Introduction

On January 9, 2007, Steve Jobs introduced the iPhone to an eager audience crammed into San Francisco's Moscone Center.[1] A beautiful and brilliantly engineered device, the iPhone blended three products into one: an iPod, with the highest quality screen Apple had ever produced; a phone, with cleverly integrated functionality, such as voicemail that came wrapped as separately accessible messages; and a device to access the Internet, with a smart and elegant browser, and built-in map, weather, stock and e-mail capabilities. It was a technical and design triumph for Jobs, bringing the company into a market with an extraordinary potential for growth, and pushing the industry to a new level of competition in ways to connect us to each other and to the Web.

This was not the first time Steve Jobs had launched a revolution. Thirty years before, at the First West Coast Computer Faire in nearly the same spot, the 21-year-old Jobs, wearing his first suit, exhibited the Apple II personal computer to great buzz amidst "10,000 walking, talking computer freaks."[2] The Apple II was a machine for hobbyists who did not want to fuss with soldering irons: all the ingredients for a functioning PC were provided in a convenient molded plastic case. It looked clunky, yet it could be at home on someone's desk. Instead of puzzling over bits of hardware or typing up punch cards to feed into someone else's mainframe, Apple owners faced only the hurdle of a cryptic blinking cursor in the upper left corner of the screen: the PC awaited instructions. But the hurdle was not high. Some owners were inspired to program the machines themselves, but true beginners simply could load up software written and then shared or sold by their more skilled or inspired counterparts. The Apple II was a tabula rasa, a bold departure from previous technology that had been developed and marketed to perform limited, immutable tasks from the first day of its sale to the last day of its use.

The Apple II became popular quickly. And when programmer and entrepreneur Dan Bricklin introduced the first killer application for the Apple II in 1979 – VisiCalc, the world's first spreadsheet program – sales of the ungainly but very cool machine took off dramatically.[3] An Apple running VisiCalc helped to convince a skeptical world that there was a place for the PC at everyone's desk and hence a market to build many, very fast.

Though these two inventions – iPhone and Apple II – were launched by the same man, the revolutions that they inaugurated are radically different. For the technology that each inaugurated is radically different. The Apple II was quintessentially *generative* technology. It was a platform. It invited people to tinker with it. Hobbyists wrote programs. Businesses began to plan on selling

software. Jobs (and Apple) had no clue how the machine would be used. They had their hunches, but fortunately for them, nothing constrained the PC to the hunches of the founders. Apple did not even know VisiCalc was on the market when it noticed sales of the Apple II skyrocketing. The Apple II was designed for surprises – some very good (VisiCalc), and some not so good (the inevitable and frequent PC crash).

The iPhone is the opposite. Rather than a platform that invites innovation, the iPhone comes preprogrammed. You are not allowed to add programs to the all-in-one device that Steve Jobs gives you. Its functionality is locked in, though Apple can change it through remote updates. Indeed, to those who managed to tinker with the code to enable the iPhone to support more or different applications,[4] Apple threatened (and then delivered on the threat) to transform the iPhone into an iBrick.[5] The machine was not to be *generative,* beyond the innovations that Apple (and its exclusive carrier, AT&T) wanted. Whereas the world would innovate for the Apple II, only Apple would innovate for the iPhone.

Jobs was not shy about these restrictions baked into the iPhone. As he said at its launch:

> We define everything that is on the phone ... . You don't want your phone to be like a PC. The last thing you want is to have loaded three apps on your phone and then you go to make a call and it doesn't work anymore. These are more like iPods than they are like computers.[6]

No doubt, for a significant number of us, Jobs was exactly right. For in the thirty years between the first flashing cursor on the Apple II and the gorgeous iconized touch menu of the iPhone, we have grown weary not with the unexpected cool stuff that the generative PC had produced, but instead with the unexpected very uncool stuff that came along with it. Viruses, spam, identity theft, crashes: all of these were the consequence of a certain freedom built into the generative PC. As these problems grow worse, for many, the promise of security is enough reason to give up that freedom.

* * *

In the arc from the Apple II to the iPhone, we learn something important about where the Internet has been, and something more important about where it is going. The PC revolution was launched with PCs that invited innovation by others. So too with the Internet. Both were designed to accept any contribution that followed a basic set of rules (either coded for a particular operating system, or respecting the protocols of the Internet). Both overwhelmed their respective

proprietary, non-generative competitors, such as the makers of standalone word processors and proprietary online services like CompuServe and AOL. But the future unfolding right now is very different from this past. The future is not one of generative PCs attached to a generative network. It is instead of *appliances* tethered to a network of control.

These appliances take the innovations already created by Internet users and package them neatly and compellingly, which is good – but only if the Internet and PC can remain sufficiently central in the digital ecosystem to compete with locked-down appliances and facilitate the next round of innovations. The balance between the two spheres is precarious, and it is slipping toward the safer appliance. For example, Microsoft's Xbox 360 video game console is a powerful computer, but unlike Microsoft's Windows operating system for PCs, it does not allow just anyone to write software that can run on it. Bill Gates sees the Xbox as at the center of the future digital ecosystem, rather than at its periphery:

> It is a general purpose computer. . . .[W]e wouldn't have done it if it was just a gaming device. We wouldn't have gotten into the category at all. It was about strategically being in the living room. . . .[T]his is not some big secret. Sony says the same things.[7]

It is not easy to imagine the PC going extinct, and taking with it the possibility of allowing outside code to run – code that is the original source of so much of what we find useful about the Internet. But along with the rise of information appliances that package those useful activities without readily allowing new ones, there is the increasing lockdown of the PC itself. PCs may not be competing with information appliances so much as they are becoming them. The trend is starting in schools, libraries, cyber cafés and offices, where the users of PCs are not their owners. The owners' interests in maintaining stable computing environments are naturally aligned with technologies that tame the wildness of the Internet and PC, at the expense of valuable activities their users would otherwise discover.

The need for stability is growing. Today's viruses and spyware are not merely annoyances to be ignored as one might tune out loud conversations at nearby tables in a restaurant. They will not be fixed by some new round of patches to bug-filled PC operating systems, or by abandoning now-ubiquitous Windows for Mac. Rather, they pose a fundamental dilemma: as long as people control the code that runs on their machines, they can make mistakes and be tricked into running dangerous code. As more people use PCs and make them more accessible to the outside world through broadband, the value of corrupting these users' decisions is increasing. That value is derived from stealing people's attention, PC processing cycles, network bandwidth, or online preferences. And the fact that a Web page can be and often is rendered on the fly by drawing upon hundreds of

different sources scattered across the Net – a page may pull in content from its owner, advertisements from a syndicate, and links from various other feeds – means that bad code can infect huge swaths of the Web in a heartbeat.

If the security problems worsen and fear spreads, rank-and-file users will not be far behind in preferring some form of lockdown – and regulators will speed the process along. In turn, that lockdown opens the door to new forms of regulatory surveillance and control. We have some hints of what that can look like. Enterprising law enforcement officers have been able to eavesdrop on occupants of cars equipped with the latest travel assistance systems by producing secret warrants and flicking a distant switch. They can turn a standard mobile phone into a roving microphone – whether or not it is being used for a call. When these opportunities arise in places under the rule of law – where some might welcome them – they also arise within technology-embracing authoritarian states, because the technology is exported.

A lockdown on PCs and a corresponding rise of tethered appliances will eliminate what today we take for granted: a world where mainstream technology can be influenced, even revolutionized, out of left field. Stopping this future depends on some wisely developed and implemented locks, along with new technologies and a community ethos that secures the keys to those locks among groups with shared norms and a sense of public purpose, rather than in the hands of a single gatekeeping entity, whether public or private.

The iPhone and its siblings are products of both fashion and fear. They boast an undeniably attractive aesthetic, and they bottle some of the best innovations from the PC and Internet in stable, controlled forms. The PC and Internet were the engines of those innovations, and if they can be saved, they will offer more. As time passes, the brand names on each side will change. But the core battle will remain. It will be fought through information appliances that are not just products but also services, updated through a network by the constant dictates of their makers.

In this book I take up the question of what is likely to come next and what we should do about it.

Notes

1 Steve Jobs, CEO, Apple, Macworld San Francisco 2007 Keynote Address, http://www.apple.com/quicktime/qtv/mwsf07/ (last visited Aug. 16, 2007).

2 David H. Ahl, *The First West Coast Computer Faire*, *in* 3 THE BEST OF CREATIVE COMPUTING 98 (David Ahl & Burchenal Green eds., 1980), *available at* http://www.atariarchives.org/bcc3/showpage.php?page=98.

3 See Tom Hormby, VisiCalc and the Rise of the Apple II, Orchard, Sept. 26, 2006, http://lowendmac.com/orchard/06/0922.html.

4 *See, e.g.,* ModMyiPhone Main Page, http://www.modmyiphone.com/wiki/index.php/ (containing code and instructions for modifications) (last accessed September 30, 2007).

5 *See* Saul Hansell, *Steve Jobs Girds for the Long iPhone War*, N.Y. TIMES, Sept. 27, 2007, http://bits.blogs.nytimes.com/2007/09/27/steve-jobs-girds-for-the-long-iphone-war/; Jane Wakefield, *Apple iPhone Warning Proves True*, BBC NEWS, Sep. 28, 2007, http://news.bbc.co.uk/2/hi/technology/7017660.stm.

6 *See* John Markoff, *Steve Jobs Walks the Tightrope Again*, N.Y. TIMES, Jan. 12, 2007, http://www.nytimes.com/2007/01/12/technology/12apple.html?ex=1326258000&en=90 db9ea5a3d8350d&ei=5088&.

7 Posting of Ryan Block to Engadget, *A Lunchtime Chat with Bill Gates*, http://www.engadget.com/2007/01/08/a-lunchtime-chat-with-bill-gates-at-ces/ (Jan. 8, 2007, 2:01 PM).