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CENTURY TECH

CHAPTER

5

# Computers of the Next Millennium

**“Computers in the future may weigh no more than 1.5 tons.”**  
—Popular Mechanics, 1949

The thing about predicting the future is that the more specific you are, the more likely you are to be wrong. The future is an infinite set of possibilities. The odds are stacked mightily against picking the one possibility that’s going to turn into a reality. (I’ve survived countless airplane flights by predicting they would crash.)

As various quotes scattered throughout this book will remind you, when it comes to technology, people—from the chairman of IBM to the editors of Popular Mechanics—people who should know what’s going to happen, don’t. Oh, sure, some things are easy to predict for the short run: The sales of PCs will increase in the first years of the third millennium. Microsoft will be a powerful, wealthy company—or many companies—long after you and I are dead. And children will always know more about using technology than adults do. But go beyond a few decades, and all these predictions about computing become chancier, except for the one about kids. Part of the reason is our perspective; sitting at what is still merely the beginning of the computerized age. Looking over our shoulders, we see, only in the last 20 years, how far personal computers have changed and how fundamentally

they've affected society. And it has been impressive. But we're being impressed by just the tip of the iceberg. What we can't begin to imagine are the final stages of computing—if, in fact, it will have an end, to be replaced by something else as the dominant influence on civilization. (It would take something as dramatic as telepathy or time travel to supplant computing, but don't wait up for it.) We can be pretty sure that we've milked the steam engine and the entire industrial revolution for about all they're worth. But when it comes to computing, folks, we don't know where it will lead in 1,000 years.

That said, in the last chapter of each part of this book, I'm going to make some fearlessly obvious predictions about what's going to happen in the next decade in personal computers, software, microchips, storage, input/output—how we communicate with computers—multimedia, the Internet, and printing. Most of these changes are already under development and take no particular savvy to predict. But I'll bounce some more fanciful, Jetsonesque predictions off the wall. After all, I won't be around to see my predictions flop: I don't have anything to lose if I'm wrong. And I probably will be.

## **Revolutionary Evolution**

In its infancy, computing has had such dramatic effects, so swiftly, on how we work, spend, and play that it's understandable if someone refers to the “computer revolution.” In fact computing is staunchly conservative, deeply indebted to its past. Technology builds gradually on the technology before it. For something to be truly revolutionary, it must be so different from anything already in existence that, to some, it will seem useless. In 1968, an engineer at the Advanced Computing Systems Division of IBM, commenting on the newly developed microchip, could only ask, “But what is it good for?” If the answer to that question were obvious, the chip surely would have been invented far sooner.

The appearance of fundamental technologies, such as the transistor and microchip, is rare and germinal. What grows out of that little revolution is a lot of slow, sometimes painful, evolution. When the IBM PC was introduced in 1981, no one suggested it was a great technological leap. It was actually a hodgepodge of components that were already on the market, chosen because they were cheap, tested, and plentiful—not because they were revolutionary. Marketing and what people are used to working with more often mold the shape of things to come than do sparks of genius from engineers and scientists. At the start of the 21st century, we are using hardware and software that works in the quirky way it often does, not because someone actually thought it was a good idea, but because we're already trapped by the technological limits of early generations.

That will change. It's the nature of evolution. But unlike the epochs of time it took to change T-Rex into a robin, technical evolution moves fast enough that we can actually see the process as it moves along. The relatively scampering pace of computing's evolution is that it gives you certain knowledge that the PC hardware you buy today will be powerful and cheaper in six months.

## The Vanishing Computer

The computer whose workings are described in this book is doomed. No matter what oddball predictions I may make about how computers work and how we'll use them, the safest thing I can predict is that the computer as we think of it today will disappear. That, too, is part of evolution. You can see it happening already. Parts of our everyday landscape that we don't think of as computers have microprocessor buried in them: the car, oven, refrigerator, phone, watches, and junior's toys as well as the Army's toys, smart bombs. The computer is not dying so much as it is morphing into a many new and related species. The fundamental ways we most communicate with computers—the keyboard and monitor—will be replaced by what's been the communications standard for centuries: voice and gesture. The mysterious components, cards and chips that confront us when we open a PC today, will migrate their separate ways into our surroundings. The cards, chips, and software will be able to learn without being given specific instructions, and they'll be self healing, drawing new software from the Internet and placing orders for parts that need replacing. A room will know when you've walked into it, and can change the lighting, background music, even the paintings on the wall, to match your tastes. Everywhere we go, at all times, we will be *within* the computer, or what the computer will have become by then.

More than that, we will all be within the same computer. We'll share the "pancomputer," a vast, worldwide network of information that can be accessed anywhere with just a spoken word. Why spend your time looking up some stock prices and moving the numbers into a spreadsheet to find out your net worth when there's a computer system with access to the information and knowledge of what to do with it. The allness of the computer will be crucial. Instead of all the redundant records kept by individuals, government, and businesses, everyone will have access to the same information. The pancomputer will have tendrils in objects as lowly as an alarm clock, so that after checking the weather, it wakes you up a half hour earlier because the computer checked the weather bureau and sensors outside your house, found out it's snowed overnight and realized you'll need more time to drive to work. That is, if you have a job that forces you to go to an office rather than use a computer from home.

It's not magic. There will be many physical devices from microphones to heat sensors to cameras to devices yet to be invented that will connect you to the pancomputer. They may take the form of a ring, necklace, data woven into your clothing, or even that staple of *The X Files*: the body implant. And there will be physical objects of many kinds where the world's public and private information is stored. But essentially the pancomputer will be as invisible as it will be ubiquitous and omniscient.

If you look close enough, the technology for doing all this can be seen in the computer components explained in this book. Creating the pancomputer doesn't require anything we can't envision based on the technology we have today, although vastly improved. That doesn't mean the universal computer will be here anytime soon. Small changes will add improvements without supplanting already existing computers that represent too large a commitment of time, learning, and money to be abandoned all at once. Plus, there are absolutes that can't be overcome—the size of atoms and the speed of light being the most important. More important than physical laws is humankind's willingness to trust an all-knowing computer network with the information that makes possible the pancomputer's ease, power and flexibility. As a species we are in love with our Big Brother paranoia and for good reason. But access to knowledge is a two-way trip. We must give up information to get information. As a society, we will need to decide how much of our privacy we're willing to pay for convenient omniscience. Or it may be that we will not have a chance to decide, no more than we today can decide what goes in our credit report or medical records. The pancomputer will collect personal information about us from many sources with or without our permission or knowledge. In the chapters of this book marked 21st Century Tech, we'll look at some ways in which the pancomputer will develop. But remember, in another millennium, I'll probably be proven wrong.

