Chapter 16
The Expanding Commonwealth of Learning:
Printing and the Net

by Michael Hauben

A revolution in human communications is happening. People around the world are connecting to each other via the new computer telecommunication networks now known as the Net. The Net, in a significant way, is a continuation of the important technological development of the printing press. The printing press might seem to be an unlikely choice for such a comparison considering the similarity that might be seen between the Net and, for example, television, the telephone, radio, or the news media. That is why it is important to compare the current networking developments with the history of printing to understand why the printing press should be seen as the forefather of the currently developing computer networks.

With the invention of the printing press in the second half of the fifteenth century, there arose print shops and printing trades. Printing and the distribution of printed works grew rapidly. In the last quarter of the twentieth century, a global computer network has emerged which gives users the ability to post and distribute their views and news broadly and inexpensively. Comparing the emergence of the printing press to the emergence of the global computer network will reveal some of the fascinating parallels which demonstrate how the Net is continuing the important social revolution that the printing press had begun.

The printing press developed out of a scribal culture surrounding the hand-copying of texts. This scribal culture could only go so far in furthering the distribution of information and ideas. Texts existed, but were largely unavailable for use by the common people. There were very few copies of books as each copy of a book had to be laboriously hand-copied from a previous copy. Relying on scribal culture for access to and distribution of knowledge caused many problems. Texts were often inaccurate as scribes made mistakes while copying them. Since a single scribe usually had access to only one copy of the text he was copying, he had no way to know if he was duplicating mistakes other scribes had made before him. The effect of copying mistakes, or non-exact copies, led to numerous "versions" of the same text. Also, scholars who wanted to use various texts had to travel in order to have a good variety of material to study. The majority of people could not afford, nor did they have the time to pursue scholarly pursuits. In her book,The Printing Revolution in Early Modern Europe: Elizabeth Eisenstein writes: "[one] needs to recall the conditions before texts could be set to type. No manuscript, however useful as a reference guide, could be preserved for long without undergoing corruption by copyists, and even this sort of 'preservation' rested precariously on the shifting demands of local elites and a fluctuating incidence of trained scribal labor…wear and tear...moisture, vermin, theft or threat."[1] Under such conditions, scribal efforts did not preserve many valuable texts. Plenty did not survive.

Just as the printing press essentially replaced the hand-copying of books in the Renaissance, people using computer networks are essentially creating a new method of production and distribution

of creative and intellectual written works today.

Around the same time that computer communications networks started to emerge from computer communications research communities in the early 1970s, the personal computer (PC) was developed by students, hobbyists, and proponents of the free-speech movement on the West Coast of the United States. The personal computer became widely available at prices many people could afford. The PC made the power of the multipurpose computer available to a wider cross section of people who otherwise would not have had access to time on a larger minicomputer or mainframe computer which were then owned by universities, businesses and the government. The personal computer movement made computers available to the mass of people in the United States. As computers are multipurpose, they can be used to accomplish many things. A PC can be made to duplicate the functions of a printing press, with the user having little or no professional printing experience. In the past, a skilled printer combined movable type and engravings (woodcut, or otherwise) to mass produce copies of a page combining varied images (text, graphics, etc). The personal computer brings this power from the master printer to the average individual – both in price and availability. The personal computer (e.g., Apple II family, Commodore, Atari, TRS-80, etc. leading to the IBM PC family, the Apple Macintosh family, Amiga, etc.) linked to an electronic printer (first dot-matrix and daisy-wheel, later laser printers) and even more recently to scanners which convert images into usable data – make the production and reproduction of information a common task available to all. Even if one does not own a PC, one can rent time on one in a store. Copy shops (in themselves part of the continual process that made publishing ubiquitous) have begun to have PCs available to rent time on. These advances make the act of publication immensely easier. The personal computer, printers and scanners, however, do not solve the problem of distribution.

The recent development, standardization and interconnection of computers via computer communications networks help to solve the problem of distribution. Examples of on-line utilities include file transfer (ftp), remote login to other computers (telnet), remote execution of programs, electronic mail (e-mail), access to various information data bases (gopher, WWW), other information searching utilities (archie, veronica, Lycos), real-time chat (irc), and a distributed news service which allows people to share information publicly and become citizen reporters (Netnews). The two utilities most relevant to this revolution in human communication are e-mail and Netnews (or Usenet). E-Mail allows for the private and semi-private distribution of information and communications through messages to a particular person or persons, or to a designated set of people via electronic mailing lists. Netnews allows for the public dissemination of information, opinions and questions in an open forum. When a Netizen makes a contribution to any of the many defined subject areas (newsgroups), anyone from around the world who chooses to read that particular newsgroup will have a chance to read that message. Usenet's potential for inexpensive global distribution represents one major advance of Usenet beyond the printing press.

The printing press developed sometime in the 1460s and spread quickly throughout Europe. The broad distribution of presses ended the age of the scribal culture and ushered in the age of printing. "Unknown anywhere in Europe before the mid-fifteenth century," Eisenstein writes,

"printer's workshops would be found in every important municipal center by 1500."[2]

Eisenstein points out that the printing press dramatically increased the total number of books, while at the same time decreasing the number of hours of labor necessary to create books. She argues that this made the transition from hand-copied manuscripts to machine-produced books one of a revolutionary nature, and not evolutionary as claimed in much of the literature about this transformation.[3] Understanding how the printing press unleashed a communications revolution provides a basis to assess if the establishment of worldwide computer communication networking is the next communication revolution.

New communication technologies facilitate new ways of organizing information and of thinking. The invention of the printing press changed the way texts were handled. From its outset, the men who controlled the presses, the printers, experimented with ways to use the printing press to change texts. Textual techniques such as "graduated types, running heads…footnotes…table of contents…superior figures, cross references…"[4] are examples of the ways in which the press broke through some boundaries which had previously limited the production of books in scribal culture.

Moreover, the new technologies changed the way books were written. The establishment of printing shops in the major European cities formed a common meeting place for scholars and authors from across the continent. The great number of printing presses and printing shops enabled more people to write books and produce works that would be duplicated by the presses. When these new authors traveled they would gather in printing shops to meet other writers and scholars. Thus the printing press facilitated the meeting of minds pursuing intellectual pursuits. The interconnection of people led to the quickening of the development of ideas and knowledge. These progenitors of the printing trade were in the forefront of the sweeping intellectual changes which the presses made possible.[5] Similar connections among people are taking place on the Net today at a much faster rate. And, just as the printers were in the forefront of the printing revolution, so today the developers of computer communications software and hardware and netusers are the first to experience the increased connectivity with other people around the world afforded by the computer networks.

As printing spread, publishers realized the value of utilizing input from readers to improve their product. Since the press could turn out multiple copies of a first edition quickly, many people would see the first edition and could send by letter their comments, corrections and criticisms. Publishers and authors could then use this feedback to write and print second, and third editions, and so on. Mistakes would be caught by careful readers, and printers thus "were also able to improve on themselves." Eisenstein explains that copied mistakes and mistakes in copying common with scribal copies now could be caught by the increasing number of readers. She writes, "the immemorial drift of scribal culture had been not merely arrested but actually reversed."[6]

The Net likewise provides a ready mechanism for the interaction between authors and readers. On the Net, people often keep track of knowledge, such as lists of a musician's records (discographies), or FAQ files of answers to Frequently Asked Questions. Authors of these works often act as both editor and compiler. People send further information, which the keeper of the file

often adds. This makes for a communal base of information which is often available to anyone minimally connected to the Net by at least electronic mail. The constant updating of information on the Net continues the tradition of revising intellectual work introduced by the printing press.

Eisenstein's description of how communal information was gathered is similar to how such procedures work on the Net. She writes: "But others created a vast network of correspondents and solicited criticism of each edition, sometimes publicly promising to mention the names of readers who sent in new information or who spotted the errors which would be weeded out."[7] People who ask questions on the discussion sections of the Net (either Netnews or Mailing lists) often summarize the answers they receive and post this summary back to the Net. When doing this, many compilers include acknowledgments to the people who supplied the information. Also when people send in corrections to an FAQ, the keeper of the FAQ often makes a list at the end thanking these individuals.

Eisenstein details these networks of correspondence in an example of a particular text titled the "Theatrum".

By the simple expedient of being honest with his readers and inviting criticism and suggestions, Ortelius made his Theatrum a sort of cooperative enterprise on an international basis. He received helpful suggestions from far and wide, and cartographers stumbled over themselves to send him their latest maps of regions not covered in the Theatrum.[8]

On Usenet, too, making a contribution is an integral part of Netizen behavior. Netizens make a point of being helpful to others. Often the Net has made a positive difference in their lives and they return the favor by making their own contribution, perhaps by answering the questions of others or developing an archive. These individual and increasingly group contributions are what have built the Net from a connection of computers and computing resources into a vast resource of people and knowledge. People who use the Net have access to Net resources and can contribute to them. Thus the culture of the Net has been shaped by people actively contributing to the growth and development of the Net. The tale of the Theatrum shows there is a historical precedent in human nature for this "stumbling over oneself" in order to try and be helpful.[9]

The flow of information to the publishers of the Theatrum meant that at least 28 editions were published by the time of the publisher Ortelius' death in 1598.[10] In a similar way, Usenet is by its very nature constantly evolving. The basic element of Usenet is the post whose life is temporary. The Usenet software is designed to "expire" or delete messages after a certain time period. Without constant new contributions from people to Netnews, there would be no messages to read or discussions to take part in. So there is a constant evolution of Usenet. But, also the material in the more permanent information depositories is often updated so they evolve as well.

During the early days of the printing press, publishers' requests for information led to people starting their own research and work. "Thus a knowledge explosion was set off," Eisenstein exclaims.[11] The Net follows in the tradition of the press, by having one set of people asking

questions, leading to another set of people conducting research. In this sense the Net can serve the role as a thinktank for the ordinary person. So the advanced possibilities the printing press made possible in the sixteenth century is being replicated many times more by the Net today. It is important to recognize and value Netnews for its contribution to human society and the advancement of knowledge.

Eisenstein observed that the art of printing opened people's eyes to their previous ignorance. She quotes the German historian, Johann Sleidan, in his "Address to the Estates of the Empire" of 1542, describing the impact printing had in Germany, "[The] art of printing [has] opened German eyes even as it is now bringing enlightenment to other countries. Each man became eager for knowledge, not without feeling a sense of amazement at his former blindness."[12] This sentiment has been echoed by many Netizens on Usenet and in other on-line conversations. People have been amazed at what the Net made possible and how it was changing their lives.

Eisenstein comments in her book on the role of feedback to early authors and print publishers. She wrote that feedback helped to "define the difference between data collection before and after the communications shift. After printing, large-scale data collection did become subject to new forms of feedback which had not been possible in the age of the scribes."[13] Computer networks likewise make possible very easy and natural feedback. Once one reads a message (either public or private), a simple keystroke allows the composition of an answer or response, and another keystroke is often all it takes to send the response. This takes less effort than writing to a publishing house or calling a television station. Since responding to other messages becomes such a natural part of the on-line process, the procedure becomes almost automatic.

Many people who use Usenet find television dull rather than thought provoking. Doug Thompson, a user of Usenet, wrote "TV is so bloody tame and boring in comparison to Usenet." Others, too, have described how they have completely stopped watching TV and reading the newspaper because of Usenet.

Eisenstein refers to the process of constant improvement which printing made possible, as observed by the Scottish philosopher David Hume, "The Power which Printing gives us of continually improving and correcting our Works in successive Editions appears to me the chief advantage of that art."[14] Eisenstein expands on this idea adding, "The future seem[ed] to hold more promise of enlightenment than the past."[15]

This promise of a better future is also seen by those on the Net. People on-line are being enlightened by the interconnection of peoples around the world. The Net helps people to make social connections which were never before possible, or which were relatively hard to achieve. Geography and time no longer are boundaries. Social limitations and conventions no longer prevent potential friendships or partnerships. In this manner Netizens are meeting other Netizens from far-away and close by that they might never have met without the Net.

Eisenstein reports that the printing press too helped people interact with other people who

they would not have met before its invention. "Vicarious participation in more distant events was enhanced," she writes, "and even while local ties were loosened, links to larger collective units were being forged."[16] Improvement of information about other parts of the world "by the output of more uniform maps containing more uniform boundaries and place names" helped people to know more of the facts of the world. "Similar developments affected local customs, laws, languages, and costumes."[17]

The Net similarly provides people with a broader view of the world by introducing them to other people's ideas and opinions. The Net makes it possible to access more and differing viewpoints than were normally available in a person's daily life.

Much as printer's houses in the sixteenth century served as places to stop when traveling, computers and phone lines connect people around the world as in our times. Eisenstein describes how such print shops, "point to the formation of polygot households in scattered urban centers upon the continent." She observes that during the sixteenth century, "such printing shops represented miniature 'international houses.' They provided wandering scholars with a meeting place, message center, sanctuary, and cultural center all in one. The new industry encouraged not only the formation of syndicates and far-flung trade networks, similar to those extended by merchants engaged in the cloth trade, or in other large-scale enterprises during early modern times. It also encouraged the formation of an ethos which was specifically associated with the Commonwealth of Learning – ecumenical and tolerant without being secular, genuinely pious yet opposed to fanaticism, often combining outward conformity to diverse established churches with inner fidelity to heterodox creeds."[18]

The social networks made possible by Usenet and the emergence of the printing press are very similar. Even though Netnews has no official guiding body, Netizens have developed social rules which control and mediate the medium. As the forum is democratic, there will be people who have nothing intelligent to add, or only want to be disruptive or offensive. Others will often debate these troublemakers and through argumentation and the posting of opposite opinions help others to make up their own minds as to the value of the original postings.

The printing press facilitated new cross-cultural networks which encouraged "forms of combinatory activity which were social as well as intellectual."[19] Differing ideas were more easily set against one another. The theories of Arabists were set against the theories of Galenists and those of Aristotelians against Ptolemaists. Eisenstein writes: "Not only was confidence in old theories weakened, but an enriched reading matter also encouraged the development of new intellectual combinations and permutations. Combinatory intellectual activity…inspires many creative acts."[20]

The Net helps people communicate with each other who might not have communicated before. Strangers meet each other because of interest in each other's ideas and this leads to new intellectual collaborations and combinations.

The connection of differing ideas and people meant the first century of printing is recognized

for "intellectual ferment" and by what Eisenstein writes was a "somewhat wide-angled, unfocused scholarship."[21]

The new availability of different theories or opinions about the same topics led Eisenstein to conclude that the contribution a scientist like Copernicus was able to make was not that he produced a new theory, but rather he was "confronting the next generation with a problem to be solved rather than a solution to be learned."[22] Lastly on this subject, Eisenstein equates the quickening of science toward a "cognitive breakthrough of an unprecedented kind."[23] The Net is continuing and accelerating that advance.

The lure of being able to produce numerous copies of books cheaply, was that an author's words could be spread around the world. This proved to be powerful. Eisenstein quotes Maurice Gravier on the power the press presented to the Protestant reformers: "The theses…were said to be known throughout Germany in a fortnight and throughout Europe in a month…. Printing was recognized as a new power and publicity came into its own. In doing for Luther what copyists had done for Wycliffe, the printing press transformed the field of communications and fathered an international revolt. It was a revolution. The advent of printing was an important precondition for the Protestant Reformation taken as a whole; for without it one could not implement 'a priesthood of all believers.' At the same time, however, the new medium also acted as a precipitant. It provided the 'stroke of magic' by which an obscure theologian in Wittenberg managed to shake Saint Peter's throne.[24] This idea is repeated by the English writer Daniel Defoe (1660-1732), whom Eisenstein quotes, when he wrote "The preaching of sermons is speaking to a few of mankind, printing books is talking to the whole world."[25] The Net has opened up a channel for "talking to the whole world" to an even wider set of people than did printed books.

A social role which grew to be crucial in this new world of printing was that of the master printer. His was the business of running a print shop, and finding and promoting potential authors. In the course of this work his workshop became a center of intellectual excitement. Eisenstein explains that the master printer's "workshop became a veritable cultural center attracting local literati and celebrated foreigners, providing both a meeting place and message center for an expanding Commonwealth of Learning."[26]

This development of an intellectual family started to bring the world closer together. "In the late sixteenth century," Eisenstein maintains, "for the first time in the history of any civilization, the concept of a Concordia Mundi was being developed on a truly global scale and the 'family of man' was being extended to encompass all the peoples of the world."[27] The hospitality which the printers provided to travelers and intellectuals helped to make this happen.

The Net continues in this tradition of uniting the world. It is easy to hold conversations and develop relationships with others from around the world. The Net speeds this transaction as the conversation is brought from the print shop into a Netizen's home. A major advancement which the personal computer and the Net make possible is accessibility of publishing. Anyone who owns a personal computer can develop and print their own books, pamphlets, signs, and so forth. The Net

comes in to help with distribution.

Eisenstein talks about one result that standardization of printing brought about. "One might consider," she writes, "the emergence of a new sense of individualism as a by-product of the new forms of standardization. The more standardized the type, indeed, the more compelling the sense of an idiosyncratic personal self."[28] Similarly, because Usenet and mailing lists only present people via their ideas and writing styles, people have to write the way they want themselves to be viewed. Thus people develop their own styles. Reading posts can therefore at times be an enjoyable experience. A famous cartoon printed in the New Yorker magazine in 1993 show a dog at a computer. He says to another dog, "On the Internet, no one knows you're a dog." In fact, no one knows if you are white or black, yellow or purple, ugly or beautiful, short or tall. Discrimination based on appearance and visual impressions loses its basis. People can still be verbally harassed if they act stupid, or prove unhelpful to the Net. One problem, however, which has not yet been solved is harassment based on user name. For example, women with user names that are clearly identifiable as a woman's still receive some attention and sometimes harassment.

The printing revolution affected both tool making and symbol manipulation, which led to new ways of thinking. As Eisenstein notes, "The decisions made by early printers, however, directly affected both tool making and symbol making. Their products reshaped powers to manipulate objects, to perceive and think about varied phenomena." Computers, too, are in general directly affecting tool production and symbol manipulation. The tools on the Net are new tools – and thus lead to radical ways of thinking and dealing with information. People's thought processes can expand and develop in original ways. New ways of manipulating information, such as unix tools, hypertext media and search engines for searching distributed data sources foster new means of intellectual activity.

Printing made consultation of various texts much easier – no longer did someone have to be able to be a "Wandering Scholar" to gain access to various information. With the development of the Net, information access becomes much more varied and widespread. The local public library, along with libraries around the world, other data banks and knowledgeable people are becoming accessible via the Net, for some netusers even from their homes. Only a few libraries currently offer electronic access to any of the actual texts of their holdings, but that is rapidly changing. Undertakings such as Project Gutenberg and various digital library initiatives are trying to make library resources available from any computer hooked into the Net.

Both the printing revolution and the Net revolution have been a catalyst for increased intellectual activity. Such activity tends to provide pressure for more democracy. When people have the chance and the means to start thinking, ideas of self-rule appear. Eisenstein describes how, "Puritan tradesman who had learned to talk to God in the presence of their apprentices, wives, and children were already on their way to self-government."[30] Many social and political questions are being discussed on Usenet newsgroups especially questions like censorship and Net access which affect the Net directly. Based on these discussions, Netizens are exerting pressure on their governments to form new democratic structures like the NTIA on-line conference.[31]

Mass production via printing makes it possible to have sufficient books so that everyone who wants a copy can borrow one from a library or buy one. Eisenstein presents Thomas Jefferson's view of this "democratizing aspect of the preservative powers of print which secured precious documents not by putting them under lock and key but by removing them from chests and duplicating them for all to see." According to Eisenstein, "The notion that valuable data could be preserved best by being made public, rather than being kept secret, ran counter to tradition, led to clashes with new censors, and was central both to early modern science and to Enlightenment thought."[32] The democratizing power and effect of the printing revolution, Eisenstein contends, is overlooked in most historical writings.[33]

With the advent of printing, the Law was affected by the onset of the ability to duplicate numerous copies of a single document cheaply. People saw that this capability would be helpful in making the Law available for the common person to read and understand, and therefore the common person would be able to watch carefully if it was administered fairly. John Liburne, a person who lived in England during the Stuart Monarchy felt that legal documents should be freed from the confines of Latin and old French so that "every Freeman may reade it as well as the lawyers." People like him also held that knowledge which had been esoteric, "rare, and difficult," should be transformed into a form where it could be useful to all. Eisenstein also quotes Florio, who made translations and dictionaries in English. He symbolized the democratic possibilities of the printing press saying, "Learning cannot be too common and the commoner the better…. Why but the vulgar should not know all."[34]

Legal decisions are now being made available on the Net so that anyone with a computer and modem and net connection will have access to them. Also there are legal newsgroups on Usenet like misc.legal where various laws are examined and discussed. This provides a helpful perspective for understanding the value of the Net. The culture that is currently characteristic of the Net supports the principle that much of it should be available openly for the rest of the world to use. There is a collective communal democratic aspect of it, too. The simple fact of the matter is that every single person who is connected to the Net and has Usenet access can make a post to Netnews and every net user can send electronic mail to any other person who is on-line.[35]

The scribal tradition restricted who made the choice of what was copied to the Church or those who had substantial property. "As long as texts could be duplicated only by hand, perpetuation of the classical heritage rested precariously on the shifting requirements of local elites."[36] With the spread of the printing press, the monopoly of these elites was broken. Netnews is a similar advance over today's mass media. In the 'traditional' forms of mass media, the content is decided by the national 'elites'. However, on Netnews there is no control over the whole and the content is contributed to by every single person who is active on the Net.

Eisenstein compares this control of elites over what manuscripts were copied to the role of the printer and publisher who have it in their interest to unleash all sorts of books. Eisenstein writes: "The politics of censorship made [the printers] the natural opponents not only of church officials but also of lay bureaucrats, regulations and red tape. As independent agents, they supplied organs of

publicity and covert support to a 'third force' that was not affiliated with any one church or one state. This third force was, however, obviously affiliated with the interests of early modern capitalists."[37]

These publishers were "the natural enemy of narrow minds," and "encouraged the adoption of a new ethos which was cosmopolitan, ecumenical, and tolerant without being secular, incredulous or necessarily Protestant…."[38] The Net has offered a parallel encouragement by providing a new kind of public space separate from either commercial purposes or religious or political limitations or ideas.

The printing press provided a new way for people to challenge the status quo. Eisenstein asks the question, "Did printing at first serve prelates and patricians as a 'divine art,' or should one think of it rather as the 'poor man's friend'?"[39] She answers it might have served in both roles, but that literacy seemed more "compatible" with the life of a peasant than that of a noble or lord.[40]

We can pose the same question about the Net. Should one think about the Net as a 'poor man's friend'? If we think of the Net as an alternative to the current media of Television, Radio, and Newspapers and Magazines – the answer is yes. People who have a lot of money can afford to own a segment of the mass media described above, and control the content of that media, whereas the Net is controlled by the mass of people connected to it, so it is 'the poor man's' version of the mass media.

The printing revolution fostered the spread of education. Books were used by apprentices and students to learn more than was offered by their teachers. The Net similarly makes multiple resources available for people interested in learning. People can access more information resources and, even more important, other people. This increased accessibility of people to each other means we can all gain and learn from the interests and knowledge of others, more so than from any single teacher.

The impact of the new print technology on science was enormous. Collaboration and cooperation over longer distances were made possible by the power of print. In particular, Eisenstein refers to the impact on the science of Astronomy. The change she sees happened within Copernicus's lifetime. "Copernicus was not supplied, as Tycho's successors would be, with precisely recorded fresh data," she notes. "But he was supplied, as Regiomontaus's successor and Aldus Manutius's contemporary, with guidance to technical literature carefully culled from the best Renaissance Greek manuscript collections, and for the first time, made available outside library walls.[41]

The progress of science is much faster because of the speed of communication afforded by the Net. Articles to be published in scientific journals are often available as electronic preprints – and thus have wider distribution earlier than was the norm before the Net. An outstanding example of this increased speed of scientific activity occurred when researchers all over the world tried to reproduce the result of the two University of Utah researchers who had announced that they had achieved cold fusion. A newsgroup sci.physics.fusion was very quickly set up and researchers' questions and results and problems were posted regularly and feverishly. As a result, what might have taken years to retest and figure out was sorted out in a three or four month period. The

physicists found the rapid exchange of data and results invigorating and encouraging and felt they were more productive and sharper in their work because of the Net. Also, they argued that the use of the Net saved much valuable research time which might have been wasted if the original claims had not been shown to have been faulty in such a short amount of time and to such a wide body of scientists.

The invention of the printing press, which led to many developments not possible before the power of printing, "laid the basis for modern science…and remains indispensable for humanistic scholarship." Eisenstein poignantly claims that printing is responsible for "our museum without walls."[42] As a storehouse of information and living information contained in other people, the Net could also be seen as a living "museum without walls." In her conclusion Eisenstein states that "Cumulative processes were set in motion in the mid-fifteenth century, and they have not ceased to gather momentum in the age of the computer printout and the television guide."[43] We, too, are in an age of amazing changes in communications technologies, and it is important to realize how these changes are firmly based on the extension of the development of the printing press which took place in the fifteenth and sixteenth centuries.

Notes for Chapter 16

1. Elizabeth L. Eisenstein, The Printing Revolution in Early Modern Europe, Cambridge University Press, Cambridge, 1993, p. 78.

2. Ibid., p. 12.

3. Ibid., p. 13.

4. Ibid., p. 22.

5. Ibid., p. 45.

6. Ibid., p. 73.

7. Ibid., p. 74.

8. Ibid.

9. See "The Net and the Netizens". ***

10. The Printing Revolution in Early Modern Europe, p. 74.

11. Ibid., p. 75.

12. Ibid., p. 150.

13. Ibid., p. 76.

14. Ibid., p. 77.

15. Ibid., p. 78.

16. Ibid., p. 95.

17. Ibid., p. 56.

18. Ibid., p.101.

19. Ibid., p. 45.

20. Ibid., p. 44.

21. Ibid., p. 45.

22. Ibid., p. 223.

23. Ibid., p. 225.

24. Ibid., p. 154.

25. Ibid., p. 157.

26. Ibid., p. 25.

27. Ibid., p. 182.

28. Ibid., p. 56.

29. Ibid., p. 64.

30. Ibid., p. 167.

31. See "The Net and the Future of Politics", Chapter 13.***

32. The Printing Revolution in Early Modern Europe, p. 81.

33. Ibid., Chapter 1, "An Unacknowledged Revolution."

34. Ibid., p. 165.

35. See Chapter 18, "The Computer as Democratizer." ***

36. The Printing Revolution in Early Modern Europe, p. 125.

37. Ibid., p. 178.

38. Ibid., pp. 177, 178.

39. Ibid., p. 31.

40. Ibid.

41. Ibid., p. 209.

42. Ibid., p. 275.

43. Ibid., p. 276.