



## Nintendo's "Revolution"

*Sangbeom Kim, Ian Lamont, Hiroshi Ogasawara, Mansoo Park, Hiroaki Takaoka*

Satoru Iwata, president of Nintendo Corporation (Nintendo), strode from the conference room with a smile on his face. It was late 2004, and he was tremendously excited with what his engineers had just demonstrated — a video game controller that was not a variation of the joystick, but rather a stubby rod that a gamer could manipulate with one hand. Not only did it enable the creation of games that mimicked real-world movements like throwing, hitting, or aiming, Iwata believed it could help open up video games to a vastly different audience than the boys and young men who traditionally bought video game consoles.

Expanding the gaming industry's customer base was key to Iwata's vision of a next-generation console codenamed "Revolution." The idea was to bring tens of millions of new customers into the gaming realm, people who had never played video games before or saw them as mere toys. Iwata believed that a new take on gaming might even attract mothers — an influential household constituency, thanks to their influence over household spending<sup>1</sup> — through a combination of hardware design, game-play, and price. What better way to attract them than through a controller that had a form factor similar to a TV remote control?

But Iwata's enthusiasm for the controller prototype was tempered by a number of real-world considerations. First, no other company had ever released such a controller. How would the marketplace react to such a vastly different model? Second, many of the technologies that were required to make the rod controller work — such as wireless positioning — might never operate perfectly outside of the lab, in people's apartments and homes. Third, any new Nintendo controller

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<sup>1</sup> American Express Everyday Spending Index, via Ashish Rajan, "Convenience Drives Cards," *CardTrak.com*, March 13, 2000. Accessed via [http://www.cardtrak.com/news/2000/03/13/convenience\\_drives\\_cards](http://www.cardtrak.com/news/2000/03/13/convenience_drives_cards) in June 2011.

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had to be backwards compatible with games made for older Nintendo consoles like the GameCube, which used traditional two-handed controllers.

Additionally, Iwata was very sensitive to the reaction of the gaming industry and the existing gaming population to a non-traditional product aimed at a non-traditional audience. Nintendo had a long history of video game success, epitomized by the popular *Mario Bros.* franchise invented by Nintendo's game design guru Shigeru Miyamoto in the 1980s. However, the company's last console, the GameCube, was unable to get sufficient traction after it was launched in 2001. In 2002, sales forecasts for the GameCube had been off by 44% and the company had been forced to cut revenue targets by ¥100 billion.<sup>2</sup> Gamers much preferred Sony's PlayStation 2 console and Microsoft's Xbox console,<sup>3</sup> which were characterized by flashy graphics and hardcore fighting and sports titles. Iwata needed a home run to put Nintendo back on its feet. Could the Revolution's radical hardware design help turn the company's fortunes around?

## History of Video Games

### 1960s-1970s

Video games have been around since the early 1960s. In 1962 MIT students Steve Russell, Martin Graetz and Wayne Witaenem developed *Spacewar*, the first video game. *Spacewar* marked the first time that computer graphics were used in a game. It quickly gained popularity among hackers and computer geeks,<sup>4</sup> but never had a mainstream audience, owing to the fact that most people did not have computer access.

In the late 1960s, Alan Kay developed the Dynabook, an early personal computer, which was targeted at children. The Dynabook concept set the stage for both the PC and computer game revolutions in the 1970s.<sup>5</sup> The first game console was the Magnavox Odyssey, developed by engineer Ralph Baer as a side project in 1972.<sup>6</sup> The following year, U.S.-based Atari launched a simple table tennis game called *Pong* in the United States, which could be hooked up to a TV set.<sup>7</sup> It was a hit. In 1977, the company released a more sophisticated game console, the Atari 2600, which let users load different games into the system using rectangular cartridges. It was an even bigger hit, selling more than 30 million units.<sup>8</sup>

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<sup>2</sup> David Teather, "Nintendo in Sales," *The Guardian*, March 8, 2003. Accessed from <http://www.guardian.co.uk/technology/2003/apr/08/business.onlinesupplement> in December 2010.

<sup>3</sup> Ibid.

<sup>4</sup> MIT 150 Exhibition "Spacewar! Steve Russell, Martin Graetz, and Wayne Witaenem, 1961–1962." Accessed from <http://museum.mit.edu/150/25> in May 2011.

<sup>5</sup> Pete Markiewicz, "Plyojump - Computer History." Accessed from [http://www.plyojump.com/classes/microcomputer\\_era.html](http://www.plyojump.com/classes/microcomputer_era.html) in May 2011.

<sup>6</sup> Philip Likens, "Ralph Baer: The Magnavox Odyssey." Accessed from <http://deptof.com/?p=185> in May 2011.

<sup>7</sup> Pete Markiewicz, "Plyojump - Computer History - Computer and Console Games (1952-Present)." Accessed from [http://www.plyojump.com/classes/computer\\_games.html](http://www.plyojump.com/classes/computer_games.html) in May 2011.

<sup>8</sup> Geoff Edgers, "Q&A: A Talk with Nick Montfort: Atari and the Deep History of Video Games," *Boston Globe*, March 8, 2009. Accessed from [http://www.boston.com/bostonglobe/ideas/articles/2009/03/08/a\\_talk\\_with\\_nick\\_montfort/](http://www.boston.com/bostonglobe/ideas/articles/2009/03/08/a_talk_with_nick_montfort/) in December 2010.

Japanese companies took notice. In 1977, Nintendo released a Pong knockoff called Color TV Game 6 ("6" referred to the number of variations of the game that players could select). It sold more than 1 million units.<sup>9</sup> In 1978, Taito launched an arcade game called *Space Invaders*. The game, designed by Tomohiro Nishikado, was one of the first video games to feature shooting, and helped expand the video game industry from a novelty to a global industry.<sup>10</sup> In 1980, Atari licensed the game from Taito, which greatly boosted the 2600 console's sales and audience size.

### Global Expansion

Atari's business model — licensing titles, commissioning developers to write games, and developing other titles in-house — was not sustainable, especially as the 2600 console's 1977-era technology became dated. As it faded in the early 1980s, Japanese companies took the lead in developing gaming hardware and software for both mobile and console systems.

In 1980, Nintendo launched "Game and Watch," which was the first handheld game device inspired by an LCD calculator and digital watch.<sup>11</sup> Later in the decade, the company would release the Game Boy, which dominated the hand-held gaming market for years.

Nintendo's console foray was even more successful. It developed the Famicom (short for "Family Computer") in Japan in 1983. Titles such as *Mario Bros.* and a console version of the arcade hit *Donkey Kong* made the Famicom hugely popular in Japan. In 1985, Nintendo released the Famicom worldwide as the Nintendo Entertainment System, or NES.<sup>12</sup> (See **Exhibit 1**.) The NES console had a different exterior casing than the Famicom's, but the components inside were nearly identical. It was a runaway success, selling 62 million units worldwide.<sup>13</sup>

Key to Nintendo's success was the company's control over third-party software developers. Nintendo encouraged third-party developers to create games for the wildly popular NES, as long as they agreed to produce no more than five games per year, and not produce titles for any other console system for two years.<sup>14</sup> Nintendo would manufacture approved titles on NES-compatible game cartridges and sell them back to developers, who would then market and distribute the games. The system encouraged the development of innovative new titles and more NES sales. By 1989, video games were a \$3.4 billion market in the United States, and Nintendo claimed a 79% market share.<sup>15</sup>

<sup>9</sup> Wikia Gaming, "Nintendo: Color TV Game 6." Accessed from [http://nintendo.wikia.com/wiki/Color\\_TV\\_Game\\_6](http://nintendo.wikia.com/wiki/Color_TV_Game_6) in June 2011.

<sup>10</sup> Tony Gray, "Hooked on Space Invaders," *The Sydney Morning Herald*, September 9, 1980.

<sup>11</sup> Sally Solo, "The Best Toys Come in Square Packages," *United Press International/Times Daily*, November 27, 1983.

<sup>12</sup> "Top 25 Video Game Consoles of All Time," *IGN.com*. Accessed from <http://www.ign.com/top-25-consoles/> in December 2010.

<sup>13</sup> Ibid; Nintendo Co., Ltd.: Consolidated Sales Transition by Region. Accessed from [http://www.nintendo.co.jp/ir/en/library/historical\\_data/index.html](http://www.nintendo.co.jp/ir/en/library/historical_data/index.html) in June 2011.

<sup>14</sup> J. Rader, "Background: Atari Games Corp. v. Nintendo of America Inc. U.S. Court of Appeals, Federal Circuit, September 10, 1992." Accessed via <http://digital-law-online.info/cases/24PQ2D1015.htm> in June 2011.

<sup>15</sup> George Tibbets, "Nintendo Has Strategy to Keep its Lead in Toy Industry," *Associated Press/Pittsburgh Post-Gazette*, December 25, 1989, page C18.

Nintendo wasn't the only company to profit. Several American game studios grew very successful businesses creating games using the Nintendo model until lawsuits from shut out developers and an antitrust investigation forced Nintendo to discontinue exclusivity requirements.<sup>16</sup> Nevertheless, the third-party developer model was established as an extremely profitable and effective way to sell games — and consoles.

### A Technological Arms Race

Nintendo began to face strong competition from Tokyo-based Sega, which released a 16-bit console called Genesis in 1989. There was also growing competition from PC games, including new role-playing titles such as *Ultima*, which took advantage of rapid advances in semiconductor technology as well as the huge distributed base of PCs running on Microsoft Windows. Additional PC technology enablers included 256-color VGA graphics cards and "Sound Blaster" cards for audio.

Increasingly, games and game consoles began to compete on underlying technological advancements, enabled by exponential advances in computing technology. Blocky 2D graphics and limited sound effects had been replaced by slick 3D environments, stereo audio, and even high-quality CGI "cutscenes" that featured the voices of actors recorded in professional sound studios.

Even though the modern consoles were roughly the same size as their late-1970s counterparts, the hardware inside the machines had drastically changed. A video game console was essentially a computer with a niche purpose: letting users play games. Just like PCs and all other computers, video game consoles had a central processing unit (CPU), which carried out the various processing functions necessary to play games, including starting a new game, loading a new level, calculating scores, processing inputs from the controllers, and displaying the results on the screen. The power of early console processors was measured in "bits," or a binary digit (one or zero). The Atari 2600 had a 4-bit CPU, while the consoles of the late 1990s used faster 64-bit CPUs.

Modern consoles had an additional component, as well: graphics processing units (GPU), also known as graphics accelerators. A GPU was an extra processor that allowed the CPU to offload calculations and instructions required to render graphics on the screen. With powerful CPUs, GPUs, and sound cards, consoles could deliver more intense gaming experiences, including more realistic textures, weapons, backgrounds, characters, and monsters in 3D worlds.

### Diversification in the 1990s

As the hardware race heated up, Nintendo and Sega continued developing consoles. A second Nintendo console, the Super Famicom, or Super NES, was launched in the early 1990s and sold 49

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<sup>16</sup> L. Gordon Crovitz, "Rule of Congress Zaps Mario and Luigi With Killer Lawyers," *The Wall Street Journal*, January 17, 1990.

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million units globally.<sup>17</sup> Starting in 1989, the company released a series of innovative and ultimately successful handheld gaming products. The Super Game Boy even had an adapter for earlier NES and Super NES cartridges.

But not all of Nintendo's gaming efforts were successful. In 1995, Nintendo attempted to capitalize on a craze for early virtual reality technologies. It announced the first 3D graphic video game console, called Virtual Boy (**Exhibit 2**). The Virtual Boy used a head-mounted display to give users an illusion of depth in a simple monochrome virtual world. It was an ambitious project, but met with lukewarm reception in the market.<sup>18</sup>

Sega launched its 32-bit Saturn console in 1995,<sup>19</sup> but it did not fare well against the crop of graphically superior systems that were entering the market around the same time.<sup>20</sup> In 1996, Nintendo announced the Nintendo 64, the company's last home console to use cartridges (**Exhibit 3**). Later, Nintendo switched to a MiniDVD-based format for the GameCube. The Nintendo 64 sold about 5.5 million units in Japan and 33 million units worldwide<sup>21</sup> — an impressive feat, but not nearly as powerful an impact as Sony's PlayStation.

Sony entered the market on the software side with its Famicom game called *Captain ED* in 1989.<sup>22</sup> Initially, there was strong internal resistance to entering the video game business. Some in the company assumed that being associated with a toy would ruin the Sony brand. But an insightful Sony executive, a former engineer named Ken Kutaragi, had another idea. In 1990, Kutaragi proposed that Nintendo partner with Sony to co-develop a CD-ROM-based console that leveraged Sony's CD-pressing technology. Nintendo and Sony started work on the console, but Nintendo later backed out, fearing it was too risky to work with a potential competitor. Sony started to develop its own CD-ROM-based console, and in 1994 released the 32-bit PlayStation. Sony engineers managed to overcome the limitations of earlier systems by pricing the PlayStation lower than the previous CD-ROM-based game consoles like the NEC PC Engine.<sup>23</sup> The PlayStation's superior system performance, affordable price, and wide array of games were enough to turn the market upside down. It was the prelude of a new era in the console industry.<sup>24</sup>

Not all new competitors fared so well. In the mid-1990s, 3DO, an American company, developed a 32-bit console called the 3DO Interactive Multiplayer, and licensed the technology to three

<sup>17</sup> "Top 25 Video Game Consoles of All Time," *IGN.com*. Accessed from <http://www.ign.com/top-25-consoles/> in December 2010. Nintendo Co., Ltd.: Consolidated Sales Transition by Region. Accessed from [http://www.nintendo.co.jp/ir/en/library/historical\\_data/index.html](http://www.nintendo.co.jp/ir/en/library/historical_data/index.html) in June 2011.

<sup>18</sup> Mike Cameron, "Virtual Boy Is a Virtual Snore," *The Spectator*, September 21, 1995, page 11.

<sup>19</sup> "Top 25 Video Game Consoles of All Time," *IGN.com*. Accessed from <http://www.ign.com/top-25-consoles/> in December 2010.

<sup>20</sup> Ibid.

<sup>21</sup> Nintendo Co., Ltd.: Consolidated Sales Transition by Region. Accessed from [http://www.nintendo.co.jp/ir/en/library/historical\\_data/index.html](http://www.nintendo.co.jp/ir/en/library/historical_data/index.html) in June 2011.

<sup>22</sup> "Captain Ed," *GameFAQs*. Accessed from <http://www.gamefaqs.com/nes/579469-captain-ed> in May 2011.

<sup>23</sup> "SNES CD-ROM Console Information," *Console Database*. Accessed from <http://www.consolodatabase.com/consoleinfo/snescdrom/> in May 2011.

<sup>24</sup> Lev Grossman, "Ken Kutaragi: Gutenberg of Video Games," *Time*, September 27, 1993. Accessed from <http://www.time.com/time/subscriber/2004/time100/artists/100kutagari.html> in December 2010.

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manufacturers: Panasonic, Goldstar, and Sanyo. It initially received strong reviews, but the \$699 price was too high and there weren't enough games. The effort failed.<sup>25</sup>

Another American company that attempted to follow the licensing route was Apple, which partnered with Japanese manufacturer Bandai on the Pippin. The Pippin console, which launched in 1996 in Japan, North America, and Europe, ran on an Apple operating system but was an utter failure. It was later rated by *PC World* magazine as one of the “worst tech products of all time,” owing to its high price (\$600) and limited game selection. The product was withdrawn from the market in 1997.<sup>26</sup>

Besides the console wars, several technological trends also shaped PC gaming during the 1990s, including the introduction of faster processors and graphics cards as well as the spread of network connections via the Internet and local-area networks (LAN). First-person shooter titles such as *Doom* and *Quake* could be played over a LAN or Internet connection, and featured sophisticated 3D graphics. Another genre that began to gain steam was online role-playing games, such as *Starcraft* and the continuation of the *Ultima* series from the 1980s. By the late 1990s, sales of video games rivaled movie ticket sales.<sup>27</sup>

## Market Dynamics

### Competitive Trends in the Early 2000s

By the early part of the 2000s, video games were firmly entrenched in youth culture. A report published by the Pew Internet and American Life Project noted that in 2002, 60% of U.S. residents aged six and older played video games and more than 221 million games were sold.<sup>28</sup>

Clearly, games were a big business. Nintendo had fared well, outliving all of its early console competitors (Sega's last console was the Dreamcast, released in 1999<sup>29</sup>). But, Sony and Microsoft, two relative newcomers, threatened Nintendo's future in console gaming.

By this time, Sony dominated with its PlayStation 2 (which could play DVDs as well as game titles). Launched in 2000, it was designed to be backwards-compatible with all games from the original PlayStation console.<sup>30</sup> This meant it launched with a massive base of players, which expanded to 24

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<sup>25</sup> “Top 25 Video Game Consoles of All Time,” *IGN.com*. Accessed from <http://www.ign.com/top-25-consoles/> in December 2010.

<sup>26</sup> Dan Tynan, “The 25 Worst Tech Products of All Time,” *PCWorld*, May 26, 2006. Accessed from [http://www.pcworld.com/article/125772-6/the\\_25\\_worst\\_tech\\_products\\_of\\_all\\_time.html#pippin](http://www.pcworld.com/article/125772-6/the_25_worst_tech_products_of_all_time.html#pippin) in December 2010.

<sup>27</sup> P.J. Huffstutter, “Now Video Games Are as Big as the Movies,” *Los Angeles Times*, May 10, 1999. Accessed from <http://articles.latimes.com/1999/may/10/news/mn-35703> in June 2011.

<sup>28</sup> Steve Jones, “Let the Games Begin: Gaming Technology and College Students,” *Pew Internet & American Life Project*, July 6, 2003.

<sup>29</sup> “Top 25 Video Game Consoles of All Time,” *IGN.com*. Accessed from <http://www.ign.com/top-25-consoles/> in December 2010.

<sup>30</sup> Richard Stenger and Daniel Sieberg, “PlayStation 2 Makes Its North American Debut,” *CNN.com*, October 26, 2000. Accessed from <http://edition.cnn.com/2000/TECH/computing/10/26/ps2.main.story/> in July 2011.

million within three years as new titles were built for the PlayStation 2's superior graphics.<sup>31</sup> Sony was also battling Nintendo in mobile gaming. In 2004 the two companies released new handheld gaming systems. The Sony PSP was a portable device that had the most advanced graphics available for a portable gaming device. However, the Nintendo DS took a different approach to gaming, featuring two screens with more cartoon-like effects and simple game scenarios. While the PSP attracted attention from hardcore gamers, the DS was a hit with children, thanks to its easy-to-learn game-play and popular titles such as *New Super Mario Bros.*

Meanwhile, Microsoft was attempting its own aggressive push into gaming. In the 1980s and 1990s, Microsoft's gaming efforts centered on support for PC game publishers and its own *Flight Simulator* franchise. That changed with the launch of the original Xbox in 2001. The Xbox went head-to-head with Sony's PlayStation 2. Both consoles competed for hard-core gamers on hardware performance and graphics — popular titles like *Madden* and *Half-Life 2* tried to immerse players in realistic 3D environments, and depended on heavy-duty processing power and a constant stream of new titles to keep players hooked. In-game scenarios were getting longer and more sophisticated and, like their PC counterparts, they let players perform a wide range of functions using various combinations of input buttons on the controller. The games were clearly aimed at a hard-core audience of regular players.

Although Microsoft had never disclosed how much it spent developing the Xbox, analysts estimated it lost \$2 billion to establish the console in the market.<sup>32</sup> In terms of the two consoles' installed bases, Sony had a market share of 66% while Microsoft had just 22%.<sup>33</sup> Squeezed in-between these two aggressive competitors, Nintendo had to think through how to fight back.

In 2001, Nintendo released the GameCube console (**Exhibit 4**). It was housed in a plastic cube about the size of a lunchbox. Inside, it featured an IBM-designed "Gekko" processor and ATI "Flipper" GPU, and had an optical disc drive.<sup>34</sup> While adequate for basic 3D games and *Mario Bros.*, the hardware failed to measure up to the PlayStation 2 or the Xbox. Nintendo dismissed the criticism, saying that the simple design and emphasis on fun-to-play software like *Metroid Prime* and *Legend of Zelda* was an asset, and would help attract new gamers who were turned off by long, complex console games. Indeed, the GameCube's software, toy-like feel, low-powered hardware, and cheap price (\$200 at launch) appealed to families with younger children. However, many serious gamers derided it for its poor hardware specs and lack of compelling software.<sup>35</sup> It sold nearly 22 million units

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<sup>31</sup> Davide Dukcevich, "Monday Matchup: PlayStation 2 Vs. Xbox," *Forbes*, December 22, 2003. Accessed via [http://www.forbes.com/2003/12/22/cx\\_dd\\_1222mondaymatchup.html](http://www.forbes.com/2003/12/22/cx_dd_1222mondaymatchup.html) in June 2011.

<sup>32</sup> David Becker and Joe Wilcox, "Will Xbox Drain Microsoft?" *CNet News*, March 6, 2001. Accessed from [http://news.cnet.com/Will-Xbox-drain-Microsoft/2100-1040\\_3-253654.html](http://news.cnet.com/Will-Xbox-drain-Microsoft/2100-1040_3-253654.html) in June 2011.

<sup>33</sup> Davide Dukcevich, "Monday Matchup: PlayStation 2 Vs. Xbox," *Forbes*, December 22, 2003. Accessed via [http://www.forbes.com/2003/12/22/cx\\_dd\\_1222mondaymatchup.html](http://www.forbes.com/2003/12/22/cx_dd_1222mondaymatchup.html) in June 2011.

<sup>34</sup> "Nintendo's GameCube Technical Overview," *Dreamcast Technical Pages*. Accessed from <http://www.segattech.com/gamecube/overview/index.html> in June 2011.

<sup>35</sup> "Top 25 Video Game Consoles of All Time," *IGN.com*. Accessed from <http://www.ign.com/top-25-consoles/16.html> in December 2010.

worldwide before being discontinued.<sup>36</sup> By comparison, the PlayStation 2 sold an estimated 130 million units.<sup>37</sup>

## Two-Sided Networks

The video game industry was a classic example of a business based on network externalities. The more consoles that were sold, the more independent gaming studios were incented to develop new titles. This in turn increased console sales. Console makers could also sell their own titles, a tactic that had worked very well for Nintendo and its *Mario Bros.* and *Pokémon* franchises.

As the video game market was growing, hardware was typically sold at a loss right after launch in order to build a customer base. Once the customer base was established, software could be sold at a higher price and/or volume to make a profit. Average console costs dropped over time, as manufacturing scaled up, component costs declined, and the learning curve kicked in. Sony lost an estimated \$100-\$160 per PlayStation 2 when it was first launched, but reportedly made up for the loss with profits generated by selling game titles and accessories.<sup>38</sup> Microsoft also sold consoles at a loss, in order to establish a presence in the new industry.<sup>39</sup>

But the positive feedback loops required to make a successful console were hard to maintain.<sup>40</sup> First, a constant stream of new game titles was required to preserve the value of the console hardware, and convince gamers not to switch. If a platform failed to preserve a steady stream of new titles, negative feedback loops would kick in as gamers and developers abandoned the platform. Second, game development had become far more complicated in terms of game-play scenarios and technology requirements. In 1996, a typical PlayStation game cost \$1 million to develop and sold for \$49. By 2003, PlayStation 2 and Xbox games still cost \$49, but development costs had risen to between \$5 million and \$7 million per game. The high costs meant console companies, major game publishers and independent studios had to rely on a high degree of collaboration. These requirements dissuaded smaller studios from producing lots of titles, which created an additional drag on the network externalities that powered successful platforms. Third, independent game studios did not want the console market dominated by only Sony and Microsoft, as it reduced their bargaining power in profit-sharing negotiations. This dynamic was actually a boon to Nintendo — many third-party publishers wanted to help Nintendo with its next console effort, which served as an additional positive network effect for Nintendo.

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<sup>36</sup> Nintendo Co., Ltd.: Consolidated Sales Transition by Region. Accessed from [http://www.nintendo.co.jp/ir/en/library/historical\\_data/index.html](http://www.nintendo.co.jp/ir/en/library/historical_data/index.html) in June 2011.

<sup>37</sup> “Top 25 Video Game Consoles of All Time,” *IGN.com*. Accessed from <http://www.ign.com/top-25-consoles/> in December 2010.

<sup>38</sup> “The Game of War,” *Red Herring*, October 14, 2001. Accessed from <http://www.redherring.com/Home/2699> in June 2011.

<sup>39</sup> David Becker and Joe Wilcox, “Will Xbox Drain Microsoft?” *CNet News*, March 6, 2001. Accessed from [http://news.cnet.com/Will-Xbox-drain-Microsoft/2100-1040\\_3-253654.html](http://news.cnet.com/Will-Xbox-drain-Microsoft/2100-1040_3-253654.html) in June 2011.

<sup>40</sup> Tom Loftus, “Top Video Games May Soon Cost More,” *MSNBC*, June 17, 2003. Accessed from [http://www.msnbc.msn.com/id/3078404/ns/technology\\_and\\_science-games/](http://www.msnbc.msn.com/id/3078404/ns/technology_and_science-games/) in December 2010.

## Periodic Market Cycle

The video game industry had a five-year hardware cycle. Once a new game console was released, new game titles would be launched on their own cycles over the five-year period. Many were one-off titles that were nominally successful or, in some cases, lost money. Others were popular and generated sequels every two or three years. Some, such as popular sports titles, had new releases or expansion packs every year.

Since there were a limited number of developers or game publishers, early mover advantage existed for console manufacturers. And once software developers devoted resources to building game titles for one hardware platform, it was difficult for them to switch to another platform owing to different staffing or technical requirements. Furthermore, once gamers invested in one console, they were less likely to switch consoles owing to the additional cost.<sup>41</sup> These factors made it difficult for new hardware manufacturers to enter the market.

By the end of 2004, the competition was starting to approach the end of their respective five-year cycles. Sony and Microsoft would be launching replacements for the PlayStation 2 and Xbox in time for the 2005 holiday shopping season.<sup>42</sup> Following this same five-year hardware cycle, Nintendo would have a new console hitting the market in 2006.

## A History of Nintendo Management

### The Playing Card Era

Nintendo was established in 1889 by Fusajiro Yamauchi to produce handmade playing cards decorated with drawings of flowers, famous people, and other objects (**Exhibit 5**). The name of the company, when rendered in the Chinese script used in Japan, meant “luck-heaven-hall.” The company began selling ‘*Hanafuda*’ cards in two shops, one located in Osaka and the other in Kyoto, where Nintendo company headquarters are still located. The cards were a success, and the company rapidly expanded. It was run by Yamauchi’s extended family for more than 100 years.

At first, the company concentrated on the card business. But in 1959, with a young CEO named Hiroshi Yamauchi at the helm, Nintendo cut a licensing deal with Disney to have Disney characters printed on Nintendo’s playing cards, thus giving them a brand new look.<sup>43</sup> In 1963, Yamauchi shortened the Nintendo Playing Card Company’s name to Nintendo Company Limited,<sup>44</sup> signaling

<sup>41</sup> Tom Loftus, “Top Video Games May Soon Cost More,” *MSNBC*, June 17, 2003. Accessed from [http://www.msnbc.msn.com/id/3078404/ns/technology\\_and\\_science-games/](http://www.msnbc.msn.com/id/3078404/ns/technology_and_science-games/) in December 2010.

<sup>42</sup> Ina Fried. “Digging Profits Out of Xbox,” *Cnet.com*. August 10, 2005. Accessed from [http://news.cnet.com/Digging-profits-out-of-Xbox/2100-1043\\_3-5827110.html](http://news.cnet.com/Digging-profits-out-of-Xbox/2100-1043_3-5827110.html) in December 2010.

<sup>43</sup> Chris Kohler, “This Day in Tech: Success Is in the Cards for Nintendo,” *Wired*, September 23, 2010. Accessed from <http://www.wired.com>thisdayintech/2010/09/0923nintendo-founded/> in June 2011.

<sup>44</sup> “Nintendo History,” *Nintendo.co.uk*. Accessed from [http://www.nintendo.co.uk/NOE/en\\_GB/service/nintendo\\_history\\_9911.html](http://www.nintendo.co.uk/NOE/en_GB/service/nintendo_history_9911.html) in June 2011.

that the company would not limit itself to playing cards, and that it would soon enter other business domains. And so it did.

### Surviving as a Toy Company

In the early 1970s, Nintendo ventured into other businesses, including food and toys. One unexpected success in the late 1970s was Nintendo's "Ultra Hand," an extendable robotic arm designed by Gunpei Yokoi, an assembly line maintenance engineer working at Nintendo. Yamauchi saw that Yokoi had great ideas and engineering talent, and transferred him to product development where he came up with innovative products like a baseball throwing machine and a puzzle game. Eventually, Yokoi oversaw Nintendo's early video game efforts, including the arcade version of *Donkey Kong* and the Game Boy.<sup>45</sup>

### Nintendo Management Under Hiroshi Yamauchi

Nintendo's modern organizational structure was strongly influenced by the management style of the former president and CEO, Hiroshi Yamauchi, who led the company from 1950 to 2002. He was a member of the founding family.<sup>46</sup>

A charismatic leader with a strong vision of what the company could become, Yamauchi drove other family members from Nintendo's board soon after he became president and CEO. Nintendo was originally a family-owned and -managed company but Yamauchi thought it was necessary to change its culture.<sup>47</sup>

Yamauchi was a hands-on leader, apt to make quick decisions according to his vision for the company. He was always thinking of ways in which the company could please its customers, and welcomed the introduction of new ideas, experimentation, novel processes and products — including food, toys, and, eventually, video games. This attitude extended to other companies in the Nintendo ecosystem, as one engineer later described: "Nintendo is always trying to do something new and different. This message has been spread not only within Nintendo, but to other companies as well. As a result, our development partners have naturally tended to present us with new technologies and ideas."<sup>48</sup>

Yamauchi established a flat organizational structure at Nintendo. He wanted employees to focus on customer value, and he believed an organization free from bureaucratic rigidity was best suited to providing it. Decisions were to be made quickly. Notably, Nintendo under Yamauchi promoted a risk-taking culture, which was unusual for a large Japanese company. Therefore, when Iwata became

<sup>45</sup> Lara Crigger, "Searching for Gunpei Yokoi," *The Escapist*, December 25, 2007. Accessed from [http://www.escapistmagazine.com/articles/view/issues/issue\\_129/2744-Searching-for-Gunpei-Yokoi](http://www.escapistmagazine.com/articles/view/issues/issue_129/2744-Searching-for-Gunpei-Yokoi) in December 2010.

<sup>46</sup> "Nintendo History," *Nintendo.co.uk*. Accessed from [http://www.nintendo.co.uk/NOE/en\\_GB/service/nintendo\\_history\\_9911.html](http://www.nintendo.co.uk/NOE/en_GB/service/nintendo_history_9911.html) in June 2011.

<sup>47</sup> Takura Kura, "The Success and Failure of Nintendo," *Doushisha Business School*, December 2006.

<sup>48</sup> Kou Shiota, Nintendo, "Using State-Of-The-Art Technology in Unprecedented Ways," *Wii.nintendo-europe.com*, December 2006. Accessed from <http://wii.nintendo-europe.com/163.html> in December 2010.

president of Nintendo in 2002, the company was prepared to compete in a fast-moving, uncertain, and competitive environment.<sup>49</sup>

### Iwata's Influence

Iwata, an experienced game developer and former president of game studio Hal Laboratory, became president of Nintendo in 2002. Even though he was not a member of the founding family, Yamauchi believed Iwata was the right leader to take Nintendo into the new millennium.<sup>50</sup>

After becoming CEO, Iwata pushed for several changes in Nintendo's organizational culture. First, he asked Nintendo executives to think about what made initiatives succeed or fail. In his mind, the process was more important than the result. He pressed executives and employees over why certain business results had occurred. Even if sales were great, executives couldn't sit back and bask in their success —Iwata would demand to know the factors that had led to the positive outcome.<sup>51</sup>

This emphasis on understanding led to improved communication across departments. The company's strategy became better understood among the 1,300 rank-and-file employees, which resulted in more autonomy across the organization.<sup>52</sup>

Coming from outside of Nintendo, Iwata made it a rule to talk with staff and persuade them of his vision for the company. This practice created a culture of discussion in an organization that had previously been managed in a top-down way. This culture of discussion reinforced coordination among the company's software and hardware divisions, which had been established during the development of the Nintendo DS. This culture proved beneficial as the Revolution project got underway.<sup>53</sup>

### Revolution

While Hiroshi Yamauchi would never have been able to participate in the highly technical discussions that took place during earlier console development projects in the 1980s and 1990s, Iwata relished rolling up his sleeves for the Revolution project and diving into the problems with his top lieutenants and engineers. (See **Figure 1** for a description of the core product team.) “We brainstormed with each other from square one,” Iwata recalled. “We were all running into the same walls, and we made the critical decisions together. I talked with a lot of people, such as Takeda-san and Miyamoto-san, along the way at each juncture.”<sup>54</sup>

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<sup>49</sup> Takura Kura, “The Success and Failure of Nintendo,” *Doushisha Business School*, 2006.

<sup>50</sup> “The Stars of Asia: Satoru Iwata,” *BusinessWeek*, July 8, 2002. Accessed from [http://www.businessweek.com/magazine/content/02\\_27/b3790605.htm](http://www.businessweek.com/magazine/content/02_27/b3790605.htm) in June 2011.

<sup>51</sup> Kouji Sasaki, “Interview with Satoru Iwata,” *Nikkei Business*, November 27, 2006.

<sup>52</sup> “Turning the Tables: Asking Iwata,” [Wii.nintendo-europe.com](http://wii.nintendo-europe.com). Accessed from <http://wii.nintendo-europe.com/165.html> in December 2010.

<sup>53</sup> Kouji Sasaki, “Interview with Satoru Iwata,” *Nikkei Business*, November 27, 2006.

<sup>54</sup> “Turning the Tables: Asking Iwata,” [Wii.nintendo-europe.com](http://wii.nintendo-europe.com), December 2006. Accessed from <http://wii.nintendo-europe.com/165.html> in December 2010.

**Figure 1 Revolution Core Product Team**

Genyo Takeda	General Manager, Integrated Research and Development Division
Shigeru Miyamoto	General Manager, Entertainment Analysis and Development Division. Miyamoto was a legend in the industry for his software development work and design for games such as <i>Donkey Kong</i> and early NES titles such as <i>Super Mario Bros.</i> He had also worked on titles for the GameCube, including <i>Legend of Zelda</i> .
Kou Shiota	Integrated Research and Development Division, Product Development Department, Development Group No. 2. Shiota's specialty was semiconductor design. He, too, had worked on the GameCube.
Kenichiro Ashida	Integrated Research and Development Division, Product Development Department, Design Group. Ashida was a long-time Nintendo employee who had worked on the Super NES, Nintendo 64, and GameCube, and for the Revolution was responsible for the design of the console, controller, packaging, and logos.
Akio Ikeda	Integrated Research and Development Division, Product Development Department, Development Group No. 5. Ikeda had developed several games in the past that had used accelerometers and innovative interfaces.
Junji Takamoto	Integrated Research and Development Division, Product Development Department, Development Group No. 3. Takamoto was responsible for all hardware parts on the Revolution with the exception of the circuit board.

As planning began on Nintendo's next-generation gaming console in the months following the release of the GameCube, the team began to think about the core concepts that would underlie the project. Takeda described the typical development process for a new console:

As soon as we complete one system, we start thinking about the next one. Needless to say we don't design new components or technologies from scratch. Rather, we have to base our designs on existing technologies. In the world of technology, there are so-called Roadmaps (overviews of proposed technologies/products) that are used by each industry in order to make general forecasts about where semiconductor technology is heading, as well as the evolution of disc and wireless technologies. Engineers and developers normally refer to these Roadmaps while developing hardware.<sup>55</sup>

However, some Nintendo executives and engineers had begun to question the importance of traditional hardware preferences, such as faster processors, slick graphics, and sophisticated

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<sup>55</sup> "Using State-Of-The-Art Technology in Unprecedented Ways," *Wii.nintendo-europe.com*, December 2006. Accessed from <http://wii.nintendo-europe.com/455.html> in December 2010.

controllers. Even before the Revolution project, Miyamoto worked on a game called *Animal Forest*, which was launched for the Nintendo 64 console in 2001. He deliberately designed it to be easy to play and appeal to a wide range of people. Takeda had also considered non-traditional gamers in his earlier work on the GameCube, which had a controller with an extra large “A” button for inexperienced gamers. In 2003, Takeda proposed that the Revolution project should depart from the technological roadmap, believing that the performance arms race, which drove Sony and Microsoft’s console efforts, was ultimately futile for Nintendo:

After speaking with Nintendo’s development partners, I became keenly aware of the fact that there is no end to the desire of those who just want more. Give them one, they ask for two. Give them two, and next time they will ask for five instead of three. Then they want ten, thirty, a hundred, their desire growing exponentially. Giving in to this will lead us nowhere in the end. I started to feel unsure about following that path about a year into development.<sup>56</sup>

Iwata and the team began to discuss how best to approach the challenge of developing a console that would increase the population of gamers beyond its traditional customer base. Certain elements from the GameCube, including the CPU and GPU, could be upgraded for the Revolution, but other elements would have to be completely redesigned, based on new product concepts. By 2003, the team had identified several basic concepts for the console:

- The Revolution was not just a toy for children. The console had to be familiar enough to be played by all family members, right in the living room.
- It had to be designed in a way that it would be acceptable to mothers, as they have control over the living room in most households. This meant a small, polished design.
- The console should be inexpensive compared to rival products – namely, Sony PlayStation and Microsoft’s Xbox. Ideally, the price should be less than 10,000 yen (about \$100).
- Software should be easy enough to play so that every family member can play, even for a short time.
- The console would need to stay on for 24 hours, consume little electricity, and make little sound.<sup>57</sup>

There were other requirements, as well. Besides appealing to mothers, Nintendo had to entice partners, particularly developers. Further, the Revolution had to be backwards compatible with older GameCube games and even games from earlier Nintendo consoles, such as the Nintendo 64. This

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<sup>56</sup> “Using State-Of-The-Art Technology in Unprecedented Ways,” *Wii.nintendo-europe.com*, December 2006. Accessed from <http://wii.nintendo-europe.com/455.html> in December 2010.

<sup>57</sup> Ibid; “Wii Remote: Taking Control Back To The Drawing Board,” *Wii.nintendo-europe.com*, December 2006. Accessed from <http://wii.nintendo-europe.com/164.html> in December 2010; “The Big Ideas Behind Nintendo’s Wii,” *BusinessWeek*, November 16, 2006. Accessed from [http://www.businessweek.com/technology/content/nov2006/tc20061116\\_750580.htm](http://www.businessweek.com/technology/content/nov2006/tc20061116_750580.htm) in November 2010.

would help the Revolution launch with a back catalog, and would also appeal to loyal Nintendo customers who had invested in GameCube games.<sup>58</sup>

This new approach to console design was extended to the controller. Designer Kenichiro Ashida explained the evolution of his thinking about the controller:

I felt strongly that this would be a console that I, too, could enjoy. More specifically, I felt that it might be time to reconsider the entire game-play style of grasping the controller with two hands, sitting glued to the TV until morning. Of course, I'm not rejecting that intense style of play, but I did feel that taking the whole idea of grasping the controller with two hands back to the drawing board offered a glimpse of the future.<sup>59</sup>

The rest of the design team, right up to the CEO, was supportive of the new approach. Iwata, as someone who had started developing computer games on a programmable calculator when he was a teenager, appreciated evolutionary steps in game-play and hardware design, and encouraged the team to think creatively. However, there were limits to how far the team would go, as Miyamoto noted:

This was good in the sense that it allowed us to consider ideas such as not using hands at all, or even putting the controller on your head. Of course, going too far in that direction would just lead to something that is different just for the sake of being different. An eccentric design like that might work well for some games, but could never be used as a standard, making it a difficult choice for a console's primary controller. So we wanted to come up with a bold and daring design that would be within the bounds of reason.<sup>60</sup>

Takeda formed a special controller development team. He believed that the controller was not just a console peripheral, but also an intermediary between man and machine, and even an extension of the human body. As the controller would be the most frequently used part of the console, the controller development team aimed to create a simple and comfortable controller, which everyone would like to touch.<sup>61</sup>

The team created a series of prototypes. Early designs were molded out of clay or Styrofoam. The more promising designs were turned into plastic prototypes with working buttons. One prototype had a touch panel like the Nintendo DS. Another featured a mouse-like pointing device. There was also a track pad, and even a hat-like controller that allowed gamers to play without using their hands. The team constantly experimented with the designs, but decided a pointer-based controller was the best way to go.

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<sup>58</sup> "Wii Remote: Taking Control Back To The Drawing Board," [Wii.nintendo-europe.com](http://wii.nintendo-europe.com), December 2006. Accessed from <http://wii.nintendo-europe.com/164.html> in December 2010.

<sup>59</sup> Ibid.

<sup>60</sup> Ibid.

<sup>61</sup> Kouji Sasaki, "Interview with Satoru Iwata," *Nikkei Business*, November 27, 2006.

But within the team, there were debates about what the controller should look like.<sup>62</sup> Console gaming had been based on a two-handed experience since the first joysticks were developed in the 1970s. One pointer-based design was a two-handed controller with a pointer in the middle. This prototype was named “Gumbai,” after the referee’s fan in Japanese Sumo wrestling. However, Miyamoto was interested in a one-handed device — perhaps something that resembled a familiar device like a mobile phone — that was easy to use and not intimidating to new gamers. Iwata seized upon the idea of something that looked like a TV remote control. Eventually, Ashida and his staff drew up a rod-shaped pointer, and a demonstration unit was prepared.<sup>63</sup>

### Decision Point

Iwata eagerly entered the conference room and looked at the new rod-shaped device on the table. He had tried pointer-based prototypes before, but this single-handed design appealed to him: “From the moment I picked it up, it just felt right. I had handled other pointer devices before, but they are not normally responsive and leave you feeling more frustrated than relaxed. The pointer idea itself was also good, but in this case it was the sense of control, the finish of the product, that was particularly good.”<sup>64</sup>

But some members of the team had reservations. Ashida reminded the group of the need for the Revolution to be able to play GameCube games as well as popular titles dating from Nintendo’s NES from the 1980s. Most of these games required two-handed play. On top of that, they also had to consider the traditional gamer audience. Despite all of the attention on the “mom” crowd and other new audience segments, Nintendo needed to convince serious gamers to give the Revolution a chance. The team knew that overseas gamers preferred first-person shooters and other action titles that worked well with two-handed controllers.<sup>65</sup>

In addition, Ashida pointed to game developers, who had their own ideas about innovation: “There were also requests from the development teams for Metroid and other software titles asking for a new kind of controller that uses both hands, that can offer a new type of game-play.”<sup>66</sup>

Iwata knew that the team was taking a big gamble with a new controller design. While they had brainstormed and experimented extensively, the company refused to bring in focus groups to test out the designs, partially out of fear of leaks. As a result of this decision, the company would only know user reaction after the Revolution’s launch.

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<sup>62</sup> “Wii Remote: Taking Control Back To The Drawing Board,” *Wii.nintendo-europe.com*, December 2006. Accessed from <http://wii.nintendo-europe.com/164.html> in December 2010.

<sup>63</sup> Ibid.

<sup>64</sup> Ibid.

<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

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Besides user reaction, there was also the question of how the proposed one-handed rod could be used with older Nintendo console games that had been designed for two-handed controllers. Backwards-compatibility with the older games was required, to give an incentive for the existing customers who owned them to upgrade to the new console. How could the Revolution's rod controller be modified for two-handed action?

Iwata and his team had little time. At the 2005 E3 gaming exposition in Los Angeles, Nintendo planned to announce the Revolution, and maybe even demonstrate the console and controller. Industry buzz was pointing to both Microsoft and Sony announcing their own next-generation consoles at E3. Would Nintendo be able to deliver?

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***Exhibit 1 Nintendo Famicom/NES***



Source: Jennifer Boriss/DoNotLick, <http://www.flickr.com/photos/donotlick/4352297340/>.

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**Exhibit 2    Nintendo Virtual Boy**



Source: kafka4prez, <http://www.flickr.com/photos/kafka4prez/59373076/sizes/m/in/photostream/>.

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**Exhibit 3    Nintendo 64**



Source: Ciro Duran/cirofono, <http://www.flickr.com/photos/ciroduran/3109883260/>.

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### **Exhibit 4    Nintendo GameCube\***



\*GameCube accessories include bongo drums, used for titles such as *Donkey Kong Jungle Beat*.

Source: freesspamfree, <http://www.flickr.com/photos/7524204@N07/1767205224/>.

**Exhibit 5 Hanafuda 48 Cards**



Source: <http://commons.wikimedia.org/wiki/File:NintendoCards.jpg>, accessed December 2010.

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### **Appendix 1    Most Popular Game Types (% of games sold in U.S., 2004)**

Genre	Console games	PC games
Action	30%	4%
Sports	18%	5%
Shooter	10%	16%
Children & family entertainment	10%	20%
Racing	9%	N/A
RPG	9%	10%
Fighting	5%	N/A
Strategy	N/A	27%
Adventure	N/A	6%

Source: NPD Group. , cited in "Computer and Video Game Software Sales Reach Record \$7.3 Billion in 2004; Final U.S. Sales Data Indicates 8 Games Sold Every Second of 2004," Business Wire, January 27, 2005.

### **Appendix 2    Top-selling U.S. Console and Portable Games, 2004**

	Name	Console	Units (million)
1	Grand Theft Auto: San Andreas	PS2	5.1
2	Halo 2	Xbox	4.2
3	Madden NFL 2005	PS2	3.2
4	ESPN NFL 2K5	PS2	1.5
5	Need for Speed Underground 2	PS2	1.4
6	Pokémon FireRed (with adapter)	GameBoy	1.2
7	NBA Live 2005	PS2	1.2
8	Spider-Man 2	PS2	1.1
9	Halo: Combat Evolved	Xbox	1.1
10	ESPN NFL 2K5	Xbox	1

Source: "NPD: \$9.9 billion worth of console games sold in 2004." GameSpot, January 18, 2005. Accessed from <http://www.gamespot.com/xbox/action/halo/news/6116499/npd-99-billion-worth-of-console-games-sold-in-2004> in August 2011.

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**Appendix 3 Production and Sales Information, FY 2004**

<b>Production</b>	2003	2004
Electronic entertainment products		
(Hardware)		
Handheld	128,902	200,502
Console	171,730	14,368
Others	39,156	24,835
Subtotal	339,789	239,707
(Software)		
Handheld	129,830	119,746
Console	107,204	94,727
Subtotal	237,034	214,474
Other Products	704	1,506
Total	577,528	455,687
<b>Sales</b>		
Electronic entertainment products		
(Hardware)		
Handheld	132,246	185,175
Console	101,554	54,366
Others	41,453	49,679
Subtotal	275,254	289,220
(Software)		
Handheld	123,369	132,911
Console	99,325	86,262
Royalty income and contents income	3,978	3,015
Other	476	881
Subtotal	227,149	223,070
Other Products	1,730	2,513
Total	504,135	514,805

Source: Nintendo Co. Ltd., Consolidated Financial Statements, May 27, 2004.