5

PONG

Video games are bad for you? That's what they said about rock and roll.

—*Shigeru Miyamoto, the most famous game developer in history (Mario Bros and Donkey Kong, among others)*[1]
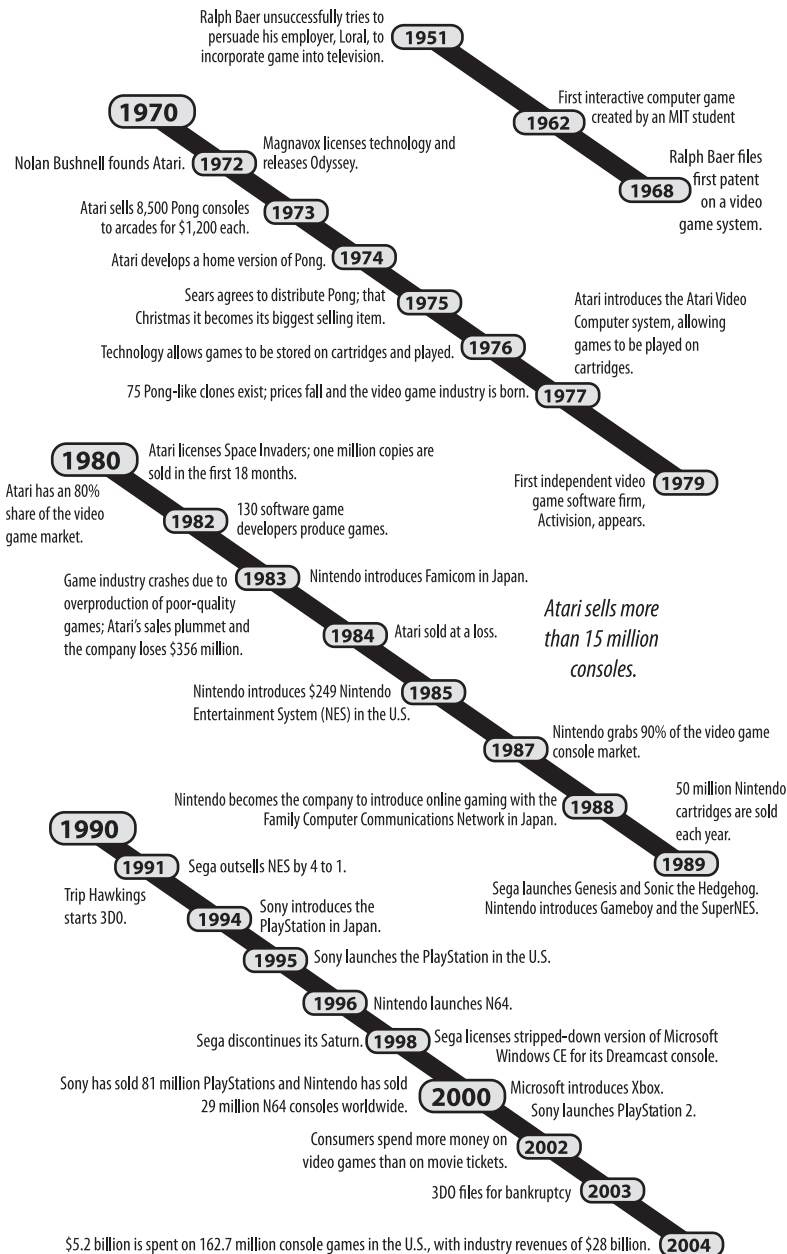

INSIDE THIS CHAPTER

· What ignited the market for video games
· Why video game business models are different from other software platforms
· How the video game industry operates today

In 1991, Trip Hawkins seemed to be trying to do for video games what Bill Gates had done for PCs. He started 3DO as a new kind of game console company. Instead of making its own consoles, it licensed its technology to manufacturers in return for royalties. Matsushita, Sanyo, AT&T, and other major players agreed to make 3DO's Multiplayer, a 32-bit CD-based console released in 1993. Further departing from industry practice, 3DO charged game developers royalties that were about a fifth of what its competitors were asking.

It was an interesting idea, but it didn't work. Even though analysts had said the Multiplayer was based on some of the finest technology in the market, the public didn't rush to buy it. It isn't hard to see why. The hardware manufacturers sold the Multiplayer for $700, compared to prices ranging from $150 to $200 for competing consoles from Sony and Sega. There weren't many games for 3DO's product either, despite the

1. http://www.answers.com/topic/shigeru-miyamoto.

Chapter 5: Video Game Console Timeline

Ralph Baer unsuccessfully tries to persuade his employer, Loral, to incorporate game into television. — **1951**

1962 — First interactive computer game created by an MIT student

1970

Nolan Bushnell founds Atari. — **1972**

Magnavox licenses technology and releases Odyssey.

Ralph Baer files first patent on a video game system. — **1968**

Atari sells 8,500 Pong consoles to arcades for $1,200 each. — **1973**

Atari develops a home version of Pong. — **1974**

Sears agrees to distribute Pong; that Christmas it becomes its biggest selling item. — **1975**

Atari introduces the Atari Video Computer system, allowing games to be played on cartridges.

Technology allows games to be stored on cartridges and played. — **1976**

75 Pong-like clones exist; prices fall and the video game industry is born. — **1977**

1980

Atari licenses Space Invaders; one million copies are sold in the first 18 months.

Atari has an 80% share of the video game market.

1982 — 130 software game developers produce games.

First independent video game software firm, Activision, appears. — **1979**

Game industry crashes due to overproduction of poor-quality games; Atari's sales plummet and the company loses $356 million.

1983 — Nintendo introduces Famicom in Japan.

1984 — Atari sold at a loss.

Atari sells more than 15 million consoles.

Nintendo introduces $249 Nintendo Entertainment System (NES) in the U.S. — **1985**

Nintendo grabs 90% of the video game console market. — **1987**

Nintendo becomes the company to introduce online gaming with the Family Computer Communications Network in Japan. — **1988**

50 million Nintendo cartridges are sold each year.

1990

1991 — Sega outsells NES by 4 to 1.

Trip Hawkings starts 3D0.

1989

Sega launches Genesis and Sonic the Hedgehog. Nintendo introduces Gameboy and the SuperNES.

Sony introduces the PlayStation in Japan. — **1994**

1995 — Sony launches the PlayStation in the U.S.

1996 — Nintendo launches N64.

Sega discontinues its Saturn. — **1998** — Sega licenses stripped-down version of Microsoft Windows CE for its Dreamcast console.

Sony has sold 81 million PlayStations and Nintendo has sold 29 million N64 consoles worldwide. — **2000** — Microsoft introduces Xbox. Sony launches PlayStation 2.

Consumers spend more money on video games than on movie tickets. — **2002**

3D0 files for bankruptcy — **2003**

$5.2 billion is spent on 162.7 million console games in the U.S., with industry revenues of $28 billion. — **2004**

low royalty rate developers paid. Game developers likely figured out that at more than three times the price of the competition, Multiplayers weren't going to fly off the shelves. There wouldn't be enough demand to justify the cost of writing games. In 1996, 3DO stopped selling console technology, and in 2003 it filed for bankruptcy.[2]

3DO tried a product pricing and integration strategy that was much closer to the long-standing PC model than the long-standing video game console model. As it went under, it became the exception that proved the rule.

Almost from the beginning, makers of game consoles have followed an approach that stands the PC model on its head. They integrate the hardware and the core software. Consumers can't get one without the other. They sell this integrated console to end users at a price that often doesn't even cover the manufacturing cost. The console producers make their profits from games they develop for their own consoles and, more important, from licensing their console's proprietary coding information to third-party game developers.

The difference between the PC strategy and the video game strategy presents an intriguing puzzle. Video game consoles and PCs are technically similar. Developers write games for both platforms and consumers use both platforms for playing games. The console platform rules, though. U.S. consumers spent five times more on video games than on PC games in the first half of 2005. Indeed, video games have become a major entertainment industry. By 2002, consumers around the world were spending more money annually on video games than on movie tickets. That year, the top-selling game, Halo 2, sold 2.4 million copies and earned about $125 million in its first *24 hours* on store shelves. That was more than three times as much the highest-grossing Hollywood movie that year, *Spider-Man 2*, which earned a mere $40.5 million in its first day.[3]

This chapter examines the puzzle of the video game pricing model in the course of describing an industry that has revolutionized how people

2. Harvard Business School, "Power Play (C): 3DO in 32-bit Video Games," July 12, 1995; http://en.wikipedia.org/wiki/The_3DO_Company.

3. http://www.npd.com/dynamic/releases/press_050728.html; video game sales were $21 billion in 2002, whereas box office sales were $19 billion. "Gaming's New Frontier," *The Economist*, October 2, 2003; http://www.usatoday.com/life/movies/news/2004-07-01-spider-man-2-opening_x.htm; http://money.cnn.com/2004/11/11/technology/halosales/.

play games, a millennia-old pastime, and how people, especially those who grew up after the twin birth of the PC and the video game console in the late 1970s, entertain themselves at home.

The Birth of the Video Game Industry

In 1951, Ralph Baer was designing a television for aerospace electronics manufacturer Loral. He wanted to make the television interactive and incorporate a game, but his employer didn't like the idea. Fifteen years later, working for another defense contractor, Baer got permission to try television-based games. His team developed a chase game, tennis, Ping-Pong, and a "gun" that could sense light on the television screen. He filed what is considered the first patent on a video game system in 1968.[4]

Magnavox, a television manufacturer, licensed the technology and released the Odyssey game system in early 1972. For $100 it came with twelve games, each on a printed circuit board. For another $25 buyers could get a rifle to use with the system. Magnavox limited retail outlets for the Odyssey to its own dealers. Its advertising—plus its exclusive use of Magnavox dealers—suggested, incorrectly, that people needed a Magnavox television to use the system. Magnavox might have stimulated its television sales with this strategy had Odyssey been more appealing. Instead, it limited sales to the 10 percent of households that had a Magnavox television. It sold more than 100,000 game systems by year end, but sales quickly trailed off, and Odyssey was pulled from the market.[5]

Meanwhile, significant innovations in games were taking place elsewhere. Nolan Bushnell had played the Spacewar game on a minicomputer while in graduate school. Created in 1962 by an MIT student, it used the machine's toggle switches as controls for dueling rocket ships.[6]

4. Rusel Demaria and Johnny L. Wilson, *High Score!: The Illustrated History of Electronic Games* (Berkeley, Calif.: McGraw-Hill/Osborne, 2002), p. 14; http://www.emuunlim.com/doteaters/play1sta1.htm.

5. http://www.pong-story.com/odyssey.htm; http://www.gbrc.jp/GBRC.files/journal/abas/pdf/ABAS4-1-1.pdf. David Sheff, *Game Over: Press Start to Continue* (Wilton, Conn.: Game Press, 1999), p. 141.

6. Demaria and Wilson, *High Score!*, p. 12; Steven L. Kent, *The Ultimate History of Video Games* (Roseville, Calif.: Prima Publishing, 2001), p. 18.

A decade later, Bushnell came up with the idea of using the new microprocessor technology to develop a coin-operated arcade version of Spacewar called Computer Space. The console he conceived and licensed to a manufacturer had a circuit board with only Computer Space hardwired into it, a black-and-white monitor, and a mechanism for handling coins put in through a coin drop. Computer Space didn't do well—it was too complex for inebriated bar patrons. The manufacturer liked the console design, however, and asked Bushnell for another game. They couldn't come to terms, however, and Bushnell started Atari instead.[7]

Atari's first game hit was a version of Ping-Pong called Pong. Atari sold 8,500 Pong consoles in its first year, a high volume for an arcade-type game, for about $1,200 each. The buyers got to keep all the quarters that people paid to play the game. Atari, like Apple in PCs, did everything—it designed the hardware and software for the arcade game consoles and manufactured them itself.

The arcade game business boomed in the 1970s. Numerous variants on Pong were introduced as multiple players searched for the next killer app for arcade machines. Over time, arcade games have declined as home video games have become more popular. We focus exclusively on the latter in what follows.

Magnavox Collects

Ralph Baer patented the idea of projecting electronic games onto a television screen and the design of a Ping-Pong game. Magnavox sued Atari for patent infringement and claimed that Bushnell had gotten the idea for Pong from seeing the Odyssey demo in a trade show. Bushnell managed to negotiate an out-of-court settlement with Magnavox that allowed Atari to become Magnavox's sole licensee in exchange for a one-time fixed fee of $700,000. As more Pong-based games came into the market, Magnavox successfully prosecuted a number of patent claims during the 1970s. Most game system makers paid Magnavox royalties for use of its video game patents. Magnavox reportedly received more than $80 million in royalty payments or settlement checks.

7. Sheff, *Game Over*, p. 135. http://lavender.fortunecity.com/fullmonty/22/atari. htm.

Although a television maker for living rooms tried to start the home video game industry, it was an arcade game maker for bars that succeeded. Atari developed a home version of Pong in 1974. Having seen the Odyssey system fizzle, retailers weren't interested. But in 1975, Sears agreed to distribute it, and ordered 150,000 systems. At $100 each, they flew off the shelves. By Christmas, Pong had become the biggest-selling item at Sears, with lines of parents waiting outside the stores.[8]

Meanwhile General Instruments had developed a $5 chip with four tennis-like games and two shooting games programmed into it. That allowed any toy maker to produce Pong clones. Dozens of manufacturers introduced game systems based on these chips. By 1977 there were almost 75 Pong-style clones, each of which sold for a few dollars. The home video game industry had arrived.

These early manufacturers sold complete systems that included one or more games. Consumers had no way to install additional games. These were single-sided businesses. Moreover, the machines didn't make significant use of microprocessors or rely on software to develop the games.

The Emergence of the Video Game Platform

The foundations for the two-sided business model that dominates the video game industry today were laid in the late 1970s. Video games were separated from the console so that end users could add games over time. This separation made it possible for companies to specialize in developing games for these consoles. It also raised the basic pricing question: Should console makers raise prices for the console, given that third-party games make those consoles more valuable, or should console makers figure out some way to charge third-party game producers for games—or both?

8. http://en.wikipedia.org/wiki/Pong; Demaria and Wilson, *High Score!*, p. 26.

Adding Games

In 1976, Fairchild Camera introduced the Channel F console. It could play games stored on cartridges. Each cartridge had a memory chip that had one or more games programmed into it. Fairchild sold the cartridges for $19.95 each and eventually released twenty-one versions of them. The Channel F console itself went for about $170.

A year after Channel F came out, Atari introduced the Video Computer System (VCS). It had an 8-bit microprocessor and could play games that came in cartridges. The console sold for $199—a little more than manufacturing cost—and the "carts" containing the games sold for $30 each (it cost less than $10 to manufacture a cartridge).[9] The console came with what became an important peripheral, a joystick.

The Atari VCS didn't sell well at first. That changed in 1980 when it licensed the popular arcade game, Space Invaders. This killer app for the VCS sold one million copies in its first 18 months, and helped Atari sell more than 15 million VCS consoles between 1979 and 1982. Atari earned about $512 million in 1980 and had an 80 percent share of the gaming market. As an Atari history Web site notes, "designers had unknowingly created a console whose hidden potential was quickly discovered by programmers who created games far outperforming what the console was originally conceived to do."[10]

From then on, video game consoles have been based on microprocessors and games have been stored mainly on removable media rather than being hardwired into the console. The Atari VCS was an inflection point for the video game industry.

Sell the Blades

Now that it had separated the console and the games, Atari—and its copycat competitors—had more flexibility in how they priced their products. Earlier, single-game console makers had to recover their investments

9. Demaria and Wilson, *High Score!*, p. 29; Kent, *The Ultimate History of Video Games*, p. 107; http://en.wikipedia.org/wiki/Atari_2600.

10. http://en.wikipedia.org/wiki/Atari_2600; http://www.biggeworld.com/archive/atarishift.html; http://www.atarimuseum.com/videogames/consoles/atari_videogame_consoles.htm.

and earn a return from selling the integrated game consoles. They had to do it in a hurry before a rival came out with a more attractive game.

Atari decided to sell the VCS at or below manufacturing cost and make its profit from selling games over time to its installed base of console owners. This was a novel strategy in the 1970s: computer makers then were giving away software to sell more hardware, from which they earned their profits. Atari turned this strategy upside down. Like many critical innovations, it is obvious in hindsight. The economic theory of two-part pricing offers some hints as to Atari's thinking and also suggests why this approach worked for video game consoles but not other computer hardware.[11] (We return to these matters in Chapter 10.)

There's an old business strategy often described as giving away razors to sell blades. It isn't literally used much by razor manufacturers anymore. But the basic idea is still employed by many other makers of durable goods who sell the durable good at little or no markup over cost, or even at a loss, and make their profit from products that work with the durable good. The basic idea is that selling the razor at cost, or even at a loss, encourages people to buy the razor and increases the demand for blades. Technically, the razor and blades are complements: because lowering the price of the razor raises the demand for blades, which are sold at a profit, the optimal razor price is lower than it would be for a firm that didn't sell blades.

But there is more to the story. Not only can the razor-blade business make money from people who buy blades, it can make more money from people who shave a lot, either because they have fast-growing beards or because they care more about their appearance. By making money mainly or exclusively on the blades, the business sorts customers so that those who value the system (razor + blade) more end up paying more for it.

11. Thomas T. Nagle and Reed K. Holden, *The Strategy and Tactics of Pricing*, 3rd ed. (Englewood Cliffs, N.J.: Prentice-Hall, 2002); Richard Schmalensee, "Monopolistic Two-Part Pricing Arrangements," *Bell Journal of Economics* 11 (Autumn 1981): 445–466.

Technically, this is a two-part tariff, consisting of an access fee (the price of the razor) plus a usage fee (the price of the blade). Here the blade can be thought of as having two related roles. It meters the use of the durable good, and it sorts customers into those who are willing to pay more and those who are willing to pay less. These metering devices tend to increase profits and help companies better recover their fixed costs of investment. Because it is particularly attractive to make money on the blades, it is especially attractive to reduce the price of the razor, perhaps to below cost, or perhaps even to zero in extreme cases.

For video game console makers this razor-blade strategy made a lot of sense. Getting the console into the hands of many people increased the demand for the games it could play. Moreover, it made buying a console less risky for households, who had no good way of knowing how valuable the console would be until they saw the games produced for it. The game-console company, which was in the best position to forecast the quality of those games, took the risk: it lost money if consumers didn't buy many games, and it made money if they did. The people who ultimately bought a lot of games were those who valued the console the most, so making profits mainly or even entirely on games enabled the console makers to earn the most from those willing to pay the most for their system.

Even though royalties are paid to console makers by game developers, the above discussion implicitly assumes that they are passed along dollar-for-dollar to consumers. In this textbook case, the only reason to charge royalties to developers rather than directly to consumers is convenience. As we discuss in Chapter 10, however, because competition among game developers involves the production of highly differentiated products, even if convenience were not an issue, console makers would probably earn more charging game developers.

The video game pricing strategy wouldn't have made sense for computer makers. There's probably not much correlation between the number of applications that someone uses on a computer and the value that person places on that computer. An engineering firm might use more applications than an electrical utility, but most likely both are using the

computer to its maximum capacity. Likewise, there's no apparent reason why an author who uses her PC only for word processing and email will value it any less than a retired person who runs dozens of different applications for fun.

The Emergence of the Two-Sided Platform

When games were separated from consoles, it became possible for console makers to adopt a two-sided model by encouraging other companies to develop games for them. But none took that step at first.

Several game programmers left Atari to start the first independent video game software firm, Activision, in 1979. Using their knowledge of the Atari VCS, they developed a number of very popular games. Other third-party game developers quickly appeared. Some of their games were great. Others weren't.

These game makers had all developed their games without obtaining permission from the console makers or paying anything to them. Since the console makers had invested to develop the underlying technology and were earning returns on those investments by selling games, this third-party entry posed a direct threat to their profits. Notice the contrast with PC software platforms: the major players didn't specialize in making applications for their platforms, had other sources of revenues, and quickly encouraged developers to free-ride on their platform code. The game console makers, on the other hand, saw independent game developers as a scourge. Atari sued Activision repeatedly.[12]

The bottom fell out of the video game industry in 1983. According to one source, of more than 130 significant video game software firms in 1982, only five or six survived the crash. Atari, the industry leader, was the biggest victim. Its sales fell from 5.1 million units in 1982 to 3 million units in 1983, when it lost $356 million, taking down the share price of the company to which Bushnell had sold it, Warner Communications, by 50 percent over 10 months. The next year, Warner sold

12. SN Kent, *The Ultimate History of Video Games*, p. 194.

Atari at a loss. The other publicly held companies such as Mattel and Coleco took similar hits. Many video game magazines also went out of business.[13] We leave the causes of the great video game depression to others. Some say it was the proliferation of bad games. Others at the time thought a fad had merely run its course.

A new entrant, however, soon appeared that embraced the two-sided platform model and reignited the industry. Nintendo introduced its Famicom system in Japan in 1983 and its Nintendo Entertainment System (NES) two years later in the United States. The console was sold for $249, at an operating loss.

Nintendo had actively pursued licensing agreements with third-party game publishers to get a critical mass of games for its new system. However, having witnessed the 1983 U.S. video game market crash, it concluded that in order to succeed, it had to control the quality of games sold for its platform. Accordingly, each NES cartridge contained an authentication chip that was necessary to provide access to the console circuits. Nintendo also kept tight control over the games supplied for its console through its Nintendo "Seal of Quality" policy and, in the interest of quality control, forbade any single developer to publish more than five games every year for the NES.[14]

The authentication chip also allowed Nintendo to charge royalties to third-party game developers, thus converting them from enemies to allies. Nintendo determined the selling price of all games and charged its third-party developers a 20 percent royalty on sales. Since Nintendo made the cartridges and required licensees to order them in advance and be subject to strict inventory management policies, it knew how many

13. Martin Campbell-Kelly, *From Airline Reservations to Sonic The Hedgehog: A History of the Software Industry* (Cambridge, Mass.: MIT Press, 2003), p. 280; http://www.dbbs.gr/hcg/cop36.htm; Warner Communications historical share prices; Kent, *Ultimate History of Video Games*, pp. 239, 252–255; Leonard Herman, *Phoenix: The Fall and Rise of Videogames* (Union City, N.J.: Rolenta Press, 1997), p. 128.

14. Later, several very successful developers such as Acclaim and Konami were granted licenses for an additional five games a year.

games each licensee was producing. Nintendo also adopted the novel policy of prohibiting game makers from publishing their games on a rival system for at least two years.[15]

A year after Nintendo entered, there were more than twenty-four games for the NES. By 1989 Nintendo games were selling at a rate of 50 million cartridges per year. Some of these are all-time classics, such as Donkey-Kong. Nintendo wrote many of its games itself, including Mario Brothers, which was the killer game for the NES. This reflected both its strong previous experience in arcade games and its inability to sign up more than four developers, all Japanese, by NES's launch. Despite countless visits and evangelization efforts, major American developers that had survived the 1983 crash preferred to remain focused on the emerging PC gaming market, which we discuss below.[16]

As Nintendo captured a larger share of the U.S. video game console market—reaching 90 percent in 1987—American third-party game developers began to come on board. At the same time, however, the Federal Trade Commission also started taking an interest in Nintendo. Under its scrutiny, Nintendo stopped setting retail prices for its games, dropped the exclusivity clause in its licensing agreements, and let developers make their own cartridges. Nintendo kept its security chips, though, and continued to charge royalties.[17]

15. Campbell-Kelly, *From Airline Reservations to Sonic The Hedgehog*, pp. 284–286.

16. "Robot Lets Firm Toy with Success: Electronic Playmate Opens Doors for Redmond Video-Game Maker," *The Seattle Times*, February 11, 1986; "Home Electronics: Video Wars," Associated Press, October 16, 1989; Kent, *The Ultimate History of Video Games*, p. 307.

17. http://www.nationmaster.com/encyclopedia/List-of-NES-games; http://www.cyberiapc.com/vgg/nintendo_nes.htm; "Will Justice Dept. Probe Nintendo? (Antitrust Investigation)," *HFD—The Weekly Home Furnishings Newspaper*, December 18, 1989; "Nintendo Agrees to Settle FTC Charges," *Los Angeles Times*, April 11, 1991; "FTC Action Takes No Bite Out of Nintendo (Federal Trade Commission, Nintendo Company Ltd) (Washington Report)," *Discount Store News*, August 5, 1991. Nintendo thought their antitrust problems were over, but not long after the price fixing settlement in 1991 the FTC began a new investigation into monopolization charges. The investigation was dropped in 1992. "FTC Halts Probe of Nintendo: Two-Year Investigation Looked Into Accusations of Antitrust Activity," *Seattle Post-Intelligencer*, December 3, 1992.

The Game Boy

> In 1989, Nintendo introduced another gaming platform, the handheld Game Boy. Like the NES, the Game Boy was initially driven by one killer app, Tetris. Tetris had been created by a Russian mathematician, Aleksey Pajitnov. In 1986, Robert Stein, the president of a London-based software company, encountered a pirated copy of Tetris and negotiated with Pajitnov for the right to license it. Stein apparently did not realize that he needed to obtain the rights from the Russian authorities, not Pajitnov. Stein went on to negotiate deals for the European and American computer rights to the game before the Russians had actually given him the authority to do so. Atari also obtained the rights to the game and in turn sold the Japanese coin-operated rights to Sega. Multiple firms obtained the same rights to Tetris from Stein, who did not have the authority to issue any of these contracts. At this point Nintendo realized no one truly owned the rights to Tetris, negotiated with the Russians, and obtained the worldwide video game rights to Tetris. Nintendo then introduced the Game Boy handheld console with the Tetris game bundled. The Game Boy sold over 1 million units and over 2.4 million games in its first year on the market. By 1992, worldwide shipments were 10 million units per year.[18]
>
> The licensing contracts for third-party Game Boy developers were identical to those for the NES. When the Game Boy was first released, there were only four games in addition to Tetris available, but twenty-three of the licensees for the NES had signed on to develop more titles. By May 1990 there were seventy titles available for the Game Boy, and at the June Expo Center show of the same year there were 200 titles available for trial.[19]

Nintendo's lead didn't last. In 1989, Sega launched its 16-bit console, Genesis, several months before Nintendo came up with its own 16-bit Super NES. With its killer game, Sonic the Hedgehog, Genesis had outsold Super NES four to one by 1991. Sega relied on the same platform strategy as Nintendo: it used a security system to lock out

18. Kent, *The Ultimate History of Video Games*, pp. 377–381. "Nintendo Doesn't Intend to Sell 16-Bit Game," *Los Angeles Daily News*, March 23, 1990; "Grown-up Game Boy Still Has Youthful Charm," *Plain Dealer Cleveland*, December 22, 1997.

19. "Nintendo Nirvana: Thousands of Devotees of Electronic Games Plan to Converge on Portland for Expo Center show," *Portland Oregonian*, June 27, 1990; "A Video Shootout in Hand-held Games," *The Dallas Morning*

unlicensed game developers, and it relied on first-party game sales and royalties charged to licensees (virtually identical to those charged by Nintendo) for the bulk of its profits. All subsequent significant game console makers have followed the same basic strategy. While it is possible that the strategy could be improved upon, 3DO's failure suggests that low-priced games can't make up for a high-priced console and that "charge developers/subsidize consoles" is the more profitable model.

The Other Video Game Platform: PC

Personal computers arose as a gaming platform when the first cheap PCs appeared in the wake of the 1983 video game crash. Introduced in 1982 at a price of $600, the Commodore 64 (C64) claimed to rival the Apple II, priced at more than $1,000, in power. The C64 helped shift the market's attention from dedicated video game consoles to PCs.

Trip Hawkins created Electronic Arts in 1983 to develop games for the C64. Within 6 months of introducing its first products, Electronic Arts was supporting the Apple II and the Atari 800, in addition to the C64. When Nintendo introduced the NES in the United States, Electronic Arts refused to support it. Like many others in the industry, Hawkins thought the PC platform had definitively supplanted the console platform as a gaming medium.

Three years and 28 million NES video game consoles later, it became clear that he was wrong. (Note that while Hawkins has gotten two major things wrong so far in this chapter, Electronic Arts is the world's largest game developer, with annual revenues of over $3 billion.) In the 1990s, console game software outsold PC game software by two to one in unit terms and four to one in revenue terms, even though there were nearly ten times more computer game titles than console titles on the market. In 2004, U.S. consumers spent $5.2 billion on 162.7 million console games, compared to $1.1 billion on 45 million PC

News, May 30, 1990; "Atari's Handheld Video Game Bows With Color LCD Monitor," *HFD—The Weekly Home Furnishings Newspaper*, June 12, 1989.

games and $1.0 billion on games for Game Boy and other portable devices.[20]

Clearly, neither of the two overlapping platforms has driven the other out of the market. They are still competing today for both game developers and users, as we discuss later. Remarkably, they are overlapping multisided platforms (see Chapter 3) with opposite two-sided pricing strategies. Their coexistence is a testament to the power of product differentiation in multisided platform industries.

The Sony PlayStation

Sony solidified the two-sided platform model. And it introduced the first commercially successful machine with an operating system and with applications that came on a CD rather than a chip.[21]

Sony's first contact with the video game market occurred when Nintendo approached it in 1988 with a proposal to manufacture a CD-ROM drive for the Super-NES. That deal never materialized, and Sony opted to design its own console. The PlayStation hit the market in 1994 in Japan, and at its 1995 U.S. launch the console sold for $299 and the games for about $40–$50 each.[22] It was competing against Sega's Saturn, Nintendo's Super NES, and later against Nintendo's N64, which was launched in 1996.

Unlike Nintendo and Sega, Sony didn't have much experience in developing games and decided to rely mainly on third parties. By 1999, about 77 percent of the games developed for PlayStation came from third parties, whereas they supplied only 43 percent of N64's games. To ensure

20. "The Power of Nintendo (Direct Marketing Success of Nintendo America Inc.)," *Direct Marketing*, September 1, 1989; Electronic Arts, Income Statement, 2004; Peter Coughlan, "*Competitive Dynamics in Home Video Games* (K): Playstation vs. Nintendo64," Harvard Business Online, June 13, 2001; http://www.writenews.com/2005/021105_gamesales_04.htm.

21. Among a slew of ill-fated video game consoles introduced at the beginning of the 1990s, 3DO's Multiplayer and NEC's Turbografx were the first machines to play games on CDs.

22. http://www.scee.com/about/sonyHistory.jhtml   http://en.wikipedia.org/wiki/Sony_Playstation; "Console Yourself—It's Only Money," *The Independent–London*, January 8, 1996.

the availability of some quality titles, the company purchased a leading game developer before launching the PlayStation.[23] Sony also pursued alliances with other developers to secure the exclusive support of their games for its console.

Users preferred the Sony PlayStation because it was sleeker and had more games than Sega's Saturn. Also, though the Saturn came bundled with the highly desirable Virtual Fighter game, it cost $100 more than the PlayStation.[24]

The software platform for the PlayStation was a proprietary Sony operating system developed in-house. It was designed exclusively for the PlayStation and optimized to make the most of the console's hardware capabilities, including a very capable microprocessor. It was also designed to read game software from CD-ROMs, just as PCs did. CD-ROMs were much cheaper to manufacture than cartridges, had more storage capacity, making possible a significant improvement in game complexity, and could be easily obtained if game makers needed to increase production. The only drawback was that the data access speed was somewhat slower. Sega's Saturn also relied on CD-ROMs, but Nintendo decided to continue using cartridges, both for the Super NES and for the N64.

By the time the PlayStation launched, Sony had signed up nearly a hundred game companies, and with its licensees had more than 300 individual game projects under way. An important factor in Sony's success was its provision of an unprecedented array of development tools and software libraries that made it easier to write games to the PlayStation than to the competing systems from Nintendo and Sega. The latter were believed to discriminate in favor of their own game developers when it came to supplying tools. (This is a tension that runs through businesses that produce applications as well as software platforms. Many software platform makers, however, also do applications for their platforms. Providing developers assurance that there is a level playing field is a business necessity.)

Over time Sony has nurtured the PlayStation platform by continuing to encourage third-party game developers. Its library of titles grew

23. Coughlan, "Competitive Dynamics in Home Video Games," p. 1; Kent, *The Ultimate History of Video Games*, p. 505.

24. Kent, *The Ultimate History of Video Games*, p. 517.

from 19 in 1995 to 300 in 1997 and 2,600 in 2000. It managed to sell almost 10 million consoles within its first two years on the market, and 26 million consoles by the end of 1997 (three years after release). Even the launch of Nintendo's N64 in 1996 was not enough to stop it. By 2000, there were more than 81 million PlayStations worldwide, compared to 29 million N64s. Sega's Saturn fared very poorly, with only 17 million units sold by 1998, when it was discontinued. Between 1996 and 2000, PlayStation's market share never dropped below 33 percent.[25]

PlayStation 2

Launched in 2000, PlayStation 2 continued Sony's dominance into the current generation of 128-bit consoles, where it faced Sega's Dreamcast, Nintendo's GameCube, and the new kid on the block, Microsoft's Xbox.

Like the original PlayStation, PlayStation 2 was initially priced at $299 when it was released in the United States. It followed the established industry pattern of selling hardware below cost (at least initially)—according to some estimates, its manufacturing cost was over $400—and recouping through sales of first-party game software and royalties charged to third-party game publishers. Component costs fell over time and manufacturing efficiency increased over time, so that in 2004 a Sony executive could assert that there was a "positive gross margin" on PlayStation 2 sales. But the largest share of PlayStation's profits (between 60 and 70 percent, according to interviews with Sony executives) still comes from sales of Sony-produced games and royalties ($3 to $9 per disk) paid by third-party game publishers.[26]

25. "Sony Sets Up New Games Companies," *Music & Copyright*, February 1, 1995, "PlayStation Game Console Sells More Than One Million Units in November," *Business Wire*, December 8, 1997; "Video Game War Heats Up Sony Re-enters Fray with Playstation 2," *The New Orleans Times-Picayune*, February 19, 2000; "Worldwide Videogame Forecast and Analysis, 2001–2006" (IDC report no. 26906), 2002, table 4; Installed Base "Video Game Consoles: Sony, Nintendo and Sega Brace for Microsoft Challenge," *In-Stat*, December 2000, table 2.

26. Dean Takahashi, *Opening the Xbox* (Prima Lifestyles, 2003); Takao Yuhara, Sony Corporation earnings conference call, January 28, 2004; Adam Brandenburger, "Power Play (C): 3DO in 32-bit Video Games," *Harvard Business Online,* April 10, 1995; Coughlan, "Competitive Dynamics in Home Video Games (K)."

Built around a new processor, the "Emotion Engine," PlayStation 2 was a powerful machine, able to process graphics fifty times faster than the PlayStation 1, according to a standard measure of speed. PlayStation 2 games were loaded on DVDs, with twenty-five times the capacity of a conventional CD. The new console could also play movies stored on DVDs.

The PlayStation 2 suffered, though, from a lack of investment in development tools. Developers complained that the system was very difficult to work with. Shinji Mikami, the designer behind several such hit games, complained that unlike the original PlayStation, the PlayStation 2 had "no library." Developers needed "to create [their] own library, which poses its own set of problems in that there are so many choices to achieve the same effects." And Gozo Kitao, the general manager of Konami, stated, "If you focus on making full use of all the specs, it will be very expensive and time-consuming to produce a game."[27]

In addition to being sparse, the developer tools for PlayStation 2 were also released quite late, only nine months before its Japanese launch. By contrast, game developers for Xbox had received their tools from Microsoft 18 months before that console launched. It is therefore not surprising that at Sony's PlayStation Festival 2000 trade show, which took place about a month before the Japanese launch, only nineteen games were in development for the PlayStation 2.

PlayStation 2 managed to win the support of third-party game developers in part because it was compatible with PlayStation 1. Manufacturers had previously reasoned that incompatibility would help drive sales of game software developed for new machines. It turned out, however, that backward compatibility was especially attractive to PlayStation 1 users, who valued the ability to play their library of games on the new console. These users upgraded even though there were relatively few new games initially available for PlayStation 2. By 2004, PlayStation 2 had more than 1,000 titles, compared to roughly 700 for Xbox and 600 for GameCube.[28]

27. Kent, *The Ultimate History of Video Games*, pp. 568–569.

28. Anthony N. Gihas and Stephanie S. Wissink, "The Video Game Industry" (Piper Jaffray & Co.), April 2005, p. 18.

PlayStation 2 emerged as the clear winner of this round of console competition. In 2004, it sold 15.2 million consoles worldwide and had a 58 percent market share.[29] Sony has announced that it hopes to transform its game console into a rich home entertainment device. But so does Microsoft. The bundling of new features this broader role involves has become a major focus of the competition between consoles.

The Xbox

Microsoft made its first foray into the video game market when Sega decided to use a stripped-down version of Microsoft's Windows CE software platform as a development environment for its 1998 Dreamcast console. Sega had invested heavily in Dreamcast development tools. It standardized the interface between its development environment and the Windows CE development environment. As a result, developers could easily port games to and from PCs. Good theory, bad execution. The performance of game software using the Microsoft APIs was much slower than that of software using Sega's original Ninja library of APIs. In the end, only one of the forty games available within six months of Dreamcast's launch used the joint development tools.[30] Although the reasons for the failure may be different, Microsoft, like 3DO, found that licensing software platforms to hardware makers was not the road to riches in the video game industry.

Microsoft got the execution right the next time. Rather than build a new gaming platform for its Xbox, Microsoft relied on a version of the Windows NT/2000 operating system, stripped down and modified in order to focus it on gaming. It built the Xbox software platform around DirectX, a collection of Windows software services that were specially designed to help PC game developers deal with the diversity of user hardware, particularly the sound and graphics cards that were so important to games. In the words of J Allard, one of the key executives on the

29. "Worldwide Videogame Hardware and Software 2004–2008 Forecast and Analysis: Predicting the Future" (IDC report no. 31260), May 2004.

30. Stegan Thomke and Andrew Robertson, "Project Dreamcast: Serious Play at Sega Enterprises Ltd.," Harvard Business Online, September 9, 1999, p. 11.

Xbox team: "We started taking things out of Windows NT, or rather putting things in DirectX, to put the software together. It was more or less a DirectX operating system."[31]

The Xbox operating system resides on the DVD disk with each game rather than, as in a PC, on the console's hard disk. This enables developers to customize the operating system to some extent and thereby to enhance memory usage. If a game does not make use of online capabilities, for example, the corresponding networking code can be left off the DVD.

The original Xbox hardware had two important innovations: an 8-gigabyte hard drive and a high-speed Ethernet adapter. Earlier consoles had not included hard drives because of the cost involved. Indeed, Microsoft spent almost $50 per machine for the hard drive. However, the company reasoned that a hard drive would give more flexibility to game developers and would help improve the online gaming experience by providing a storage medium for game data.

PlayStation 2 and GameCube did not come with built-in network connections but could be connected through either a 56K modem or an Ethernet adapter. By contrast, Microsoft chose to integrate a broadband-only connector to simplify the life of online game developers, who did not program for slower forms of Internet access. Of course, this was a gamble on the growing penetration of broadband connectivity, but it was one that paid off. Microsoft's subscription-based online gaming service, Xbox Live, has grown from 750,000 users in 2004 to about 2 million in 2005. The PlayStation 2 boasts the same number of online gamers, but that is a much lower proportion of the console's installed base, 6 percent of the PlayStation 2 installed base compared to 16 percent for Xbox.[32]

To ensure the availability of attractive first-party titles, Microsoft recruited game developers and acquired game companies. These

31. Takahashi, *Opening the Xbox*, pp. 150–153.

32. "Microsoft Quarterly Revenue Tops $10 Billion Launch of Office 2003 and Strength in PC Market Fuels Demand for Desktop Software," *PR Newswire*, January 22, 2004; "Xbox Dedication: With 3-Day Jump, Greenfield Teen Finds Lot to Love in New Machine," *The Milwaukee Journal Sentinel*, November 22, 2005; "Nintendo Gives Gamers a Reason to Chat," *The Boston Globe*, May 23, 2005.

supplemented its in-house team, which had done only PC games. The most significant acquisition was the highly acclaimed game development firm Bungie, whose Halo has been by far the strongest selling Xbox game and has largely driven purchases of Xbox.[33] Overall, there were three first-party and twelve third-party titles available for Xbox when it was released. That number doubled to more than thirty games available during the 2001 holiday season.[34]

Even though Microsoft chose to follow video game industry practice, rather than its policy regarding PC games, and to act as a careful gate-keeper for third-party games with the Xbox, it courted developers to an extent unprecedented in the video game industry. Before the Xbox launch, it set up an Independent Developer Program. It also established the Incubator Program to encourage smaller developers by providing free software tools, and it waived the normal prepublishing requirements.[35] The presence of DirectX and its evangelization were particularly successful. The tools used for creating Xbox games were quite similar to PC game tools, which made life particularly easy for developers with PC experience.

Like most consoles since the Atari VCS, the Xbox console is a loss leader: its launch price was $260, which was $100 less than its estimated manufacturing cost. Microsoft has continued to lose at least $100 on each console sold, as price cuts have tracked reductions in manufacturing costs. From its 2001 launch through December 2003, the company had gross revenues of $961 million from Xbox software sales—direct sales of its own games plus $7 per unit royalties levied on third-party games—and $313 million gross revenues from sales of peripherals such

33. Analysts estimated that over 80% of Xboxes sold at launch were sold with Halo. Takahashi, *Opening the Xbox*, p. 319.

34. "Microsoft Playing Out of the Box," *The Hartford Courant*, November 4, 2001; "Game on! Sony, Nintendo and Microsoft Get Ready to Rumble in the Battle for North America's $8-Billion Video-Game Market," *Winnipeg Free Press*, November 10, 2001; "Game Wars," *The Tampa Tribune*, November 19, 2001.

35. Microsoft PressPass, "Microsoft Embraces the Worldwide Independent Video Game Developer Community," November 7, 2000 (http://www.microsoft.com/presspass/press/2000/Nov00/XPKPR.asp [downloaded 21 June 2004]); http://news.com.com/2100-1040-248875.html?legacy = cnet.

as game controllers, memory cards and other plug-ins, and remote controls. (First-party games accounted for roughly 70 percent of total game software revenues over this period.) Because of negative hardware margins, however, through the end of 2003 Xbox had incurred a total loss of roughly $590 million.[36]

The foregoing may suggest that Microsoft simply accepted the core elements of the standard video game business model. In fact, in the process of creating Xbox it challenged almost every element of that model, from the vertical integration between software and hardware in the platform and the below-cost pricing of the console to the royalty-based model with quality control for third-party games. For example, it considered making money on the console but learned from developers that they wouldn't write games unless they were confident that many consumers would buy the console. The fact that Microsoft ended up adopting the standard business model despite its initial skepticism suggests that model makes good economic sense for this industry, at least at this time.

Microsoft (Almost) Channels 3DO

Xbox started as Project Midway in 1999 inside Microsoft—a bow to the critical World War II battle in the Pacific and an expression of the company's intention to produce something midway between a PC gaming platform and a console. Indeed, the original idea was to come up with a low-cost personal computer specialized for playing games, in order to counter the threat posed by Sony's ambitious PlayStation 2.[37] Remarkably, the Windows Entertainment Platform, as the machine was to be called in the beginning, was initially supposed to run a future version of the Windows 98 operating system, function as an open platform like the PC (in the sense that game developers could program anything they wanted without constraints or having to pay royalties), and be made according to Microsoft's specifications by licensed third-party OEMs. Microsoft knew about 3DO's failure six years earlier, but it concluded that overpriced hardware had been the main flaw and decided it had what it took to make the

36. This estimate and the next are based on J.P. Morgan North American Equity Research, "Microsoft Corporation: Patience Is a Virtue," January 6, 2004, table 12.

37. Takahashi, *Opening the Xbox*.

(continued)

same strategy succeed. After all, if anyone could successfully bring the PC platform model into the gaming industry, it would surely be Microsoft.

Not surprisingly, the initial hardware strategy did not work. Dell, Panasonic (Matsushita), Sharp, Toshiba, Mitsubishi, and Samsung all declined to produce hardware under license, arguing (quite reasonably) that there was no way for them to make money. Everyone was aware of the negative hardware margins characteristic of the video game industry, and a third-party hardware maker had no way to recoup its losses because it did not sell any game software. In the end, Microsoft had to rely on a contract manufacturer for Xbox, just like all other console vendors.

Similarly, the Xbox was in the end designed as a closed system, and Microsoft charged royalties to third-party developers, just like all the other console vendors. One reason for this shift was that Microsoft came to the conclusion that it was important to control the quality of titles supplied for the console. (In particular, it understood that it had to exclude the mediocre games that flooded the PC platform, especially if it planned to charge royalties to developers; a security system was accordingly developed to prevent quick-and-dirty porting of PC games.) A second reason for this shift was financial: after long brainstorming sessions with senior executives, it became clear that the company needed the royalty revenues from third-party game developers to help offset the losses incurred on console sales. The case for royalties was even stronger when Microsoft realized it had to supply the hardware itself. In the end, it settled on the $7 per game royalty charged by everyone else.

Today's Video Game Industry

When Pong came out thirty years ago, mainly young boys played video games. The industry has grown up along with those boys: the average age of video game players had crept up to 28 by 2004. More games are written for young adults: they are rated, like movies, and many have explicit sexual content. Online gaming is also beginning to take off, to the point that the "currency" used in these games is now bought and sold on eBay so that game players can purchase some of the virtual weapons of war needed in their favorite online games.[38]

38. "Reel fakes; Phony Web sites are the movie studios' latest advertising tactic. But have they gone too far?," *St. Paul Pioneer Press*, May 30, 2004. In the United

The video game industry had global revenues of $28 billion in 2004 from the sale of video game consoles and games. It is still only one-fifth the overall size of the movie industry, which had global revenues of $129 billion in 2004 from all sources, although, as mentioned earlier, video game sales exceed movie ticket sales. But the video game industry has grown at an average rate of 17 percent per year in the last four years, compared with 4 percent for movies, and if these trends continue, video games will overtake movies in a decade.[39] Whether they do or do not, what is striking is how these software platforms coupled to specialized computers have revolutionized home entertainment.

Console Makers

At the software platform level, the video game industry is far less concentrated than the PC industry. In 2004, Sony's PlayStation (1 and 2) accounted for about 65 percent of both console and game sales worldwide. Xbox was second in console sales, with a 17.6 percent share, and had a 15.5 percent share of software sales. And Nintendo's GameCube also had a 16.9 percent share of console sales, which well exceeds Apple's 4 percent share in PCs.[40]

Though there has generally been a clear leader among each crop of new consoles, none has attained shares like those enjoyed by Microsoft in PCs. Why not? After all, video games have the same sorts of network effects: users like platforms with more games, and developers like

States, for example, rating is done by the Entertainment Software Rating Board. There are similar organizations in many other countries, including Japan, Australia, and Germany. http://en.wikipedia.org/wiki/Entertainment_Software_Rating_Board "Patti Waldmeir: Cyber World is Heading for Regulation," March 30, 2005.

39. "Global—Movies & Entertainment—Market Value," Datamonitor Market Research Profiles, May 1, 2004; "Worldwide Videogame Forecast and Analysis, 2001–2006" (IDC report no. 26906), 2002, table 20 (derived 2000 revenues from growth percentage and 2001 numbers).

40. "Worldwide Videogame Hardware and Software 2004–2008 Forecast and Analysis: Predicting the Future (IDC report no. 31260)," May 2004; "Worldwide Client and Server Operating Environments 2004–2008 Forecast: Modest Growth Ahead" (IDC report no. 34599), December 2005. Apple's share is 3.7%.

platforms with more users. There are scale economies in software plat-
forms and scale and learning economies in console production.

We can see at least three reasons.

First, there has been less demand by customers for standardization of
video game consoles. People don't use these devices for the sort of col-
laborative work that requires file sharing on PCs and that places a
premium on compatibility. If Billy has a PlayStation, he might actually
prefer that his buddy Johnny buy an Xbox; that way Billy will get to
play a new set of games. In addition, games aren't like word-processing
packages that people keep upgrading. Game players like diversity, just
as moviegoers and television watchers do. Indeed, until the PlayStation,
console vendors explicitly rejected backward compatibility to differenti-
ate new products from old ones; that stands in sharp contract to the
considerable investments Apple and Microsoft regularly make to ensure
that new versions of their operating systems are able to run old appli-
cations. As the stock of games increased, console makers realized that
some game players didn't want to lose their entire investment in games
or to have to maintain two consoles. Nevertheless, as the leap-frog
competition in this industry shows, consumers care far more about "new
features" than backward compatibility of their games or having the same
console as their friends do. The demand for product differentiation coun-
ters direct network effects and makes it hard for a single platform to
emerge triumphant and secure.

A second reason why console leaders' shares have stayed well short of
100 percent is related to their basic business model. By pricing consoles
low (at or below manufacturing cost) and relying on games (their own
and third parties') for profit, they have been able to weaken consumers'
resistance to buying new consoles before the full set of compatible games
is known.[41] Because consoles are both differentiated and relatively cheap,
there is significant multihoming on the consumer side in this market: 60

41. It is worth noting just how much cheaper these consoles are than similarly
equipped PCs. The Xbox 360, for instance, comes with a Power PC processor,
500 megabytes of memory, and an operating system that allows users to play
movies and connect to the Internet. At $399, it is around a tenth of what a sim-
ilarly powerful Apple PC costs. See the prices for Apple Power Mac G5 at
http://store.apple.com/, checked August 22, 2005.

Table 5.1
Technical Specifications for Selected Consoles

Console	CPU Width	CPU Speed	Memory	Media	Release Date
Atari VCS 2600	8-bit	1.19 MHz	128 bytes	4 kb	1977
NES	8-bit	1.79 MHz	2 kb	0.5 Mb	1983
Genesis	16-bit	7.61 MHz	64 kb	4 Mb	1989
SNES	16-bit	3.58 MHz	128 kb	6 Mb	1991
PlayStation	32-bit	33 MHz	2 Mb	CD (650 Mb)	1994
Saturn	32-bit	2×28.6 MHz	2 Mb	CD (650 Mb)	1994
N64	64-bit	93.75 MHz	4 Mb	64 Mb	1996
Dreamcast	128/64-bit	200 MHz	16 Mb	1 Gb	1998
PlayStation II	128-bit	300 MHz	32 Mb	DVD (4 Gb)	2000
Xbox	128-bit	733 MHz	64 Mb	DVD (8 Gb)	2001
Game Cube	128-bit	485 MHz	40 Mb	1.5 Gb	2001

percent of American households who play video games own more than one console.[42]

Last, technology has moved fast enough (Table 5.1) that using technological advances to make significantly better consoles and games has helped console makers displace or least seriously challenge the leading platform maker several times in the short history of the industry. From 1989 to 1994, Sega's Genesis machine was clearly the leading console, but it was displaced by the Nintendo Super NES shortly after its 1995 launch. After a very brief reign, the Super NES was outsold by the PlayStation in 1996. The PlayStation led the market until 2001, when it was replaced by the PlayStation 2, which, as this is

42. "Tales of the Gamer: IDC's 2004 Videogamer Survey" (IDC report no. 31760), September 2004, fig. 7.

written (just after the Xbox 360 launch), remains the market leader.[43] Network effects don't always favor incumbents: a hot new console can attract consumers because it plays a few great games, or it can attract game developers because they can obtain its software platform and development tools to write great games at reasonable cost, or both. Once both sides race to climb on board a hot new platform, there is little a market leader with an inferior platform can do to lure them back.

The software platform has become an important part of this competition. As we have seen above, Xbox placed unprecedented emphasis on the software platform. Although many see Sony's strategy as quite different because it emphasizes hardware capabilities, a closer look makes it clear that PlayStation's appeal to developers also rests on the extensive software development tools that Sony and licensees provide.[44]

Game Developers and Publishers

Since Activision began writing third-party games in 1979, this niche in the ecosystem has grown rapidly (Table 5.2). By 2005, the bulk of games were developed by third-party publishers. Nintendo, for example, developed only 10 percent of the games currently available for its GameCube and Sony only 9 percent for its PlayStation 2.[45]

Electronic Arts

Electronic Arts (EA) was founded by entrepreneur Trip Hawkins after he left Apple Computer in 1982. EA started as a game developer for the PC platform and, having observed the 1983 video game crash, ignored Nintendo's NES console initially. Later Hawkins admitted his mistake, and EA entered the console gaming market in 1990 as a licensee of Sega's Genesis.

Today EA is the world's largest video game publisher, with 2005 fiscal year sales of $3 billion and market capitalization in 2005 of over $16

43. IDC reports nos. 31260, 29404, 28282, and 26906; "Video Game Consoles: Sony, Nintendo and Sega Brace for Microsoft Challenge," *In-Stat*, December 2000, table 2.

44. See, for example, "Video Games: A Serious Contest," *The Economist*, May 8, 2004.

45. http://www.us.playstation.com/gamefinder.aspx; http://www.nintendo.com/gamelist.

(continued)

billion.[46] It supports all major gaming platforms: PC, Xbox, PlayStation, and GameCube. It also runs its own Internet gaming Web site, Pogo.com, that provides small Internet games for brief entertainment.

Hawkins's key innovation was the so-called Hollywood model of game production. At a time when game developers were not well rewarded by their employers, he decided to treat them as artists. He attracted top development talent by offering attractive bonuses and introducing the practice of printing the authors' names clearly and visibly on game packages, to some extent imitating album covers in the music industry. In general, EA paid more attention to the packaging and marketing of games than its rivals. By careful management of the creative process, coupled with creative marketing, EA transformed game development into the complex process we see today. Games are no longer created only by programmers: video layout artists, sound and music directors, and script editors are also employed, as well as marketing specialists.

EA's other major innovation was the introduction of sports tie-ins. It began by paying the modest sum (by today's sports industry standards) of $25,000 to legendary NBA star Julius Erving for using his image in a basketball game. Today EA owns the rights to several extremely profitable sports game franchises (NBA Live, Madden NFL, FIFA soccer, and others), some of which are exclusive, others of which are shared with competitors. For example, in December 2004, EA obtained from the NFL the exclusive rights to publish games using the league's image and that of its players for five years, in exchange for an amount speculated to be in the neighborhood of $300 million. In contrast, the NBA has licensed the rights to produce basketball games to EA, Take Two Interactive, Sony, and Atari. EA is rumored to have paid up to $20 million each for the rights to both the *Harry Potter* and the *Lord of the Rings* franchises.[47]

EA operates nine in-house development studios around the world. In addition, it frequently publishes games from independent studios that lack the capital and marketing savvy necessary to go it alone. Sometimes EA buys out promising studios altogether and creates episodic franchises based on their successful games. For example, it bought Origin Systems Inc. in 1992, and after the success of Ultima Online, released in 1997, it decided to focus Origin on building the Ultima franchise, the latest incarnation of which is Ultima IX: Ascension.

46. http://en.wikipedia.org/wiki/Electronic_Arts; Yahoo! Finance Electronic Arts, August 22, 2005.

47. Kent, *The Ultimate History of Video Games*, pp. 260–266; http://money.cnn .com/2004/01/20/commentary/game_over/column_gaming/?cnn = yes.

Table 5.2
United States Third-Party Game Developers

Publisher/ Developer	2004 Revenues[48] (millions)	Platforms Supported (no. of titles)[49]	Hit Titles
Electronic Arts	$444	GameCube (74); PS 2 (121); Xbox (80); PC (15)	NBA Live (2003: GC, PS2, Xbox), 007: Agent Under Fire (2003: GC, PS2, Xbox)
Nintendo of America	$231	GameCube (53); PS 2 (0); Xbox (0)	Super Mario Sunshine (2002: GC); Donkey Kong Jungle (2005: GC)
THQ	$133	GameCube (40); PS 2 (55); Xbox (30); PC (23)	SpongeBob SquarePants: Battle for Bikini Bottom (2003: GC, PS2); Evil Dead (2002: PS2, Xbox)
Activision	$125	GameCube (35); PS 2 (43); Xbox (40); PC (43)	Spiderman (2002: GC, Xbox); Tony Hawk's Underground (2003: GC, PS2, Xbox)
Sony[50]	$116	GameCube (0); PS 2 (98); Xbox (0)	EverQuest Online Adventures (2003: PS2)
Konami	$77	GameCube (21); PS 2 (69); Xbox (20); PC (22)	Yu-Gi-Oh! (2003: GC, PS2, Xbox); Dance Dance Revolution Extreme (2004: PS2, Xbox)
Sega	$69	GameCube (29); PS 2(42); Xbox (34); PC (7)	ESPN College Hoops (2003: PS2, Xbox); SEGA Sports NHL 2K3 (2002: GC)

48. Piper Jaffray, "The Video Game Iindustry."

49. http://www.nintendo.com/gamelist; http://www.us.playstation.com/ gamefinder.aspx; http://www.xbox.com/en-US/games/catalog.htm; http://www. sega.com/home.php?hsid=235711; http://www.ea.com/home/ pccd.jsp?src=11001hometab5linknone; http://www.activision.com/en_US/ game_list/game_list.jsp; http://www.konami.com/gs/, http://www.konami.com/ gs/; http://www.namco.com/platform/pc/; http://www.microsoft.com/games/pc/ default.aspx.

50. Includes games published by SCEA and Sony Online Entertainment.

Table 5.2
(continued)

Publisher/ Developer	2004 Revenues[48] (millions)	Platforms Supported (no. of titles)[49]	Hit Titles
Midway	$59	GameCube (4); PS 2 (40);Xbox (31); PC (4)	Mortal Kombat (2002: GC, PS2, Xbox); MLB Slugfest (2002: GC, PS2, Xbox)
Microsoft	$58	GameCube (0); PS 2 (0); Xbox (53); PC (42)	Project Gotham Racing (2003: Xbox); Amped: Freestyle Snowboarding (2001: Xbox)
Namco	$57	GameCube (16); PS 2 (44); Xbox (11); PC (5)	SoulCalibur II (2003: Xbox); Moto GP (2000: PS2, Xbox)

Most video game developers write games for several competing platforms (that is, they multihome), as shown in Table 5.2. Often they will write a game for one platform and, if it is successful, port it to other platforms. This happens much more in video games than it does in software applications because there are comparably large markets on multiple consoles.

Technical progress in hardware has made it possible to write and play increasingly sophisticated games. As a consequence, the game development process has become longer and more complex. During the early days of Atari (1977–1982), individual developers sometimes produced games in as little as 3 months. A quarter-century later, video games are developed by large teams of software engineers, 3D graphic designers, and sound artists. These teams may devote 18 months or more to a single game. For example, reportedly more than 100 developers are currently working on Halo 3 for Xbox 360. Developing a video game is becoming more like producing a movie with extensive special effects than like writing a typical software application.

The tools used in the development process have also become more sophisticated. In the early days, game developers wrote in assembly language and worked directly with the console. As the

hardware platforms, software platforms, and the games themselves have become more complex, the modeling, graphics and design work, and actual coding have moved to workstations or PCs. Developers use higher-level programming languages, development tools, and software libraries provided by the console's manufacturer or third-party firms. Development tools include development environments emulating the upcoming console's capabilities (usually a modified console plus a PC), APIs, documentation, demos that can be used as prototypes, and more.[51]

Console manufacturers generally price the assistance they provide developers just to cover costs. In addition, in exchange for a modest fixed licensing fee (approximately $12,000 for PlayStation 2) covering administrative costs, developers and publishers can get technical information about the console and the right to sell their products to licensed game developers.[52] The provision of good development aids at attractive prices is one of the major ways of getting and keeping developers on board the platform. Particularly intense efforts go into providing game developers and publishers with development tools in a timely manner so as to allow the latter to maximize the number of attractive games ready at console launch.

Console makers use multiple channels and venues for reaching their development communities. At the industry's two most prominent events, the annual Electronic Entertainment Expo and the semi-annual Consumer Electronics Show, they expend large sums of money on lavish parties and fancy booths, which are used to showcase cool technologies, as a public relations vehicle and as a way to advertise their clout to game developers and (via the media in attendance) end users. Console makers also hold regular briefing sessions for licensees, with announcements and technical presentations regarding upcoming consoles, features, and business schemes, as well as some hands-on opportunities for developers in attendance.

51. For example, Sony offers both a professional developer toolkit (T10K) and a Linux kit for PlayStation 2. See http://playstation2-linux.com/faq.php# Availability__When_Where_and_how_much.

52. http://www.tmstation.scei.co.jp/ps2/public/license.html.

Other creative initiatives abound. For instance, Sony launched a developer kit for hobbyists that it sent to college programmers eager to take a stab at game development for PlayStation 2. And Microsoft sent two key members of its Xbox team on a three-week worldwide evangelization tour to visit some forty game publishers, introduce and demonstrate the Xbox, and convince them to work with it.[53]

As with many economic activities, the growth, maturation, and increasing complexity of the game development process has led to a division of labor among specialist firms. Development studios do most of the actual game programming. Game publishers provide seed money, take responsibility for most of the financial risks associated with the marketing and distribution of games, and negotiate the licensing agreements with the console manufacturers. Some firms are integrated across this boundary, others cross it by contract. The contracts between a publisher and an independent development studio generally involve payments made by the publisher in the form of a cash advance and, in case a game is successful (if sales exceed a certain threshold), royalties ranging from 10 to 40 percent of the game's retail price, depending on the studio's reputation and self-financing ability.

A third category of firms has recently emerged, specializing in providing development tools and middleware to game developers. These products can significantly lower development time and costs and reduce the expertise required by developers in order to be able to program for a specific console. There are currently over fifty third-party providers of tools and middleware for the PlayStation 2 and over thirty for Xbox.[54] Their products range from 3D graphics APIs and console-specific compilers to speech recognition software and music playback systems.

Thus, as with PCs, a complex ecosystem of interdependent companies has developed around multisided platforms (Figure 5.1). The key difference is that several significant software platforms coexist.

53. http://www.xboxusersgroup.com/forums/showthread.php?t = 167.

54. http://www.tmstation.scei.co.jp/ps2/public/TM_liste.html http://www.xbox.com/en-US/dev/tools.html.
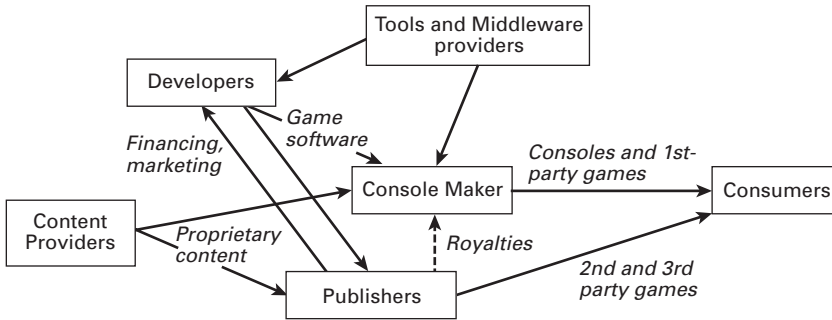
Figure 5.1
Platform ecosystem for consoles.

PC Games

As noted earlier, console gaming has led PC gaming in terms of revenues since the late 1980s. Nevertheless, PC gaming hasn't disappeared. It remains strong in some segments, particularly online gaming, which first appeared on the PC platform. In 2005, there were about 62 million online PC gamers in the United States.[55]

There are three main categories of PC games. Classic CD-based games usually focus on single-player experiences, although multiplayer support has become more common. Like sellers of any other software application, the publishers of these games receive revenue only from CD sales. Not surprisingly, they suffer from extensive piracy.

Games in the second category, known as massive multi-player online role-playing games (or MMPORPGs), are played online simultaneously by thousands of users 24 hours a day, 7 days a week. They are the most expensive PC games to develop, with budgets ranging from $5 million to $30 million. They are hosted on the publishers' servers. Users pay a fixed fee to buy the game CD, usually around $50, after which they are charged monthly subscription rates, typically between $6 and $15.

55. http://blogs.zdnet.com/ITFacts/?p=920156. Another option chosen by Real, for example, is to allow users to play the full version for free but for a limited time only.

Web-based games, the third category, are short, fun, and easy to learn, designed to appeal to casual gamers (think office employees playing during coffee breaks). And they have become the most popular form of entertainment on the Internet. These games range from Solitaire, Tetris, and Collapse to arcade classics and word puzzles. They are most commonly Java applications played through a browser, which can be accessed through sites such as Electronic Arts' pogo.com, Real's Real One Arcade, and Shockwave.com. The basic version of the game is usually free and designed to whet the appetite for the full version, for which the publisher charges a one-time fixed fee for unlimited play thereafter. Upgrade rates from free downloaders to paying customers are low (between 1 and 5 percent), and game sites have turned to advertising as a source of revenue.

As with console games, there are development studios, game publishers, and middleware providers involved in developing PC games. Most firms in each of these three segments are active on both platforms, consoles and PCs. All this makes for a rather rich ecosystem around the PC gaming platform, similar to the console ecosystems but with several new actors. We illustrate it in Figure 5.2.
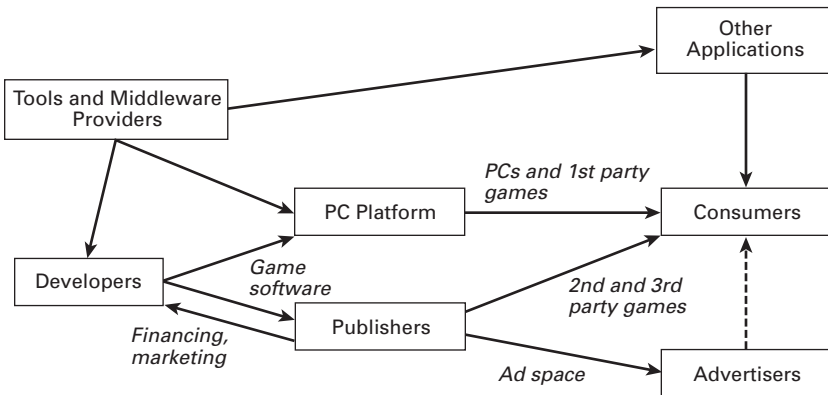
Figure 5.2
Platform ecosystem for PC games.

PC versus Consoles: Platform Competition

At first glance it is quite surprising that the PC and console gaming platforms have coexisted for a long time by the standards of computer-based industries, even though they employ radically different business models. A closer look suggests a straightforward economic explanation.

As two-sided platforms, PCs and consoles compete for both game developers and game users. The most obvious difference is on the developer side: PCs are open platforms, while developing games for a console requires access to proprietary information supplied by its vendor, as well as the payment of royalties. On the other hand, thanks to the gatekeeper role played by console vendors, console games compete against fewer titles (there are approximately ten times more PC game titles) and are not "diluted" into the mass of low- to mediocre-quality games that flood the PC market. On the PC side, games are only one category of application among many. Nonetheless, games are an important category of PC applications, and PC software platform vendors have accordingly been interested in attracting them. Perhaps the best illustration is Microsoft's development of the DirectX collection of APIs specifically geared for PC game development, discussed earlier.

There is much multihoming by both developers and users. Most publishers of console games are also very active in the PC game business. For example, in June 2006 the Electronic Arts Web site listed fifty-two games on CD for PCs, fifty-four games for Xbox, and fifty-four games for PlayStation 2, with at least fifteen titles available on all three platforms. Similarly, 91 percent of console gamers who own a PC also use their PC for playing games.[56] These facts suggest that consumers and therefore developers value the different features offered by these alternative platforms. They like variety.

From the point of view of users, the game technologies are quite different. PC games use a keyboard and a mouse, whereas consoles use a controller and/or a joystick. The latter are more suitable for "fast twitch"

56. Coughlan, "Competitive Dynamics in Home Video Games."

games, and it is thus not surprising that console game developers generally focus on racing and shooting games. Strategy games such as Civilization, by contrast, are available exclusively on PCs. Another interesting source of differentiation on the consumer side is that consoles are naturally geared for a more social gaming experience: most people play console games in the living room, often with friends or family competing against each other. By contrast, PC games are more solitary experiences: users sit alone in front of a computer and play either against the machine or against other players in remote locations.

Thus the PC and console gaming platforms offer rather different experiences to end users, with many enjoying both, and game developers seem to find it easy to participate in both ecosystems. As long as both sides of the market continue to benefit from both platforms, both platforms will survive. This is consistent with a more general pattern that we will see in later chapters: when consumers value product differentiation and platforms can offer innovative and unique features, multiple platforms can coexist despite indirect network effects that make bigger better.

Online Games

Lured by the prospect of profits that a subscription-based online service could create for a video game console, Nintendo was the first to get into online games, back in 1988, with the Famicom, the Japanese version of the NES. Nintendo sold a $100 modem, which allowed the Famicom to hook up to a telephone line. With this connection, Famicom users could play games with each other and also get stock prices, make purchases, read news, or do the many things one does on the Internet nowadays. Despite the potential to become a nascent online community in Japan, the Famicom network failed. Only 130,000 households purchased the modem, and only a fraction of those ended up using the services. Sega also sold a modem peripheral for the Genesis that allowed players to compete against each other via the phone lines, but it wasn't a great success either.[57]

57. Ibid.

Microsoft and Sony have started online gaming platforms more recently. They have gotten multiple sides on board and are growing rapidly. They have adopted different strategies in doing so.

Microsoft built an integrated, centralized, closed platform, Xbox Live, that provides a variety of services to both users and game developers. Developers must comply with Microsoft's technical specifications and cannot rely on their own online infrastructure. At the same time, they can benefit from a host of features built into Xbox Live: matchmaking, authentication, friends service, statistics storage, content delivery, and, most notably, support for voice communication. Meanwhile, users, who pay about $50 a year for a subscription, benefit from a centralized service with a consistent interface across games.

Sony, by contrast, has chosen an open approach for its online gaming platform. It simply supplies the network and the security system, as well as the option to host third-party games on its servers. However, it leaves the task of providing additional features such as matchmaking to individual developers. This approach works for big publishers such as Electronic Arts that can use their existing infrastructures, but not for many smaller publishers. Because each developer can add its own features, this approach results in fragmentation of the platform, and each publisher offers a few games for its "flavor" of the platform.

Platform Expansion

The guts of any game console are basically the same as those of a PC. Video game platform vendors have long realized that their consoles are capable of much more than just playing games. Since the start of the industry, some vendors have looked to expand the functionality of their machines and to invade formerly separated markets. As we discussed above, for instance, in 1988 Nintendo launched the Family Computer Communications Network System in Japan. A modem and a special cartridge allowed the Famicom console to interact with other networked Famicoms and with computers. This ultimately unsuccessful system offered users services such as online stock trading, banking, travel reservations, and game-related information.

The most radical expansions occurred in the early 2000s. Industry experts dubbed the Sony PlayStation a Trojan horse for taking control of the living room. The PlayStation and Sega's Dreamcast could play music CDs, while Xbox and PlayStation 2 are capable of playing movies as well as music, both on DVD and on traditional CD-ROM formats. In 2003, Sony launched PlayStation X, a souped-up version of PlayStation 2, including a hard-disk–based video recorder, satellite and analog TV tuners, and photo album and music playback features. Pushing the limits even further, the Xbox 360, which went on the market in late 2005, can check email, surf the Internet, and record television programs, as well as connect with the version of Windows that Microsoft has developed for home entertainment use.[58] Not to be outdone, PlayStation 3, due in November 2006, will be an even more powerful home computer, making all PlayStation 2's features available in high definition and adding the ability to connect to various consumer electronics devices.

This is all part of the continuing quest for the living room, to which we return in Chapter 12.

INSIGHTS

· The console video gaming industry operates a radically different business model from other software platform industries. Game manufacturers tightly integrate hardware and software systems; they offer consoles to consumers at less than manufacturing cost, and they earn profits by developing games and charging third-party game developers for access to their platforms.

· In 1977, Atari's VCS 2600 established this "razor/blade" strategy, by pricing that encouraged people to buy the console (the razor) so that Atari could earn profits from the sale of games (blades) to them.

58. "Microsoft Gambles With Xbox 360," *Wall Street Journal*, May 13, 2005; "Power-Packed Chatty Xbox," *The Australian*, May 17, 2005.

· In the early 1980s, Nintendo was the first to embrace the now-standard two-sided business model; it recruited independent third-party game developers by offering them a 20 percent royalty on game sales while imposing procedures to control game quality.

· The PC and console video game platforms have maintained opposite business models, even though many game developers and others participate in both ecosystems. This has been possible because the two platforms offer products that users consider significantly different.

· Video game consoles have greatly expanded beyond games and have become platforms for all kinds of home entertainment with the addition of such features as DVD playing and recording capabilities, photo management, Internet access, and on-line shopping.

Invisible Engines

How Software Platforms Drive Innovation and Transform Industries

By: David S. Evans, Andrei Hagiu, Richard Schmalensee

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