

[Chapter 13: The World Goes Mobile]

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The Steves Leave Apple

Apple launched the Apple II computer in 1977 and made in that year all of \$41,575 on total sales of roughly \$774,000. Steve Jobs didn't really think the personal computer was a consumer product yet, but it became one quickly.⁸²⁹ Apple's revenues exploded over the next three years: \$7.9 million in 1978; \$47.9 million in 1979; and \$117.9 million in the 1980. Apple went public in December 1980 and the prospectus for the IPO touted the fact that Apple had sold 131,000 "Apple II computer mainframes."⁸³⁰ The investment bankers may not have known exactly how to describe Apple's computers, but they certainly understood what a hot stock looked like.⁸³¹

How many successful products does a firm need to have to

⁸²⁹ Lee Dembart, Computer Show's Message: 'Be the First on Your Block', The New York Times, Aug 26, 1977, p10.

⁸³⁰ Apple Computer, Inc. Prospectus, Dec 12, 1980.

⁸³¹ Karen W. Arenson, A 'Hot' Offering Retrospective, The New York Times, Dec 30, 1980, pD1.

succeed? What batting average can it get by with and still be a successful firm? Apple introduced a computer targeting business users, the Apple III, in May 1980, but it flopped.⁸³² In January 1983, Apple again chased the business market this time with its first graphical user interface (GUI) computer, the Lisa. The Lisa's list price tag—\$9,995—meant that it clearly was not a computer for the rest of us.⁸³³ Or anyone else as it turned out, as the Lisa sold poorly.⁸³⁴

In April 1983, Apple hired John Sculley as its new CEO. Sculley was only 44 years old, but he had worked his way up to the presidency of Pepsi-Cola and with his hiring, Apple was seen as taking steps toward maturity. Steve Jobs, then 28, would remain in place as Apple's chairman and would have other operational duties.⁸³⁵ Apple was now competing in the personal computer business with IBM and Sculley was seen as someone who knew how to compete in the face of a better capitalized, better-known behemoth, though of course it wasn't clear how success in selling soda water in competition with Coca-Cola would translate into the personal computer market. And, based on the continuing success of the Apple II and new variants on it, Apple was still growing nicely as the personal computer market expanded, as sales in fiscal year 1983 had risen 69% to \$982.8 million.

Super Bowl XVIII was on January 22, 1984 and while Super Bowls come and go, the ad Apple ran for its new computer remains memorable. People in gray, drab clothing lacking any hint of individuality watched a totalitarian figure droning on about the glorious revolution while a young woman in shorts and a t-shirt ran in to throw a sledgehammer at the screen. As

⁸³² Apple II Makes Its Debut at NCC, InfoWorld, June 9, 1980, p1; Andrew Pollack, Apple's Mac Taking on I.B.M., The New York Times, Nov 22, 1984, pD1.

⁸³³ Apple's New Lisa, Apple IIs Are Called Vital to Firm's Future, The Wall Street Journal, Jan 20, 1983, p5.

⁸³⁴ Andrew Pollack, Apple Expands Product Line, The New York Times, Jan 16, 1984, pD1.

⁸³⁵ Janet Guyon & Erik Larson, New Apple Chief Expected to Bring Marketing Expertise Gained at Pepsi, The Wall Street Journal, Apr. 11, 1983, p29.

the screen exploded, text rolled over the screen with a new voiceover: “On January 24th, Apple Computer will introduce Macintosh. And you’ll see why 1984 won’t be like ‘1984.’”

The Macintosh was Apple’s second try at a GUI computer this time priced at \$2495 for a version with a single 400K floppy drive, a 128K—yes, K not meg—of RAM and no hard drive.⁸³⁶ As part of rolling out the Mac, Apple had reorganized internally creating separate operating divisions for the Mac and the Apple II line. Steve Jobs, still chairman of the Apple board, would head the new Mac division.⁸³⁷

But barely a year later, Apple seemed to lose its soul. In February 1985, Steve Wozniak gave up his job as principal engineer at Apple to exit to start a home-video business. Wozniak was rich—worth around \$100 million—still young—only 33—and somehow chose not to start preparing immediately for his 2009 stint on *Dancing with the Stars*.⁸³⁸ In hindsight, of course, that was a mistake, but you can’t blame Wozniak for not figuring that out. In June 1985, Apple again reorganized internally and Steve Jobs was out an operational role at the company he had co-founded.⁸³⁹ By September 1985, Jobs had resigned as Apple chairman to go build a new computer company with five soon-to-be-former Apple employees.⁸⁴⁰

Of course, this is a familiar pattern. The Traitorous Eight exited Shockley Semiconductor in 1957 to form Fairchild and in 1968, Bob Noyce, Gordon Moore and Andy Grove exited Fairchild to form Intel. Texas Instrument couldn’t really get its

⁸³⁶ Carrie Dolan, Apple Introduces Its Macintosh Unit At Annual Meeting, The Wall Street Journal, Jan. 25, 1984, p12.

⁸³⁷ Apple Creates Division for Macintosh and Lisa Series of Computers, The Wall Street Journal, Jan. 31, 1984, p3.

⁸³⁸ Kathleen Day, Wozniak Takes Leave at Apple to Start Firm, The Los Angeles Times, Feb. 7, 1985, pF3.

⁸³⁹ Donald Woutat & William C. Rempel, Apple Unveils Major Reorganization; Jobs Gives Up a Key Post, The Los Angeles Times, June 1, 1985, pC1.

⁸⁴⁰ Patricia Bellew Gray & Michael W. Miller, Apple Chairman Jobs Resigns, Citing Firm’s ‘Hostile’ Response to New Venture, The Wall Street Journal, Sept. 18, 1985, p2.

act together in the personal computer business and in 1981 Rob Canion and others exited to start Compaq Computer. Steve Jobs intended to build the next insanely great computer and if he couldn't do that at Apple, he would do it in a new firm that he would eventually found, appropriately enough, as NeXT Computer. Apple sued Jobs within a week of his departure alleging misappropriation of trade secrets and breach of fiduciary duties as Apple believed that Jobs had been plotting his next move while he was still chair of Apple.⁸⁴¹

Endings are hard and this one was no different, but as time passed, Apple and Jobs settled the suit. The settlement barred NeXT from selling a computer before July 1987 and limited NeXT's ability to hire other Apple employees.⁸⁴² In October 1988, NeXT introduced its first computer, a high-end machine, priced at \$6,500 targeting the academic market.⁸⁴³

Mobile Computing 1.0

Apple CEO John Sculley was nearing a decade at Apple as he prepared to give an opening speech at the January 1992 Consumer Electronics Show in Las Vegas. Apple was in the middle of a revival. Its share of personal computer sales had dropped from 1988 to 1990 from roughly 13% to under 10%, but it was expected to restore those lost sales by the end of 1992. That in turn would have made Apple the single largest seller of personal computers, though that reflected IBM's decline in the PC market as much as anything else. Much more importantly, with the success of Apple's PowerBook line of notebook computers, Apple was surging in this important new market segment.⁸⁴⁴ That said, the PC standard still reigned supreme,

⁸⁴¹ Andrew Pollack, Apple Sues Ex-Chief Over Computer Venture, *The New York Times*, Sept. 24, 1985, pD5.

⁸⁴² Andrew Pollack, Steven Jobs Settles Suit Filed by Apple, *The New York Times*, Jan. 18, 1986, p35.

⁸⁴³ Andrew Pollack, The Return of a Computer Star, *The New York Times*, Oct. 13, 1988, pD1.

⁸⁴⁴ Andrew Pollack, Apple's Chief Sees Future in Electronics, *The New York Times*, Jan 10, 1992, pD4; John Markoff, Beyond the PC: Apple's Promised Land, *The*

even if IBM was no longer the dominant firm within that part of the market.

John Sculley went to the January 1992 consumer electronics show to discuss the future—one that Apple would play a big role in his view and help to shape—and that future was a combination of computers, consumer electronics and wireless connectivity. Sculley’s term was the “personal digital assistant” or PDA. Apple had another name for this category—personal interactive electronics—which conveniently gave rise to Apple PIE.⁸⁴⁵ Electronic organizers were already well-known—the Sharp Wizard was released in 1989⁸⁴⁶—but Sculley seemed to promise something new, such as a broader, more encompassing device with an interface that would change the basic mechanisms of computing. A device with no physical keyboard of the sort used with personal computers but instead a simple blank screen that users would interact with.

This was an exciting prospect. Industry analysts thought that computing might be ready to make another generational change.⁸⁴⁷ On that framing, mainframe computers represented the first generation—the world of analog computing had receded into history—and minicomputers of the sort built by Digital Equipment Corp. and others represented the second generation. Mainframe computers hadn’t disappeared when minis appeared but the minis opened up new computing opportunities that just didn’t match very well with a mainframe infrastructure. More frontiers opened up with the arrival of personal computers. The overall computing footprint expanded with each new computing architecture and competition across the generations occurred at the edges of the architectures. The new fourth generation—mobile—would consist of laptops and notebooks and some sort of handheld device.

New York Times, Nov 15, 1992, pF1.

⁸⁴⁵ Lawrence M. Fisher, Apple to Give the Public Its First Look at Newton, The New York Times, May 29, 1992, pD3.

⁸⁴⁶ [need source on this].

⁸⁴⁷ Portia Issacson, Frontline, CIO, July 1993, p60.

And the potential market seemed almost limitless: The personal computer for all of its success had reached around 2% of the world, so a device for the other 98% would be revolutionary. And presumably quite profitable. Even in the U.S., the opportunity to expand computing looked huge. For every 100 Americans, there were 102 telephones, 70 TV sets and only 12 computers.⁸⁴⁸ For all of the success of the computer, there was an enormous amount of unexplored territory. At least that was how it looked if you were a true believer like John Sculley. Andy Grove, the chairman of Intel, dismissed the idea that everyone would get some sort of wireless personal communicator, calling it “a pipedream driven by greed.”⁸⁴⁹

John Sculley believed that device was the Apple Newton. It was Apple’s first new fully new product since the Macintosh in 1984 (and since the Steves had left Apple) and it would implement the vision that Sculley set out in his January 1992 Las Vegas speech. The Newton was roughly 6" x 8", was powered by an ARM 6 RISC chip and was to sell for roughly \$1000.⁸⁵⁰ It was intended to be an organizer, possibly an ebook reader, a notetaker and it would have maps available on the go.⁸⁵¹ And best of all, the Newton was designed to work with handwriting via a stylus. Printing was something you learned early in school and so the idea was to make the device adapt to you rather than the other way around. Plus if the Newton was matched with a wireless network, then it would be a real-time communications

⁸⁴⁸ Craig Bromberg, Here Come the Gizmos, *New York Magazine*, Aug 17, 1992, p36.

⁸⁴⁹ Peter H. Lewis, ‘Mother of All Market’ or a ‘Pipe Dream Driven by Greed?’, *The New York Times*, July 19, 1992, pF8.

⁸⁵⁰ Apple to Give the Public Its First Look at Newton, *The New York Times*, May 29, 1992, pD3; Christopher Lloyd, Cards to outsmart the fraudsters, *The Times*, Oct 17, 1993. Apple had invested in a new chip venture, Advanced Risc Machines, Ltd., in 1990. See Jonathan Weber, Apple to Join Acorn, VLSI in Chip-Making Venture, *The Los Angeles Times*, Nov 28, 1990, pD5.

⁸⁵¹ Andrew Pollack, Apple’s Chief Sees Future In Electronics, *The New York Times*, Jan 10, 1992, pD4; Yvonne Lee, Apple’s Newton will help users get around town, *InfoWorld*, Dec 7, 1992, p135.

device, perhaps even ultimately a Newton with a built-in cell phone, say the nPhone.⁸⁵²

Moreover, Sculley seemed to have absorbed what one might have taken to be the central lesson of the computer competition between the Wintel platform and the Apple Macintosh: open beats closed and there was enormous amounts of money to be made in licensing the operating software of a robust ecosystem constructed around it. Apple was ready to license its Newton architecture to help to build the overall system in the face of the genuine completion it faced from the likes of AT&T, IBM and Microsoft in this new fourth-generation computing space.⁸⁵³

Big picture, of course, we know that Sculley was right about the market for a handheld device even if the timing and execution was off. Sculley was ultimately describing the iPhone, circa 2007, when, unfortunately, he had the Newton, circa 1993. This was a pre-Internet, pre-WiFi device. The goal is not merely to have a vision—Sculley had that—but to have a vision that can actually be executed at a price that the market will buy at. Sculley didn't have that and the Newton would become a legendary bust, ranking right up there with Ford's Edsel and new Coke among the great product failures. Apple would kill the Newton in early 1998, having sold roughly 120,000 of them with 80,000 of those sold in the first year. The handwriting interface was notoriously buggy, being made fun of in cartoons and even as the device evolved it never seemed to get beyond its initial problems.⁸⁵⁴

Apple was obviously a well-established computer firm in 1992 and was a plausible candidate to be at the forefront of a next-generation computing device, but it also certainly didn't have the market position to just establish a new standard and of

⁸⁵² Craig Bromberg, Here Come the Gizmos, *New York Magazine*, Aug 17, 1992, p36; John Markoff, Beyond the PC: Apple's Promised Land, *The New York Times*, Nov 15, 1992, pF1.

⁸⁵³ Portia Isaacson, *Frontline*, CIO, July 1993, p60; Portia Isaacson, *Frontline*, CIO, Apr 15, 1994, p64.

⁸⁵⁴ Mary Brandel, Early PDAs: Pretty Darn Annoying, *Computerworld*, Nov 8, 1999, p68.

course the fact that the Newton didn't really work as promised turned out to be fatal. But of course there were other firms that might have seemed like more plausible firms to define a new standard, IBM, AT&T, Microsoft and Intel had to seem like a natural set of firms to play that role, though, as noted above, Andy Grove at Intel was deeply skeptical about a handheld device.

IBM was in a different place. Having basically ignored the minicomputer market as it evolved and Digital Equipment Corp. grew into a major computing firm, IBM made sure not to repeat that mistake with personal computers. It defined the personal computing platform when it introduced the IBM PC in August 1981, even if it didn't successfully build a platform that it could control on an ongoing way. In late October 1993, IBM announced its new device, Simon, as part of a partnership with BellSouth.⁸⁵⁵ BellSouth was, in telecommunications lingo, an RBOC (regional Bell operating company), meaning one of the regional local telephone companies that was formed when AT&T was broken up in 1984 as part of an antitrust settlement.⁸⁵⁶

Unlike Apple's original Newton, Simon was a wireless device from the beginning, meaning phone, email and faxes (no Internet of course because it didn't exist yet). But it wasn't just a wireless communicator as the Intel-based device also had a PDA-style screen, roughly 2" by 6", that you interacted with using a stylus. Simon represented the coming convergence of computers and telephones and therefore could reasonably be seen (and was) as a smart phone. But like the Newton, this was a device that was long on vision and short on execution.⁸⁵⁷ Both devices almost certainly reflected the fact that the underlying

⁸⁵⁵ Dennis Kneale, IBM, BellSouth Team Up to Sell 'Simon', *The Wall Street Journal*, Oct 29, 1993, pB1.

⁸⁵⁶ [get wsj, nyt on this].

⁸⁵⁷ Yvonne L. Lee, 'Simon' PDA will emphasize communication, *InfoWorld*, Nov 8, 1993, p6; Stewart Alsop, Building a better handset: A tale of two telephone companies, *InfoWorld*, Nov 22, 1993, p5; Harry McCracken, Phone capabilities are Simon PDA's bright spots, *InfoWorld*, Oct 31, 1994, p119.

technology just wasn't there yet to pull off the envisioned convergence of computers and communications.

In this era of mobile, successful firms didn't try to create a single grand device—a sort of unified field theory of fourth-generation computing—but instead created devices that did one or two functions well given the limits of the current technology. Three real successes emerged from the early churn. U.S. Robotics released its Palm 1000 PDA in April 1996 at a price of \$299. Apple's Newton tried to read your printing and turn that into text. The Palm also relied on a stylus and handwriting for input, but it offered a specialized handwritten language, Graffiti, for input.⁸⁵⁸ It turned out to be easier to train humans to write something computers could understand than to go the other way. And at the Fall 1996 [Comdex] in Las Vegas, Microsoft announced Windows CE, a slimmed-down version of Windows 95, as an operating system for the PDA market.⁸⁵⁹

Palm quickly became the first great PDA success selling more than 300,000 units in the year after its introduction. And that success wasn't just about getting Palm Pilots into the hands of devoted customers. The Palm was becoming a platform with extensive third-party development of software to extend the capabilities of the device.⁸⁶⁰ Palm was willing to let other firms produce their own versions of its PDA. With the Simon, IBM had tried to build its own device and replicate the success of the IBM PC, but with Simon a failure, in September 1997, IBM struck a deal to sell its own version of the Palm PDA.⁸⁶¹ And when Jeff Hawkins who had founded Palm left 3Com to start a new PDA company, Handspring, 3Com was perfectly happy to

⁸⁵⁸ Dylan Tweney, You can take it with you: Pilot puts information in hand, InfoWorld, May 13, 1996, p118.

⁸⁵⁹ Lee Gomes, High-Tech Gurus, Thronging Las Vegas For Trade Show, Will Bet on PC's Fate, The Wall Street Journal, Nov 15, 1996, pB9; Mindy Blodgett, OS may goose PDA market, Computerworld, Oct 7, 1996, p43.

⁸⁶⁰ Evan Ramstad, The Pilot Is This Year's Digital Toy, And Those Who Love It Are Passionate, The Wall Street Journal, Apr 1, 1997, pB1.

⁸⁶¹ Raju Narisetti, IBM to Sell Relabled 3Com PalmPilot As Its First Personal Digital Assistant, Sept 23, 1997, pB6.

license the Palm OS to Handspring as part of its platform competition with Windows CE.⁸⁶²

On January 19, 1999, Research In Motion Ltd. announced a new portable device targeting mobile professionals. Lawyers, investment bankers, business-firm managers and the like. It was device designed to make email available wherever you were. An upgraded two-way pager as it were. The device was based on an Intel 386 chip and came with a small physical QWERTY keyboard and built-in wireless access.⁸⁶³ You were supposed to hold the small device in both of your hands and type with your thumbs. The device of course was the Blackberry; the intended method of operation would give rise to the idea of Blackberry prayer—two hands close together, head bent over in communion with the device—and the resulting desire for constantly and instantly available email would lead to a different name for the device, the Crackberry.

John Sculley had really brought a huge amount of public attention to the idea of a PDA, but Apple had failed in the new market. Others had taken different, more limited approaches and had succeeded. In 2001, PDA shipments in the United States reached roughly 6.5 million (the worldwide figure was roughly 13 million). The Palm OS had a 57% of the worldwide market while Windows CE was at 21%, which was a jump from 11% in 2000. RIM held a 6.6% share of the U.S. market.⁸⁶⁴ By 2006, worldwide PDA shipments had jumped to 17.7 million, but PDA operating system market shares had shifted substantially away from Palm in favor of Microsoft and RIM: Windows CE, 56.1% of 2006 shipments; RIM, 19.8%; and Palm OS, 11.7%.⁸⁶⁵

⁸⁶² Palm, Part II, PC Magazine, Jan 5, 1999, p10.

⁸⁶³ Research In Motion Delivers Wearable Wireless Device Based on Embedded Intel Architecture, Business Wire, Jan 19, 1999.

⁸⁶⁴ Gartner, Gartner Dataquest Says Worldwide PDA Industry Grew 18 Percent in 2001, Feb 13, 2002.

⁸⁶⁵ Gartner, Gartner Says Worldwide PDA Shipments Top 17.7 Million in 2006, Feb 6, 2007.

But the original vision of convergence of computing and communications that John Sculley had seen was still out on the horizon. High-end tech users were living in a world of multiple mobile devices: a cell phone *and* a PDA or a cell phone *and* a Blackberry. The Holy Grail was a device that brought all of these functions together in a single device. It had to be coming and with the rise of Microsoft and RIM and the relative decline of Palm, it had to look like a two-horse race between Microsoft and RIM.

The New Walkman

If you were a musician who wanted to enjoy a quiet life of going into the studio, cutting an album, and then selling it, the best time to be alive was 1999. Revenues from the sale of recorded music peaked that year and would decline globally by 40% between 1999 and 2014.⁸⁶⁶ Ticket sales to concerts are a different matter but selling tickets means being on the road putting on a satisfying live performance night after night. And in doing that we have largely abandoned copyright and returned to the world of selling physical property. Copyright is all about selling copies of the work. If you can't sell those copies for whatever reason, then you sell physical seats, merchandise and perform live music.

There is a small—perhaps even a large—industry devoted to exquisitely teasing out causal connections to explain the decline described above,⁸⁶⁷ but it is natural to point to three related developments, namely, first the development of the MP3 format; second the rise of filesharing software, in particular, Napster which became a force in 2000; and third, the rise of the MP3 player. It is that third piece that we are most interested in here as really is the starting point for the company that Apple Computer would become. The other point to note is that the

⁸⁶⁶ Paul Resnikoff, *The Music Industry: Inflation Adjusted 2013 Dollars (1973-2013)*. Digitalmusicnews.com, Aug 26, 2014; IFPI, *Global Music Industry Report 2017: Annual State of the Industry*, p11.

⁸⁶⁷ Add cites.

standard music CD, the format on which almost all of those 1999 revenues were based, arrived in a consumer's hands unprotected. No embedded DRM—digital rights management—to try to control the copying of the music on the CD. Rip, mix, burn with peer-to-peer filesharing software meant that a single purchased copy of a music CD could percolate quickly through a filesharing network.

The MP3 format allowed for efficient distribution of audio over the Internet by compressing the data on a CD all while preserving quality—not perfectly but acceptably—and that was essential if the Internet was going to threaten the CD.⁸⁶⁸ And consumers had developed a taste for portable music at least since the release of the Sony Walkman in July 1979. Just a little bit bigger than the cassettes that it played back, the Walkman was an enormous success and was one of the products that defined Sony as the Apple of its day.⁸⁶⁹ The combination of the Internet and the new file format made digital distribution a real possibility. Would the music industry embrace it? Or would digital distribution just happen on its own?⁸⁷⁰

MP3 players, the portable devices on which MP3 files could be played, started to appear in 1998. The first of these was the MPMan, a name that presumably was a mash up of MP3 and Walkman. The 32-megabyte model sold for \$299, the 64 meg version for \$499. The device used flash memory—no moving parts—and was produced by SaeHan Information Systems, then a Samsung subsidiary. The company also had another model with a 2½ inch hard drive that would hold 500 songs. And a

⁸⁶⁸ The MP3 file format story is itself quite interesting, but not a point of interest here. For more, see Jacob Ganz, *The MP3: A History of Innovation and Betrayal*, *The Record*: NPR, Mar. 23, 2011; Stephen Witt, *How Music Got Free: A Story of Obsession and Invention* (Penguin Books, 2016).

⁸⁶⁹ Carl Franzen, *The history of the Walkman: 35 years of iconic music players*, *TheVerge.com*, July 1, 2014.

⁸⁷⁰ Doug Reece, *Industry Grapples with MP3 Dilemma*, *Billboard*, July 18, 1998, p1.

second player, the Rio, had been announced by Diamond Multimedia Systems, Inc.⁸⁷¹

In October 1998, the Recording Industry Association of America (RIAA) sued Diamond alleging that the Rio violated the Audio Home Recording Act of 1992 (AHRA), which was a special copyright statute. The content industry has often tried to use the legal system to control new tools of distribution. The Sony Betamax video cassette recorder ended up before the U.S. Supreme Court, where in 1984, the Court ruled in a 5-4 decision that Sony wasn't liable for home taping by Betamax purchasers.⁸⁷² That result was driven off of two ideas, first that home-taping—so-called timeshifting—was fair use and therefore didn't violate U.S. copyright law. The Court also concluded that even if there was a copyright violation by the home taper, Sony couldn't be held secondarily liable for the violation because the Betamax was capable of substantial noninfringing uses. Products might have legitimate and illegitimate uses and the question was how to balance those and *Sony* announced an outcome particularly protective of the consumer electronics industry.

Having failed in the court system, the content industry would turn to Congress to seek new legislation and the AHRA emerged.⁸⁷³ The AHRA is a tricky little statute with detailed definitions but the impetus for the new statute was a new emerging copying technology, digital audio tape or DAT. DAT promised higher quality recording that would be readily available to consumers. The AHRA defined a compromise under which the new devices would legal but would have to be built with a built-in copyright protection scheme (the Serial Copy Management System). And recording devices and

⁸⁷¹ Doug Reece, Industry Grapples with MP3 Dilemma, *Billboard*, July 18, 1998, p1; Doug Reece, Industry Wary As Wave Of Portable MP3 Players Looms, *Billboard*, Sept. 19, 1998, p1.

⁸⁷² *Sony Corp. of America v. Universal Studios, Inc.*, 464 U.S. 417 (1984).

⁸⁷³ Pub. L. 102-563, Oct 28, 1992.

recording media would pay a statutory fee that would work its way back to the content industry.

DAT never really went anywhere, either because of the complex legislative scheme or because it just failed in the way that most new technologies fail, but the AHRA didn't go away and the RIAA pounced on it when confronted with the Diamond Rio. Of course, no one had MP3 players in mind when the statute was passed in 1992, but statutory language says what it says and the question was whether the RIAA could shoehorn the Rio into taxation/copy-protection scheme defined by the AHRA. That result would clearly have shaped how MP3 players would have emerged—and might have given the content industry a chunk of the revenues associated with MP3 players—but also might have been a sufficient roadblock to block them completely.⁸⁷⁴

Ease of use—transaction costs if you are a Coasian economist—matter enormously to product success. The recorded music industry didn't like copying of music cassettes or burning of CDs, but all of that was sufficiently clunky that the technology naturally limited the extent of the copying. With the old tech, copying didn't *scale*. With peer-to-peer filesharing software, the scale of possible copying had changed dramatically and an MP3 player would untether the results of that copying from a desktop computer and make it fully portable. That had to look like a threat to the current revenue model for recorded music.

The RIAA lost its suit against the Diamond Rio and the subsequent appeal and, by June 1999, it was clear that that the new MP3 players could be produced outside of the confines of the AHRA.⁸⁷⁵ With the legal issues resolved and with the MP3 player industry poised to emerge, the question was in what form and who would shape it? Microsoft was looking to move beyond the computer desktop into consumer electronics more directly.

⁸⁷⁴ Doug Reece, RIAA Files Suit Over MP3 Player, *Billboard*, Oct. 24, 1998, p8.

⁸⁷⁵ Recording Industry Association of America v. Diamond Multimedia Systems, Inc., 180 F.3d 1072 (9th Cir. 1999).

After all, once you have 100% of the market, there isn't anywhere to go. That of course wasn't fully accurate, but it should capture the dilemma faced by a company looking to continue to grow. At the January 2001 Consumer Electronics Show in Las Vegas, Bill Gates introduced Microsoft's new Xbox gaming system, a combined hardware/software play by Microsoft in a new market for it.⁸⁷⁶ But Microsoft also announced at CES that eleven new MP3 players were using its Windows Media Audio (WMA) format for music.⁸⁷⁷ Microsoft wasn't building its own MP3 player—at least not yet—but instead was making a play to own the software on which the new MP3 players would be based. Of course, Microsoft had become Microsoft by building the key platform software for the IBM PC platform and it hoped to repeat that success for the new MP3 players.

2001: Apple Before the iPod

The world of personal computers reset in August 1995. Netscape went public, America Online was ascending and Microsoft released Windows 95. IBM's PS/1 and OS/2, IBM's effort to regain control of the personal computer platform that it had created, had failed to shake the positions of Intel, Microsoft or IBM's clone competitors. The relentless progress in hardware defined by Moore's law for processors and even faster developments in networks provided the absolutely essential infrastructure to make the consumer experience change, but the real interface of that change was being driven by Netscape, Microsoft and AOL. The internet was competing with the desktop for supremacy. And a company named Amazon had started selling books online in July 1995, thought it was hard to know then whether that mattered or not.

As all of this was happening, Apple Computer was dying.

⁸⁷⁶ John Markoff, *New Focus for Gates Is Consumer Electronics*, *The New York Times*, Jan 5, 2001, pC4.

⁸⁷⁷ Steve Traiman, *Digital Media, WMA, Mac Innovations Among Highlights At Int'l CES*, *Billboard*, Jan 27, 2001, p62.

Apple has historically been a vertically integrated hardware and software company. It is easy to forget that that business model really almost failed for Apple and by early 1996, it was losing money and laying off employees.⁸⁷⁸ In January 1996, Apple faced a low-ball takeover offer from Sun Microsystems and it wasn't clear that Apple would continue as an independent company.⁸⁷⁹ On February 3, 1996, Apple's board of directors pushed out Apple CEO Michael Spindler and replaced him with Gilbert F. Amelio, an Apple board member and then the CEO of National Semiconductor Corp.⁸⁸⁰ Spindler had taken over from John Sculley in October 1993, when it was clear that vision wasn't enough.⁸⁸¹

Apple's losses accelerated with a second quarter loss of \$700 million which reflected inventory write downs from unsold computers.⁸⁸² It wasn't clear how Apple would revive itself, but at the end of 1996, Apple made the bold move to go retro and pursue the future all at the same time. Apple purchased Steve Job's NeXT for \$400 million which brought with a new software code base and the return of Steve Jobs. Jobs had exited Apple in 1985 and formed NeXT and his return to Apple was hailed as perhaps the last chance to restore luster to Apple. Jobs was returning to a company in decline that had seemed to have lost its ability to deliver on updates to its core operating system software.⁸⁸³ That would be a problem at almost any point, but it

⁸⁷⁸ Lawrence M. Fisher, *Apple Raises Loss Estimate, In a Surprise To Wall Street*, *The New York Times*, Jan 11, 1996, pD1; Lawrence M. Fisher, *Apple Plans 1,300 Layoffs And Takes Loss*, *The New York Times*, Jan 18, 1996, pD1.

⁸⁷⁹ John Markoff, *Sun Bid for Apple Computer Is Placed Below Stock Price*, *The New York Times*, Jan 25, 1996, pD1.

⁸⁸⁰ Peter H. Lewis, *Shake-Up at Apple Computer Places Director in Chief's Job*, *The New York Times*, Feb 3, 1996, p1.

⁸⁸¹ Charles McCoy, *As Sculley Leaves Apple, Image Lingers Of a Leader Distracted by His Vision*, *The Wall Street Journal*, Oct 18, 1993, pB8.

⁸⁸² John Markoff, *Apple Expects It Will Lose \$700 Million*, *The New York Times*, Mar 28, 1996, pD1.

⁸⁸³ John Markoff, *Steven Jobs Making Move Back to Apple*, *The New York Times*, Dec 21, 1996, p37; Rajiv Chandrasekaran, *Steve Jobs Returning to Apple*, *The Washington Post*, Dec 21, 1996, pD2.

was especially so with the emergence of the Internet.⁸⁸⁴ That was a powerful new feature for computers and Apple needed to bring it into its software platform.

As Apple entered 2001, it still wasn't clear what Apple's future looked like. After the disastrous financial losses in 1997, Apple has been profitable in 1998, 1999 and 2000, but it was again losing money in 2001. Apple's fiscal year for 2001 ended on September 29th and its net sales had plunged from nearly \$8 billion in 2000 to only \$5.4 billion in 2001.⁸⁸⁵ Apple seemed to have lost its position in the education market, though the extraordinary sales drop had to reflect broader concerns about the future of Apple products.⁸⁸⁶

Steve Jobs appeared at the MacWorld⁸⁸⁷ conference in San Francisco on January 9, 2001 to try to articulate that vision.⁸⁸⁸ Apple launched the iPod on October 23, 2001, so it is natural to try to imagine that Jobs had the iPod in mind in doing the keynote, but the best information suggests that Apple didn't even start meaningful development on the iPod until late January 2001 and so the keynote should be seen as a look at an alternative universe in which Apple never builds the iPod.⁸⁸⁹ There is certainly nothing in the speech that reflects the idea that in ten months Apple's future would change trajectories dramatically and all of the doubts about whether Apple had a future would go away.

In his keynote speech, Jobs announced Mac OS X, the new operating system that Apple had been working on since he

⁸⁸⁴ Look at new book at office on this.

⁸⁸⁵ Apple Inc Form 10-K405

⁸⁸⁶ John Markoff, Thinking Revolution, Talking Evolution at Apple, The New York Times, Jan 21, 2001, p[B4].

⁸⁸⁷ Need to confirm spelling of name. It is MacWorld at 1:15:56 of the video.

⁸⁸⁸ Pui-Wing Tam, Apple's New Items Are Made to Back 'Digital Hub' View, The Wall Street Journal, Jan 10, 2001, pB6.

⁸⁸⁹ Apple Press Release, Apple Present iPod, Oct 23, 1991; on the development of the iPod and the timing of the start of the project at Apple, see Steve Levy, The Perfect Thing (Simon & Schuster 2006) p97-98.

returned from NeXT.⁸⁹⁰ The new OS just meant that Macintosh product line was reestablished as a product with a future *if* personal computers themselves weren't receding into the past. But the broader question confronting Apple was whether the personal computing era was over. Recall that Microsoft had announced a real push into consumer electronics at the January 2001 Consumer Electronics Show in an effort to move into new markets. The computer industry was moving, it was thought, to a new era which would be wireless and handheld and Apple didn't seem to have much role there, especially given the Newton failure.

Jobs rejected the notion that the personal computer age was closing. He instead saw three different eras of personal computing: an experimental prehistoric era from 1976-1979; a first golden age from 1980-1994 defined by new productivity with spreadsheets, word processors and desktop publishing; and a third era—a second golden age—from 1995-2000 defined by the emergence, and, as Jobs put it, the maturation of the Internet. Jobs believed that the personal computer would continue to evolve and was entering a new era which he termed “Digital Lifestyle.” The personal computer was going to serve as the digital hub of the new universe of digital devices (cell phones, digital cameras and camcorders, portable music players (both CD players and MP3 players), DVD players and PDAs).

For Jobs, the digital hub vision was crystalized by the camcorder, which was a good device standing alone but so much better—ten times more valuable he believed—when the video was brought onto the desktop via Apple's FireWire port for editing and then redistribution. For audio, Jobs believed that music was in the middle of a digital revolution defined by ripping CDs, creating playlists and burning those to disks to be played back in portable players or in your car. This transformation gave listeners an unprecedented ability to

⁸⁹⁰ The description that follows is based on a video of the speech posted on the Internet with the title “Steve Jobs Keynote Macworld 2001 SF.” See also John Markoff, *Thinking Revolution, Talking Evolution at Apple*, *The New York Times*, June 21, 2001, p.[Br].

organize music and play it in just the sequence that they desired in the moment.

There was no discussion of music piracy and Napster and the like which was perhaps the bigger music revolution. Of course, Jobs had purchased the company that would become Pixar after he had exited Apple. That meant he almost certainly understood the real difficulties of content creation and the importance to content creators of selling audio and video. It seems to have been more comfortable for Jobs to just ignore the role of content piracy in the new digital lifestyle.

Jobs introduced Apple's new software to address this music moment, iTunes. It is conventional to talk about firms facing a buy-or-build decision: Which technologies should you build in house and which should you just buy in the marketplace? Macintosh software was one of Apple's core competences and so it would have been natural for Apple to build new music software from the ground up.

It didn't do that. Casady and Greene was a small company selling a number of Macintosh utilities, including a successful Macintosh music program, SoundJam. Apple went to C&G with a sell-or-compete offer. It wanted to buy SoundJam and hire a chunk of the software team at C&G and if SoundJam didn't sell, Apple would enter the market on its own. Apple of course sold lots of software, but there was no assurance that it would sell its new music software. Faced with the prospect of competing with free music software from Apple, C&G did a deal with Apple.⁸⁹¹

Apple sold hardware and software together and Apple was going to give away iTunes to try to drive sales of Macs for this new digital lifestyle. The crowd at Jobs's Macworld keynote cheered when he announced that iTunes would be free but presumably any Mac developer making competing music software was less excited. They would be selling against a company running a different business model. The U.S. government doesn't generally regulate entry when it occurs and

⁸⁹¹ Jim Heid, SoundJam Fading, Leader Post, May 25, 2001, pF1; Jeffrey Young & William Simon, The god of iPod, The Sydney Morning Herald, May 24, 2005.

doesn't limit firms to particular business models. It only jumps in after the fact using antitrust as it did in the Microsoft browser case. The new iTunes would also only run on Macs, so Apple was making no effort to turn the much larger universe of Windows users into Apple customers.

Jobs gave his digital hub keynote on January 9, 2001. You can't watch the keynote and not see Jobs as intensely focused on physical media for content. Lots of facts and figures about the number of blank CD and DVD disks sold and the difficulties of burning those. The focus on physical media—fancy pieces of plastic for storage—again shows how hard it is for even someone in Steve Jobs's position to see what was coming next. Apple had zero presence in the rapidly growing world of handheld devices and digital peripherals. The Newton had been a bust and Apple had no real plans yet to move back into that market. In the keynote, as Apple was trying to articulate a story of its continued relevance, Job's defended the continuing importance of the personal computer in a world defined by physical media for content.

Apple Reborn

That world was about to change and, remarkably, Apple was the company that would drive that change. It is impossible to imagine the Apple of today without the iPod, or, rather, it is easy to imagine Apple without the iPod and the picture isn't pretty. Apple was roughly 25 years old as of 2001. The original contract organizing Apple between Jobs, Wozniak and Ronald Wayne—who you ask immediately²—was dated as of April 1, 1976. Wayne played a critical role in brokering the match of Jobs and Wozniak, but backed out after all of 12 days and sold his 10% stake back to Jobs and Wozniak for \$800.⁸⁹² (Those contracts themselves—just the pieces of paper—would eventually sell at auction for nearly \$1.6 million, though Wayne himself sold them for just \$500.⁸⁹³) Apple's net sales had risen from roughly \$7

⁸⁹² Walter Isaacson, *Steve Jobs* (Simon & Schuster, 2011), p63-65.

⁸⁹³ Emmie Martin, *Investment fail: Why Apple's little-known third co-founder sold*

billion in 1992 to just over \$11 billion in 1995 but had fallen precipitously after that to just under \$6 billion in 1998. Net sales had jumped back up to nearly \$8 billion in 2000 but had again plunged in 2001 to roughly \$5.4 billion or roughly where Apple had been in 1990.

Steve Jobs had returned to Apple with the NeXT purchase at the end of 1996 but entering 2001, it still wasn't clear what Apple's future was. Apple had limped along since Jobs's return with its financial posture bolstered by repeated sales of chunks of its stake in ARM, Ltd, the company that had been formed to make the processor for the Apple Newton. The Newton may have been an epic failure, but the company that produced the original ARM chip for the Newton was not and sales of Apple's stake in ARM injected cash into Apple as it was faltering.⁸⁹⁴ But that couldn't go on forever, and Apple did need an actual operating future if it was going to survive. That was the vision that Jobs tried to articulate in his 2001 MacWorld keynote for the personal computer and especially the Macintosh in a new digital lifestyle.

The iPod was born out of frustration and technological opportunity. The frustration was the current state of the MP3 player market.⁸⁹⁵ Apple employees were consumers of course and presumably early-adopters of new technology. They were using the early crop of MP3 players and didn't like them at all. Of course, we all get frustrated and that doesn't cause us to try to build something better.

The technological opportunity was a new class of smaller hard drives. Toshiba had a new five-gigabyte 1.8" hard drive which held 1000 songs.⁸⁹⁶ That was an essential component of a great MP3 player and that should make clear that Apple's ability to deliver something like the iPod was very much

his 10% stake for \$800, CNBC.com, Sept 12, 2017.

⁸⁹⁴ Daniel Eran Dilger, iPhone Patent Wars: Apple's \$1.1 billion ARM injection ignites a mobile patent race, appleinsider.com, Aug 12, 2013.

⁸⁹⁵ Levy at p[xx].

⁸⁹⁶ Levy p100.

dependent on the progress that other companies had made in key component technologies. The progression of hard disk sizes from 14 inches to 8 inches and then to 5.25, 3.5, 2.5 and then 1.8 had been associated with new products with each new form factor.⁸⁹⁷ An MP3 player built around the 1.8 inch drive matched that path.

That said, the 1.8 inch form factor wasn't new in 2001, as the first ones had been released a decade earlier in 1991, so presumably the timing of the iPod reflects the continued rapid improvement of hard disks over that time.⁸⁹⁸ The form factor mattered for the size of an MP3 player, but the raw capacity—how many songs could it hold?—of course mattered as well. And, of course, if every firm had access to the same key outside components, it wasn't obvious exactly how Apple would build a device that couldn't be copied. Recall that IBM had relied on outside components in releasing the IBM PC in 1981—Intel chips and DOS from Microsoft of course—and that led to the clone onslaught once the intellectual property issues for the BIOS were navigated.

Apple introduced the iPod on October 23, 2001. Apple's net sales would grow from \$5.4 billion in 2001—meaning pre-iPod—to \$5.7 billion in 2002; to \$6.2 billion in 2003; to \$8.3 billion in 2004; to \$13.9 billion in 2005; to \$19.3 billion in 2006; and to \$24 billion in 2007. Apple's fiscal year ends at the end of September, and while the original iPhone launch event was January 9, 2007, it didn't actually go on sale under June 29, 2007, so Apple's 2007 sales figures are largely separate from sales of the iPhone. Apple was continuing to sell Macintosh hardware and software during this time, but of course it was doing that before the iPod and was in a state of decline.

By the end of fiscal year 2006, Apple's net sales from the iPod and music substantially exceeded those from the

⁸⁹⁷ Clayton M. Christensen, *The Innovator's Dilemma* 3-25 (Harvard Business School Press 1997).

⁸⁹⁸ Karen Blumenthal, *Start-Up Integral Peripherals Unveils Hard Disk Drive*, *The Wall Street Journal*, Sept 3, 1991, pB4.

Macintosh (\$9.5 billion vs. \$7.4 billion) and it is almost certainly the case that the success of the iPod had spilled over to improve the fortunes of the Macintosh. Apple had lost roughly \$25 million in 2001 and yet it made roughly \$3.5 billion in profits in 2007. The iPod turned Apple Computer into the modern Apple, though Apple waited until the iPhone launch event to make the name change official.⁸⁹⁹

It appears that Apple didn't begin real work on the iPod until mid-to-late January 2001, which makes the arrival of the iPod in October 2001 and its eventual success even that much more extraordinary.⁹⁰⁰ The new device was clearly targeting the consumer market and that meant that it was important to have it ready for purchase in advance of the 2001 end-of-year holiday buying season. Of course, Apple's best known consumer device was the Newton and that was a bust, plus Apple was hardly the only firm working on a new MP3 player, as one analyst suggested in mid-2000 that more than 200 firms were working on their own version of the device.⁹⁰¹ It would have seemed next to impossible to predict in January 2001 that Apple would come to dominate the MP3 player market and that device would put Apple on the path to become the first company with a trillion-dollar market capitalization.

There are differing published accounts on precisely how Apple started down the path of creating the iPod.⁹⁰² Three names loom especially large at the point of inception: Steve Jobs, Jon Rubinstein and Tony Fadell. Jobs of course had returned to Apple in December 1996 when Apple purchase NeXT and had become "interim" CEO of Apple in 1997.⁹⁰³ In 2001, in addition to Jobs, Apple had seven executive officers—

⁸⁹⁹ Thomas Ricker, Apple drops "Computer" from name, *engadget.com*, Jan 9, 2007.

⁹⁰⁰ Levy p98.

⁹⁰¹ Mark Hachman, Startup Portalplayer takes on chip giants in MP3 play, *EE Times*, June 5, 2000.

⁹⁰² See xxx.

⁹⁰³ Apple Officially Names Jobs Temporary Chief, Sept 17, 1997, pD4.

including Tim Cook—and Rubinstein was one of those as Apple’s senior vice president for hardware engineering.⁹⁰⁴ And as of the start of 2001, Tony Fadell didn’t even work for Apple.

One account of the creation of the iPod has Steve Jobs pushing internally for Apple to build an MP3 player as early as the fall of 2000. That date would be particularly interesting as that would mean that Apple was thinking seriously about an MP3 player before Jobs’s January 2001 digital hub presentation. But it seems clear that Rubinstein didn’t believe that the essential components were in place then and it was only in February 2001 that Rubinstein saw the new Toshiba 1.8 inch hard drives. On that account, Rubinstein asked Jobs to commit \$10 million to lock up an exclusive deal for the new drives. And after that, Rubinstein called Fadell.⁹⁰⁵ In an alternative account, Rubinstein called Fadel in January 2001 and asked him to come to Apple to talk about something. Apple wasn’t big on disclosing much of anything to outsiders and Rubinstein asked Fadel to sign up blind to an eight-week contract with Apple. The project of course was a possible new Apple MP3 player.⁹⁰⁶

Fadell had joined General Magic in 1992 after he completed college at Michigan. General Magic is, like Fairchild, one of the legendary Silicon Valley firms best known not for what it accomplished but for what would emerge from it. General Magic was formed in mid-1990 by three former Apple employees to build some sort of handheld communications device. Apple had close ties to the new firm: it invested in the firm and received licenses to produce General Magic devices, plus John Sculley then Apple’s CEO joined the board of the new firm.⁹⁰⁷ General Magic would go on to strike deals with many leading tech firms, would go public in 1995 and would fold by

⁹⁰⁴ Executive officers list taken from Apple Inc. Form 10-K405 for the period ending 9/29/01.

⁹⁰⁵ Walter Isaacson, *Steve Jobs* p384-85 (Simon & Schuster, 2011).

⁹⁰⁶ Steven Levy, *The Perfect Thing*:

⁹⁰⁷ Software Designer at Apple To Form Spinoff Company, *The Wall Street Journal*, July 12, 1990, pB4.

2002. Fadell had signed on with General Magic early in the ride but left in [date] for a series of jobs with Philips and RealNetworks before starting his own firm.

But Fadell signed up for the 8-week stint with Apple. By early April 2001, as Fadell's contract was ready to expire, an internal meeting was called at Apple to assess the state of the project. Apparently, there was an art to presenting projects to Steve Jobs. Fadell first gave a sense of the individual components that would likely end up in the new device. Having done that, he offered Jobs some sacrificial device design alternatives that Jobs could reject out of hand as inadequate. With that done, Fadell returned to the individual pieces and started to assemble them into something and what emerged from that caught Jobs's attention. That was progress and in final bit of showmanship, Fadell then lifted an upside down bowl that had been sitting at the center of the table during the presentation and underneath the bowl was an even more developed version of the third offering. With that, Phil Schiller then presented a few mockups each of which included the soon-to-be-famous clickwheel. By the end of that meeting, a vision of what would become the iPod was in place, even if the questions of the relative contributions of Jobs, Rubinstein and Fadell were less clear.⁹⁰⁸

But agreeing on the basic structure of the iPod wasn't even close to actually being in the position of building the device or knowing what many of the operational insides would look like. Just like IBM reached outside to find key components for the IBM PC, Apple went looking for hardware and software. Later component cost breakdowns of iPods suggested that the disk drive was by far the largest component cost in an iPod, accounting for roughly 50% of the materials cost of the iPod.⁹⁰⁹

But the Toshiba disk drive was still an off-the-rack preexisting component. That meant that it could be used

⁹⁰⁸ See Isaacson at 387-89; Levy at xxx.

⁹⁰⁹ Greg Linden et al, Who Captures Value in a Global Innovation System? The case of Apple's iPod, Communications of the ACM, Mar 2009.

quickly—and Apple was on a tight schedule—but it also should not have been seen as a source of sustainable advantage, as there were any number of makers of 1.8 inch drives. Apple turned to the chipset next. By mid-2000, there was a newish market in MP3 decoder chips with a few well-established firms, including Texas Instruments, but also a start up firm, PortalPlayer.⁹¹⁰ PortalPlayer had been formed when an old-line chip firm and Fairchild competitor, National Semiconductor, turned down an opportunity to build MP3 chips and a few National Semi executives decided to grab the opportunity.⁹¹¹

When Apple first approached PortalPlayer, PortalPlayer was building key hardware and software components, other than the hard drive, for MP3 players. It was working with roughly a dozen customers on possible MP3 player designs, including IBM, who was going to match PortalPlayer's software and components with IBM hard drives.⁹¹² Apple seemingly wanted an exclusive arrangement with PortalPlayer and that fact emphasizes that the buy-vs-build line isn't always particularly sharp. There was going to be additional design work going forward and if PortalPlayer continued to work with Apple's MP3 player competitors, Apple's efforts in improving the hardware and software might redound to their benefit. An exclusive arrangement with Apple—including on one account an equity investment by Apple in PortalPlayer—solved that problem for Apple, though it meant that PortalPlayer was making a bet on the success of the iPod. Apple also reached out to a second firm, Pixo Inc., for additional key software for the iPod.⁹¹³

⁹¹⁰ Mark Hachman, Startup Portalplayer takes on chip giants in MP3 play, EE Times, June 5, 2000.

⁹¹¹ Peter Kafka, Apple Seed, Forbes, Feb 16, 2004.

⁹¹² Leander Kahney, Inside Look at Birth of the iPod, Wired Magazine, July 21, 2004.

⁹¹³ John Markoff, He Helped Build the iPod; Now He Has Built a Rival, The New York Times, Feb 27, 2006, pC1; Levy, p110-11.

A Breakthrough Digital Device

At the October 23, 2001 product launch, Jobs continued to describe the Macintosh as the hub of a digital lifestyle centered on digital peripherals like the DVD player, the camcorder, the digital camera and the MP3 player (a CD player appeared on the screen and then vanished (we call that foreshadowing)). In Jobs's view, Apple had built great software to run on the Mac to interact with all of those devices, but no one had built a device to seamlessly integrate with the capabilities of the Mac. Jobs promised "a breakthrough digital device that wasn't a Macintosh" to do just that.

Jobs emphasized his love for music but also the universality and timelessness of music and, to be practical for a second, what that meant for the potential size of the music market. Compared to mainframes and minicomputers, personal computers looked like they were everywhere, but in truth they had reached only a small percentage of the world. Music was actually *everywhere*. The digital music market was incredibly young and no firm yet led the market.

Jobs set out the specs of the iPod: a 5 gigabyte hard drive that would hold 1000 high-quality (high bitrate) songs; a Firewire connection for fast transfers of songs between a Mac and the iPod (10 minutes for 1000 songs vs. 5 hours using a USB port); a ten-hour battery life; and Apple design, with the soon-to-be-legendary iPod clickwheel, integrated with new iTunes 2. All for \$399 and available on November 10th as the hot holiday gift for Mac owners. Windows owners need not apply and instead could just stare with envy.

The audience watching the iPod launch was very quiet, especially by the often raucous standards of Apple launches. That may have reflected the general status of the economy—the economy was in a recession during most of 2001—or the fact that Apple still seemed to be in trouble. And of course even after the iPod was released, there was no obvious reason to think that it would revolutionize the position of Apple in the tech industry. The iPod was a tethered device by design as that was a key part

of the digital hub vision that Jobs had described in his January 2001 MacWorld keynote. The personal computer was a powerful device and that meant that peripherals like the iPod could rely on that power and that in turn meant the peripheral itself could be simple. That was the hub role for the personal computer that Jobs had described in his 2001 MacWorld keynote.

There was little doubt that new the iPod was a great device, but the fact that the iPod was tethered to the Macintosh meant that iPods could not be sold to anyone using a Microsoft Window-based computers.⁹¹⁴ Windows was where the real money was: at the end of 2002, Windows had a 94% market share in the personal computer market and Apple 3%.⁹¹⁵ The U.S. government had won its titanic antitrust case against Microsoft in June 2001, but Microsoft's market position in the personal computer operating system market remained fully intact.

The Mac had a small market share and Apple's sales were dropping, so the iPod looked like it was attached to a sinking ship. And of course if the iPod did sell well in the Mac market, it wasn't obvious what would prevent another firm from copying it to sell in the Windows market. IBM lost control of the personal computer market because of the emergence of the clones, which could buy Intel chips and license MS-DOS from Microsoft. The key to their success was lower prices than comparable IBM machines. A Windows iPod clone didn't need to match the iPod exactly, as Apple wasn't providing music but just a blank copying and storage device.

Apple held another launch event at MacWorld, New York on July 17, 2002.⁹¹⁶ Apple launched iTunes 3, its first update to iTunes in 18 months; updated versions of the iPod—bigger

⁹¹⁴ Matt Richtel, *Apple Introduces What It Calls an Easier to Use Portable Music Player*, *The New York Times*, Oct 24, 2001, pC8.

⁹¹⁵ Brian Garrity & Melinda Newman, *Two Take The Rail*, *Billboard*, Oct 25, 2003, p1.

⁹¹⁶ Apple Press Release, *Apple Unveils New iPods*, *Apple.com*, July 17, 2002.

drives, lower prices and yet somehow thinner devices; but given Windows's market share, the much bigger announcement was that the iPod was coming to Windows. That was roughly nine months after the release of the original iPod, so Apple had not given the competition much of an opening to grab the Windows market with a design inspired by the new iPod. But Apple didn't release the new iPod for Windows with iTunes but instead was relying on a well-know Windows music program, MusicMatch Jukebox.⁹¹⁷ Indeed, Apple wouldn't bring iTunes to Windows until October 16, 2003.⁹¹⁸ That timeline suggests that the entry costs of connecting to a new platform—Windows—for even a sophisticated software company like Apple.

iPod for the Mac was almost just proof of concept; iPod for Windows was for the money. Apple's net sales for 2002 for iPod and music were \$147 million; 2003, \$381 million; and 2004, \$1.58 billion. The 2004 figure reflects the combined effect of bringing the integrated Apple iPod experience—the iPod and iTunes—to Windows users and the growing success of the Apple Music Store. The iPod allowed Apple to break out of its small Macintosh-based world and to join the much larger world of Windows.

Music Goes Digital

The iPod introduced in October 2001 was a gorgeous, sleek, Grammy-award winning *empty* five gigabyte hard disk.⁹¹⁹ It was designed to be the next great portable device for listening to music—the successor to the Sony Walkman and the Sony Discman—and it clearly was exactly that, but it needed music. You purchased cassettes for the Walkman and CDs for the

⁹¹⁷ Press Release, Apple Unveils New iPods, Apple.com, July 17, 2002; Steve Traiman, Dennis Mood: The Ahmet of Online Music Wants Users To Take Control Over How They Listen And Buy, *Billboard*, Jan 8, 2000, p66.

⁹¹⁸ Press Release, Apple Launches iTunes for Windows, Apple.com, Oct 16, 2003; John Markoff, With Flair, Apple Extends Its Reach Into Online Music, *The New York Times*, Oct 17, 2003, pC1.

⁹¹⁹ Press Release, Apple Wins 2002 Technical GRAMMY Award, Apple.com, Feb 26, 2002.

Discman, but the iPod played digital music and Apple wasn't supplying the music. The iPod was just a device that was plugged into an existing world of ripped CDs and music pirated using peer-to-peer software like Napster. The whole vision of the iPod was that music would somehow get on your Macintosh and then be synced—copied—to your iPod.

And it is important to situate the iPod in U.S. copyright law. The Diamond Rio lawsuit over the applicability of the Audio Home Recording Act to MP3 players had removed a potentially important legal barrier in the U.S. to these new devices. Had the AHRA “tax” and digital rights management system applied to MP3 players, this new category of devices would have faced a potentially large barrier to the creation and eventual success of the devices. After all, digital audio tape, the real target of the AHRA, basically went nowhere. The iPod had a few built-in limitations to control how music might be shared using the iPod, but it also wasn't fully locked down and didn't come with the AHRA anti-copying scheme and the iPod itself was going to make music separated from physical CDs—digital music—much more attractive.⁹²⁰ Do ask the question: had the Ninth Circuit ruled against Diamond in 1999, would we have the Apple of today? Possibly no iPod and without a new Apple, no iPhone?

Jobs talked about ripping CDs and while that may have been seen as completely standard to music listeners, the legal status of CD ripping was open. You were, after all, making a copy of a CD even if it was *your* CD. And of course your Macintosh couldn't tell whether the CD belonged to you or one of your friends. The U.S. Supreme Court's 1984 decision regarding the Sony Betamax video cassette recorder had validated so-called time shifting as fair use. That meant that you could tape a broadcast TV show and watch it at a different time without infringing the copyright in the broadcast.

⁹²⁰ Matt Richtel, Apple Introduces What It Calls an Easier to Use Portable Music Player, *The New York Times*, Oct 24, 2011, pC8; Troy Dreier, iPod: Not Just iCandy, *PC Magazine*, Dec 26, 2001, p34.

But the music industry believed that time-shifting was different than space-shifting, which was its characterization of copying to the iPod. But the Diamond Rio lawsuit turned out to be a double-whammy for the music industry. They failed to get the tax and copy-control scheme requirements to apply to MP3 players, plus there was one consumer-friendly provision in the AHRA that permitted some noncommercial personal copying and the Ninth Circuit concluded that that provision blessed exactly the type of space-shifting performed by an MP3 player.⁹²¹

But that suggested that you could rip CDs that you owned to your iPod. The music industry might have liked to collect money in that process, but you were still *buying* a CD to get music on your iPod, so I suspect that the music industry could have lived with that world. The bigger problem, as the music industry saw it, was that you might fill up your iPod with music downloaded from peer-to-peer file-sharing networks.

Total revenues from sales of recorded music in the U.S. (inflation adjusted to 2017 dollars) in 1999 was roughly \$21.5 billion dollars. That figure would plunge going forward reaching a low of \$6.9 billion in 2015. Sales have risen over the last two years to \$8.7 billion in 2017.⁹²² You would need to look at more sources of revenue to assess the health of the music industry, but presumably music lovers liked going to concerts and T-shirts—merch—in 1999 too. And revenue of course is only one angle on the industry, the one that a professional musician presumably cares about, but you could focus instead on music production and distribution.

It is interesting to ask the question, if you were a time-traveling strategy consultant and had seen the timeline that actually unfolded, what advice would you have given the music industry in 1999 to bend that timeline? Peer-to-peer file sharing

⁹²¹ The provision was 17 USC 1008. See Recording Industry Ass'n of America v. Diamond Multimedia Systems, Inc., 180 F.3d 1072, 1079 (9th Cir. 1999).

⁹²² Figures from Recording Industry Ass'n of America, U.S. Sales Database, RIAA.com.

was a new means of distribution and one designed to transfer digital music efficiently. That meant, at a minimum, that record retailers—Tower Records and the like—were perhaps no longer required. And indeed both Tower Records and Sam Goody would file for bankruptcy in 2006.⁹²³ Peer-to-peer also might have been harnessed as an early exercise in *social* music, a new approach to the discovery of new music. Get recommendations from your friends. But at least in its initial incarnation, peer-to-peer meant free music. It isn't that you can't compete with free, especially when the free system was plagued by all sorts of issues that made it clumsy to use—high-transaction costs in a phrase—but the new free p2p distribution would almost certainly affect the price that could be charged for any new fee-based digital music offering.

The music industry didn't have access to our time traveler, so it is impossible to know what the music industry thought would happen as music went digital, but presumably the rise of music sharing scared the industry and it launched a fierce legal campaign to fight it. The lawsuits were remarkably successful in the conventional sense that the industry sued and won and a complete failure in the more basic sense of preserving the position of the industry in 1999.

The Ninth Circuit decided *Diamond Multimedia* on June 15, 1999. It is interesting to speculate on what the recorded music industry might have done had it been successful in controlling the MP3 player. That might have given it a direct stake in some of the revenues associated with pirated music. But having lost, the industry needed a new approach. On December 6, 1999, a record industry group sued Napster in federal court alleging that Napster had violated federal copyright law by helping its users make copies of recorded music.⁹²⁴ According to evidence presented in the case, Napster was then growing at a rate of 200

⁹²³ Sam Goody's parent bankruptcy, CNN.com, Jan 13, 2006; Anastasia Tsiouglas, *The Life And Death Of Tower Records*, Revisted, NPR.org, Oct 20, 2015.

⁹²⁴ Don Clark, *Recording Industry Group Sues Napster, Alleging Copyright Infringement on Net*, *The Wall Street Journal*, Dec 9, 1999, pB18; *A&M Records, Inc. v. Napster, Inc.*, 114 F.Supp.2d 896 (N.D. Calif. 2000).

percent per month and roughly 10,000 music files were shared every *second* using the Napster protocol.⁹²⁵ If all of this file-swapping was by people who wouldn't otherwise have been buying music, recorded music sales might have continued as usual, but if the file-sharers were substituting Napster downloads for buying music, these figures look like a disaster for sales of recorded music.

Napster's natural defense was to try to wrap itself in the protective embrace of the U.S. Supreme Court's Sony Betamax decision. That decision had found time-shifting of broadcast TV shows to be permitted fair use copying and had further found that Sony itself couldn't be held liable for the copyright infringement of others given that the VCR was capable of noninfringing uses. Napster argued that the copying over its network was also fair use, but that was always going to be a difficult argument. In contrast, *Sony's* substantial-noninfringing-use rule was a reasonably comfortable fit for Napster. Technology is often agnostic and it was here: you could share music or public domain Supreme Court opinions using the software, even if it turned out that there was a huge amount of the former and none of the latter. The *Sony* test focused on what was possible with the technology, not necessarily on how it was actually being used.

But while the VCR was a product, Napster was a service and that gave Napster a level of continuing control over the use of the service that Sony didn't have. On August 10, 2000, a federal district court issued a preliminary injunction effectively ordering Napster to shut down and Napster would eventually lose on appeal.⁹²⁶ This lawsuit was just the first of many against Napster and its various successors, most notably, Grokster, and even as the music industry won in court, it had to realize that legal success didn't necessarily translate into actual changes in the extent of file copying.⁹²⁷

⁹²⁵ Id. at 902.

⁹²⁶ A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004 (9th Cir. 2001).

⁹²⁷ See A&M Records, Inc. v. Napster, Inc., 239 F.3d 1004 (9th Cir. 2001); In re

The natural solution to this problem was to try to sell digital music. If the only place to get digital music was from an illegal online filesharing service, many users would continue to use that service absent a legal alternative. You could of course buy CDs but that really wasn't the same type of immediate access to individual songs that existed on the filesharing services. It was much easier to justify not paying for music when there was no simple way to do just that.

On April 28, 2003, Apple launched the iTunes Music Store in a bid to solve the digital music problem. The contemporaneous news coverage of the launch made clear the depth of the problems faced by record companies. Just three days earlier, a federal district court had found that Grokster and StreamCast, two file sharing companies, were not liable for contributory copyright infringement for the use of their software in peer-to-peer file sharing. The services had been designed to sidestep the direct role that Napster had played in file sharing, and whatever one thought of the morality of that design choice, the judge found the difference important in finding no liability for contributory infringement. Grokster would eventually lose 9-0 in the U.S. Supreme Court two years later, but the record companies didn't know that in 2003.⁹²⁸

At the product launch for the new music store, Jobs addressed music piracy directly. He hadn't done that at the 2001 launch of the iPod, as how music would actually get on the iPod was left hanging in the ether. Not so in 2003. Napster had changed the sense of what was possible in getting music. The lawsuits had shut down Napster but filesharing continued with Kazaa and other file sharing software. The success of file-sharing undoubtedly reflected the price for the music—\$0—but also demonstrated that the Internet was ideal for music delivery.

Aimster Copyright Litigation, 334 F.3d 643 (7th Cir. 2003); *Metro-Goldwyn-Mayer Studios Inc. v. Grokster, Ltd.*, 545 U.S. 913 (2005).

⁹²⁸ Matt Richtel, *Apple Is Said To Be Entering E-Music Fray With Pay Service*, *The New York Times*, Apr 28, 2003, pC1; *Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd.*, 259 F.Supp.2d 1029 (C.D. Calif. 2003), *aff'd*, 380 F.3d 1154 (9th Cir. 2004), *rev'd*, 545 U.S. 913 (2005).

Online music distribution offered instant gratification with access to a virtually infinite inventory.

Apple was ready to compete with that. Jobs made clear that filesharing was wrong: “It’s stealing” and that it was “it’s best not to mess with karma.” Jobs identified two legal alternative services to filesharing—pressplay and Rhapsody—but both were subscription services and Jobs thought that that was the wrong business model. You couldn’t just pay a little and own music but instead you were locked into a monthly fee and once you stopped paying, you lost access to the music.

Jobs was quite dismissive of the current legal music offerings, and that might have been fair, but the reality was that the music industry had tried to create legal alternatives to filesharing. The shutdown of Napster had, perhaps, created a window to create a legal alternative, though there was no shortage of peer-to-peer alternatives to Napster, such as Kazaa, Morpheus and Grokster. The recorded music industry was organized around the Big Five music companies: BMG, EMI, Sony, Warner and Universal.

The Big Five had spent most of 2001 organizing two different joint ventures, pressplay and MusicNet. Pressplay was owned by Sony and Vivendi Universal and was working with Microsoft tech plus Microsoft would sell online music through MSN, its online portal, though the pressplay offerings would be available through other portals including Yahoo. MusicNet was a joint venture of EMI, Bertelsmann (BMG) and AOL Time Warner and was using RealNetworks tech. The fact that there were two joint ventures meant that music was split between the two of them, a stark contrast from the one-stop “shopping” offered by the free download software.

These joint ventures faces a number of legal issues. Antitrust enforcers in Europe and the United States saw the new joint ventures as possible collusion.⁹²⁹ And songwriters and music

⁹²⁹ Brandon Mitchener, Probes Into Online Music Services, DVD Pricing Are Launched by EU, *The Wall Street Journal*, June 12, 2001, pA17; Matt Richtel, Napster Appeals an Order To Remain Closed Down, *The New York Times*, July 13, 2001, pC4;

publishers were raising possible copyright concerns about how revenues should be split for online sales though eventually a deal was cut to permit the new legal services to move forward.⁹³⁰ But even as all of this was going on, file downloading continued and was growing beyond even the levels that Napster had achieved.⁹³¹ And for all of the effort to create viable legal alternatives, pressplay and MusicNet really hadn't achieved much by the time Apple launched the iTunes Music Store. In May 2003, Roxio acquired pressplay for \$40 million and RealNetworks announced that it was shifting its attention away from MusicNet in favor of Rhapsody, its newly-acquired subscription service.⁹³²

Apple's goal was to offer a legal paid version of what was available for free on the file-sharing services. Apple had cut deals with all of the Big Five in an effort to recreate the universal access you got from the filesharing software. Apple was obviously a separate entity from the Big Five, so it didn't face the same antitrust issues that they faced in their joint ventures, though it needed to be careful in exactly how it acquired access to the recorded music. (To just glimpse ahead, Apple would lose an antitrust lawsuit over collusion in ebook pricing when it released the iPad in 2010.) The new iTunes Music Store offered 200,000 tracks and unlimited CD burns. You could play the music on an unlimited number of iPods plus three Macs. There was no monthly subscription fees and songs sold for 99 cents each. The new store would be Mac only initially but would be available on Windows by the end of the year.

Anna Wilde Mathews & John R. Wilke, U.S. Investigates 2 Joint Ventures In Online Music, *The Wall Street Journal*, Aug 6, 2001, pA3.

⁹³⁰ Matt Richtel, Agreement Is a First Step For Licensing Online Music, *The New York Times*, Oct 10, 2001, pC2.

⁹³¹ Matt Richtel, Free Music Service Is Expected to Surpass Napster, *The New York Times*, Nov 29, 2001, pC4.

⁹³² Amy Harmon, RealNetworks Shifts Distribution Service, *The New York Times*, May 28, 2003, pC4; Roxio Acquires Pressplay for \$40 million, *The New York Times*, May 20, 2003, pC6.

The obvious question here is why would Apple stand any chance of succeeding in online music? But on a closer look, Apple looked surprisingly well positioned to take a serious run at this new business. It had of course the iPod and iTunes and the iTunes Music Store was going to be a new feature in the new version of iTunes, iTunes 4. That meant that Apple had an installed base of potential users in place. Jobs noted that Apple already was running an online store that did \$1-2 billion sales a year annually, so Apple had a database of credit cards with U.S. billing addresses. It had server farms in place as the infrastructure for delivering the music.

And from the record companies's perspective, the deal with Apple was a seemingly safe, small experiment. Apple had roughly a 3% market share in the PC market and Apple wouldn't bring the iPod with iTunes to Windows users until later in 2003. The record companies could see how the new system worked before making the digital music downloads available to a potentially much larger market.⁹³³ But even with all of that, the question was whether anyone would buy. It was going to take more than finger-wagging by Steve Jobs or a short introduction to Eastern philosophy to get young people to stop downloading free music. Would people buy digital music from the iTunes Music Store?

The iPod Rises

They did, sort of. There is often something of a mystery as to which products catch on with the public and which do not, but the iTunes Music Store showed that it was possible to sell digital music even in the face of filesharing. Again, we should not understand that point to mean that filesharing didn't continue to matter, as the full "price" paid for free music—bad quality, disrupted downloads, possible moral qualms and more—set the competitive offering that fee-based music like the iTunes Music

⁹³³ Matt Richtel, *Apple Is Said To Be Entering E-Music Fray With Pay Service*, *The New York Times*, Apr 28, 2003, pC1; Laurie J. Flynn, *Apple Offers Music Downloads With Unique Pricing*, *The New York Times*, Apr 29, 2003, pC2.

Store would need to beat. But by February 2006, iTunes had sold 1 billion songs and Apple showered the lucky purchaser of the billionth song with gifts including an iMac, ten iPods and a \$10,000 gift card for the iTunes store.⁹³⁴

The Apple II had built Apple Computer into a billion-dollar company, but the biggest impact may have been inducing IBM into building its personal computer. The Macintosh revolutionized the face of computing with its graphical user interface, but most of the money ended up in Microsoft's hands for Windows and Intel's for its chips. Not so with the iPod and the iTunes Music Store. Apple's net sales grew from \$5.4 billion in 2001 to \$24 billion in 2007 and it went from a net loss of \$25 million in 2001 to profits of \$3.5 billion in 2007.

And it is worth nothing what happened to sales of recorded music in the U.S. over that same period. Those sales peaked in 1999 at \$14.6 billion and had dropped by 2001 to \$13.7 billion. By 2007, those sales had dropped to \$10.7 billion, while Apple's total revenues for the iPod—for the device, accessories, music and more—totaled \$10.8 billion. The same numbers were even worse in 2008—\$8.8 billion for recorded music and \$12.5 billion for Apple related to the iPod—and then after that the numbers become a little less directly comparable as Apple introduced in a new product in 2007 that cut into iPod sales.

The iTunes Music Store made the iPod and iTunes into a platform. As released in 2001, the iPod offered a roadmap to what a great MP3 player looked like. Apple was pursuing patents on a number of features related to the clickwheel interface, but Apple had not offered any music for sale with the iPod.⁹³⁵ Any new MP3 player would be able to step into the same music world, a world of ripped CDs and illegal filesharing, just the way the iPod did. Any company that wanted to enter the MP3 player market had exactly the same opportunity that Apple had. To be

⁹³⁴ Claudia H. Deutsch, A Milestone for iTunes; a Windfall for a Downloader, The New York Times, Feb 24, 2006, pC2.

⁹³⁵ See Apple Wins Patents for their Iconic Click Wheel & iPhone Gesturing, patentlyapple.com, Apr 26, 2011.

sure, you would have to compete with Apple's great new device, but the iPod didn't build up entry barriers to new entry by a competitor. In contrast, depending on exactly how Apple encoded the songs it was selling, customers of the iTunes Music Store might build up a stock of purchased songs that they couldn't move to a competing MP3 player. That starts to look like a platform with switching costs and the associated entry barriers.

The iPod put Apple in a genuinely new situation, one where it had a strong position—a dominant position?—in a rapidly growing market. Apple sold 32 million iPods in 2005 and the sheer scale of those sales meant that the iPod itself had become an ecosystem with products organized around the iPod. For every \$3 spent on an iPod, users were spending \$1 on accessories and that made add-ons a billion dollar business in 2005.⁹³⁶

Apple was now a target and the attacks would be new competitors and legal inquiries into Apple's operations. Samsung released its Z5 MP3 player in March 2006. In designing the software for the new device, Samsung relied in part on Pixo Inc., a software firm founded by former software engineer Paul Mercer. Mercer had pitched a handheld device running Macintosh software internally at Apple even before the Newton but subsequently left to form Pixo. Apple itself had drawn on Pixo in building the original iPod and Sun Microsystems bought Pixo in 2003. But Samsung wasn't able to offer the integrated device and music store offered by Apple.⁹³⁷

On September 14, 2006, Microsoft announced that it would enter the MP3 player market with the Microsoft Zune. Apple had already been in the market for 5 years and had a 75% market share. There was a brief window before the iPod came to Windows when a follow-on copy like the Zune might have been attractive, but Apple had closed down that opportunity quickly

⁹³⁶ Damon Darlin, *The iPod Ecosystem*, *The New York Times*, Feb 3, 2006, pC1.

⁹³⁷ John Markoff, *He Helped Build the iPod; Now He Has Built a Rival*, *The New York Times*, Feb 27, 2006, pC1.

in bring the iPod to Windows. The Zune lacked the iPod's distinctive click wheel and overall sense of style. Microsoft was building a subscription music offering and it hoped to build music into a social experience by including wireless capability in the Zune that made possible limited sharing of music between fellow Zune users, if there were any. And the Zune would not be able to play music from the iTunes Music Store.⁹³⁸

Microsoft also offered the recording industry a different deal in an effort to disrupt the iPod/iTunes platform. The initial legal fight over MP3 players was over whether the AHRA's device tax scheme would apply to the new devices. The Diamond Rio court said no and that opened up broad entry into MP3 players. Apple had emerged as the great beneficiary of that decision. Microsoft offered to share Zune revenues—both device revenues and music revenues—with the recording industry. By giving the recorded-music companies a direct stake in the success of the Zune, Microsoft hoped to pry the record companies away from Apple. Apple was making a fortune off of the iPod and while the music companies benefited from downloads, they didn't share in iPod revenues.⁹³⁹

The reviews of the Zune were tepid.⁹⁴⁰ The music sharing feature was interesting but it required other people to buy the Zune and the actual rights to use the shared music were quite limited. Microsoft was entering a market where Apple was the dominant firm and the Zune offered no real advantage over the iPod. The Zune seemed more like a strategic move by Microsoft. Microsoft famously succeeded on the third version of its products, not the first or second version, and that meant that Microsoft needed to build a device to compete with the iPod if it was going to be able to compete when digital

⁹³⁸ Laurie J. Flynn, Music Player From Microsoft Offers Wireless Song-Sharing, *The New York Times*, Sept 15, 2006, pC3.

⁹³⁹ Jeff Leeds, Microsoft Strikes Deal For Music, *The New York Times*, Nov 9, 2006, pC1.

⁹⁴⁰ David Pogue, Trying Out The Zune: iPod It's Not, *The New York Times*, Nov 9, 2006, pC1.

convergence arrived. Microsoft needed to take even a weak first step if it was going to take a second or third step.

In early 2007, as part of another product launch, Steve Jobs gave an update on Apple's music business. The iPod continued to succeed in a huge way, even succeeding in video, and more than 2 billion songs had been sold on iTunes. The number of songs sold in 2006 had doubled over 2005 and the sales were still growing rapidly. Apple had become the fourth largest reseller of music in the United States, ahead of Amazon, and only trailing Walmart, Best Buy and Target, each of whom of course were still selling physical CDs. Jobs also used the music discussion to poke Microsoft again, as its newly-released Zune music player had garnered only 2% of the market in November, 2006 against the iPod's 62% market share. If digital music was the future, Apple was that future.

The iPod/iTunes Platform

When Apple introduced the new iTunes Music Store in April 2003, Steve Jobs had made clear that the songs purchased through the new service came with a number of limitations. I am sure that he believed that those use limits—for example, that the music could only be used on three Macintoshes at one time—were perfectly reasonable and worked for most customers. But they were limitations and the natural question was how was Apple actually enforcing those limits? It turned out that as part of negotiating with the record companies for access to the music, Apple had agreed to implement a version of digital rights management (DRM) software. DRM is rarely—never?—perfect, but it perhaps operated as a speed bump to nudge people into behavior that the record companies found to be acceptable.⁹⁴¹

When the success of the iPod, competing firms started to look for ways to connect to the iPod/iTunes platform. Apple had built a vertically-integrated system. With that system locked,

⁹⁴¹ Hiawatha Bray, Missing the Point on Antipiracy Technology, The Boston Globe, Oct 13, 2003, pC2.

a firm that wanted to compete with Apple needed to create both a player and a music offering, though again that suggests that the music offering was important to Apple's success. With an unlocked system, a competing firm could choose to compete in just one piece of the system. Build a new MP3 player and hook it up to the iTunes Music Store or build a new music store and sell music to iPod owners. But with the system locked by Apple's FairPlay DRM, only Apple could sell digital downloads for the iPod and songs sold by Apple on iTunes would only work with the iPod. The DRM that started as a way to reassure the recorded music industry that the content they provided to iTunes would be protected had become a tool that shaped competition on the iPod platform.

Connection rights and obligations are a defining issue for platforms. That is true in classic network industries like electricity and telecommunications, but it also true across the history of computers. In the 1970s, Telex didn't want build mainframes to compete with IBM but instead just wanted to build peripherals—tape drives in Telex's case—while IBM tried to block that competition by altering the technical interface for connecting to the mainframes. In 1975, a federal appellate court concluded that IBM had not violated U.S. antitrust law in taking those steps.⁹⁴² In 1982, Franklin tried to build an Apple II-compatible computer by just copying key Apple operating system software. That was an attempt by Franklin to hook up to the ecosystem of software that ran on the Apple II, but in 1983, a federal appellate court blocked Franklin's efforts as violation of U.S. copyright law.⁹⁴³

For the IBM PC, because IBM had outsourced the microprocessor to Intel and the operating system to Microsoft, IBM couldn't block efforts by the clones to connect to the PC platform once IBM's BIOS software was successfully reverse

⁹⁴² *Telex Corp. v. International Business Machine Corp.*, 510 F.2d 894 (10th Cir. 1975).

⁹⁴³ *Apple Computer, Inc. v. Franklin Computer Corp.*, 714 F.2d 1240 (3rd Cir. 1983).

engineered. And Microsoft used its control over connections to Windows both to improve Internet Explorer's competitive posture and to create direct roadblocks to the distribution of Netscape Navigator.

By July 2004, the record industry was talking about interoperability and "portability" for digital downloads, meaning that songs purchased at one store could be played on different devices. The irony there is rich given that the record companies had driven DRM for iTunes in the first place and nothing prevented the record companies from making the music that they controlled available for other MP3 players, though they did need to pay attention to antitrust law in how they did that. By 2006, the U.S. Department of Justice was again investigating whether the Big Four record companies—Sony and BMG had merged in 2004, so the Big Five was no more—were colluding in the prices they were setting for selling music to digital retailers like Apple.⁹⁴⁴

With the rise of the iPod platform, the music industry may have been looking for more competition. The new online music world had the look of a standards war, where Apple and Microsoft were bidding to establish the standards, but where other others, Sony and RealNetworks in particular, were also offering competing standards.⁹⁴⁵ Given Apple's strong position, it was well situated to create interoperability if it wanted to do so, but it seemed to have little interest in that. Microsoft had approached Apple to support the Windows Media audio format as part of the iPod which would have meant that music stores organized around WMA could have sold to iPod customers, but Apple had turned them down. And Apple was refusing to license its own DRM tech, FairPlay, to anyone else.⁹⁴⁶

⁹⁴⁴ Jeff Leeds, Sony and BMG Start Building Their Odd Music Club, *The New York Times*, July 30, 2004, pC1; Jeff Leeds, U.S. Inquiry on Online Music, *The New York Times*, Mar 3, 2006, pC6.

⁹⁴⁵ Brian Garrity, Biz Urges Download Harmony, *Billboard*, Feb 7, 2004, p69.

⁹⁴⁶ Brian Garrity, Real: Harmony Is Key, *Billboard*, July 24, 2004, p5.

Voluntary connection was only one possible path, but in July 2004, RealNetworks moved to force the issue. RealNetworks had a well-known music player and have moved into online music subscriptions by buying Rhapsody in April 2003 and then had launched the RealPlayer Music Store for downloads.⁹⁴⁷ Subscription services were hobbled in that they worked only on computers and not on MP3 players, but Real wanted to sell downloads to iPod owners. Real built a new software tool, Harmony, so that downloads from the Real store would work on the iPod. Apple had declined to work with Real, so Real had, presumably, reverse-engineered FairPlay to create Harmony. Apple had a name for that behavior—hacking—and was said to be considering its legal options under the Digital Rights Millennium Act (DMCA).⁹⁴⁸

The DMCA was enacted in 1998 to bring the United States into compliance with international treaties on copyright.⁹⁴⁹ There is a long history of international copyright harmonization—trying to make copyright laws alike across different countries—and a new treaty then brings with it the question of exactly how it will be implemented in domestic law. The DMCA is quite complicated but a core part of it established rules barring circumvention of technological measures.⁹⁵⁰ The precise boundaries of those restrictions weren't clear in 1998 and remain meaningfully uncertain today. Given that uncertainty, Apple could have had good reason to believe that it had a legitimate claim against Real for “hacking” FairPlay.

Apple's refusal to play well with others was hardly new. Steve Jobs had long believed in the virtues of tightly integrated hardware and software and the great success of the iPod had to be proof to Jobs that he was right. You wouldn't necessarily

⁹⁴⁷ Brian Garrity, 'Song Plays Is The Ultimate Test For The Health of Subscriptions', *Billboard*, Apr 17, 2004, p78.

⁹⁴⁸ Brian Garrity & Scott Banerjee, At Plug.In, Portability Carries Much Weight, *Billboard*, Aug 7, 2004, p1; Sebastian Rupley, Digital Music Discord, *PC Magazine*, Sept 21, 2004, p23.

⁹⁴⁹ Digital Millennium Copyright Act, Pub. L. 105-304, 112 Stat. 2860 (Oct 28, 1998).

⁹⁵⁰ 17 U.S.C. 1201.

expect *The New York Times* editorial board to be well-situated to offer Apple business advice on how to manage the iPod, but it jumped in suggest that Apple was replicating its mistake in declining to license the Mac operating system in refusing to license FairPlay, though the Times failed to note that Apple had been willing to license the Newton software to others and that went nowhere.⁹⁵¹

Of course litigation is only one way that matters can be resolved and it almost always takes a substantial amount of time, for a networked device like the iPod, Apple had other tools available to deal with Real: “We strongly caution Real and their customers that when we update our iPod software from time to time, it is highly likely that Real’s Harmony technology will cease to work with current and future iPods.”⁹⁵² That is some nice software that you have there; it would be a shame if something happened to it.

This is the burden of regulating these edge connections to leading platforms. The DMCA authorizes lock-and-key systems for certain copyrighted works. Apple’s may have originally embraced FairPlay because of the record companies, but it had evolved into a tool for insulating the iPod platform from competition by firms like Real that were seeking to connect to that platform. And there are natural and competing characterizations of this behavior.

Locking systems can improve competition across systems and platforms. When Microsoft launched the Xbox, it was estimated that it was losing \$100 on each one.⁹⁵³ That doesn’t seem like much of a business strategy, but Microsoft clearly was trying to create an installed base of players and it was counting on making money from the games. It could make its own games, but there was no reason to think that Microsoft had a monopoly

⁹⁵¹ A Digital Divide, *The New York Times*, Aug 26 ,2004, pA26.

⁹⁵² Sebastian Rupley, *Digital Music Discord*, *PC Magazine*, Sept 21, 2004, p23.

⁹⁵³ David S. Evans, Andrei Hagiu and Richard Schmalensee, *Invisible Engines: How Software Platforms Drive Innovation and Transform Industries* (MIT Press, 2008) p135.

on gaming talent and so Microsoft was eager to see third-party game development. But again, Microsoft needed to make money on the games given the losses on the console and that meant that Microsoft needed to sell access to game developers to the console. That called for a technological lock.

But of course Apple wasn't losing money on the iPod, quite the opposite. There was no obvious sense in which the lock between the iPod and the iTunes Music Store was somehow essential for Apple to create the iPod in the first place. The fact that most music was available in the wild unlocked, early via ripping CDs or through pirated peer-to-peer downloads, meant that Apple didn't need to create its music store to be induced to create the iPod in the first place.

That isn't to say though that Apple didn't need that control for creating the Apple Music Store. Presumably that was an expensive undertaking and given the strong decline in the sale of recorded music, there was no assurance that anyone would buy digital songs from Apple or anyone else for that matter. Apple's new music store was a separate investment and that fact that Apple would have been willing to build the iPod without having exclusive control who could sell music for the iPod didn't mean after all that it would be willing to make that separate investment in the music store without that control.

But the right public policy approach to this isn't obvious and given that uncertainty, it wasn't particularly surprising when in 2006, France appeared ready to regulate access to the iPod.⁹⁵⁴ There is absolutely no reason why countries should see complex issues identically and if your goal was to maximize innovation, it wasn't clear which way authorizing locks went. Apple in turn was threatening to stop selling music in France. In the face of this conflict, on June 30, 2006, new legislation was approved that created new obligations for music interoperability but also created a new regulator to ensure that the new interoperability obligation didn't somehow infringe on IP rights held by

⁹⁵⁴ France Softens iTunes Law, But Apple Is Still Disgruntled, *The New York Times*, June 23, 2006, pC2.

Apple.⁹⁵⁵ But within two months, the French constitutional council found that the new law was unconstitutional in the way in which it altered some of Apple's property rights.⁹⁵⁶

And there was a more basic point here. In mid-December 2006, *The New York Times* did a little math—taking the total number of songs then sold on iTunes (1.5 billion) and dividing that by the total number of iPods sold so far (67.4 million)—to conclude that on average each iPod held roughly 22 songs purchased from the iTunes Music Store.⁹⁵⁷ The original iPod held a 1000 songs and the newer models held substantially more than that, so either most iPods were a sea of empty gigabytes or people were still getting almost all of their music from somewhere other than the iTunes Music Store. Perhaps from CDs and the Internet. FairPlay didn't seem like a substantial barrier to entry for a new device like the Zune. It was blocking other sellers like Real from selling music for the iPod and there was money there, but nothing like the money that Apple was making from the iPod.

Apple entered 2007 in a strong position and then on January 9, 2007 it released the iPhone. You know what that led to, though the path is more interesting than you may recall and we will see that in the next chapter. Apple's mindshare had usually exceeded its market share, but with the iPod, they were finally in sync. Apple wasn't used to having sufficiently large market share market that anyone cared about what their exact practices were, but with the iPod, things were different. On February 6, 2007, Steve Jobs issued a missive entitled "Thoughts on Music" to explain how he saw the music market and the role of digital rights management software in it. Jobs noted that DRM had been required by the music companies in their deal with Apple and that they retained the rights to yank the licenses if Apple's

⁹⁵⁵ Thomas Crampton, Paris Approves Law Aimed at Making iTunes Compatible With Rival Devices, *The New York Times*, July 1, 2006, pC4.

⁹⁵⁶ Thomas Crampton, Apple Gets French Support In Music Compatibility Case, *The New York Times*, July 29, 2006, pC9.

⁹⁵⁷ Alex Mindlin, Sales of iPods and iTunes Not Much in Sync, *The New York Times*, Dec 11, 2006, pC5.

FairPlay DRM system was somehow compromised. Apple needed to make FairPlay work if it was going to continue to run the Apple Music Store.

Jobs saw three different paths for the future. One would be vertically integrated players and music stores. Jobs called these top-to-bottom proprietary systems and saw Apple as competing with Microsoft, Sony and others to provide integrated experiences. Jobs responded to the claim that these systems had substantial switching costs built in by making the same point that the New York Times had made: the average iPod only had 22 songs purchased from Apple and, even for the original 1000-song iPod, that represented less than 3% of the capacity of those iPods. Second, Apple was being pushed to license FairPlay to others, but Jobs feared that doing so would increase the chances that the FairPlay DRM secret sauce would leak out and it would be harder for Apple to fix that live with more users of the FairPlay system. The third alternative was the one that Jobs strongly preferred: Abolish DRM. It didn't really work, plus the record companies still sold most of their music on CDs and those songs came free of DRM.

The Jobs letter was seen by some as a cynical effort to distract attention from Apple and to get consumers to put pressure on local regulators, especially in Europe where Apple was facing more pressure to create an interoperable system.⁹⁵⁸ But by April 2007, EMI had come on board and while the other record companies were slower, by January 2009, Apple had moved its music store to a richer menu of prices where consumers could buy DRM-free music at a higher price.⁹⁵⁹

⁹⁵⁸ Joseph Schuman, *The Morning Brief: Is Jobs Playing A New Tune?*, *The Wall Street Journal*, Feb 7, 2007.

⁹⁵⁹ Apple Press Release, *Apple Unveils Higher Quality DRM-Free Music on the iTunes Stores*, Apr 2, 2007; Brad Stone, *Copy an iTunes Song? Go Ahead, Apple Says*, *The New York Times*, Jan 7, 2009, pB1.

Innovation and the iPod

The Apple I computer released in 1976 was the result of the combined efforts of Steve Wozniak and Steve Jobs. Two decades later, from the Apple II through the Macintosh and with both Steves gone, Apple had grown into an enormous company—its sales topped \$11 billion in fiscal year 1995—but it seemed to have lost its footing and it lost more than \$800 million in fiscal year 1996. The computing world really had shifted in August 1995 when Windows 95 was released and Netscape went public. Apple seemed to be lost. John Sculley saw the future in 1992 and took a bold run at creating it in building the Apple Newton, but his reach exceeded his grasp and the Newton was a failure. With Sculley gone, Steve Jobs returned at the end of 1996 when Apple purchased Jobs's NeXT Computer, but even as late as January 2001 it wasn't clear what Apple's future would look like. That changed in a ten-month window in 2001 as Apple designed and released the iPod.

How should we think of the iPod as an innovation? Apple as we know it in 2018—trillion-dollar market cap Apple—almost certainly would not exist without the iPod. Apple may have limped along—or not—with a single-digit market share in personal computers but it hard to see how Apple gets to the iPhone without the iPod. In that sense, the iPod is an extraordinary success but that of course doesn't make it an extraordinary innovation.

Most of English novels literature of combinations and permutations of twenty-six letters, ten symbols for numbers and a handful of punctuation marks. The art isn't in somehow expanding the number of symbols—does anyone really that quality jumped after the interrobang was invented in 1962?—but in how they are combined. The difference between Shakespeare and bad literature.

The world of physical innovation is meaningfully different. The nature of a foundational innovation is that it provides the critical infrastructure for additional innovation to be built upon it. It in some sense expands the raw tools available to produce

the next set of innovations. Across the course of the book so far, we have seen some foundational innovations, say the invention of digital computing, the transistor, the ARPANET, the GUI, the reshuffling and auctioning of the wireless spectrum. The digital computing that emerged from World War II and led by the government became the world we live in. The Bell Labs transistor invented in 1947 and then shared with others through military contracts and the 1956 antitrust final judgment created a technological commons that led to the integrated circuit and then the microprocessor. The four-node APRANET of 1969 became the internet of today. Doug Engelbart's 1968 mother of all demos led to the Xerox Alto and then to the Apple Macintosh and Microsoft Windows and then eventually to the icon-filled devices in our hands that we stare at all day. And that always online world of today—next chapter—would not exist without the wireless infrastructure that the FCC helped to put in place via auction in 1995 and through subsequent auctions.

The IBM PC, released in August 1981, was a huge success for IBM—at least for awhile—but I don't think that it is too uncharitable to say that it wasn't an important technical innovation, at least as a device, if you measured the IBM PC against its personal computing peers. The IBM PC was an insurance policy, a guarantee as it were, to the market that the leading computer company of the day thought that a new category of computers mattered. The IBM PC platform became a standard, and like many standards—say driving on the left vs. driving on the right—what matters most is that the standard is fixed and it is perhaps less important that the standard is best. IBM had the market position—the market power you might say—to define the new personal computing standard and the fluke that twelve years earlier the U.S. government had filed a still-ongoing antitrust suit against it meant that IBM didn't firmly control the new standard and it would quickly slip out of its hands as Microsoft and Intel rose. But in defining the standard, IBM almost certainly concentrated innovative activity on that standard and, with a focal point in place, boosted the

sheer amount of effort going into personal computer innovation.

The iPod was much more Shakespeare and much less the transistor. Lots of companies were trying to build MP3 players between 1998 and 2001 and they were working with the same basic alphabet to do that. The April 2001 meeting at Apple where Steve Jobs greenlit the iPod makes that point pretty clearly. Tony Fadell took a bunch of pieces in an almost Lego-like exercise to build a mock up of what would become the iPod. The iPod probably doesn't exist if 1.8 inch hard drives had not developed to where they were in 2001, an arc that started with the IBM RAMAC disk drive in 1956.

But the fact that the iPod itself didn't create new components doesn't somehow make it less remarkable. It wasn't ala the IBM PC some simple combination of preexisting components, but really created something that was far removed from what other firms were able to create with access to the same basic tools. And it is hard to assess exactly what the iPod did without knowing what came after it. The world had gone mobile, but convergence was coming.