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DOCUMENT TITLE

*INFORMATION APPLIANCES;
A NEW INDUSTRY*

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FEB 1986

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7 pages

INFORMATION APPLIANCES: A NEW INDUSTRY

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February 16, 1986

Introduction

One of the prophets of the personal computer industry, Alan Kay, now chief scientist at Apple, has said that the true personal computer has not yet been made. I disagree. We have, as the ancient curse warns us, gotten what we asked for. We do indeed have computers being bought by individuals for themselves; they are "personal computers". The problem is that many of us didn't want computers in the first place -- computers are merely boxes for running programs -- we wanted the benefits that computer technology has to offer. What we wanted was to ease the workload in information-related areas much as washing machines and vacuum cleaners ease the workload in maintaining cleanliness.

By choosing to focus on computers rather than the tasks we wanted done, we inherited much of the baggage that had accumulated around earlier generations of computers. It is more a matter of style and custom than technical necessity that we have involved and convoluted operating systems that need elaborate user interfaces to support huge application programs. These structures demand ever larger memories and complex peripherals. It's as if we had asked for a bit of part-time help and were given a bureaucracy.

This is not to say that personal computers are a mistake. They fill a very real need and will continue to do so. What they have not become, and will not become as long as they remain computers, is the simple, universal tool that can sell to the widest customer base.

Historical Basis: Why It Hasn't Happened Already

We have learned a lot in the past decade. For example, the original personal computer dream included programming languages so transparent that we could have universal programming literacy, a world where we would all create custom software to satisfy our needs. We have come to realize that this will not happen: making one's own tools, whether of wood and metal or of bits and bytes, is for specialists or hobbyists, and even then it is a time-consuming art requiring much practice. While the personal computer industry is still making hardware and running software on it, it has at least learned to think in terms of benefits instead of general and abstract abilities.

But even in realizing this, the personal computer industry is blinded to the next logical step by its own success at marketing the existing product lines. This phenomenon, this blindness to what lies at the tip of one's nose, has occurred time and time again in the computer industry.

For example, when the minicomputers were first marketed, the mainframe manufacturers were unperturbed: their marketing people knew all too well what the customers wanted, namely the products they were already selling, except perhaps with more memory, more powerful peripherals, and more ambitious virtual-memory operating systems. What the experts did not see was a new and different marketplace for lower-priced and lower-powered machines that could go places and do things prohibited by the cost, size, and complexity of the mainframes. There were also many places mainframes were being used solely because they were the only game in town. When minicomputers became available they not only opened up new areas but took away sales from these underutilized mainframes.

Minicomputer manufacturers themselves soon forgot the lesson they had taught to the mainframers. Thus history records Steve Wozniak approaching his superiors at Hewlett-Packard, proposing the personal computer as a product, and getting turned down. Amazingly, the minicomputer marketeers made the same misjudgment as the mainframers. They failed to see a new and different marketplace for lower-priced and lower-powered machines that could go places and do things prohibited by the cost, size, and complexity of their products.

When presenting the concept of what I call an "information appliance" to people experienced in marketing personal computers, I often hear the same objections to it that we heard in reference to minicomputers and, later, to the personal computers. Appealing to sales charts and customer surveys, these objectors try to show that people want bigger and more of what they already have. Although customer surveys can help guide an ongoing marketing effort of an established product, they are of far less guidance when dealing with something new and unfamiliar. Billions of dollars in sales can give those in the industry a possibly unwarranted sense of security. Like the industries that have come before, time has bent the early, exponential growth curves of the personal computer industry into the familiar S-shaped sign of maturity.

To bring back explosive growth to the computer technology industry, a new marketplace must be found, and that requires a new kind of product. Some, like Joel Birnbaum of HP Labs, suggest that the way to success lies in still larger and more complex systems powerful enough to employ advanced techniques such as artificial intelligence. Another approach -- that of the present industry -- is to provide cosmetics to disguise the complexity within. However, in our attempt to make computers less obnoxious in one way, they just seem to become annoying in another way. Thus the Macintosh is a relatively friendly personal computer, but it is slow, and all the proposed solutions increase its complexity and cost.

As I read the lessons of history, to reach a larger customer base we need less rather than more. I also conclude that most of the existing companies are not likely to go after the new marketplace until it is a

worrisome competitor.

The Information Appliance

The change from maxi to mini to personal computers is much easier to understand than the change from computers to information appliances. As each new species of computer appeared, it was essentially the same as the previous species except that it was (initially) smaller and less powerful, and far less expensive. The information appliance is different in a deeper sense. For example, from the point of view of the purchaser, there are no separate hardware and software components. Like the user of a microwave oven who does not realize that it has a microprocessor, software, I/O devices and the like, the user of an information appliance need not be aware of the details of internal operation: the users of a personal computer have had these details drummed into them because they need to know them before it is even possible to make a buying decision.

What the information appliance retains from the personal computer is the set of tasks people most often perform with them. They include basic processes almost synonymous with civilization: writing, now exalted with the name "word processing"; the storage and retrieval of facts, yclept "information retrieval"; the doing of arithmetic, by itself and in the novel form of linked calculations called "spreadsheets"; and communicating ideas, now in the guise of "telecommunications".

A personal computer can do all these tasks, but at a considerable price, both in terms of mental effort and financial drain. To reach a new market, the information appliance must behave as simply as a typewriter while handling a person's flow of information. It must be in the price range of other tools of personal life. Though it uses computer technology, an information appliance is not a computer, and it is not a replacement for a computer (except where they are being used only because there are no simpler options).

Lee Felsenstein, an early champion of personal computers, stated that he could tell a good personal computer from the enthusiasm of its users' groups. From the point of view of the information appliance, a users' group is an indication that the product has failed to reach its proper audience. There is, I observe, no Maytag users' group. That's because none is necessary. We will have a true information appliance when the product gets taken for granted and when it does not force people to band together for mutual support and help in using it.

A New Software Technology

The personal computer was made possible by the development of the microprocessor. The microprocessor was radically smaller, cheaper, and easier to apply than the discrete-chip processor that preceded it. The information appliance has become possible due to a similarly radical change in software design and implementation. It is based on the field called "software ergonomics", which eases the user's mental effort just as today's ergonomic hardware designs remove physical strain.

The computer industry and its customers have become inured to the mass of conventions and techniques they had to learn; they have forgotten that to use a personal computer one has to know how to load software, name files, format diskettes, transfer files, operate menus, and a host of other techniques that are irrelevant to the task at hand, but are demanded by our computer technology. More than being just accustomed to this nonsense, we have also gotten sucked in by it. It takes a certain amount of cleverness and persistence to make today's personal computers do useful work, and in overcoming our difficulties we have become, perversely, attached to them.

To create the information appliance we observed the traps and problems posed by personal computers to naive and experienced users alike, and eliminated them. Since frustration is a major component of most people's reaction to computers, we removed the delays and inconsistencies that lead to frustration. The system was also designed to minimize user errors, and when errors are made, to eliminate any penalty. We do not have a multiplicity of "levels" or "subsystems"; there is only one level, and all abilities are available simultaneously, and at any time.

But most important, and impossible to describe, is the difference in "feel" between an information appliance and a computer. It is this feel that will build a solid customer base that cannot be wooed away by the older technologies. In fact, we expect that some of the features of the information appliance will, in the long run, appear on personal computers, typewriters, and eventually even mainframes -- paralleling what has happened with electronic spreadsheets.

Some Long-Promised Technologies Can Come to Fruition

Telecommunications has failed to live up to its promise. To be truly useful it must be (a) cheap, (b) easy, and (c) available full-time. Dedicated terminals are not cheap, and may or may not be easy to use. Western Union's "EasyLink" is an example of a system that is anything but easy. Telecommunications with a personal computer requires that you dedicate the computer to that application while you are communicating. If you want 24-hour-a-day operation (as with your telephone) you end up losing the use of your computer for other tasks -- this approach is neither cheap nor (considering today's telecommunications packages) easy.

With personal computers you also have the tasks of hooking up an interface and a "modem". You must learn to use the telecommunications software, which usually is very different from the rest of your software, and you also have to learn the protocols, editors, and general behavior of the systems with which you communicate.

The information appliance has the communications facility available at all times without interrupting ongoing tasks. Since it is designed in rather than added on, the information appliance makes telecommunications much simpler to use than any personal computer telecommunications package. In fact, the information appliance is simply plugged in like a telephone. Unlike most personal computer modems, it does not interfere

with your normal use of the telephone. Since there is no separate telecommunication facility, you stay in your familiar environment, and there is nothing new to learn beyond a single button to push to send your messages.

People will telecommunicate with their information appliances because it will be easy, omnipresent, inexpensive, and because it works with an established network that reaches into every home and business.

Another technology that seems attractive but has not lived up to expectations is the portable computer. Some have been overly expensive with hard-to-read screens. But all have shared the computer designer's penchant for menus, operating systems, programs, and file structures. The manuals outweigh the computers. It is little advantage to have a computer with you if you can't remember how it's supposed to be used and don't enjoy using it anyway. We believe that what people want and will buy is not a portable computer, but a portable information appliance.

Distribution and Support

It is easier for a dealer to sell an information appliance than a personal computer since so much less support is required. This also means that a broader range of outlets is available to the manufacturer or distributor of information appliances.

Another key difference between information appliances and computers is that the information appliance does not require a software base in order to sell. On the other hand, a new personal computer must either be compatible with an existing, successful product, or the company making it must be able to stick with it for the three to five years it takes for a significant software base to grow. The "chicken and egg" problem of personal computer software does not apply to the information appliance.

An information appliance is not a collection of four or five separate boxes strung together with cables. It is a single unit, compact and ready to operate out of a box. All the user has to do is plug it in (or insert batteries) and begin typing. Installation must not be an issue.

Since all examples of a given model of information appliance are the same, with no hardware or software options, dealer and factory support is far easier than for personal computers. The manuals are shorter and easier to use. In the store, the salespeople need less training in order to be able to give a demonstration. Given a floor full of products, all with comparable commissions and margins, a salesperson will tend to demonstrate the product they understand best, and that is more likely to be an information appliance than a personal computer.

Giving help to a customer with a malfunctioning personal computer is difficult because it may involve not only their computer, but X's software and Y's peripherals. Because of the relative simplicity of the information appliance, and its freedom from having to interact with products from other vendors, it will be less costly to support customers after they have purchased one. This means lower after-sale costs.

Another change from selling personal computers is that instead of thinking in terms of "updates", one could choose to follow the lead of the automotive industry, and think in terms of model years. When you buy a 1986 car, you do not feel cheated when the 1987 model comes out, especially if the '86 is still giving good service. But whenever a manufacturer makes a change to a personal computer, customers complain mightily. Also, the manufacturer is saddled with the need for backwards compatibility; this prevents many kinds of improvements from being made. With the information appliance, the only backwards compatibility needed is that text be transferable from one to the other.

The hand-holding style we have inherited from the days of the mainframe computers must go if our products are to be as profitable as possible. Out-of-warranty service will be paid for as rendered, with modular component replacement the main means of repair, as with the automotive industry.

Marketing

Only a little bit more is known about how to market an information appliance than was known about how to market a personal computer in 1975. There are abundant opportunities, but there are also many problems: existing computer users are often locked into the paradigms they have learned. Naive customers believe the current advertising that implies an ease-of-use for personal computers that is not in fact delivered, and in any case the claims for the two products sound much the same. Many will not understand the advantages of not having to buy and learn a number of software packages.

The target audience includes people who do what are essentially clerical or secretarial tasks for themselves. Such tasks run from looking up phone numbers to preparing elaborate reports and numerical projections. The potential consumer base is much larger than that for personal computers (just as the consumer base for personal computers is larger than that for minicomputers). For every person who will bother to learn to operate a personal computer there are certainly three who would appreciate the benefits of the PC but will not put up with the hassle of learning and operating one. Our experience shows that the only dissatisfied customers are a subset of those people who are already wedded to the current technology. Fortunately, they are not the target audience, and they are not numerous compared to the target audience.

Following in the footsteps of the personal computer, the information appliance will sneak into the business market via the back door. Individuals who discover its utility will purchase them for themselves, use them at work, and persuade their associates to use them. The fundamental fact is that a person can be more productive on most office tasks with an information appliance than they can be with an unwieldy personal computer. Eventually, and after much tribulation, the large corporations will embrace them as they have personal computers.

The education market has tremendous need for information

appliances. In many schools, students who wish to use the computer to learn writing are required to first take the computer literacy course. With personal computers, the teacher must spend valuable classroom time on procedural matters such as formatting disks, using the operating system, and working the software itself. All of this detracts from the quality of education. With an information appliance, the students can begin working in the very first minute of class. Of course, the administrative and secretarial benefits of the information appliance will be as useful in an educational environment as in any other.

In the university setting, the advantages of an information appliance to students and professors who spend a significant portion of their time writing papers, theses, proposals, etc., is obvious. The high cost of personal computers often makes it necessary to sequester the equipment for security, making it all the more difficult for students to get their work done. The low cost of the information appliance means that a student will have the text processing power he or she needs for an affordable price, and at a convenient location.

By positioning each of them appropriately, a company could market a full gamut of products including personal computers, office machines, printers, and information appliances without causing customer confusion. The information appliance can be positioned with respect to personal computers much as one-piece stereo systems are sold alongside component units. Having both information appliances and personal computers in a product line can offer the consumer a meaningful choice, with a path upwards if they purchase the information appliance first. Going in the other direction, we have had many personal computer owners say that the information appliance is perfect for their children, spouse, or parents.

The greatest marketing trap to avoid is evaluating the information appliance as though it were a personal computer. Just as a PC, on the basis of a checklist prepared by a minicomputer manufacturer, would have lost hands down, an information appliance would prove to be a very poor personal computer. It must be kept in mind at all times that the information appliance is not a new kind of personal computer, it is a new product altogether.

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