

Why Old Technologies Are Still Kicking



Bob Goldberg/I.B.M., via Feature Photo Service, left; I.B.M., via Business Wire

Left, I.B.M. employees with a z10 mainframe, part of the latest generation of the computers and designed for new tasks. Right, an older iteration of the mainframe, I.B.M.'s System/360. In the 1960s, it introduced technology still in use today.

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IN 1991, Stewart Alsop, the editor of *InfoWorld* and a thoughtful observer of industry trends, predicted that the last mainframe computer would be unplugged by 1996. Last month, [I.B.M.](#) introduced the latest version of its mainframe, the aged yet remarkably resilient warhorse of computing.

Today, mainframe sales are a tiny fraction of the personal computer market. But with the mainframe facing extinction, I.B.M. retooled the technology, cut prices and revamped its strategy. A result is that mainframe technology — hardware, software and services — remains a large and lucrative business for I.B.M., and mainframes are still the back-office engines behind the world's financial markets and much of global commerce.

The mainframe stands as a telling case in the larger story of survivor technologies and markets. The demise of the old technology is confidently predicted, and indeed it may lose ground to the insurgent, as mainframes did to the personal computer. But the old technology or business often finds a sustainable, profitable life. Television, for example, was supposed to kill radio, and movies, for that matter. Cars, trucks and planes spelled the death of railways. A current death-knell forecast is that the Web will kill print media.

What are the common traits of survivor technologies? First, it seems, there is a core technology requirement: there must be some enduring advantage in the old technology that is not entirely supplanted by the new. But beyond that, it is the business decisions that matter most: investing to retool the traditional technology, adopting a new business model and nurturing a support network of loyal customers, industry partners and skilled workers.

The unfulfilled predictions of demise, experts say, tend to overestimate the importance of pure technical innovation and underestimate the role of business judgment. “The rise and fall of technologies is mainly about business and not technological determinism,” said Richard S. Tedlow, a business historian at the Harvard Business School.

To survive, technologies must evolve, much as animal species do in nature. Indeed, [John Steele Gordon](#), a business historian and author, observes that there are striking similarities in the evolutionary process of markets and biological ecosystems. Dinosaurs, he notes, may be long gone, victims of a change in climate that better suited mammals. But smaller reptiles evolved and survived, and today there are more than 8,000 species of reptiles, mainly lizards and snakes, compared with about 5,400 species of mammals.

As a media technology, radio is an evolutionary survivor. Its time as the entertainment hub of American households in the 1930s and '40s, captured in the [Woody Allen](#) film “Radio Days,” gave way to the rise of television.

TV replaced radio as the box families gathered around in their living rooms. Instead, radio adopted shorter programming formats and became the background music and chat while people ride in cars or do other things at home — “audio wallpaper,” as Paul Saffo, a technology forecaster in Silicon Valley, puts it.

While television did pose a threat to movies, it also served as a prod to innovation, including failures like Smell-O-Vision but also wide-screen, rich-color technologies like Cinerama and CinemaScope. The idea — and a good one — was to give viewers a more vivid, immersive experience than they could possibly have with television.

Today movies, like other traditional media, face the digital challenge of the Internet. And Mr. Saffo is betting that after a period of adjustment and experimentation, they will make another life-prolonging adaptation.

“Technologies want to survive, and they reinvent themselves to go on,” he said.

The survivors also build on their own technical foundations as well as the human legacy of people skilled in the use of a technology and the business culture and habits that surround it. And a change in the economic environment can sometimes lead to the renaissance of an older technology. Railroads, for example, have enjoyed a revival of investment recently as rising fuel costs and road congestion have prompted shippers to move from trucks to trains; some travelers, too, have opted for railways, along routes like the Boston-New York-Washington corridor.

The weight of legacy is underestimated, according to John Staudenmaier, editor of the journal *Technology and Culture*, because innovation is so often portrayed as a bold break with the past. A few stories of technological achievement fit that mold, like the Manhattan Project, but they are rare indeed.

The mainframe is the classic survivor technology, and it owes its longevity to sound business decisions. I.B.M. overhauled the insides of the mainframe, using low-cost microprocessors as the computing engine. The company invested and updated the mainframe software, so that banks, corporations and government agencies could still rely on the mainframe as the rock-solid reliable and secure computer for vital transactions and data, while allowing it to take on new chores like running Web-based programs.

“The mainframe survived its near-death experience and continues to thrive because customers didn’t care about the underlying technology,” said Irving Wladawsky-Berger, who led the technical transformation of the mainframe in the early 1990s and is now a visiting professor at the [Massachusetts Institute of Technology](#). “Customers just wanted the mainframe to do its job at a lower cost, and I.B.M. made the investments to make that happen.”

I.B.M.’s most recent model, the z10, represents an investment of \$1.5 billion and the work of 5,000 technical professionals. To nurture its ecosystem, the company partners with 400 universities worldwide in programs to teach mainframe skills.

The mainframe doomsayer, Mr. Alsop, is now a venture capitalist. In retrospect, he says, his 1991 prediction was wrong only in the timing. I.B.M. has so drastically reinvented the mainframe technology and its business model that the mainframes he wrote about are long gone. “It is a different world,” he said.