually, to reply by e-mail or to post a follow-up message calmly explaining why they disagree. Users need to remember that freedom of speech is very highly valued by the Internet community, and so any attempt to censor or punish another user for expressing an opinion will often be met with contempt.

The other caution to be made about complaining to a postmaster is that not all sites have a separate postmaster. If a person has a private Internet site of their own then they are their postmasters, and so a complaint will be sent to the very person who is being complained about. There is little that can be done in this situation except to calmly and clearly explain why the action taken has caused such offence.

7.2 **Glossary**

As with any profession, computers have a particular terminology all their own. Below is a condensed glossary to assist in making some sense of the Internet world. This glossary is not exhaustive and was inspired by the one of Christian Huitema[82], the one of Goldsborough[83].

ACM : Association for Computer Machinery A group established in 1947 to promote professional development and research on computers address. There are two separate uses of this term in Internet networking: "electronic mail address" and "Internet address". An electronic mail address is the string of characters that you must give an electronic mail program to direct a message to a particular person. See "Internet address" for its definition.

AI : Artificial Intelligence The branch of computer science, which deals with the simulation of human intelligence by computer systems.

AIX : Advanced Interactive Executive IBM's version of Unix.

ANSI : American National Standards Institute A group that certifies organisations, which develop U.S. standards for the information processing industry. ANSI accredited groups participate in defining network protocol standards.

Archie : Archie is a system, which allows searching of indexes of what files are available on public servers on the Internet. You may know that such and such a database or public domain program exist on the Internet, but finding it is another matter. Archie, generally accessed through Telnet, scans the directories of all the registered servers on the Internet and sends you

82 Huitama, C., *Et Dieu créa l'Internet...*, pp.193-201

83 Goldsborought, R., *Sraight talk about the Information Superhighway : Hear what these industry leaders and experts have to say*, Indianapolis, Alpha Books, 1994, pp. 319-328

the filenames that match your search string, together with the server where each file is available.

ARP : Address Resolution Protocol An Internet protocol which runs on Ethernet and all IEEE 802.X LANs which maps internet addresses to MAC addresses.

ARPA : Advanced Research Projects Agency. The former name of what is now called DARPA.

ARPANET : Advanced Research Projects Agency Internetwork. A pioneering long haul network funded by ARPA. It served as the basis for early networking research as well as a central backbone during the development of the Internet. The ARPANET consisted of individual packet switching computers interconnected by leased lines.

AS : Autonomous A collection of gateways (routers) under single administrative authority using a common Interior Gateway Protocol for routing packets.

ASCII : American Standard Code for Information Interchange

ATM : Asynchronous Transfer Mode. Could replace the TCP/IP in the future

B : Byte One character of information, usually eight bits wide

b : bit - binary digit. The smallest amount of information which be stored in a computer.

BBN : Bolt Beranek and Newman, Inc. The Cambridge, MA company responsible for development, operation and monitoring of the ARPANET, and later, the Internet core gateway system, the CSNET Co-ordination and Information Center (CIC), and NSFnet Internetwork Service Center (NNSC).

BBS : Bulletin Board Systems. “A BBS is simply a computer attached to a telephone line running a software package that allows it to exchange signals with a computer on the other end of the line”[84], usually to unload software or to exchange information.

Bitmap : An image composed of a series of pixels or dots.

BITnet : Because It's Time Internetwork. BITNET has about 2,500 host computers, primarily at universities, in many countries. It is managed by EDUCOM, which ides administrative support and information services. There are three main constituents of the network: BITNET in the United States and Mexico, NETNORTH in Canada, and EARN in Europe. There are also AsiaInternet, in Japan, and connections in South America. See CREN.

bps : bits per second. A measure of data transmission speed.

[84] Wolf, G. and Michael Stein, *Aether Madness*, p.4

Browser : A program that allows you to follow a hypertext chain, an activity very much like browsing a book (see Mosaic)

BSD : Berkeley Software Distribution. Term used when describing different versions of the Berkeley UNIX software, as in "4.3BSD UNIX".

catenet : A network in which hosts are connected to networks with varying characteristics, and the networks are interconnected by gateways (routers). The Internet is an example of a catenet.

CCITT : International Telegraph and Telephone Consultative Committee core gateway. Historically, one of a set of gateways (routers) operated by the Internet Internetwork Operations Center at BBN. The core gateway system forms a central part of Internet routing in that all groups had to advertise paths to their networks from a core gateway.

CMC : Computer Mediated Communication, Internet is an example of CMC

CREN : The Corporation for Research and Educational Internetworking BITNET and CSNET have merged to form CREN.

CSNET : Computer + Science Internetwork A large data communications network for institutions doing research in computer science. It uses several different protocols including some of its own. CSNET sites include universities, research laboratories, and commercial companies. See CREN.

DARPA : U.S. Department of Defense Advanced Research Projects Agency. The government agency that funded the ARPANET and later started the Internet.

datagram : The unit transmitted between a pair of internet modules. The Internet Protocol provides for transmitting blocks of data, called datagrams, from sources to destinations. The Internet Protocol does not provide a reliable communication facility. There are no acknowledgements either end-to-end or hop-by-hop. There is no error for data, only a header checksum. There are no retransmissions. There is no flow control. See IP.

DCA : Defense Communications. The government agency responsible for installation of the Defense Data (DDN), including the ARPANET and MILNET lines and PSNs. Currently, DCA administers the DDNand supports the user assistance and network registration services of the DDN NIC.

DDN : Defense Data Internetwork. Comprises the MILNET and several other networks.

DDN NIC : The network information center at SRI International. It is the primary repository for RFCs and Internet Drafts, as well as providing other services.

DEC : Digital Equipment Corporation.

DECnet : Digital Equipment Corporation network. A networking protocol for DEC computers and network devices.

default route : A routing table entry, which is used to direct any data, addressed to any network numbers not explicitly listed in the routing table.

DES : Data Encryption Standard

DNS : The Domain Name System is a mechanism used in the Internet for translating names of host computers into addresses. The DNS also allows host computers not directly on the Internet to have registered names in the same style, but returns the electronic mail gateway, which accesses the non-Internet network instead of an IP address.

DOD : U.S. Department of Defense

DOE : U.S. Department of Energy

dot address (dotted address notation) : Dot address refers to the common notation for Internet addresses of the form A.B.C.D; where each letter represents, in decimal, one byte of the four byte IP address.

EARN : European Academic Research Internetwork. One of three main constituents of BITNET.

EBCDIC : Extended Binary-coded Decimal Interchange Code

EGP : Exterior Gateway A protocol which distributes information to the gateways (routers) which connect autonomous systems.

Ethernet : A network standard for the hardware and data link levels. There are two types of Ethernet: Digital/Intel/Xerox (DIX) and IEEE 802.3.

FAQ : Lists of frequently asked questions and their answers.

FDDI : Fiber Distributed Data Interface. FDDI is a high-speed (100Mb) token ring LAN.

FIPS : Federal Information Processing Standard

FTP : File Transfer Protocol. The Internet standard high-level protocol for transferring files from one computer to another gateway. See router.

GB : Gigabyte. A unit of data storage size which represents 2^30 (over 1 billion) characters of information.

Gb : Gigabit. 2^30 bits of information (usually used to express a data transfer rate; as in, 1 gigabit/second = 1Gbps).

GIF : The filename extension for files in a bitmap format that is commonly used to store digitised colour photographs.

GNU : Gnu's Not UNIX. A UNIX-compatible operating system developed by the Free Software Foundation.

header : The portion of a packet, preceding the actual data, containing source and destination addresses and error-checking fields.

host number : The part of an internet address that designates which node on the (sub)network is being addressed.

HP : Hewlett-Packard.

HYPER : channel High-speed communications link.

Hypertext : "A computer-based text retrieval system that enables the user to provide access to or gain information related to a particular text"[85]. Usually the coloured words are pointers to further information. Hypertext works much more effectively on computers, and is most familiar on Windows help screens in which you click coloured cue words to call up related topics. Such links are not confined to text. You might click on areas of a map, or an icon, or call up sound and video. Hence the term Hypermedia, most commonly seen on CD-ROM

I/O : Input/Output.

IAB : Internet Activities Board. The IAB is the co-ordinating committee for Internet design, engineering and management.

IBM : International Business Machines Corporation.

ICMP : Internet Control Message Protocol. ICMP is an extension to the Internet Protocol. It allows for the generation of error messages, test packets and informational messages related to IP.

IEEE : Institute for Electrical and Electronics Engineers.

IESG : Internet Engineering Steering Group, controls the IETF

IETF : Internet Engineering Task Force. The IETF is a large open community of networks designers, operators, vendors, and researchers whose purpose is to co-ordinate the operation, management and evolution of the Internet, to resolve short- and mid-range protocol and architectural issues. It is a major source proposed protocol standards, which are submitted to

[85] The American Heritage Dictionary of the English Language, Third Edition is licensed from Houghton Mifflin Company. Copyright © 1992 by Houghton Mifflin Company.

the Internet Activities Board for final approval. The IETF meets three times a year and extensive minutes of the plenary proceedings are issued.

INRIA : Institut national de recherche en informatique et automatique.

internet, internetwork : Any connection of two or more local or wide-area networks.

Internet : The global collection of interconnected local mid-level and wide-area networks, which use IP as the network layer protocol.

internet address : An assigned number, which identifies a host in an internet. It has two or three parts : network number, optional subnet number, and host number.

IP : Internet Protocol. The network layer protocol for the Internet. It is a packet switching, datagram protocol defined in RFC 791.

IRTF : Internet Research Task Force. The IRTF is a community of network researchers, generally with an Internet focus. The work of the IRTF is governed by its Internet Research Steering Group (IRSG).

ISO : International Organisation for Standardisation.

KB : Kilobyte. A unit of data storage size which represents 2^10 (1024) characters of information.

Kb : Kilobit. 2^10 bits of information (usually used to express a data transfer rate; as in, 1 kilobit/second = 1Kbps = 1Kb).

LAN : Local Area Internetwork. A network that takes advantage of the proximity of computers to offer relatively efficient, higher speed communications than long haul or wide-area networks.

LISP : List Processing Language. A high-level computer language invented by Professor John McCarthy in 1961 to support research into computer-based logic, logical reasoning, and artificial intelligence. It was the first symbolic (as opposed to numeric) computer processing language.

MAC : Medium Access Control. For broadcast networks, it is the method which devices use to determine which device has line access at any given time.

Mac : Apple Macintosh computer.

Mail : see E-mail.

MAN : Metropolitan Area Internetwork.

MB : Megabyte. A unit of data storage size which represents over 2^20 (one million) characters of information.

Mb : Megabit. 2^20 bits of information (usually used to express a data transfer rate; as in, 1 megabit/second = 1Mbps).

MILNET : Military Internetwork. A network used for unclassified military production applications. It is part of the DDN and the Internet.

MIME : Multimedia Internet Mail Extension, enable to send sound, pictures and special symbols via Internet, especially useful for E-mail[86].

MIT : Massachusetts Institute of Technology.

Mosaic : A WWW browser with a classic mix of simplicity and power. There are now about four commercial Mosaics but good public domain versions are freely available at many Internet sites.

MTTF : Mean Time to Failure. The average time between hardware breakdown or loss of service. This may be an empirical measurement or a calculation based on the MTTF of component parts.

MTTR : Mean Time to Recovery (or Repair). The average time it takes to restore service after a breakdown or loss. This is usually an empirical measurement.

MVS : Multiple Virtual Storage. An IBM operating system based on OS/1.

NASA : National Aeronautics and Space Administration.

NBS : National Bureau of Standards. Now called NIST.

Network : A system of computers interconnected by telephone wires or other means in order to share information. Also called net1.

network number : The part of an internet address, which designates the network to which the addressed node belongs.

Net : See Internet

Netscape : a browser for WWW

news : see Usenet

NFS : Internetwork File System. A network service that lets a program running on one computer to use data stored on a different computer on the same internet as if it were on its own disk.

NIC : Internetwork Information Center. An organisation which provides network users with information about services provided by the network.

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[86] Huitema, C., *Et Dieu créa l'Internet*, Paris, Eyrolles. 1995, pp.37-38.

NOC : Internetwork Operations Center. An organisation that is responsible for maintaining a network.

NIST : National Institute of Standards and Technology Formerly NBS.

NSF : National Science Foundation.

NSFnet : National Science Foundation Internetwork. The NSFnet is a high speed "network of networks" which is hierarchical in nature. At the highest level is a network that spans the continental United States. Attached to that are mid-level networks and attached to them are campus and local networks. NSFnet also has connections out of the U.S. to Canada, Mexico, Europe, and the Pacific Rim. The NSFnet was part of the Internet and was decommissioned in 1995.

NSFnet Mid-level Level Internetwork : A network connected to the highest level of the NSFnet that covers a region of the United States. It is to mid-level networks that local sites connect. The mid-level networks were once called "regional".

OSI : Open Systems Interconnection. A set of protocols designed to be an international standard method for connecting unlike computers and networks. Europe has done most of the work developing OSI and will probably use it as soon as possible.

OSI Reference Model : An "outline" of OSI, which defines its seven layers and their functions. Sometimes used to help describe other networks.

OSPF : Open Shortest-Path First Interior Gateway Protocol. A proposed replacement for RIP. It addresses some problems of RIP and is based upon principles that have been well-tested in non-internet protocols. Originally acronymed as OSPFIGP packet The unit of data sent across a packet switching network. The term is used loosely. While some Internet a literature use it refers specifically to data sent across a physical network, other literature views the Internet as a packet switching network and describes IP datagrams as packets.

PC : Personal Computer.

PCNFS : Personal Computer Internetwork File System.

PGP : Pretty Good Privacy, a software that enables you to encrypt messages.

POSIX : Portable Operating System Interface. Operating system based on UNIX.

PPP : Point-to-Point Protocol. The Point-to-Point Protocol (PPP) provides a method for transmitting datagrams over serial point-to-point links.

protocol : A formal description of message formats and the rules two computers must follow to exchange those messages. Protocols can describe low-level details of machine-to-machine interfaces (e.g., the order in which bits and bytes are sent across a wire) or high-level

exchanges between allocation programs (e.g., the way in which two programs transfer a file across the Internet).

RFC : The Internet's Request for Comments documents series The RFCs are working notes of the Internet research and development community. A document in this series may be on essentially any topic related to communication, and may be anything from a meeting report to the specification of a standard.

RIP : Routing Interchange Protocol One protocol, which may be used on internets simply to pass routing information between gateways. It is used on may LANs and on some of the NSFnet intermediate level networks.

RJE : Remote Job Entry. The general protocol for submitting batch jobs and retrieving the results.

RLOGIN : Remote Login. A service on Internet very similar to TELNET. RLOGIN was invented for use between Berkeley Unix systems on the same LAN at a time when TELNET programs didn't provide all the services users wanted. Berkeley plans to phase it out.

router : A special-purpose dedicated computer that attaches to two or more networks and routes packets from one network to the other. In particular, an Internet gateway routes IP datagrams among the networks it connects. Gateways route packets to other gateways until they can be delivered to the final destination directly across one physical network.

RPC : Remote Procedure Call. An easy and popular paradigm for implementing the client-server model of distributed computing.

RSA : Rivest Shamir Adleman, an algorithm for encryption.

Search engine : To find his way on the Wed is not so easy, you can “ surf ” on it or if you prefer you can use a “ search engine ” like Yahoo or Lycoos for example which allows you to answer at your query.

server : A computer that shares its resources, such as printers and files, with other computers on the network. An example of this is a Internetwork Files System (NFS) Server which shares its disk space with one or more workstations that may not have local disk drives of their own.

SLIP : Serial Line Internet Protocol SLIP is currently a defacto standard, commonly used for point-to-point serial connections running TCP/IP. It is not an Internet standard but is defined in RFC 1055.

Smiley : J

SMTP : Simple Mail Transfer Protocol. The Internet standard protocol for transferring electronic mail messages from one computer to another. SMTP specifies how two mail systems interact and the format of control messages they exchange to transfer mail.

SNA : System Internetwork Architecture. IBM's data communications protocol.

SNMP : Simple Internetwork Management Protocol. The Simple Internetwork Management Protocol (RFC 1157) is the Internet's standard for remote monitoring and management of hosts, routers and other nodes and devices on a network.

subnet : A portion of a network, which may be a physically independent network, which shares a network address with other portions of the network and is distinguished by a subnet number. A subnet is to a network what a network is to an internet.

subnet number : A part of the internet address, which designates a subnet. It is ignored for the purposes internet routing, but is used for intranet routing.

T1 : A term for a digital carrier facility used to transmit a DS-1 formatted digital signal at 1.544 megabits per second.

T3 : A term for a digital carrier facility used to transmit a DS-3 formatted digital signal at 44.746 megabits per second.

TCP : Transmission Control Protocol. A transport layer protocol for the Internet. It is a connection oriented, stream protocol defined by RFC 793.

TCP/IP : Transmission Control Protocol/Internet Protocol. This is a common shorthand, which refers to the suite of application and transport, which run over IP. These include FTP, TELNET, SMTP, and UDP (a transport layer protocol).

Telenet : A public packet-switching network operated by US Sprint. Also known as "SprintInternet".

TELNET : The Internet standard protocol for remote terminal connection service. TELNET allows a user at one site to interact with a remote timesharing system at another site as if the user's terminal was connected directly to the remote computer.

THEnet : The Texas Higher Education Internetwork, a multiprotocol network connecting most major academic and research institutions in the State of Texas, as well as several institutions in Mexico.

Token Ring : A type of LAN. Examples are IEEE 802.5, ProNET-10/80 and FDDI. The term "token ring" is often used to denote 802.5.

Transpac : A French network working on X.25 (1975).

Tymnet : A public character-switching/packet-switching network operated by British Telecom.

UDP : User Datagram Protocol. A transport layer protocol for the Internet. It is a datagram protocol, which adds a level of reliability and multiplexing to IP datagrams. It is defined in RFC 768.

ULTRIX : UNIX-based operating system for Digital Equipment Corporation computers.

UNIX : An operating system developed by Bell Laboratories that supports multi-user and multitasking operations.

URL : Uniform Resource Locators Standardised formatted entities within HTML documents, which specify a network, service or document to link to.

UUCP : UNIX-to-UNIX Copy Program. A protocol used for communication between consenting UNIX systems.

VAX : One of a range of minicomputers produced by Digital Equipment.

Veronica :Veronica is an index and retrieval system, which can locate items on most of the gopher servers in the Internet. Veronica finds resources by searching Words in Titles. It does not do a full-text search of the contents of the resources ; it finds resources whose titles contain your specified search word(s). The " title " is the title of the resource as it appears on the menu of its HOME gopher server. Veronica is used with a gopher client. You will choose " veronica " from the menu of some gopher server, and enter a set of query words or special directives. When the search is finished, the results will be presented as a normal gopher menu. You may browse the discovered resources in this menu, as you would use any other gopher menu. Most Veronica's access menus offer several types of searches. In addition to these pre-defined types, you can compose veronica queries using a number of special options to focus your search more precisely. You should use these options when appropriate, as they will make it much easier to locate resources.

VMS : Virtual Memory System. A Digital Equipment Corporation operating system.

W3 Organisation : W30 and W3C were formed earlier this year with the stated aim of encouraging commercial and educational use of the Internet. Details can be found by pointing your Web browser at http://info.cern.ch/ and following the hypertext links.

WAIS :WAIS (Wide Area Information Servers) is a commercial software package "developed by a consortium of companies that included Thinking Machines Inc., Dow Jones and Apple Computer"[87] that allows the indexing of huge quantities of information, and then making those indices searchable across networks such as the Internet. A prominent feature of

[87] Clark, S., "Where there's a will...there's a Wais" in *NetUser*, Issue 3, September 1995, p.44

WAIS is that the search results are ranked according to how relevant the “ hits ” are, and that subsequent searches can find “ more stuff like that last batch ” and thus refine the search process.

WAN : Wide Area Internetwork.

WHOIS : An Internet program which allows users to query a database of people and other Internet entities, such as domains, networks, and hosts, kept at the NIC. The information for people shows a person's company name, address, phone number and e-mail address.

World Wide Web (WWW, Web, W^3) : A hypermedia-based Internet system for obtaining and distributing information.

XNS : Xerox Internetwork System. A data communications protocol suite developed by Xerox. It uses Ethernet to move the data between computers.

X.25 : A data communications interface specification developed to describe how data passes into and out of public data communications networks. The public networks such as Sprintnet and Tymnet use X.25 to interface to customer computers (1976).

X.400 : A data communication interface specification more complex than X.25 (1984)

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