Internet: the real pre-history and its implications for social theory

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1.   Introduction

Discussing the history of the Internet, Wellman (2002) safeguards us from three fallacies:

- **Presentism** (Assumes that only phenomena that happened since the Net are relevant to understanding the Net)
- **Parochialism** (Assumes that only phenomena that happen on the Net are relevant to understanding the Net)
- **Punditism** (Make "common sense" pronouncements instead of investigating systematic research)

Wellman's three observations converge. *In addition to* chronology-, story-, and invention-centered Internet chronicles (for the best, see Hafner-Lyon, 1996, Naughton, 2000) that start storytelling in the 1960s, it is also essential to conduct enhanced historical investigations based on profound researches, which seek to grasp the Internet-phenomenon in its integrity retroactively. This study is a systematization effort made with a similar approach, which I intend to carry on toward the completion of the typology.

2. Dimensions of pre-histories

Stefik's (1996) systematic collection of selected passages arranged imported texts according to four "basic metaphors".

- Digital library – the Internet as a publishing venture and public memory
- The electronic mail metaphor – the Internet as a communications medium
- The electronic marketplace metaphor: selling of goods and services via the Internet
- The metaphor of digital realm: the Internet as the gate of cognition (as well as the realm of multiplayer games)

It is clear that Stefik's metaphors grasp the substantial features of the nature of the Internet, however, they ignore some of the possible dimensions. In the following passages the metaphors of "communication" and "digital library" will be joined by 6 axes of technologies that seek to emerge from the shadow of the PC in respect of (online) communities, network-oriented early functional systems, network-focused thinking and network development. We will carry out our investigation being aware of the fact that besides the axes of the electronic marketplace and the digital realm, which will not be dealt with here, there are several other possible axes to scrutinize – which may make way for further investigation...

2.1. Book and mail
(communication pre-history)

Ronda and Michael Hauben (1997) claim that *the essential aspect of a physical (electronic) communications backbone network is the development of the latent social infrastructure.* That is the reason why these early forms pointed toward an expanded and large Internet audience (from the precursors of computer networks and prototype networks like the US ARPAnet, the British National Laboratory of Physics, the less renowned French CYCLADES to community network forms emerging from these like BITNET, FIDOnet, Usenet, VMSnet, the Soviet RELCOM and other networks.

The authors surprisingly turn back to early modern times to give an account of the interesting analogies of Usenet that resemble the initial communal embeddedness of printing[1].

Table 1

Early book-community, Usenet-community (adopted from Hauben, 1997)

Analogue feature	Early book-community	Usenet-community
Attitude	"Everyone has become eager for knowledge with the awesome and inspiring sense of the awareness of their previous ignorance."	Eyes opened wide, recognition of the transformation of the way of

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[1] 16th-century analogies are taken from Elizabeth Eisenstein's monography (Eisenstein, 1993). For the history of Usenet, see Usenet History Archives: ftp:weber.ucsd.edu <usenet.hist>.

	(Johann Sleidan, 1542)	life
Motivation	The tremendous productive role of feedback for authors.	The instant feature of communication, and the need for interaction
The innovation spiral	The power of printing constantly reinvents the way we perform and improve our work. (David Hume)	Cooperative knowledge production and new infrastructure
The emergence from locality, common meanings	Orientation toward larger community forms as a result of the loosening local ties, standardized means of information storage, getting more familiar with the world	The exchange of opinions and standpoints implies a transforming capacity that may lead to more profound experience than everyday life
The fermentative role of network hubs	Book workshops have become places of news exchange and scientific workshops creating a multilingual international environment	The network is the commonwealth of knowledge and learning
Social responsiveness	Intellectual workshops are equally intellectual and socially responsive	Need to involve those excluded from the network and to help newbies

If we are looking for analogies from communication history, the entire history of the post is available to us. The post-Internet, if we accept the opinion of Arnold Toynbee, a prominent British economist and social reformer, had emerged by the second half of the 19th century. "*The establishment of the international organization for the post in 1875*" is not merely a milestone in post history, but *from the point of view of communication* it is also the spectacular starting point of the "*emergence of the world-society*". The decisive aspect for Toynbee (1969) is correspondence, the growth of which exceeds the "*breakneck growth of the population*".

The comparison of e-mail and traditional mail offers plentiful analogies from postal network topologies through the early days of data privacy (for example the violation of the secrecy of correspondence was punished with death according to the 14th-century criminal code of Milan) to the so-called mail-art movement of the direct pre-digital age. (In the beginning of the 1970s, the first mail-art initiatives were united by *Eternal Network* to enable a magazine titled FILE (!) to emerge from the potential forums as the *international*

switchboard of the network. FILE, as the center for information related to "mail-art", has prepared the way for the worldwide proliferation of the movement.)

From among the early forerunners of communal correspondence, however, two rarely discussed network organizations will now be introduced: the *guilds*, the well-known, characteristic players of medieval Europe, and the Erasmusian mail network of the early modern times.

Guilds, "as professional associations of mutual aid and protection" uniting the representatives of handicraftsmen, had almost exclusively controlled the operation and regulation of the profession they represented up until the emergence of the advanced manufacturing industry. Nevertheless, the solutions for communication remarkably resembling today's *network newsgroups* have emerged due to the necessity to effectively deliver information that would immediately impel those members to act who were relatively close to one another geographically (within a maximum 50km-radius circle), and not those who were situated beyond the borders.

Announcements that invited associates working in their own workshops to participate in public events were mostly launched by guild-masters in the form of the so-called "table-running" a relatively uniform European standard. Usually, the table was not else than an artistic object bearing the features of the guild symbol or badge to *authenticate* the posting. In parallel with the diffusion of the use of written records various cases, clamps, and bays have started to bear written messages or the list of the members to be informed.

The humanistic mail culture of the beginning of the 16th century earmarked by Erasmus was far from the current genre of private mail. It played the role of the newspaper (or the literary journal) (non-existent at the time) featuring the latest news in a distinct column following private postings. The authors of these letters, creating a European network, were aware of the fact that they have established point-multipoint connections, since, from the very beginning, they settled down to write with the consideration that their works would be published later. At least they were aware that the addressee would show the letters to other people as well. Therefore, *occasionally even multipoint-multipoint connections have been established among the busiest members of the network* (a "narrow public") by means of the home-made replication of the letters (by sending them to multiple adresses in several copies) and by using the similar publication method for the responses. The forum for the exchange of opinions was provided with the help (and speed) of dispatch-riders. (A little more than a century later Spanish diplomacy used a similar method by replicating the agents' reports to enable all agents to read the information from all their associates.)

2.2. Victorian and post-Victorian Internet: from the Telegraph to the Radioamateurs
(Online community pre-history)

Tom Standage's great book (Standage, 1999) pointed out that the telegraph had not simply been the revolution of communication technology, but by nature it also held a network community development capacity. The apparent analogy between the telegraph and the Internet is emphasized by Standage himself in a brief paragraph that is also available on the Web[2]:

"Although chat rooms are treated as a recent phenomenon, telegraph operators had the equivalent. Several operators on the same line could communicate with each other, tell jokes, and exchange gossip. The bored and lonely played chess and draughts over the wires, using a numbering system to identify the squares of the board. Tensions between skilled users in the cities and clueless part-time operators in rural areas led to angry exchanges similar to the "flame" wars that happen online today. Just as inevitably, romances flourished online. (Telegraphy was regarded as a suitable job for young women, because it wasn't too strenuous.) There were several telegraphic weddings".

The multipoint-multipoint design of the telephone initially referred to as speaking telegraph has then generated real and massive network presence. In communication history radio broadcasting would come next, but not so in the community dimension!

Colin Cherry, the renowned communication researcher regards the radio as unilateral as compared to the bilateral telephone, and he would be absolutely right if radio history included only broadcasting, which is undoubtedly one of the classics of unilateral communication with its unilateral point-multipoint traffic. However, the heroic period of radio communication is inseparable from the global movement of short-wave radioamateurs, which was the first to establish a real network culture through interactive multipoint-multipoint links. This movement, in which users familiar with the Internet could discover the medium predecessor recognizing the astonishing resemblance to the logics of activity forms and the process of institutionalization, had already dated back to a history of a quarter of a century preceding the onset of broadcasting.

Although short-wave radio communication originated in Britain and America, it has been developing as an international movement almost from the very beginning. Still, the language of the sometimes transcontinental communication between radioamateurs has remained English, or consisted of English abbreviations. Even those who could not speak a

word in English were able to communicate with any of the world's radioamateurs if they acquired some 150 abbreviations required to be able to participate in a usual talk and complemented this network lingua franca with an auxiliary English dictionary. The network presence was made even more diverse via the ability to receive experimental and later on regular, mostly foreign, broadcasts besides the communication between the fellow amateurs.

The radio amateur movement displaying substantial parallelism to the development of the Internet has also produced several imposing analogies. The smattering of jargon that may seem gibberish to laymen is a good example: if today a password and a login name are required for walaky@edu.com.hu to visit Web pages having a list of URLs, or to do ftp, then anno unlis OH (for example HA9YC) was required a WAC-certificate and 100 QSL-pages received from DX QSO for a broadcasting permission.

Contemporaries perceived the compulsion to log into the system and be online as addiction in the same way as today. "*The disease is mostly incurable and appears to be the most dangerous in the very beginning: all patients suffering from this disease immediately want to 'give'.*"

The rising of the radioamateur community was impeded by WWII in the shape of prohibitive measures taken by authorities with 75 percent of the programs being ceased. Silence has descended upon the air. *Inter arma silent musae.* Only the hissing of the electronic tubes of computer ancestors EDVAC and ENIAC interrupts the silence, yet the next instalment due to come in fifty years will emerge from military developments during the war…

2.3 Cybersyn, Infostrada, Minitel
(functional computer-based network pre-history)

In addition to the cradles of the Internet, the first well-known university, academic and research networks, we need to mention two incomplete and an accomplished truly functional network efforts.

2.3.1. Chile, Cybersyn, 1973

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[2] http://www.contextmag.com/archives/200208/Catalyst2.asp?process=print

In 1971 a comprehensive program, led by British cybernetician and research philosopher Stafford Beer, was launched in Chile to place the Chilean economy under *cybernetic control*. Based on Norbert Wiener's pioneering studies a branch of cybernetics that used the conceptual system and models of cybernetics to help to grasp the way society and large organizations function had already been developing for nearly twenty years by that time. This sub-domain of cybernetics has been preferably referred to as *social cybernetics* or *cybernetic enterprise management* later on.

It has not proved to be a big challenge for Beer and his team to apply the principle model of cybernetics to the Chilean economy. As a solution they chose *real-time keyword monitoring* of the transactions of factories, businesses and banks through the installation of a high-capacity central computer which allowed information terminals to connect to one another. To manage the excessive load of nonstop data flow they inserted special filters, and they were ready with the Brain of the Firm, as Beer calls it in his book in 1986. On March 1, 1972 the pioneer project called Cybersyn including four sub-programs was launched.

Cybernet: Santiago-based multipoint-multipoint national communication network for industry players

Cyberstride: a computer program sequence for all feedback levels conducting statistic filtering on homeostatic loops, and *arousal filter* to alert in critical situations

Checo: model of the Chilean economy with simulation capacity

Opsroom: specific decision-support environment, which supported decison making completely independently of the other three systems

The only one thing the cyberneticians being engaged in their work could not expect was the Pinochet-putsch and the assassination of Allende in September 1973. The Cybersyn program, in the absence of an opportunity to demonstrate its potentials, passed away after one and a half year. The Cybernet itself, therefore, can be viewed as the incomplete prototype of all future giant networks.[3]

2.3.2. The original Infostrada (1971-1974)

The world media started to embrace the concept of the *information superhighway (later info-highway, Infostrada, I-way)* following the presentation of American vice president Al Gore in the 1994 world telecommunication forum in Buenos Aires. The term equally

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[3] *Stafford Beer*'s book (Beer,1986) presents and evaluates the experiment through his own eyes. A brief review of the Cybersyn story can also be found on the Web: http://ursula.blythe.org/NameBase.

hinted at the legendary national road-building program of New Deal and Fellini's *La Strada.* Today, it is perhaps less painful to ruin the myths. The history of the concept and the term, however, dates back to Warsaw, Poland, and stems neither from the US and its National Information Infrastructure (NII) Program, nor Italy, the home of *strada*.

Between 1971 and 1974, *Andrzej Targowski,* the head of the Polish Computer Development Program launched the Polish national information infrastructure project (*Krajowy System Informatyczny - KSI*) called *INFOSTRADA*. The designation of the national computer network operating according to a time-sharing, packet-switched method was inspired by *Wislostrada,* a highway in Warsaw, which had a similarly sounding name. The Polish INFOSTRADA was an advanced and truly ambitious information infrastructure vision. The core of the system was the high-capacity national computer system, which provided the foundation for both the *national information utilities* and the transaction-based solutions supporting the operation of the major subsystems and their decision-making background. In addition to the government, the public administration, and the economic sector, the initiative would also empower citizens to have direct access to the network, which was expected by both the developers and the political leadership to bring resounding success and economic-social boom.

The first three major hubs of INFOSTRADA were built on the computers and wires of the *Singer* Company relying on the lucky accident that the cable giant was making experiments to move information services to cable precisely at that time. Before the American implementation Poland seemed to be an ideal place to experiment.

However, by 1975 it turned out that the political license had proved to be ephemeral. Even the initial achievements of the project suggested that the INFOSTRADA would impose a risk on the role of the Polish Communist Party as an information center jeopardizing the *modus operandi* of the political system. (The horizontal flow of information is unacceptable for a totalitarian regime, as Targowski pointed out twenty years later.) The program was halted, Targowski was condemned to inhibition, and six years later he decided to emigrate to the United States escaping from the turbulent times of the Solidarity period. He settled down in the US, assumed American citizenship and a couple of years later, as a *Western Michigan University* professor, launched an ambitious intelligent city program (*Kalamazoo TeleCity USA - KTUSA*) slightly transforming his former model. The program gave a considerable push to the development of *Greater Kalamazoo* county, *Kalamazoo* city and the neighboring area. The model also proved to be capable of being expanded to a national (US) scale serving as a point of departure for the design of the architecture of the *Global Information*

Infrastructure, GII). As the leading theoretician of the issue, Targowski very soon found himself among the consultants of vice president Albert Gore, just at the time when the National Information Infrastructure Program had become Global Information Infrastructure Program, and Infostrada had emerged. The circle has closed, or become squared: essentially, the architecture of the US online government system almost perfectly corresponds to the nearly twenty-five-year-old concept of INFOSTRADA including even "citizen-end-points".

2.3.3 The rise... and survival of Minitel, 1982-?

In the middle of 1981, a national videotext system was introduced in France which (from December 1982) enabled citizens owning a telephone line to request stock market information, sports information or data from an electronic telephone book on-demand online for a fee per service using their free hybrid terminals. The network, which provided 145 different services in 1984, offered the most extensive e-mail system in the world by 1987, which has by now nearly 7 million terminals (including the system of street and institutional kiosks established very soon after home use), and 80 percent of its traffic is composed of so-called *messageries* (real-time messages, chat, games, message boards, commercial *bulletin boards* and *chat-lines*).

The average Minitel user does not differ significantly from the Net user: he/she possesses an electronic mailbox (*boite aux lettres electronique, BAL*), a password (*mot de passe*), chooses a name *(pseudo)* when opening a private box, and though it may be his/her real identity, this function mainly serves anonymous communication.

Indeed, the real pioneer of all public, community and commercial networks is Minitel, the *"Grand Réseau Telematique"*, by means of which the French made double history. Having been able to develop the network to a large-scale system, they outpaced the world by ten years. So much the more that in the French society a network culture has irreversibly emerged based on the daily routine of broaching the online news and data flow. However, on the other hand, instead of utilizing this remarkable competitive advantage, the system by the beginning of the 1990s has lost its former good position it gained in the development of computing as a result of the clumsy decision-making framework, the policy and the public being weary of the pseudo-debates, the exorbitant relationship between the government and the industry, and the complete indifference to innovation and novelty, and was finally superseded by the triumphant worldwide network, the Internet. By that time, it was all too late. The launch of the multimedia project (high speed and transmission of images) in 1994 was in vain. Firstly,

the phone book appeared on the Web, secondly, in July 1996, the Windows emulator of Minitel emerged, then in 1997 the *Minitel Telestore* also moved to the Internet. And though the Internet tide was predicted to sweep away the weak Minitel, it has not happened. Today, nice examples of peaceful coexistence spice up professional journalists' lives as the Minitel is now practically functioning as the *French Intranet.* The more simple, but extensively used reliable request system, though lacking hypertext, has remained competitive in the access to local and national primary information.

Regarding the history of Minitel as a giant network laboratory, it seems to be worth lingering over the most important and characteristic lessons. It turned out relatively soon that the Minitel has developed with lightning speed from a service-oriented media toward a connection-oriented media, and that ideal (rational, moderate, individualist) users do not exist, just Dionysian: as if by magic different sites would appear resembling current hacking, network games, community development, led by the scandal of scandals, the erotic bulletin board, the later *messagerie rose* (Pink Minitel).

Minitel has considerably transformed the way the French live. The category of community needed to be revaluated and redefined (the issue of virtual communities has emerged for the first time and the most strikingly here), it had to be realized that the Minitel had become a temporary zone of autonomy, that the virtual space is self-regulating, and that people tend to personalize and humanize the potential technology holds. According to André Lemos, the Minitel-story clearly justifies Georg Simmel, the great sociologist of the turn of the century (or his book titled 'The philosophy of modernity'): the development of technology has several unforeseen corners, which is driven by *technical vitalism,* but *social vitalism,* a force responsive to new methods, always joins battle with the prevailing forms of culture in order to create the most suitable environment. This is the way Minitel, this apparently absolute rational tool, could become a symbolic medium and a cultural resource making it clear how it was possible for an obsolescent technology to survive the Internet, and how it has been capable of cementing together the French society to date. That may also be a good lesson for the government and business strategic policy makers of the Net...[4]

2.4. Pioneers of vision
(conceptual pre-history)

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[4] Minitel is accessible via the Internet on *www.minitel.fr* and *.com*. Rincé (1990) provides a review of the period up to the end of the 1980s in the popular Que sais-je series. With sociological profoundness on Minitel: Lemos (1996). For the most detailed history of Minitel Rose, see: Perier, 1988)

If we should have to name only one prominent figure in the "history of thought" of the Internet, it would probably be Vannevar Bush and his emblematic "As we may think" from 1945. But if we wanted to make a list of the conceptual forerunners of *some* of the characteristics of the Internet, we would be suddenly faced with a battalion of pioneers.

In the second half of the 19th century, *Samuel Morse* prophetically envisioned the social implications that stemmed from the new type of connectivity. *Wells* introduced the "world brain" discourse during the first thirty years of the 20th century, which was enhanced by *Teilhard de Chardin*'s noosphere vision. Many attribute the textual predecessor of the hyperlink to *James Joyce* (Theall, 1992). The inventory of the history of thought includes dozens of prominent figures. Pending the emergence of such a review, let me introduce you a world-famous artist whose ideas related to our subject may not be so well-known. At the time when Marshall McLuhan started off, Victor Vasarely, a Hungarian-born French painter, authored several essays at the end of the 1950s and at the beginning of the 1960s on the technological foundations of a future communal art.

"The industry, technology, telecommunications, and information dissemination will open bright perspectives for art and will enable them to become widely integrated into the community of our age...What a perspective! Our most beautiful and authentic works reproduced in thousands of copies .... in kindergartens, schools, youth hostels, day-time homes, municipal libraries, barracks, community centers, not to mention our homes..."

The technologically unbound new types of surfaces embracing electronically replicated artworks, the ideal conveyors of the "*lumino-kinetic function ... larger or smaller screens*", as "*the miniaturized production of integrated circuits has opened the way to the unlimited production of devices available to all...*

Having envisioned multimedia access and the network terminal, Vasarely does not let the gate-barriers of the route he has covered stop him: although he started off to find the tool that makes possible the reproduction of artworks, he immediately recognized that these screens do not only bring artworks closer to humans, but *"due to their enormous information disseminating capacity they also appear as the public tools of cognition and culture..." The communication tools of the technological civilization allow greater insight into culture for the general public than ever before... Binary codes are universal, thus information can also be made binary. Owing to data banks and advanced information dissemination, the esoteric knowledge of the privileged and well-informed circles is fading.*

Vasarely identifies that the perspectives are immense, and the real promise is Corpus Digitalis, the corpus of human knowledge. *"... the recording of the science and culture of different ages and peoples is in progress. Owing to electronics, our children would be able to enjoy the essence of it."* Vasarely recognizes that access in itself is not a panacea, the management of the enormous loads of data is enabled by the same technology that helped their accumulation. *"The individual will never be able to acquire all knowledge, however, electronics can help us grasp the contours and correlations of this immense set of information and finally reach some synthesis ... purified culture becomes democratic..."*

And that is still not the end of the road: Vasarely identifies "digital illiteracy" as the bottleneck of the new culture (*"... illiteracy is less common, yet complex electronic devices may impose the risk of a new illiteracy..."*), while evades the deadlock of superficial pseudo-debates on the end of the Gutenberg-galaxy, because he is aware that *"books continue to be an important and genuine tool"*. It is no wonder that the prediction of the diffusion of telework (*"as a result of the increasing distance between workplaces, performing our job at home will play an important role again, long-distance control will inundate non-productive sectors, because the accumulation of electronic devices has accelerated"*), and the recognition of the productive interdependence of scholars interconnected in the network space (*"from now on real creation would occur only by means of artistic association and cooperation. Cooperation between scientists, engineers, producers, architects and artists would be a fundamental condition of creation... inspired meditators would turn into contemplators ready for cooperation and synthesis... celebrated artist or lonesome genius: ever so much anachronisms. Only scientist and artist groups capable of utilizing scientific and technological innovations would be able to really create"*) are logical consequences of the above observations.

2.5. From Gessner to Otlet
("world library" pre-history)

Konrad Gesner's *Bibliotheca Universalis* was a desparate aspiration of the middle of the 16th century to accumulate and organize human knowledge (textual information) in a single comprehensive corpus. From the second century of printing, as a result of the rocketing increase in the number of publications, the heroic illusion of the capacity to give a comprehensive review has vanished for good.

The first conference on bibliography was held in 1895 on the initiative of two Belgian-French lawyers, *Paul Otlet* and *Henri Lafontaine* who later (in 1913) received the Nobel Prize for Peace. The participants of the conference decided to establish an *International Institute for Bibliography* that may be capable of assembling a universal bibliography (*Repertoire Bibliographique Universel).* The institute has accepted Dewey's Universal Decimal Classification (UDC) system, and the standard (12,5x7,5cm) catalogue card, of which 7 million were available by 1910. The gradually respected institute established a number of special collections, and the generous support of the Belgian government made it possible in 1920 to establish a special collecting institute called *Mundaneum*[5]*,* "the technical and scientific museum of humanity".

Bibliographic work had never been a pure library issue for Otlet and Lafontaine, who, as late followers of utopist socialists, hoped that "the inventory of the world's intellectual production could be available to the workers of all the countries". Indeed, they had an even more comprehensive vision: they intended to provide an "intellectual infrastructure" for the emerging global community by way of "an international inventory of thoughts and events" and by means of the exchange of information and free access.

Essentially, the theoretician Otlet embeds the technology of information dissemination in a social space. Otlet's principal work, *"Traité de Documentation. Le livre sur le livre. Theorie et pratique",* the prime of his career as a theoretician was published in 1934. This book may not have been rediscovered by chance as a "classic piece" of the discipline and republished in 1989, by the time technological conditions have grown ripe to "virtualize" the servicing function of the library.

2.6. Fax, radio, radar, for instance
             (technology pre-history)

It may not be surprising based on the above observations that in the technological history of the Internet several other "roots" can also be recognized and identified.

PBS's review on Internet history[6] for example calls attention to the fact that early computing machines were developed to process the complex radar messages, therefore one of

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[5] A detailed account of Mundaneum (in French) can be found on http://www.pastel.be/mundaneum/index.htm. Otlet as a hypertext-forerunner is described by Boyd (1994)). For the importance of Otlet's book, see Day (1997)).
[6] http://www.pbs.org/opb/nerds2.0.1/index.html

the most interesting and influential ancestors in the history of the Internet is *radar*. The development of radar during and after the war was a catalyst for some of the technologies later incorporated into the Internet". (It is more than interesting that one of the leaders of radar experiments was Vannevar Bush himself, and it should not be ignored that the young Doug Engelbart, an early advocate for Bush's idea, has read the famous article of Atlantic Monthly as a Navy Radar Technician serving in the Philippine Islands…)

And there is also a plethora of other technologies besides radar… As usual, even the incomplete world library effort has become a source of epochal recognitions. At the beginning of the 1930s, Paul Otlet had to face a double challenge: the urgent necessity to find advanced technological solutions that enable the managament of the enormous library collection, and the task of providing some sort of access, which seemed inextricable lacking the ability to travel to Belgium. To solve the former problem, Otlet could use the bibliographic knowledge accumulated thus far, but he had to find technological solutions to resolve the problem of the transmission of catalogue card information. If the reader is not able to travel to the text, let the text travel to the reader – a simple solution. But how? Since 1907 *MacAdam's* photostat machine or the photocopy have been available, *Hollerith's* tabulating machine for high-volume data processing has been there since 1890, experiments in television are underway – and Otlet introduces *screen-enabled telegraphy*.

Though *Elisha Gray* developed the so-called teleautograph in 1890 for the electronic transmission of fixed images, and *Artur Korn* invented the telegraphic machine in 1904, but because Gray's transmission method involved an analogue drawing and „receiving pen" being unsuitable to meet high-volume data transmission needs, and due to the fact that Korn's machine could not spread, it was by no means obvious that Otlet run such a long way ahead. The first fax machines by Xerox only emerged in 1971, and it has only become common by the beginning of the 1980s to send written messages, images, documents (or even texts and images simultaneously) via telephone or television cables.

Or let us take radio as another example. In one of his late works, classical scholar *Eric Havelock* recalls the impressive effect *Hitler's* 1939 (short-wave) radio speech imposed on his audience through outdoor speakers set up in the streets of Toronto. By means of the above episode Havelock, whose reputation is attributed to his book titled Preface to Plato, has found a good rhyme precisely to Plato's maxim saying "the boundaries of a city strech as far as the speaker's voice is heard". Thus, the short-wave transmission of sound had already developed the "global city" preceding Marshall McLuhan, the Canadian cultural theorist of the television, and his "global village" concept based on the transmission of pictures. Or let us try

to recollect what the wired radio of the Stalin-era reminds us, which substituted small appliances for large speakers making it impossible to achieve even the minimum of interaction – to turn it off.

This by no means imply the supremacy of sound (voice) over the image, even though the several thousand-year-old history of sound theaters revealed by *Oscar Eberle* in 1952 would suggest that. (Eberle collected ethnographic data that supported the existence of different sound theaters, and gave an account of 17 distinct types from differentl continents including the most important ones like the Pano-play of the Malaysian Semang people or the Tanuwa-play of Fuegian indians.) So much the more as anyone involved in radio broadcasting could somehow always have a feeling of insufficiency as far as the exclusively oral environment is concerned. In the United States people would demand to also have current radio plays in printed form (some 170 volumes of radio plays were published up to 1950 with the first printed one originating from 1925). Professional radio papers has been continuously interested in solutions for *colorful television*.

3. Epilogue

If we are right to assert that the Internet is a sort of convergent lens of cultural history, we should be prepared to encounter additional contributions considerably outnumbering the quantity of historical precursors accumulated in the previous passages. A systematic collection and elaboration of these historical precursors may sooner or later contribute to what we would call the "real pre-history of the Internet".

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