

## **Hippies and Hobbyists: The Shaping of the Personal Computer Revolution**

### **Introduction**

The story of the personal computer revolution is not a story about technology. It is a story about a group of people who saw beyond hardware and software and felt that giving individuals control of their own computing machine would make society more egalitarian, foster community values, and promote democracy. The center of this movement was in California's Santa Clara Valley—which since 1971 has been known as Silicon Valley.

In the counterculture of the early 1960s, the computer represented the epitome of all that was wrong with technology. Computers were giant, expensive, humming machines which required a high degree of technical expertise to operate. They were the “heartless mechanized brains of oppression, used by IBM and the Pentagon to design weapons of destruction and quantify the body counts in Vietnam.”<sup>14</sup> “Do not fold, spindle, or mutilate,” which was printed on IBM punch cards, became a common anti-computer protest slogan.<sup>16</sup> Lewis Mumford, in his *The Myth of the Machine: The Pentagon of Power*, claimed that computers were in direct opposition to human freedom and denounced the technicians who worked to create these “superhuman machines.”<sup>1</sup>

But other counterculturists like Stewart Brand realized the humanistic, democratic potential for personal information technology. Brand and others embraced personal

computing, and to them it fit well with the “small is beautiful,” decentralized ethos of the counterculture.<sup>14</sup> They saw it as a new medium, like books, records, movies, radios, or television, and soon it emerged as a vehicle for free expression and personal liberation within the broader counterculture movement. As pioneer Jim Warren said, the PC “had its genetic coding in the ‘60s...antiestablishment, antiwar, pro-freedom, antidiscipline attitudes.”<sup>6</sup> Brand later wrote in his article “We Owe it All to the Hippies” that “the counterculture’s scorn for centralized authority provided the philosophical foundations for not only the leaderless Internet but also the entire personal computer revolution.”<sup>5</sup>

### **You Want to Build a What?**

Today, the development of the personal computer seems all too obvious. The progression goes something like this: computers, once filling entire rooms, consuming hundreds of kilowatts of electricity, and costing millions of dollars, gradually shrunk in both cost and size—primarily thanks to the development of the solid-state transistor and the integrated circuit. Soon, minicomputers were affordable and versatile enough for a variety of business applications. As more people interacted with these machines and employed them in more applications, it became clear that they could be used for more than just number crunching and database management. They could be used to communicate in new ways, to play games, and to increase personal creativity and productivity. People began to want one of their own, and thus the personal computer was born. But, there are problems with this progression.

People who knew computers at the time had no idea personal computing would become such a success. It wasn’t that they hadn’t thought of it or that they were opposed

to it in some way, but they had several well-founded reasons to be skeptical. First, computing had always required a great deal of technical expertise. Computers were notoriously unreliable, and to successfully operate them one needed a thorough grasp of the CPU architecture, instruction set, memory organization, and basic electronic troubleshooting. Nobody guessed that hobbyists would take the time to acquire the necessary skills just to get a few lights blinking on a console. Second, in order to be affordable, personal computers would have to have tiny memories and unreliable or nonexistent mass storage devices. These two things were (and still are) the primary components which drove up the cost of a computer. These machines would be useless for any application handling even modest amounts of data. Third, PC users would have to write their own software—something that professional programmers struggled to do on larger machines. They did not conceive of a new software industry targeting PC users.<sup>10</sup> People viewed computers as expensive scientific equipment in the same category as, perhaps, a particle accelerator. And why would anyone want a particle accelerator in their home? They saw no useful applications that could come from personal computing.

As it happened, each of these objections was met in turn. Although the first personal computer, the Altair, was unreliable, its successors—most notably the Apple II, were quite reliable and easy to use. A support system of users groups emerged all over the country to help people get started with their new PCs. Numerous magazines such as *Dr. Dobb's Journal*, *Byte*, and *Nibble* provided users with tips, source code, and hardware schematics. Also, foremost among the early uses of the personal computer were games, which did not involve large amounts of data and could run on machines with very little memory. In other words, the personal computer found new uses besides the old tasks of

crunching numbers. As for software, after the development of simple languages for the PC like BASIC, a steady stream of off-the-shelf applications became available. But perhaps the biggest factor that nobody foresaw was the importance that the 60s and 70s counterculture would have on shaping personal computing technology.

## **Counterculture**

Counterculture values tended to center on economic simplicity (“small is beautiful”), ecological sanity, spiritual fulfillment, and participative democracy.<sup>15</sup> But there was a high degree of variability in how people approached these core themes. With regards to technology, the counterculturists split into two factions: those who saw technology and industrialization as the root of society’s problems and called for a “return to nature,” and those who felt that technology (at least in part) could be the solution to society’s problems and called for “appropriate technologies” (AT) in response to contemporary concerns such as pollution and overpopulation. It is this latter group which embraced the personal computer.<sup>14</sup> They promoted the PC along with an assortment of technologies which were aimed at decentralization, conservation, and self-sufficiency: alternative energy, recycling devices, and creative waste management. It is at first, perhaps, difficult to see how the PC really fits in here. Whereas composting toilets or solar energy panels work towards these goals in obvious ways, the benefits of the PC were more subtle.

In one sense, simply understanding how the machines worked and being able to perform limited tasks with them gave people a sense of comfort and control with the technology and thus eased the feeling of oppression. But beyond the simply educational

value, it took the vision and direction of people like Stewart Brand, Lee Felsenstein, and Doug Engelbart to guide the technology into a useful tool. They planted the seeds of inspiration in the minds of the people who would turn the PC into a useful device.

Brand was a leading figure in the appropriate technology movement, and for him, information technology was just as important to society as alternative energy and conservation. His publication, *The Whole Earth Catalog* (WEC), was a compendium of AT products and ideas which aimed to “fight fire with fire.” The mission of WEC was to show that innovation and invention, guided by a conscience, could overcome even the worst social and environmental problems. This was a profoundly different message from the technophobic, commune-dwelling environmentalists which many associate with this time period. Brand assembled an array of information on “tools, science, products, services, and publications...all concerned with crafting alternative lifestyles that subverted traditional networks of political, spiritual, and physical energy.”<sup>14</sup>

It is, therefore, not hard to see how the computer, at least in an iconic sense, could fit this theme. Thus, descriptions of the Vermont Castings “Defiant” wood stove would be followed by the latest information on Apple computers. This odd juxtaposition made perfect sense to Brand. “The Vermont Castings tool manipulated heat, and the Apple tool manipulated information...Both cost a few hundred dollars, both were made by and for revolutionaries who wanted to de-institutionalize society and empower the individual, both embodied clever design ideas.” In other words, they both shared the characteristics of appropriate technology. Brand felt that the ability to manipulate both energy and information were the basic skills required to change the system.<sup>14</sup>

The kind of counterculture promoted by Brand and the WEC is described by Roszak as “technophilic utopianism.” It was an odd marriage of rustic homespun values and advanced technology. This was often more of an idealistic, rather than a practical, union. Roszak recalls one instance where the Yogi Bhañan’s 3HO (the Holy, Healthy, Happy Organization) invited him to participate in a “planetary symposium” which would be held simultaneously in three major cities. It was to be held together via continuous, day-and-night satellite telecommunications coverage and projected onto giant video screens in each city. It sounded reasonable in theory, but the entire event was delegated to a production crew from Walt Disney, a move that was in itself somewhat anathematic to counterculture goals. Ultimately, the costs of the technology overwhelmed the project’s modest budget and bankrupted its organizers. The technological means had obscured the desired end. Roszak feels that the PC is another example of this “wishful alliance” between reversionary and technophilic visions.<sup>15</sup>

Along with the gleeful enthusiasm for computing, there was also a certain panic to become familiar with this technology that had so taken control of the world . People had become paranoid, to a certain extent, of AT&T’s phone system, the Pentagon’s cameras in space, Westinghouse’s communications satellites, and the computerized financial and banking systems. People thought that by building PCs, they would gain access to the databases of the world, which (so the argument went) was what they needed to become a more self-reliant citizenry. People saw computer hackers as heroes against tyranny and oppression—an “underground community of computer-literate rebels [who could] overthrow the technocratic centers of authority.”<sup>15</sup>

## **The Importance of Community**

Another important facet of PC technology was its potential to bring communities of people together in new ways. Brand realized the possibility of connecting like-minded people all over the world through computers so that they could share ideas, opinions, or images. AT enthusiasts were some of the first people to go online, and the Whole Earth 'Lectronic Link (WELL) became one of the first attempts at a "virtual community."<sup>14</sup>

In his article "The Commons of Information," PC pioneer Lee Felsenstein makes an interesting case for why the personal computer, and later the Internet, first became so popular in America than elsewhere in the world. All societies are based upon the "village marketplace". Older urban centers, such as those in Europe, have matured city plazas and neighborhoods, each functioning like a small village within the larger city. But in the younger American cities (particularly in the West), people rarely remain living in one place for more than 10 or 15 years. Often, neighbors are strangers to each other. This creates a void which, in a variety of ways, PCs (and the Internet) fulfilled.<sup>11</sup>

Felsenstein writes about a project in 1973 called "Community Memory" that he initiated which was basically an electronic bulletin board system (analogous to today's online message boards) which people could access from public places like record stores and libraries in Berkeley and San Francisco. What emerged was a virtual community through which people communicated "a number of different needs, desires, suggestions, proposals, offers, statements, poems, and declarations." As Felsenstein recalls, "it became clear that the crucial element was the fact that people could walk up to the terminals and use them hands-on, with no one else interposing their judgment." After the first PC kits appeared, one of the first thing people began to do with them was connect

them to one another, or dial into bulletin-board systems (BBSs), precursors to the Internet. The personal computer was therefore not an answer to a technical need, but an answer to a social one. People saw PCs as a way to connect with others and share ideas and interests.<sup>11</sup>

### **Power to the People**

Another key element to the enthusiasm surrounding the personal computer was its interactivity. Broadcast television came to dominate people's views of the world both near and far. Felsenstein recalls looking out his window in 1969 to see all the living rooms "glowing with the blue light of TV". What he realized was that they were all getting their information from Walter Cronkite in New York, yet they had no ready way to get information from each other. He initially focused his efforts on the so-called "underground press," but by 1970, he realized that "broadcast media would never serve the cause of decentralization of power within society." Personal computers, he believed, could do what broadcast media could not. "People *don't* want to be subjected to centralized information. They *do* want to be able to explore the social space of their surroundings and to ask the question, 'Who's out there?'" He likens it to the popularity of HAM and CB radio. PC networks not only offered people greater selectivity of information, they gave people a voice of their own.<sup>11</sup>

Simply controlling what was displayed on their television sets was enough to get the first group of hobbyists hooked. The "TV Typewriter" was a construction project that appeared in 1973 which allowed people to type characters on a TV—nothing more. Yet 10,000 people sent in their money for the mail-order plans! Why such an interest? As

Felsenstein explains, “the promise of ‘inverting the media,’ of controlling the display of ones’ own TV set, especially through a sacred-cow technology like digital computer electronics, was hard to resist. A cultural vein had been tapped.”<sup>11</sup>

Leary argues that throughout history, “personal technologies” which can be owned and operated by individuals have always tended to exert democratizing forces on society. Expensive machinery requiring large group efforts for operation generally becomes a tool of social repression (i.e. the tower clock, the galley ship, the cannon, the tank). Examples of other personal technologies would include the bronze dagger, the radio, the automobile, and the printed book. “Power to the people means personal technology available to the individual.” He compares the shift from mainframe to personal computers with the introduction of bottled Coca Cola. Before it was bottled, soft drinks were dispensed at a soda fountain by a “white-coated priest,” who mixed the “elixir” from a large, gleaming, mysterious machine. The soda bottle was a “hands-on” technology which gave people choice, and it soon spread throughout the world as a symbol of American egalitarianism. The personal computer, he claims, was embraced for the same reasons.<sup>8</sup>

### **LSD and “Augmentation”**

It is hard for those of us who were not around in the sixties to understand the attitudes towards drugs (particularly LSD) at the time. But many of the early computer pioneers claim that psychedelic drugs heavily influenced their attitudes and ideas about technology. As Leary writes, “The seven million Americans who experienced the awesome potentials of the brain via LSD certainly paved the way for the computer

society.”<sup>8</sup> Steve Jobs, in a recent interview, said that taking LSD was one of the two or three most important things he had done in his life. He added that he often feels lost in the corporate world because of his counterculture roots.<sup>1</sup>

Myron Stolaroff, though trained as an Electrical Engineer, is better known for his introduction of LSD to the engineers and scientists of Silicon Valley than for any technical achievements. He believed the drug could allow people to unlock their full intellectual potential.<sup>2</sup> Throughout the 60s, Stolaroff’s organization, the International Foundation for Advanced Study, led more than 350 people, many of whom were PC pioneers, through LSD experiences. As Markoff writes, “Volunteers were not hard to find.” Stanford professors, SRI researchers, medical researchers, and architects all participated. The sessions were aimed at people who had spent at least three months working on a difficult problem with little results. The problems were supposed to be ones the scientists had a high emotional need to solve. After the LSD had taken effect, mediators would guide them through their work and observe their progress. Markoff describes one session “In the group setting, everyone was making progress. Electrical engineers were designing circuits; Hewlett-Packard mechanical designers were improving their lighting designs; architects were designing buildings.”<sup>3</sup> Among Stolaroff’s experimenters were Bob Sackerman, founder of Sun Microsystems; Fred Moore, cofounder of the Homebrew Computer Club; and Doug Engelbart, inventor of the mouse and the modern desktop UI.

Engelbart believed that computers could be used to enable individual expression, creativity, and productivity.<sup>4</sup> He called his idea “augmentation,” and focused his thinking on what he called the “man-machine interface,” which back then was given little

consideration. His ideas stressed comfortable, symbiotic interaction between a machine and its user. He felt that the computer should be an extension of the mind. As he wrote, the “computer world should see similar evolution. We are in the phase now of big machines, formally scheduled, but we will pass soon into new applications where a human directs the movement and manipulation of information under continuous control as he pursues his occupational goals.”<sup>2</sup> It’s not hard to see the parallels between Engelbart’s goals of “augmenting” human intelligence through personal computing and the mind-expanding, creativity-enhancing goals of the LSD community.

### **Hobbyists and Homebrew**

The first personal computer—at least the first computer which was commercially available and targeted individual consumers—was the Altair. It was announced in *Popular Electronics* in January 1975. It was by no means a technical breakthrough. In fact, it was simply a combination of components that were already in use in minicomputers and calculators. It did not come assembled, came with no software, and the only I/O provided was a front panel of switches and LEDs.

But computer enthusiasts were chomping at the bit for a machine they could call their own, and when the Altair appeared, the manufacturer, MITS, was overwhelmed with orders. As more people began to enter the world of hobby computing, the need for a more direct information exchange became clear. User groups started popping up all over the country, the most famous of which was the Homebrew Computer Club in Silicon Valley. The first Homebrew meeting was held in 1975 and monthly meetings followed for many years. Some of the most important engineers and entrepreneurs of the PC age

attend these meetings: Steve Jobs, Steve Wozniak, Bill Gates, Bob Marsh, and Adam Osbourne, to name a few.<sup>6</sup>

The Homebrew newsletters were open and friendly. “What do you want this club to be?” asked editor Gordon French in the first issue. There was a collaborative, cooperative spirit to the group, and members were encouraged to donate copies of their software, schematics, and old electronics magazines to the club library (a filing cabinet). French would highlight the achievements of the members in the newsletter: “Bob Lash invited me over to see his 12-bit machine and it really is a pip! He showed me how it could count upwards with one register and downwards with another simultaneously...a trivial piece of bit manipulation, perhaps, but not a trivial undertaking!”<sup>9</sup>

Several of the members formed companies. They adopted friendly, folksy names like “Itty Bitty Machine Company” (an alternative IBM) or “Kentucky Fried Computers.” Jobs and Wozniak named their company “Apple Computer,” which fit nicely with the counterculture’s organic values, and also carried with it an echo of the Beatles spirit.<sup>15</sup> These entrepreneurs were proud of their products, and their personal phone number and address could be found at the end of their articles in hobbyist magazines.<sup>12</sup> They wanted their machines to seem friendly, unthreatening, and easy to use, and their marketing campaigns reflected this. Consider this early ad for the Apple II: “Clean the kitchen table. Bring in the color TV. Plug in your new Apple II, and connect any standard cassette recorder/player. Now you’re ready for an evening of discovery in the new world of personal computers.” The article assures the reader that anyone can teach themselves BASIC and have the computer assist with everything from teaching the kids spelling to charting the household finances.<sup>13</sup>

## **Open vs. Proprietary Standards**

Apple was one of many companies producing personal computers. By the late 70s there were literally dozens of companies producing entirely different machines which used different processors, had different bus architectures, and were not software compatible. Besides Apple, some of the other popular manufacturers were: Commodore, Radio Shack, Texas Instruments, MITS, IMSAI, and Processor Technology. Standardization became a big issue, and the computer world was divided over how to handle it. Most small companies and hobbyists, steeped in their decentralist, counterculture values, favored open standards which were freely available to all. Some companies, most notably MITS, wanted to keep information about their machines proprietary. When several companies wanted to create an IEEE standard for the S100 bus—the bus used by the Altair—Ed Roberts, president of MITS, refused to even send a representative to the standardization committee meetings, claiming that MITS should maintain sole control over how the bus was defined. Ultimately, the standard was defined, and MITS, largely because of Ed Roberts’s resistance to negotiation and lack of cooperation, went out of business.<sup>7</sup> Later, IBM also tried to keep its system architecture proprietary, but Compaq and others were able to reverse engineer, or “clone,” their design, paving the way for the PCs that we use today (95% of us, at least).

These days most of the communications protocols, interface specifications, and storage media that we use are based on open (typically ANSI or IEEE) standards. Without the decentralist attitudes of the hobbyists and entrepreneurs during those formative years, personal computing would have developed quite differently (and very

much for the worse). Without open standards, the Internet could have never been so successful. Not to mention, we wouldn't enjoy such cheap, widespread technologies as Wi-Fi (a.k.a. IEEE protocol 802.11b) or CDROMs (ISO standard 9660).

## **Conclusion**

The counterculture values that shaped the direction of the early PCs still echo today. What is the Internet but a gloriously amplified version of Felsenstein's Community Memory project? It is decentralized, open to any and all who want to participate, and virtually anarchic. From increasing AIDS awareness in Africa to promoting human rights in China and North Korea, the Internet is constantly cited as promoting democracy and egalitarian values throughout the world. Furthermore, the online open source software libraries like Sourceforge.net are direct descendents of Homebrew's filing cabinet.

Of course, some are concerned that there aren't enough of those ancestral values remaining in today's PC world. Most software and hardware for PCs is developed by huge multinational corporations, and every year it seems their numbers dwindle fewer. Software patents are also a big cause of concern among most small software businesses these days. The profound irony of the PC revolution is that those long-haired, short-sleeved entrepreneurs who sought to rebel against big business are now the CEOs of the new industrial giants. As Kirk puts it "Many of the radicals of yesterday have become the capitalist elite of today."<sup>14</sup>. But with companies like Google, whose motto is "do no evil," and Apple Computer, whose employees traverse barefooted between their cubicles

and sand volleyball courts, it's refreshing to find that counterculture values can still exist in a large, successful corporation.

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