Collecting the History of Computing, Networking, and Telecommunications

My interest in the history of computing dates back at least to 1970 or 1971 when I viewed the history wall on display in IBM's New York office, on which the excellent illustrated book by Charles and Ray Eames, *A Computer Perspective* (1973) would be based. This coincided with the beginning of my rare book business. At this time there were very few collectors of rare books on computing, and even fewer rare computing books for sale. However, I found myself buying what I could, and setting most of these items aside in what gradually became a small collection. In those days I understood little about computing, and I made no mental connection between computing and telecommunications or networking, though I occasionally bought and sold rare books or manuscripts on telephone, telegraph or television. I also focused more on the life and work of Charles Babbage than on computing in general. In the 1970s computing hardly seemed relevant to everyday life. Before the invention of the personal computer mainframes remained hidden in computer centers where the general public had no direct contact with them, and minicomputers were mainly used in research laboratories. After the introduction of the IBM PC in 1981 I began reading about actual computers and software rather than just the history of computing, and in 1983 purchased my first PC, a Compaq Portable Plus. I remember being impressed by the huge capacity of its ten megabyte hard drive ("enough space to store the entire text of the *Encyclopedia Britannica*"), its 128K of RAM, and thinking that because this machine was portable I would be able to use one machine both at home and at the office. Within a month or so we also had a desktop at the office since the 28-pound Compaq "portable" was way too heavy to be carried back and forth without a lot of trouble. Initially all we tried to master was word processing, but within a few years we were among the first rare book dealers to run our business from a custom networked database program designed to handle the inventory, mailing list, and accounting for mail order businesses. This was initially written in dBase and then rewritten in FoxBASE, running on a 3COM server, which had, if I recall correctly, a seemingly huge sixty megabyte hard drive, with the 3Plus network operating system. Even though development and operation of this small system required very frequent "tweaking" it was very exciting.

In 1994, after we had passed through a lot of different hardware, software, and at least two different network architectures, I offered my first small collection of about one hundred fifty computing-related items for sale in my 28th rare book catalogue. This was all I had been able to collect in about twenty years. When I sold my first collection I had little understanding of the impact of the Internet. But soon the avalanche of change was apparent. Having sold my first collection, I remained interested in collecting the history of computing, and when in the late 1990s I had the good luck to acquire a few small private collections and other remarkable material on the history of computing, networking, and telecommunications, I seized the opportunity to build a more definitive collection.

This time, in addition to assembling a nearly complete collection of Babbage's rarest publications on computing, and a large collection of trade catalogues, instruction manuals and ephemera on early calculating machines, I set out to find key material in the history of electronic computing and software from the 1930s onward, including the mathematical theories on which computing, telecommunications, and data-networking are based. Among the contents of the *Origin of Cyberspace* library are key founding documents concerning the following:

- The first programmable computer
- The first electronic computer
- Origins of the stored-program concept
- The first software
- The mathematical theory of communications
- The mathematical theory of data communications
- The origins of neurocomputing
- The origins of artificial intelligence
- Landmarks in the history of mathematical logic as they apply to computing
- The history of the computer business
- The foundation of the world's first electronic computer company
- The origins of bioinformatics
- The origins of telecommunications
- The beginnings of electronic computing in the United States and England, and to a lesser extent, in France, Italy, Australia, Germany, Switzerland and Japan

Most of these topics had never been extensively collected by a private collector or dealer before. In particular I am unaware of any earlier collector of the first software for electronic computers. I was particularly successful in acquiring some of the most important and extremely rare material, including unique manuscripts on the very earliest software. These include some of the earliest known programs written for stored-program electronic computers. When you read about the extremely simple programs that the very earliest electronic computers ran remember that for the first generation of electronic computers the cost of electronic memory in which the program was loaded and the data was processed—typically mercury delay lines or cathode ray tubes— was calculated by the individual digit, not even by the byte. The high cost of electronic memory, its relatively slow speed, and the limitations on its size, were among of the greatest stumbling blocks in the founding years of electronic computing. This problem did not truly begin to get alleviated until the development of reliable solid state memory when it began to be introduced in the late 1950s.

When the collection had reached a critical mass, I felt that we should write a bibliography describing this innovative library. By this time the impact of the Internet was obvious. It was reflected in the title of the annotated descriptive bibliography that my associate, Diana H. Hook, and I wrote about the collection: *Origins of Cyberspace: A Library on the History of Computing, Networking, and*

Telecommunications (Novato, CA: historyofscience.com, 2002.) That work describes the library in considerable detail, with 1411 annotated entries on 670 pages. Describing these technical publications bibliographically was a challenge because many of them were printed by 20th century duplication methods such as mimeograph or ditto rather than letterpress or offset printing, and also because so many of the significant works in the early history of computing and software were either the collaborations of various authors or conference proceedings in which numerous significant papers were first published by different authors. Doing justice to these publications involved the development of a fairly elaborate system of annotated cross-references and multiple entries for certain items in the bibliography which we hoped would tell the story of the development of ideas better than the traditional style of bibliographical entry. Because of this the actual number of physical items in the library is about 1000 items-- less than the 1411 entries in *Origins of Cyberspace*, or roughly six times the size of my previous collection. For the purposes of this auction catalogue the library has been distilled to about 250 lots. This required the re-writing of many of these cross-referenced descriptions in a style that represents a compromise between the more expanded method in *Origins of Cyberspace* and a typical auction catalogue style. It also required the grouping of many items into large lots, and the elimination of much bibliographical detail, but every item in the library is included. Virtually all of the large lots contain a great deal of material that is historically significant and very difficult to find. I am grateful to Christie's for producing an auction catalogue that is not only the first sale of its kind documenting the foundations of the technologies that led to the Internet, but also a first in the manner of its bibliographical presentation. Readers who want more detailed information, either historical or bibliographical, on any items in this sale should consult *Origins of Cyberspace* or ask Christie's to supply further information.

In the process of writing *Origins of Cyberspace* I was surprised to learn how few copies of some of the foundation documents in the history of computing, networking, and telecommunications are preserved in the institutional libraries of the world even though, when taken as a whole, the development of the technologies that led to the Internet are having an effect upon society similar to the impact that Gutenberg's discovery of printing by movable type had more than five hundred years ago. As a life-long student of the history of books and printing, as well as a student of the history of electronic information, I find the comparison of these two revolutionary transitions in media separated by more than five hundred years to be a topic of abiding interest. Most of us now find ourselves gathering information both from printed and electronic sources, often reading or writing on a computer connected to the Internet while we are also reading from printed books or catalogues like this. Yet while most academic libraries have major holdings on the history of the book and related technologies, such as medieval manuscripts, printing, binding, and papermaking, very few institutional or private libraries have adequate documentation of primary source material on the history of information technology (IT)—computing, networking and telecommunications—on which the Internet was built. Why is there such a disparity between the vast holdings of libraries on book history and the

comparatively limited holdings of libraries on the history of the technologies that eventually led to the Internet?

As with any complicated question, the answer is multi-faceted. One reason, of course, is that the Internet mainly began to affect society as a whole after the development of the World Wide Web in 1992. Thus the connection between information published in electronic form on the Internet and information published on paper was unclear until relatively recently. By 2004 there were about 800,000,000 personal computers in the world connected to the Internet. Yet before these developments, starting in the early 1960s, research libraries were the earliest institutions to apply electronic computers to problems in information retrieval rather than accounting or mathematics. Institutional librarians also became experts at using and providing access to online information services long before the Internet made online information more widely accessible. During those years before the spread of the Internet and the web a cultural divide developed at some institutions between proponents of books and proponents of online information. For this reason there may have been little incentive in those days for the proponents of books at institutional libraries to collect the books and reports that led to the technology of online information which they then viewed as culturally distinct from books. These are among the topics that I discuss in the introduction to my new book, *From Gutenberg to the Internet: A Sourcebook on the History of Information Technology (*Novato, CA: historyofscience.com, 2005). This is an anthology of original source material mainly derived from the *Origins of Cyberspace* library.

In the early 1970s the history of computing started to become a serious subject for scholarly research, but most of that took place at specialized research centers for the history of computing or the history of technology rather than at university libraries. Major research collections on the history of computing were developed at the Charles Babbage Institute at the University of Minnesota, at the Computer History Museum in Mountain View, California, at the Hagley Museum & Library in Wilmington, Delaware. Other research centers for the history of technology, such as the Smithsonian, and the national libraries of science and technology in other countries contain significant holdings on the history of computing, networking, and telecommunications. Aside from these institutional collections, one of the finest collections on the history of computing remains at IBM Corporation because of that company's central role in the history of computing for more than one hundred years. Other corporate archives also undoubtedly contain significant material. However, few of the great academic and national libraries made determined efforts to collect the history of the technologies that led to the Internet even though we now recognize that hundreds of millions of personal computers connected to the Internet may be as significant for information creation, preservation, and exchange as books and other printed matter. As always there are exceptions, particularly with the archives of famous people that are preserved in institutional libraries. For example, the Library of Congress holds the archive of John von Neumann, and Cambridge University holds the archive of Alan Turing.

Remarkably, the *Origins of Cyberspace* library includes the archive of Pres

Eckert, co-discoverer with John von Neumann of the stored-program concept, co-inventor of the ENIAC, the first large-scale general purpose electronic digital computer, and co-founder with John Mauchly of the electronic computer industry. Eckert also invented the earliest practical electronic memory, and was involved in the development of the EDVAC, the BINAC, and the UNIVAC series of computers. This archive is, of course, described in this auction catalogue, though a more detailed description is published in *Origins of Cyberspace*. The dispute between John von Neumann and Eckert and Mauchly over the right to patent the stored-program electronic computer is one of great dramas in the history of science and technology.

Still another reason that some academic libraries may have ignored the history of computing and related fields until comparatively recently is that many of the publications were issued as privately circulated reports rather than as conventionally published books. Sometimes there were less than 100 copies of these reports issued since in the early years very few people were interested in these topics. My theory is that most of these ephemeral publications, usually issued in very small printings, were thrown out rather than preserved. In *Origins of Cyberspace* we surveyed the holdings in OCLC of nearly all the rare publications in the collection. This confirmed how very few copies of each work were held by institutional libraries. Even though many of the nineteenth century and earlier publications are very rare, a conclusion that we drew from this research was that institutional libraries as a whole have stronger holdings of computing, networking, and telecommunications items from the nineteenth century and earlier than from the period of development of electronic computing from the 1930s to the present. A result of the neglect of these subjects by collectors and most institutional libraries is that they are now very difficult to collect. On other topics in the history of the sciences collectors typically draw on the re-circulation of centuries of previous private libraries, and institutional library de-accessions. However, because there were so few early collections, either institutional or private, and because so many of these publications were originally issued in very small editions, many classic works in the history of computing, networking, and telecommunications are unusually scarce. For all of these reasons, the sale of the *Origins of Cyberspace* library offers private and institutional collectors a very special opportunity.

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