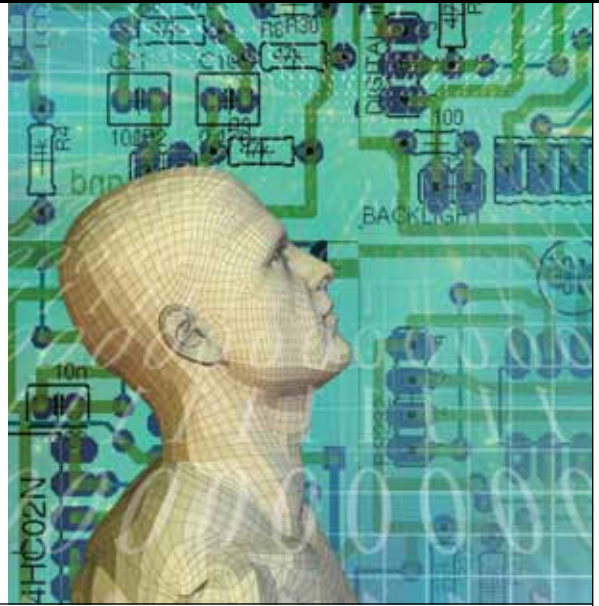


The Second-Order Effects of Steve Jobs

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Jobs-inspired Apple and NeXT products were platforms for many of the amazing innovations we take for granted today.

Much has been written about Steve Jobs' amazing leadership at Apple and how he transformed the company into one of the world's most recognizable and profitable brands after his return from NeXT.

But if you look closer, it's easy to find examples of how Jobs-inspired Apple and NeXT products were platforms for many of the amazing innovations we take for granted today. Between 1987 and 1997, we experienced a Cambrian-like explosion of completely new ideas bursting from computer science research labs into broader society at an unprecedented rate. Although Jobs wasn't directly involved in the innovations around the Internet and World Wide

Web, his technologies quite often were the platforms used to launch those innovations.

A BRIEF HISTORY

In the mid-1990s, I hosted Internet.TCI, a short-lived national TV show about the Internet that was produced and distributed by TCI Cable. Because a talk show about the Internet was a rarity at that time, my co-host Richard Wiggins and I were able to interview many of its early innovators. In retrospect, it's amazing to realize how often our guests cited Apple or NeXT technology as their source of inspiration.

When Tim Berners-Lee and Robert Cailliau invented the first version of the Web at CERN in 1990, the first webserver was a NeXT Cube and the first browser a NeXT workstation. According to Cailliau in the video you can find at [//URL TO COME//](#),

... this development system [NeXT-STEP], is so much better that porting what we had here [on the NeXT] to any other platform took an order of magnitude more time. For example, every time you clicked here [on the NeXT],

you had another window, every time you clicked on a diagram, you had the diagram in another window, when you clicked on a map, you got the map in PostScript, scalable and perfectly printable.

Between 1990 and 1993, the Web's success wasn't at all assured, as Gopher servers and clients were simpler and seemed better suited to the kind of hardware available to the general population. But the NeXT software development environment made it possible to sustain Web innovation with a minimal investment of developer time.

In 1993, a team led by Larry Smarr and Joseph Hardin at the National Center for Supercomputing Applications wrote Mosaic and released free versions for Unix, Macintosh, and Windows workstations. What made Mosaic's development practical was the fact that the NCSA had invested significant effort in the NCSA Image Library, which worked across the Unix, Mac, and PC platforms and allowed scientists to share visualizations of the data produced by the programs that ran on the NCSA

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supercomputers. As Smarr said in the video,

... we wanted to build a world of infrastructure where it was as easy to move an image around as it was to move a word. When the Mac II came out, it had 256 color levels. Apple gave us 50 Mac IIs, which was stunning. IBM at that time was telling its customers, 'You don't need color: we've already provided it. You have four of them—black, [yellow], cyan, and magenta.'

The Macintosh's far superior graphics capabilities made it possible to think of a commodity computer as a widely available, powerful, scientific workstation. Having the NCSA Image Library helped Mosaic's developers quickly build a browser that could combine graphics, text, and hyperlinks in a way that made the Web an engaging experience for users from the first time they installed Mosaic.

PUSHING FORWARD

Steve Jobs produced other innovations that pushed the industry forward, sometimes against its will. In the mid-1990s, wireless networking was the future, but a market battle between two competing IEEE 802 technologies made it difficult for anyone to purchase products at scale in case they mistakenly chose the technology that ultimately lost. One technology used frequency hopping and the other used direct sequence, so vendor groups in both camps worked feverishly to build network cards and base stations that would tempt the market in their favor.

In those early days, network cards were more than US\$500, and base stations cost thousands of dollars. In 1999, Apple chose direct sequence and introduced a \$99 network card and the \$300 Apple AirPort Base Station. With Apple tipping the balance, the market immediately shifted to direct sequence, and the price of wireless hardware

plummeted to the point where our picture frames and refrigerators now have Wi-Fi. I assume there was little or no profit margin on those early Apple wireless products, but Jobs was willing to sacrifice short-term profits to force the entire marketplace past petty bickering.

Apple invented the 3.5-inch floppy drive and then later made it obsolete with the introduction of the iMac. Although this move seemed illogical at the time, it forced the market to invest in the USB-based storage that is now commonplace and far superior to any floppy technology. Apple also

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led the way in moving the industry from CD burners to DVD burners by including them in its entire product line well before it seemed like a logical business decision. The market had to match the company's lead, and in a remarkably short time, DVD burners were the norm, with no increase in system price.

When Jobs put an accelerometer into the first version of the iPhone, was it to enable gaming software, facilitate the building of amazing augmented reality software, or encourage users to throw angry birds at pigs? I'm sure he had some ideas about how an accelerometer might be used for a few applications, but he must have known that once 100,000 creative engineers had access to a handheld device with an accelerometer, a camera, wireless networking, and GPS technology, the future would simply happen—whatever that future was to be.

How was it that Apple introduced so many products that surprised us and then radically changed how we think? The simple answer is that Steve Jobs didn't use a spreadsheet from

the finance department to decide his future product strategy. His roadmap wasn't limited by concerns about the profitability of the next few quarters. Instead, the only question was how to get to the future as quickly as possible, and once there, find a way to make it profitable.

Jobs earned the right to make innovation his top priority when he left Apple, ostensibly because the board and management valued top-down, business-style control over a relentless, quirky, unpredictable, and seemingly risky quest to push the envelope of feasibility. When he left for NeXT, Jobs focused on moving toward what he saw as "what was next," even if it meant financial failure.

Apple didn't fare so well while Jobs was gone, and the company slowly lost its innovative edge. When Jobs came back, he made it very clear that Apple's purpose was to innovate: the financial team was tasked with maximizing the revenue and profit from those innovations, not telling Jobs which things he was allowed to work on.

It took Steve Jobs a decade of his life and plenty of personal risk to prove that for Apple to be successful, he needed to focus its collective psyche on inventing the future and pulling the market and society into an increasingly exciting, technologically enhanced world. Jobs wasn't just a talented person or a visionary leader or a successful executive. For 20 years, he provided us with a gift—technology from the future. **■**

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