International and Scientific Origins of the Internet and the Emergence of the Netizens

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"Netizens are Net Citizens who utilize the Net from their home, workplace, school, library, etc. These people are among those who populate the Net, and make it a from resource of human beings. These netizens participate to help make the Net both an intellectual and a social resource."
from "Further Thoughts about Netizens"
http://www.columbia.edu/~hauben/CS/netizen_thoughts.html
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I am happy to be here today and to be presenting the opening paper in this session of the PPF conference. This conference session is titled "Computer Networks, the Internet and Netizens: Their Impact on Science and Society"

It is an honor to have this session as a side event connected to the 2nd phase of the UN's World Summit on Information Society (WSIS), where the importance of access to the Internet becoming available to all the world's peoples is being affirmed.

Secondarily, even as this conference session is taking place, there is a struggle ongoing involving a number of countries around the world to try to determine the management model that is needed for the international administration of the Internet's infrastructure. But to solve this problem it is useful to have some idea of how the Internet was developed and what are the salient aspects of that development.

In my talk today, I want to explore these aspects and in turn try to unravel some of the myths about the Internet and its origins that hide its actual character. I have a draft paper I have prepared where I explore the issues in greater detail than I will speak about today

First, a common view of the Internet is that it was created within the US by the US Department of Defense as a way to have a communication system that would survive a nuclear war.

This is a fallacious view of the origin of the Internet. It is inaccurate in many aspects. (1)

Notably:

1) The Internet is a result of scientific and technical collaboration that was international in its earliest stages.

2) There was a vision guiding and inspiring its international collaborative development

3) The Internet is a solution to the Multiple Network Problem - to connect dissimilar networks.

More specifically, the goal of Internet research was to make communication possible across the boundaries of different networks. During the period of the birth of the Internet (1973-1983), countries like Great Britain, France, Canada and others were either actually creating their own national or specific computer networks, or were developing plans to do so. These networks would all be different technically and would be owned and operated by different political and administrative entities. How to provide for communication across the boundaries of these diverse networks was the problem to be solved.

The research that solved this problem was the work to create the protocol called TCP/IP. The protocol TCP/IP makes it possible to communicate across the boundaries of dissimilar networks. This graphic shows the research collaboration by Norwegian researchers connected with NORSAR, which was a network site in Norway, with British researchers, connected by a site at the University College London, and American researchers working as part of the Information Processing Techniques Office (IPTO) on the ARPANET.(2)

In my talk today I want to focus on what I propose are some of the scientific origins of the research that have made the Internet possible. And I want to argue that though these scientific origins are poorly understood and not often recognized, they are critical to an understanding of the nature of the Internet and supporting of its future development.

To understand these scientific origins of the Internet's development, we need to look back to the early post World War II period. During this period there was scientific ferment to understand the science of communication. A community of scientists, mathematicians, engineers and social scientists were interested in exploring the processes of communication. One means some of the researchers adopted was to participate in an interdisciplinary community of researchers who met bi

yearly or yearly. Essentially these researchers pursued different disciplines and spoke different scientific languages.

Their effort was to try to bridge the boundaries that separated their disciplines. The meetings of the group were known by different names, but during one period they were called the Josiah Macy Jr Foundation conferences on Cybernetics. The phenomenon was also known as "feedback" or "self organizing systems". The meeting not only studied communication but also endeavored to develop a practice more conducive to communication. A conference session was held on a weekend. Only two or three papers were presented at each conference and people were encouraged to ask questions during the paper presentation if they didn't understand the points being raised or if they wanted clarification. After the paper there would be a more general conversation and discussion issues raised. The conference sessions were transcribed and the transcription sent to the participants after the conference. They could make corrections or clarifications. The publication of the conference proceedings would include the publication of the discussion, along with the publication of the paper presentations. There were 10 Macy conferences from 1942 until 1953. Five volumes of the conferences proceedings were published.

JCR Licklider (or Lick as he asked people to call him) was a research scientist who had made certain scientific advances in communication research. His PhD thesis broke new ground by mapping where in the brain of the cat, different pitches of sound were received and how this led to the perception of different frequencies of sound.

Also Licklider had made an engineering breakthrough which is referred to as "clipped speech". He was able to identify what small part of a the place on the soundwave was critical for the sound to be perceived. (This was helpful to the US military during WWII in identifying how pilots could get help hearing vital sounds despite lots of background noise.)

Licklider was deeply interested in the study of communication. Though he only attended one of the 10 Macy Foundation meetings on Cybernetics, he, along with other scientists, got support from the National Science Foundation(NSF) in the US to have a meeting in 1954 at MIT similar to the Macy Foundation meetings on Cybernetics that had ended in 1953. The title of the NSF conference was "Problems in Human Communication and Control". The notes of the meeting were then transcribed. Licklider edited the notes. The proceedings were published, much in the same way the Macy Conference proceedings were published.

During this period, computer scientists and engineers were interested in understanding the workings of the brain (and nervous system) and scientists like Licklider who were studying the brain were interested in the workings of the computer. There was an intuition that insight into the mechanisms of the brain could be gained from research in computers. Similarly, computer science researchers believed that learning about how the brain functioned would make possible scientific breakthroughs in computer science.

An important interest of Licklider's was in the workings of the brain and how more advanced computer development could help the research collaboration of scientists and engineers. Of particular interest was a form of modeling. In a paper written with Robert Taylor in 1968, Licklider and Taylor wrote:

> "By far the most numerous, most sophisticated and most important models are those that reside in men's minds.
> (p. 9 paper)

An example of how the computer could help represent models for Licklider was the program Sketchpad created by Ivan Sutherland. Describing a demonstration he had seen of Sutherland's modeling program, Warren Teitelman, then a graduate student at MIT, writes:

> "Sutherland sketched the girder of a bridge and indicated the points at which members were connected together by rivets. He drew a support at each end of the girder and a load at the center. The model showed the girder sagging under the load and a number appeared on each member showing the tensions there."

Sutherland was able to add the support needed using the modeling program. Then the bridge was, according to the computer simulation program, able to maintain the weight. This is an example of the encouraging potential that Licklider envisioned if the scientific research community could acquire the technology they needed for their modeling.

Licklider not only felt that modeling was critical for scientific research, but for society as well. Describing the modeling that Licklider believed characterized the functioning of the brain, he and Taylor write:

> "In richness, plasticity, facility and economy, the mental model has no peer, but in other respects it

has shortcomings."

The primary shortcomings of such a model is that it is stored in the brain of only a single individual. Hence:

"It can be observed and manipulated only by one person"

In order for such models to serve a social function, there is a need, for the models in the heads of individuals to become part of a collaborative process. This is because, as Licklider and Taylor write:

"Society rightly distrusts the modeling done by a single mind."

More specifically:

"Society demands (...) [what-ed] amounts to the requirement that individual models be compared and brought into some degree of accord. The requirement for communicating which we now define concisely [as-ed] 'cooperative' modeling -- [is-ed]cooperation in the construction, maintenance and use of a model"

Licklider and Taylor then explain that like the process they believe is ongoing in the brain, what is needed for such cooperative modeling is:

"a plastic or moldable medium that can be modeled, a dynamic medium in which processes will flow into consequences."

Most important for such a medium is that it supports collaborative contributions and processes - that it be:

"a common medium that can be contributed to and experimented with by all."

Licklider and Taylor envisioned that the developing online community would find the capability for such collaborative modeling as the Internet developed and that having access to this plastic collaborative environment would be a boon to the advancement of society and of science. As the Internet has developed, it has made possible new forms of scientific collaboration and modeling much as Licklider and Taylor proposed would become possible.

Along with the need for such a moldable medium for scientific collaborative development, Licklider also maintained that there would be a need for a collaborative community with this capability to support continuing network development and to intervene to help with the problems that would develop if government officials who don't understand the nature of computer technology, are charged with making the decisions needed for its development.

Licklider was part of a community of scientists who had seen the consequences of poor technical and political decisions made by governments. (For example the bombing of civilians during WWII by the Allies).

In 1960, a series of talks were held to celebrate the 100th anniversary of MIT. The British scientist and writer, CP Snow, was invited to give a talk discussing this problem. The title of the talk was "Scientists and Decision Making."

During his talk, Snow described the gap that would exist between understanding the nature of the new computer technology and the understanding of government officials who would have the responsibility for decisions about how to support the development of this new technology. Snow explained how such a problem required a situation similar to a phenomenon that in physics is called Brownian Motion.(1) Referring to what happened in Great Britain after World War II when the whole society began discussing the need for national health care, Snow outlines the phenomenon:

> "I believe that the healthiest decisions of society occur by something more like Brownian movement. All kinds of people all over the place suddenly get smitten with the same sort of desire, with the same sort of interest at the same time. This forms a concentration of pressure and of direction. These concentrations of pressure gradually filter their way through to the people whose nominal responsibility it is to put the legislation into a written form."

Shortly after Snow's talk at MIT, Licklider was invited to join the Advanced Research Projects Agency (ARPA). He was to set up an office for research in computer science and an office for research in behavioral

science. He called the office for research in computer science the Information Processing Techniques Office (IPTO). (1962-1986). Licklider was its first director and he was followed by Ivan Sutherland. There were several subsequent directors, and then in 1974, Licklider was invited to return as director.

In his writing and talks after he left the IPTO in 1975, Licklider describes the problems he encountered to get support for basic research in computer science within the US Department of Defense and the need for citizens who will actively take up the problems when they develop.

Licklider is not asking for citizens to vote on every issue. Instead he outlines how voting is insufficient as a way to work to promote the public interest. He writes:

> "(V)oting in the absence of understanding defines only the public attitude, not the public interest. It means that many public spirited individuals must study, model, analyze, argue, write, criticize, and work out each issue and each problem until they reach consensus or determine that none can be reached -- at which point there may be occasion for voting."
>
> (Licklider, 1979, p. 126)

Licklider describes the need for citizen involvement in government decisions to help determine how to support the continuing development of computer technology. More significantly, Licklider proposes that people will not be interested in government processes until they have a means to participate in those processes. He foresees how computer developments will provide that means. He writes:

> "Computer power to the people is essential to the realization of a future in which most citizens are informed about, and interested in, the process of government."
>
> (Licklider, 1979, p. 126)

The process for citizen involvement in the development of computer technology that Licklider outlines is a process that characterizes the kind of discussion that I found on some of the earliest mailing lists and Usenet newsgroups that developed in the early 1980s. This process functioned for needed technical discussion, such as with the ARPANET TCP/IP Digest when the cutover to TCP/IP was carried out. (3)

Such discussion also helped to develop and spread the vision for ubiquitous computer networking that was discussed on the Human Nets mailing list and other mailing lists and Usenet newsgroups during the early 1980s.

But more fundamentally, the emergence of such a public spirited online citizenry that Licklider believed so important to the continued support and development of computer and networking technology was identified through the research done by a college student in the early 1990s.

In 1992-3, as part of research done for a college assignment, the student, Michael Hauben, posted a series of questions and some preliminary research about the developing network on Usenet newsgroups. (Usenet is a worldwide discussion forum.) He also posted his questions on a few Internet mailing lists. Michael was surprised as replies to his questions began to arrive in his mailbox. Through subsequent posts, and analyzing the replies, he recognized that a new form of consciousness, a new identity was being acquired by many of those online who who wrote him. A number of the replies he received indicated how people online were not only interested in how the developing Net was contributing to their own lives, but also many were seeking to spread access to the Internet to others.

Michael had seen the word 'net.citizen' referred to online. Thinking about the social concern and consciousness he had found among those who wrote him, and about the non-geographical character of a net based form of citizenship, he contracted 'net.citizen' into the word 'netizen'. Netizen has come to reflect the online social identity he discovered doing his research.

He wrote a paper titled, "The Net and Netizens: The Impact the Net has on People's Lives" describing the research he had done and the contributions he received from many parts of the world. This research was done in 1992-1993 just at the time that the Internet was spreading to countries and networks around the world which were connecting to the Internet. Michael posted his paper on Usenet and several Internet mailing lists on July 6, 1993 in 4 parts under the title "Common Sense: The Net and Netizens: the Impact the Net is having on people's lives". People around the world wrote that they found his paper of interest and the term netizen quickly spread, not only in the online world, but soon it was appearing in newspapers and other publications offline.

I collaborated with Michael, also doing research and writing that was posted online. One of the people who found our writing of interest suggested we gather them into a book. We collected our papers into an

online book titled "Netizens and the Wonderful World of the Net" which was put online in January 1994. In 1997 a second version of the book was published in a print edition titled "Netizens: On the History and Impact of Usenet and the Internet." The book was also translated into Japanese and distributed Japan.

Netizens, as Michael wrote, are those who embodied the social conscious and public purpose similar to that which Licklider had considered important for the continued development of computer technology and of the public policy to support that development.

Michael was invited to speak at a conference in Beppu Bay in Japan in November 1995. In his speech he explained why he felt it was important to distinguish between the more general usage the media has promoted, that anyone online is a netizen, and the usage that he had introduced, reserving the title 'netizen' for the online user who actively participates to make the net and the world it is part of a better place. He explained:

> "Netizens...are people who understand it takes effort and action on each and everyone's part to make the Net a regenerative and vibrant community and resource. Netizens are people who decide to devote time and effort into making the Net, this new part of our world, a better place."
>
> Michael Hauben, talk given on November 24, 1995 at the Hypernetwork '95, Beppu Bay Conference in Beppu, Japan. The theme of the conference was "The Netizen Revolution and the Regional Information Infrastructure."

Individuals from around the world adopted and helped to spread the consciousness and identity of the netizen. A specially interesting development at the present time are the netizens of South Korea. When asking a number of people I met during a recent visit to South Korea if they are netizens, all responded yes, or "I hope so".

South Korea is one of the most wired nations in the world. Over 80% of the population has access to high speed Internet. Along with the spread of high speed Internet access in Korea is the development of netizenship among the Korean population.

In a way that is similar to how Michael described the interactive,

collaborative online processes that he and those who wrote him in the early 1990s, researchers in South Korea are documenting similar processes and the impact of netizens on Korean society. One particularly interesting aspect of these developments is that online processes are being adopted by formerly offline institutions and that online clubs have developed offline organizational forms as well. Another speaker in this session will discuss the development of the Internet and the Netizen in South Korea.

Implications and Research Questions Raised by Work

The online plastic collaboration which makes possible interactive modeling that Licklider and Taylor describe in their 1968 paper is a helpful analogy through which to view the online world that has evolved as the Internet has developed and spread around the world. It is similarly important to recognize the social consciousness of users as online citizens, as netizens that has evolved and spread.

In this conference today we will hear other talks which will explore the rich scientific and technical history that has contributed to the birth and development of the Internet.

I want to argue for the need for specific studies, whether historical or contemporaneous, of how the interactive, collaborative modeling that Licklider proposed as essential to further social and scientific development of technology is being explored via the Internet.

Also I want to argue for the need to bring this area of study into the public policy activities of those who are trying to contribute to the continued development of the Internet and the management of its infrastructure. For example, the WSIS meetings being held here in Tunis demonstrate the need for an appropriate model for the management of the Internet's infrastructure. I want to propose that there is a need for the kind of plastic, collaborative, interactive and international online public process to form the basis for the model needed to administer the Internet's infrastructure. Instead outdated models developed prior to the Internet have been dominating the discourse among those involved in the WSIS process.

There are a number of research questions that arise from my paper and study. I hope those interested in these issues will find a way to continue the discussion begun in this conference after the Congress as well.

In conclusion, not only has the Internet developed and spread around the

world with an amazing speed and impact, but the Netizens, the online citizens who have emerged from the environment fostered by the Internet have also developed and spread around the world. Along with the benefits of the online, plastic, collaborative, interactive environment that has developed as the Internet has developed and spread, so too the benefits of the new form of consciousness and identity, of netizens, have developed. I want to argue that it is critical to the continuing development and spread of the Internet, that the contributions and participation of the netizens be recognized, and encouraged.

As Michael observed(4):

> "Netizens are Net Citizens who utilize the Net from their home, workplace, school, library, etc. These people are among those who populate the Net, and make it a resource of human beings. These netizens participate to help make the Net both an intellectual and a social resource."
>
> from Michael Hauben, "Further Thoughts about Netizens"

Notes:

(1) The myth that the Internet was created by the US Department of Defense as an effort to create a military communication system that could survive a nuclear war, appears to have its origins in both a misconception about what the Internet is and how it differs from the Arpanet, and also in understanding the origins of the packet switching technology pioneered by the researchers who created the ARPANET. (see paper architectural conception)

The myth grows from the false attribution of research that Paul Baran did, a researcher at the RAND Institute, as research that created packet switching. This is inaccurate. Baran's research was not related to the early work to create either the ARPANET nor the Internet. Larry Roberts, who headed the research to create the ARPANET as the head of the Information Processing Techniques Office (IPTO) in 1967-1972, writes, describing this confusion.

(I)n 1965, a...meeting took place at MIT. Donald Davies, from the National Physical Laboratory in the UK was at MIT to give a seminar on time sharing. Licklider, Davies and I discussed networking and the inadequacy of data communication facilities for both time sharing and networking. Davies reports that shortly after this meeting he was struck with the concept that a store and forward system for very short messages (now called packet switching) was the ideal communication system for interactive systems. (See chapter of bk)

Roberts continues. Davies " wrote about his ideas in a document entitled "Proposal for Development of a National Communication Service for On-Line Data processing" which envisioned a communications network using trunk lines from 100K bits/sec in speed to 1.5 megabits/sec T1), message sizes of 128 bytes and a switch which could handle up to 10,000 messages/saec (Historical note: this took 20 years to accomplish). Then in June 1966, Davies wrote a second internal paper, "Proposal for a Digital Communication Network" in which he coined the word packet, - a small sub part of the message the user wants to send, and also introduced the concept of an "interface computer" to sit between the user equipment and the packet network. His design also included the concept of a Packet Assembler and Disassembler (PAD) to interface character terminals, today a common element of most packet networks."

Roberts explains that "As a result of distributing his 1965 paper, Donald Davies was given a copy of an internal Rand report "On Distributed Communications," by Paul Baran of the Rand Corporation, which had been written in August 1964. Baran's historical paper also described a short message switching network using Ti trunks and a 128 byte message size..." But Baran's report was about a voice network. Roberts states the influence of Baran's work was "mainly supportative, not sparking its development." from March 22 1997 (give url)

While Davies contributions to the creation of packet switching has not seemed to get the credit they deserve, the myth about the development of packet switching refers to the creation of the ARPANET, not to the creation of the Internet. The Internet is a network of networks created via an international research process to create the tcp/ip protocol. (For further background, see url paper)

(2) You may notice, perhaps, that this description by C.P. Snow of a form of Brownian Motion for society, sounds similar in some ways to the concept of the 'public sphere' that the German philosopher Jurgen Habermas explores

in his writing.

(3)See for example, Ronda Hauben, "A Study of the ARPANET TCP/IP Digest and of the Role of Online Communication in the Transition from the ARPANET to the Internet", http://umcc.ais.org/~ronda/new.papers/tcpdraft.txt

(4) http://www.columbia.edu/~hauben/CS/netizen_thoughts.html See also "Netizens: On the History and Impact of Usenet and the Internet" http://www.columbia.edu/~hauben/netbook/