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ESSAY: Forward into the Past

By Bill Buxton

AS A YOUNG MAN, I WAS NEVER ANY GOOD AT WAITING FOR THE future. Back in 1970, I composed and synthesized a film sound track using a device few people could then have imagined: a mouse-driven computer attached to a piano-like keyboard. The computer (the size of about nine refrigerators lined up side by side) even displayed the musical notes on a color screen, and when I altered a note, I could replay it instantly.

Decades before AOL came on the scene, I had an e-mail account (I still use virtually the same e-mail address I had in 1975), and in 1980 I wired my home terminal to the Internet (at 300 baud) by shoving my phone receiver into something that looked like twin toilet plungers. I hooked up full-motion desktop videoconferencing and video mail in 1988 and, four years later, started using a pen-based electronic whiteboard and drafting table.

I certainly wasn't alone in this. Many of my contemporaries at Xerox's Palo Alto Research Center (PARC) and M.I.T.'s Lincoln Laboratory in the '70s and '80s can tell similar stories. My point is not to boast about our exploits but to point out that most of what passes for new at any given time has in fact been around for quite a while. Or, to steal a line from the science-fiction writer William Gibson, "The future is already here. It is just not uniformly distributed."

Consider the LCDs on our watches, cell phones, PDAs, laptops and, increasingly, TVs. Liquid crystals were discovered in 1888 by Friedrich Reinitzer, an Austrian botanist, and named a year later by Otto Lehman, a German physicist. Since then, they have taken a leisurely route to our homes. The first prototype display emerged from RCA's Sarnoff Research Center in 1968. Two years later, Optel began producing the first watches with an LCD. I first got a computer with an LCD (an Apple Portable) 15 years ago. The road from discovery to mass market took about 116 years.

The now ubiquitous computer mouse also took a poky path to market. The first model was built in 1964 by Doug Engelbart and William English, of the Stanford Research Institute in Menlo Park, Calif. By the early 1970s, many of us at Xerox PARC had become point-and-click fans, using state-of-the-art Alto computers. But beyond that little world, few people were aware of the device until Steve Jobs unveiled the Apple

Macintosh in 1984. It took Microsoft's Windows 95 to take the mouse mainstream--some 30 years after its invention.

The commercialization of research, in other words, is far more about prospecting than alchemy. The U.S. National Academy of Sciences last year published a report prepared by the National Research Council's Computer Science and Telecommunications Board. It tracked the evolution of computer and telecommunications technologies from conception in the lab to the point where they had become $1 billion industries. In almost every case, the development took about 20 years. And that trend does not apply only to computers. Disk brakes, which we take for granted, were introduced by British inventor Frederick William Lanchester in 1901. They didn't appear in North American cars until Chrysler introduced them in the early 1950s, and they became standard only in the 1980s. Likewise, the Golden Age of television arrived some 20 years after TV was invented, around 1935.

All this suggests that the technologies that will significantly affect our lives over the next 10 years have been around for a decade. The future is with us (or at least some of us). The trick is learning how to spot it.

So, what's next? Here's one emerging innovation: take a look at the plasma panels that are replacing signs and posters at cinemas and airports. If these devices are being used now, when they cost about $10,000 apiece, imagine what we'll see when technologies like light-emitting polymers and e-Ink allow us to make even larger, thinner and higher-quality displays for perhaps as little as $100. In the mid-1800s, the introduction of the blackboard revolutionized classroom education. These displays could have a similar impact, not only in classrooms (in the form of electronic whiteboards) but also for signs, home entertainment and even interior wallpaper.

At the same time, we are seeing the emergence of smaller, brighter and cheaper data projectors. The technology in supermarket bar-code scanners is being transformed to create miniature high-resolution color laser projectors the size of a fingertip. Within a couple of years you will see them integrated into your cell phone and PDA; if you want to view data that won't fit on such small screens or if you want to look at the information with someone else, you can use those devices to project it onto any wall, tabletop or other surface so it appears as large as you'd like, always in focus. That means we aging geeks will be able to read the future!

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