

THE NEW COMPUTERIZED AGE—1: THE NEW WORLD COMING

Tomorrow's computers will revolutionize business, education, communications, science—in ways only dimly foreseen

(By John Diebold¹)

It is an extraordinary era in which we live. It is altogether new. The world has seen nothing like it before. I will not pretend, no one can pretend, to discern the end; but everybody knows that the age is remarkable for scientific research into the heavens, the earth, what is beneath the earth; and perhaps more remarkable still is the application of this scientific research to the pursuit of life. The ancients saw nothing like it. The moderns have seen nothing like it, until the present generation * * * The progress of the age has almost outstripped human belief.

Those words were once spoken today—though I choose them to set today in perspective—but were used in 1847 by Daniel Webster when he opened a new stretch of railroad track in New Hampshire. A greater parallel exists between that era and our own than we normally realize. In that earlier era, science first began to be applied on a wide scale and out of that process came an entirely new society—an industrial society. Out of it, too, came problems, many of which still plague us. When we look back at that great technological upheaval, the real significance of those then-wondrous machines is the human and social change that accompanied their industrial use.

Just as yesterday's innovations proved to be moments in history—way stations leading to newer technology—so today the conception of the computer which we have learned to accept is becoming a thing of the past. Up-to-date systems are no longer glassed-in, carefully isolated accounting machines. Instead they perform an almost limitless variety of functions, and vary with individual requirements.

For example, the newest computer systems may appear as input-output units in individual desks; small televisionlike screens with keyboards and copying devices. When you ask a question you see the answer almost simultaneously on the screen. If you want a copy of the answer, you can make it immediately. The heart of the system is a switching center rather like the telephone system. Computers, storage elements of many varieties, and many other devices used as part of the system are accessible as you need them, connected through the switching center to the terminal unit at your fingertips. Thousands of people may use such systems at the same time, and each need know no more about the operation of the system than the average person knows about the telephone. In the next decade the typical computer system is going to be of this kind.

Another radical change stemming from these new computer systems involves the relationship between man and machine. One no longer need carry data down to a computer center, or go through a laborious process of getting it into the machine and then waiting for results. Each technological development is moving us toward an easier, more productive relationship between man and machine. Already, for example, a computer can transpose a rough design into exact specifications. If an engineer makes a free-hand drawing of a bridge on such a system's television-like screen, the computer will convert the drawing into exact engineering specifications, will calculate and display materials and stress, and show the design in whole, in part, or in any perspective, in immediate response to the engineer's requirements.

Looking ahead, we see important changes in technology such as chemical memories; fluid and pneumatic systems that have instantaneous response; ability to store images, graphs, drawings, and photographs, and to transmit them around the world. All these will be important elements of future computer systems. Graphic elements and the ability to communicate with TV screens are already becoming influential in progress being made in computer design. Yesterday these elements were undreamed of.

Work is being done on language translation by machine. Some document-translation is already on a regular production basis—in fact, people are now attempting to digest articles by machine. This work is still in its beginning stages and there are many problems to be overcome. But the history of this

¹ The author, who generally is credited with coining the term "automation," is head of the Diebold Group, Inc., management consultants.