

## RIVALRY IN VIDEO GAMES\*

In May 2002, the video games industry was entering into the growth phase of a new cycle of expansion stimulated by the launch of 128-bit video games consoles. This was fifth such cycle since the late 1970s; each of them associated with a new generation of technology. With each cycle, the industry had surpassed its previous sales peak (see Figure 1). Industry forecasts suggested that the 5<sup>th</sup> generation 128-bit machines would be no exception—worldwide sales of video games consoles were expected to peak at around 45 million in 2003. However, the major part of the industry’s revenues—and virtually all of its profit—was generated by software. The production of video games software had emerged as one of the most important and profitable aspects of the entertainment industry, with retail sales increasing from about \$15 billion in 2001 to \$19 billion in 2003, the games software industry was comparable in revenues to the motion picture industry.

For the three main players in the industry, the key issue was how revenues and profits would be split between them. Sony had taken an early lead in new generation of 128 bit consoles, its PlayStation2 was well-positioned to repeat the dominance that its original PlayStation had achieved in the previous generation of 32 and 64 bit machines. However, by the summer of 2002 its continued market dominance was far from assured. Nintendo, with its powerful reputation among younger video games enthusiasts and its proven ability to create blockbuster games (Super Mario Brothers, Zelda, Gran Turismo, and Pokemon) was competing ferociously to take market share from Sony. In the meantime, newcomer Microsoft had launched the world’s most powerful games console—the Xbox with massive computing power and graphics capability and equipped with broadband connections to allow fully interactive games playing.

The intensity of competition between the players was strongly influenced by the history of the industry. In every previous generation of machines, one company had successfully dominated the world market and had scooped the major part of the industry profit pool—the only exception being the third generation 16-bit machines where Sega and Nintendo had split the world market. Escalating development costs for both hardware and software would reinforce this tendency for video games to be a “winner-take-all” industry. Already Sega had exited the hardware market, its Saturn and Dreamcast machines having failed to establish viable market shares.

Yet, despite all the advantages of market leadership, the technological and creative dynamism of the industry had resulted in transitions of market leadership. Nintendo had taken over from Atari, Sony had displaced Sega and Nintendo. The key issue for Nintendo and Microsoft was to understand how to harness the forces of change—new technology, consumers desire for novel games, and the complementarities between hardware and software—in strategies that would confer competitive advantage in the new product cycle. For Sony, the critical issue was how it could best exploit the advantages of incumbency—a vast installed base and massive library of games titles—to thwart the ambitions of the old challenger, Nintendo, and new warrior, Microsoft.

### ATARI AND THE 4-BIT GAMES MACHINES: 1972-1985

The home video games market emerged during the late 1970s. Its origins lay in the video games machines designed for amusement arcades. The first of these electronic arcade video games was *Pong*, created by Nolan Bushnell in 1972. With \$500, Bushnell and a friend formed Atari to market the game. This simple coin-operated table-tennis game caught on in bars and arcades, but Atari’s failure to establish effective patent and trademark protection resulted in a flood of imitators. By 1973, Atari held 10 percent of the new video game industry, the rest of the market was shared among the followers.

Meanwhile, several companies, including Magnavox, had developed home video game consoles with a few preprogrammed games, but these dedicated machines attracted little consumer interest. Atari itself introduced a home version of its *Pong* machine in 1975. The key innovation that permitted the development of the home video market was Fairfield’s release of Channel F, the first home video game system to accept interchangeable cartridges. Interchangeable cartridges allowed games consoles to become versatile machines capable of playing a variety of games. Nolan Bushnell saw the potential of games consoles with interchangeable cartridges and two months after the release of Channel F, he sold Atari to Warner Communications for \$27 million to give him the financial backing required to develop and launch a new home games machine. In 1977, Atari (now a division of Warner) released its 2600 home video games console at a retail price of \$200. The release of *Space Invaders* (1979) and *Pac-Man* (1981) unleashed a craze for video games. In 1982, both games were transferred from arcades to the Atari 2600: sales skyrocketed. During 1982 Atari held almost 80 percent share of the video game market.

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However, competition in both hardware and software intensified in 1982. Mattel had entered the industry with its Intellivision system in late 1979, Coleco introduced ColecoVision, and former Atari employees set up Activision. Like the Atari 2600, all these competing consoles were 4-bit machines. During 1982, 20 new suppliers of Atari-compatible cartridges entered the market and 350 new game titles were released in that year. Atari was unable to prevent independent software developers from marketing games for the Atari 2600, though Atari was able to collect a royalty. The market became oversupplied, forcing software manufacturers with slow-selling game titles to liquidate their inventories at closeout prices during 1983 and 1984: on some games, prices were slashed from \$40 to \$4. Meanwhile, consumer interest was shifting from video games to personal computers. The collapse of sales forced Atari into burying truckloads of unsold video game cartridges in the Arizona desert, forcing parent Warner Communications to report a \$539 million loss on its consumer electronics business in 1983. In 1984 Warner Communications and Mattel were driven to the brink of bankruptcy by the losses of their video game subsidiaries. Warner sold its Atari division that year, and in 1985 both Mattel and Coleco announced they were exiting the video game business. Industry sales of video games collapsed from \$3 billion in 1982 to \$100 million in 1985.

## NINTENDO AND THE 8-BIT ERA: 1986-91

Nintendo was established in 1889 in Kyoto, Japan as a playing card manufacturer. In 1922, Hiroshi Yamauchi, the great grandson of Nintendo's founder became the company's president at the age of 22 and led Nintendo's expansion into the toy business. In 1975, Yamauchi encouraged Nintendo's entry into video games, initially through licensing Magnavox's system. In 1983, Nintendo released the 8-bit Famicom home video system that used interchangeable cartridges. The ¥24,000 (\$100) machine sold 500,000 units in Japan during its first two months.

In 1980, Nintendo established Nintendo of America to enter the \$8 billion-a-year US arcade business. After a slow start, Nintendo had a hit in 1981 with *Donkey Kong*, created by Nintendo's legendary game developer, Sigeru Miyamoto. In the fall of 1985, Nintendo test-marketed Famicom, which was renamed the Nintendo Entertainment System (NES), in New York. Despite the widespread belief that home video game systems were a fad that had seen its day, Nintendo sold over a million units in the US during its first year. By the end of 1987, three million games had been sold. *Legend of Zelda* became the first game to sell over a million copies and in 1986, *Super Mario Brothers* was launched; the game would eventually sell 40 million copies worldwide. Miyamoto developed both games. By 1988, Nintendo had an 80 percent market share of the \$2.3 billion US video game industry. In 1989, Nintendo expanded its market with the launch of Game Boy, a portable video game system.

However, Nintendo learned a valuable lesson from Atari's failure: It was important to control the supply of the game cartridges to ensure quality and prevent fierce price competition. To this end, Nintendo required its game developers to follow strict rules regarding the creation and release of new games for its NES game players. Prior to release, Nintendo had to approve the content of a game. Every games cartridge incorporated a "security chip" that permitted it to operate on the Nintendo console. Nintendo controlled all manufacturing of cartridges and charged its independent games developers a 20% royalty and a manufacturing fee of \$14 per cartridge (the subcontracted cost of manufacturer to Nintendo was \$7). The minimum order was 10,000 cartridges for the Japanese market and 50,000 for the US market—paid in advance. Licensees were charged about twice the cost of manufacturing. Cartridges were delivered to licensees at the shipping dock at Kobe, Japan, and then distribution became the licensees' responsibility. Licensees were also limited to developing five NES games a year and could not release an NES game on a competing system for a period of two years. By 1983 only 30 percent of the NES cartridges sold were games developed by Nintendo, the rest were from licensed third party developers.

Nintendo's stranglehold over its software developers resulted in the huge success of its NES console, but also reflected its massive marketing and distribution effort. Its advertising, which amounted to 2 percent of sales, was closely linked to new game releases. Its monthly magazine, *Nintendo Power*, has a readership of 6 million. Its retail presence was huge—in 1989, Nintendo products amounted to 20 percent of total US spending on toys and games. Retail distribution was tightly controlled. New games were released according to a carefully designed schedule and were quickly withdrawn once interest began to wane. Nintendo typically restricted shipments of its most popular games, and discouraged its retailers from carrying competitive products.

Between 1984 and 1992, Nintendo's sales rose from \$286 million to \$4,417 million. By 1990, one-third of US and Japanese households owned an NES and in both countries its share of the home video console market exceeded 90 percent. Nintendo's return on equity over the period was 23.1 percent—far above the average for large Japanese companies, while its stock market value exceeded that of both Sony and Nissan during most of 1990-91. Table 1 shows the sales of Nintendo and other manufacturing's since 1990.

[Table 1 about here]

## SEGA AND THE 16-BIT ERA: 1992-95

Sega Enterprises, Ltd. (Sega) is a Japanese company founded by Americans. In 1951, two Americans in Tokyo, Raymond Lemaire and Richard Stewart, began importing jukeboxes to supply American military bases in Japan. In 1965, their company merged with Rosen Enterprises, founded by David Rosen, a former US airman who had been stationed in Japan. Not happy with the game machines available from U.S. manufacturers, Rosen decided to make his own. The company's first hit was a submarine warfare arcade game called Periscope. Sega was acquired by Gulf & Western in 1969 and went public in 1974. Hayao Nakayama, a Japanese entrepreneur and former Sega distributor, was recruited to head Sega's Japanese operation: Rosen headed the U.S. operation. Through the 1970s and early 1980s, the video game industry went through a boom period. Sega's revenues reached \$214 million in 1982. The overall game industry hit \$3 billion in 1982, but collapsed three years later with sales of \$100 million. With the video game slump, Gulf & Western were keen to sell, and Nakayama and Rosen bought Sega's assets for \$38 million in 1984, thus forming Sega Enterprises Ltd. The deal was backed by CSK, a large Japanese software company that in 1998 owned 20 percent of Sega. Nakayama became the chief executive, and Rosen headed the U.S. subsidiary. Sega went public in 1986. Rosen had since become a director of Sega and co-chairman of its American subsidiary.

Like Nintendo, Sega had migrated from arcade games to home games, however in Japan, Sega's 8-bit Master System lagged well behind Nintendo's Famicom. The US story was similar. Sega launched Master System in the US in 1986, but despite better graphics than Nintendo's NES, Sega achieved only a 15 percent market share. In Europe, where Nintendo sales had been slow to take off, Sega did better and Sega of Europe accounted for a large share of Sega's revenues.

In October 1988, Sega introduced its 16-bit *Mega Drive* home video system in Japan. Despite superior graphics and sound to the existing 8-bit systems and support from several of its arcade games, only 200,000 units were sold in the first year. In September 1989, the system, now renamed *Genesis* was launched in the US priced at \$190 with games selling at between \$40 and \$70. This was 16 months before Nintendo released its 16-bit Super NES player. In June 1991, Sega launched its *Sonic the Hedgehog* game and began bundling the game with its *Genesis* player.

The success of *Sonic* together with an advertising campaign built around the slogan "Genesis does what Nintendon't" established Sega's *Genesis* as the cool alternative to the Nintendo NES. In addition, Sega targeted a broader market than Nintendo, directing its appeal to adults as well as teenagers. The result was a surge of independent software developers who began writing games for Sega. By September 1991 there were 130 software titles available for the Genesis. Sega's licensing terms were similar to those of Nintendo, but there was no exclusivity clause and Sega's royalty charge was higher than Nintendo's—around \$20 per cartridge. Support by games developers and retailers for Sega's *Genesis* was partly a result of the unpopularity that Nintendo had generated through its allegedly monopolistic practices.

Nintendo launched its 16-bit machine, the Nintendo Super-NES, in September 1991. It modified its licensing terms with games developers to match those of Sega: it raised its fees to \$20 a cartridge and abandoned its exclusivity clause.

Despite Nintendo's huge installed base, brand awareness, and extensive distribution, the 16-bit market represented a new competitive arena where Sega was able to offer a wider variety of 16-bit games titles: by January 1993, Sega's library of 16-bit titles totalled 320, compared with 130 for Nintendo. In the US during 1992-96, the two companies split the market almost evenly. Elsewhere, the picture varied. In Japan, Nintendo held a commanding market position over Sega with the Super NES outselling Genesis by about nine to one. Nintendo maintained its market leadership in Europe—but barely. Sega was a market leader in several European countries and was a close follower in several others.

## THE SONY PLAYSTATION AND THE 32/64-BIT GENERATION: 1995-1998

Established in Japan in May 1946, Sony Corporation emerged during the 1970s and 1980s as one of the world's most successful and innovative consumer electronics companies. In 1990, Sony began developing a 32-bit games machine that utilized software stored on CD-ROMs. Sony introduced its PlayStation in the Japanese market in December 1994 and in the US in September 1995. The European launch did not occur until the spring of 1997.

In the new generation of 32-bit video games using CD-ROM software, Sega was able to beat Sony to market. Sega's Saturn was launched in Japan a month before PlayStation, and in the US it had a three-month lead over

PlayStation. Nevertheless, it was Sony that quickly became the market leader in the new generation of machines. Prior to its launch, Sony had built a large library of games titles. It had courted the top games developers, to the point of contributing financially for developing games on the PlayStation, and offered a broad range of game development tools, designing its hardware to facilitate game development.

Sony's ability to gain the support of both developers and retailers was also a result of Sony's stature and credibility. Despite Sony's lack of history in video game hardware or software, the company was considered a formidable competitor because of its global distribution capability, brand awareness, and the content potential of the movie libraries of Columbia Pictures and Tri-Star Entertainment (both Sony subsidiaries). Sony made few mistakes in launching its PlayStation: it came to market with a wider range of quality games, well-planned distribution, and a massive advertising budget.

By contrast, Sega, despite its solid reputation among video game consumers and its well-known brand, suffered from the ill-coordinated product launch of its Saturn system. Only a handful of game titles were available at the launch, the supply of machines was limited by lack of manufacturing capacity, and distribution was haphazard. Sony's machine attracted such a huge early following that Sega could not recover. Sega's US sales were sluggish throughout 1996 and 1997. At the end of 1997, Saturn had an estimated total installed base of fewer than 2 million units. Almost no third-party licensees published titles exclusively on the Saturn, and very few planned to publish any new titles for the Saturn system. Saturn's market failure was attributed to its comparatively high launch price, its lack of blockbuster exclusive titles, and a development system that many developers felt was inferior to that of the PlayStation. To try to bolster the declining market share of its Saturn player, Sega instituted rebate and incentive programs. Sega stopped marketing the Saturn in the United States in the spring of 1997.

Meanwhile, Nintendo attempted to recapture market leadership by leapfrogging Sony in technology. The N-64 system launched in Japan in May 1996, in the US in September 1996, and in Europe in the spring of 1997 used a 64-bit processor. One of its launch games—*SuperMario 64*—was acclaimed as one of the best games ever developed, while the James Bond game, *Goldeneye*, was a major draw that attracted customers to the N64. Unlike Sony, Nintendo stuck with cartridges instead of CD-ROMs. Although this permitted cheaper hardware, it resulted in lower margins for developers and made distribution more cumbersome. Nintendo games were priced \$15 to \$20 above those of PlayStation games.

There was little doubt about the winner of this competitive battle. Sony achieved market share leadership in Japan, the United States, and Europe. In early 1998, Sony's game division had sold more than 33 million PlayStation game players worldwide, along with 236 million games CDs. PlayStation was one of Sony's greatest product successes in its history.

From a consumer standpoint, Sony PlayStation's most attractive features (compared to those of Nintendo's N-64) were its lower software costs and greater library of titles. The average PlayStation title retailed for fewer than \$45, whereas N-64 titles averaged close to \$60. Hardware prices were comparable at \$150, with some industry participants expecting a possible PlayStation price cut to below \$100 sometime in 1998.

From a software developer's point of view, the PlayStation system had both advantages and disadvantages. On the positive side, the manufacturing cost of PlayStation CD-ROMs was far lower than that of N-64 cartridges, and CD-ROMs containing a PlayStation video game could be pressed and shipped to retailers in much less time than Nintendo cartridges (which were made in Japan). Furthermore, N-64 cartridges had to be paid for at the time of order placement. The longer lead times for getting N-64 cartridges on retailer shelves also meant greater inventory and sales risks for Nintendo game developers. It was difficult to judge how quickly a title would sell, particularly in the case of newly introduced games. To keep from losing out on sales and from disgruntling both retailers and consumers, publishers of Nintendo games were motivated to order larger quantities in order to avoid retailer stock-outs of what might prove to be a popular-selling title. In contrast, retailers could normally be resupplied with additional copies of hot-selling PlayStation titles within a matter of days (the packaging and booklets take longer to complete than pressing). If a PlayStation's title didn't sell well, no additional discs had to be pressed, and the costs associated with slow-selling inventories were minimized. Table 2 shows cost comparisons between PlayStation and the N-64 for both software and hardware.

[Table 2 about here]

Most software publishers liked developing PlayStation games because of their lower prices and short production lead times, features which gave them a lower break-even point for recovering development costs—the estimated break-even point for the N-64 was 190,000 units, versus 172,000 units for the PlayStation.

In terms of gaining the support of third-party developers, the competitive disadvantages Nintendo faced from higher cartridge costs and longer lead times to supply retailers had to be balanced against the advantages afforded by Nintendo's strategy of restricting the number of its game titles. Sony's PlayStation had over 300 titles vying for shelf space. It was estimated that the average N64 title sold over 400,000 units in 1997 whereas the average PlayStation game had sales of just over 69,000 copies. Hence, software developers had the potential to make more profit from a successful N-64 game than from a successful PlayStation game. Sony's ability to offer a vast library of titles for the PlayStation was assisted by its high ratio of games sold per console (called the *tie ratio*) was

increasing. The PlayStation had a particularly attractive tie ratio (from a game developer's perspective). PlayStation's tie ratio was estimated to be 5.82:1 in 1997 and grew to about 6.40:1 in 1998. This compared to tie ratios of less than 5:1 for older systems during their prime and a 2.55:1 ratio for the N-64 titles.

In June 1997, in an effort to combat the cost disadvantage of its cartridges, Nintendo began cutting the prices it charged third-party licensees for N-64 cartridges from over \$30 to as low as \$21. Nintendo management believed that N-64's rapidly growing installed base and recently reduced software prices would attract more game developers and publishers. The fierce competition between Sony and Nintendo fuelled further expansion in the market. During 1997 and 1998, worldwide sales of video games consoles reached unpredicted levels. (See Table 3).

[Table 3 about here]

## **THE BATTLE FOR THE 128-BIT GENERATION**

### **The Sega Dreamcast**

The failure of Saturn was a massive blow for Sega. During 1998, Sega began work on its Dreamcast games system that it hoped would give it market leadership in the new generation of 128-bit machines. The key to Sega's strategy was to be first to market with a new 128-bit console, thus leapfrogging Sony and Nintendo in technology. Through using PC-based technology for its hardware, Sega aimed to make it easy for game developers to create games for Dreamcast, and facilitate new versions of existing PC-based games. The company also wanted to pioneer internet-based interactivity.

The new system, Dreamcast, was launched in Japan at the end of 1998. A major feature of Dreamcast was in permitting interactive games playing through the Internet. The launch was seen as Sega's last chance: "This is the last roll of the dice for Sega. If it doesn't work it will have to pull out of the sector," said Stuart Dinsey of trade magazine MCV. Nick Gibson of stock broking and consulting firm Durlacher, added: "Sega has to make this work; it has no contingency plans. It is heavily in debt to fund the marketing." The development and launch of Dreamcast strained Sega's financial resources to the limit. In the year to March, Sega made a net loss of ¥45bn (\$490m) and was forced to cut costs, including the elimination of 1,000 jobs.

Sega's president, Shoichiro Irimajiri, set a target for Dreamcast at half the global market. This was seen as an ambitious goal, given Sega's 1998 market share of less than 5 percent of the world market coupled with Sony's brand strength. "PlayStation is an unbelievably strong brand; that's taken a lot of work and a lot of cash. It has done incredibly well and could sell even more this year than last. If Sony does its job properly it can keep PlayStation hot," said Stuart Dinsey. To undermine the impact of the Dreamcast launch, Sony provided advance publicity about its new version of PlayStation (PlayStation2). In particular, it emphasized PlayStation2's technological superiority to Dreamcast (especially its use of DVD technology) and its backward compatibility (allowing consumers to use their existing PlayStation software).

Failure to produce adequate games had tripped up Sega in the past; it was a key factor in Saturn's failure: "The fact that there's a new machine with 128 bits is irrelevant to consumers to a large extent. Sega needs a killer application such as PlayStation's Lara Croft—and Sonic is not so sexy. It needs to woo developers to support the platform, something Sony has worked hard to do," said Jeremy Dale, commercial and marketing Director at Nintendo.

Launched at the end of 1998, Dreamcast achieved sales of 900,000 units by March, just short of its target of a million. During 1999, Dreamcast was launched in both North America and Europe. In both regions, Dreamcast was able to establish a strong market foothold. With Sonic playing a prominent role in Sega's marketing, Sega's US market share of game machines grew to 15% in the fourth quarter of 1999 from just 0.1% a year before. Meanwhile, Nintendo and Sony lost ground: Sony dropped to a 53% market, from 63% a year ago; Nintendo (excluding GameBoy) slipped to a 32% share from 37%. Sega even exceeded its own expectations: It sold 1.5 million of its \$199 Dreamcast machines and 4.5 million games in the U.S. market in the last quarter of 1999—garnering some \$523 million in revenue. In software, Sony had 64% market share, the same as a year ago, Nintendo had 29% market share compared with 35% a year ago, while Sega had 7.1% compared with 0.6% a year ago.

Yet, despite Dreamcast's successful launch, it was not the savior that Sega had hoped for. Its technical advances were significant; nevertheless, the advantages of 128-bit over 64-bit technology were much less evident than the advantages of 32-bit over 16-bit. As a result, PlayStation continued to sell strongly long after Dreamcast hit the market: in the fourth quarter of 1999, 3.3 million PlayStations were sold in North America compared with 3.9 million in 4<sup>th</sup> quarter 1998. Moreover, despite its lead in the new generation of machines, Dreamcast was always overshadowed by the hype and expectation that surrounded the forthcoming launch of PlayStation2.

## **PlayStation2**

The launch of PlayStation2 on March 4, 2000 was the most eagerly anticipated event in the history of the Japanese consumer electronics industry. By 7am in the morning of the launch, lines of eager games enthusiasts formed outside Sony dealers and, in several instances, police had been called to control the games enthusiasts. In 48 hours, all one million PlayStation2s were sold, ten times the number sold when the original PlayStation was made available.

Ken Kutaragi, the maverick engineer who was the driving force behind Sony's entry into video games, had masterminded the design of PlayStation2. In the summer of 1996, Kutaragi had assembled a team of engineers from Sony and its manufacturing partner, Toshiba, and asked them to design a games machine with performance that exceeded any PC and graphics processing power ten times that of the original PlayStation.

At ¥39,800, PlayStation2 was a 128-bit machine offering cinematic-style graphics, a DVD player capable of showing films, and the potential for Internet connectivity. Nobuyuki Idei, Sony's president, aimed to make the PlayStation2 the main mechanism for consumers to access the Internet, offering online games, e-commerce, e-mail, and the ability to download music, software and video. As Kazuo Hirai, president of Sony US exuded, "PlayStation 2 is not the future of video games entertainment, it is the future of entertainment, period." However, initially, PlayStation2 did not include a modem, a mistake according to Sega's president Shoichiro Irimajiri. Sony's Idei countered that modem technology was moving so fast that it was better to sell them as add-ons.

PS2 represented a huge investment for Sony. The company invested \$1 billion in two plants, one a joint venture with Toshiba to make the main central processing unit (the "Emotion Engine"), and another to manufacture the graphics synthesizer. But the marketing expenses incurred in the global roll out of PS2 would dwarf investment in technology and manufacturing plants. Given these investments, and PS2's low price, analysts were forecasting that it would not be until 2002 that Sony's games division exceeded the ¥136bn record operating profits it achieved in 1998. However, Sony was confident that the business model underlying its original PlayStation remained sound. "The great thing about the games console business is that products last for three years," said Mr. Idei. "In the world of the PC, a product is doing well if it lasts three months. With the PlayStation2 we have lots of time to recoup our investment." The product provided two profit streams: those generated by the sale of the console (the original PlayStation sold 71 million units) and the much bigger profit stream from software (Dresdner Kleinwort Benson estimated that almost half of Sony's ¥255 billion operating profit for the current year would derive from games software). PS2 also offered the possibility of a third revenue stream: online usage.

Despite massive investments and careful planning, the launch of the PS2 was far from smooth. Shortages of two key components—the graphics synthesizer (made by Sony) and the "Emotion Engine" central processor resulted in a shortage of PS2s for the critical US Christmas shopping period. PS2 was also handicapped by a shortage of software. The power and sophistication of PS2, together with a number of technical quibbles, meant that it was a difficult machine for which to develop games. Hence, most of the early PS2 games were revisions of earlier titles.

## **Sega's response**

Despite good sales of Dreamcast in North America and Europe, as the launch of Sony's PlayStation2 approached, Sega's sales in Japan began to decline. Although Sega sold two million Dreamcast consoles in Japan between its launch in November 1998 and the first quarter of 2000, Sony sold 1.8 million PlayStation2s in just two months. During the first half of 2000, pessimism grew over Sega's prospects. Its share price more than halved between February and June 2000 and rumors circulated that Shoichiro Irimajiri, Sega's president, would resign because of the poor performance.

Facing the prospect of becoming an also-ran in the video-game-machine market, Sega initiated a bold new plan to grab market share: give away the hardware. Starting in August, Sega offered its Dreamcast console at no charge. The offer was available to customers who subscribed to a new Sega Web service for two years at \$21.95 a month. Customers who already owned a Dreamcast would get a free keyboard and a \$200 check if they subscribed. Sega was betting on spurring revenues from software and Internet service: "We may give up \$400 million in hardware revenue" said Peter Moore, Marketing VP at Sega of America, "but with two-year service contracts we can make \$1 billion in Internet service-provider revenue." The key issue for Sega was whether sufficient numbers of game players wanted to hook their machines to their television sets and cruise the Web. Despite the hype about accessing the Web with video games consoles, the primary medium for the Internet is still the personal computer.

During summer 2000, Sega established Sega.com, an independent company headed by Brad Huang, a 35-year-old whiz kid and former hedge-fund manager who pitched the strategy to Sega Chairman Isao Okawa a year ago. Sega's online-gaming Web site, SegaNet, made its debut in August 2000. The Web site provided Sega with a portal to the Internet and a gathering place for Sega fans, permitting Sega to sell space to other advertisers. Eventually, Sega hoped to provide games for which it will be able to charge a premium monthly fee. Gamers with Dreamcast consoles would be able to use any Internet service provider to access the SegaNet site. But Sega hoped

to persuade them to sign up for its high-speed service, which would be provided by GTE Corp.'s GTE Internetworking unit.

Sega's vision of using Internet connectivity as a basis to wrest market share from Sony was never fulfilled. By the fall of 2000, Sega's sales revenues were slipping, losses were mounting, and the company was carrying a debt burden of \$500 million. In October 2000, Sega threw in the towel. It announced its withdrawal from video games hardware in order to concentrate upon games software.

### **Nintendo: the GameCube**

Meanwhile, Nintendo saw little option but to continue fighting its corner in the video games market. During 1999 sales of the N64 began to decline. In the fourth quarter, Nintendo sold 1.9 million units, compared with 2.4 million in fourth quarter 1998. Between its launch in 1996 and April 2000, it had sold 29.6m Nintendo 64 machines, against 70m PlayStations over the same five-year period. Increasingly, the N64, which used bulkier games cartridges instead of the CD-ROMs or DVDs, was viewed as technologically outdated. However, Nintendo still dominated the hand-held market, and continued to be profitable. Like Sony, Nintendo tried to head-off declining sales by cutting console prices in the US from \$129 to \$99 in the fall of 1999.

In June 2000, it unveiled a new portable version of its Nintendo 64 console, quickly countering Sony's announcement of a smaller, portable version of its rival PlayStation console, known as the PSone. Both companies were targeting mobile Internet users of Japan's NTT DoCoMo's I-mode web phone service. Nintendo was also preparing to launch a new version of the Gameboy, its popular hand-held game machine.

However, Nintendo's major hopes for the future were pinned on the new Internet-ready 128-bit machine that was code-named Dolphin, but renamed GameCube prior to its release in 2001. The new system would offer unprecedented graphics capability and would feature state-of-the-art software, much of which would be developed internally by Nintendo's crack developers. The GameCube involved close collaboration with a number of hardware and software companies. The specially-designed processor was developed by IBM from its PowerPC processor used in the Apple iMac. The graphics chip was supplied by ArtX—a start-up company founded by ex-Silicon Graphics engineers. To encourage software writers, it improved the financial terms available to third party developers and made available a full set of development tools well in advance of the launch. Table 4 compares the features of GameCube with its rivals.

[Table 4 about here]

GameCube went on sale in Japan on September 14, 2001, with its US debut on November 18, occurring just three days after the launch of the Microsoft Xbox. Although its launch generated massive attention in Japan, initial sales of 240,000 during the first week were a far cry from selling out (initial shipments to retailers were 450,000). Despite Nintendo's internal development efforts and its wooing of external developers, only three games were available for GameCube at the time of its Japanese launch. To maximize its US market impact, Nintendo set a US marketing budget of \$75million for the fourth quarter of 2001, and set the retail price at \$199—a full \$100 below that of the Microsoft Xbox and PS2. The GameCube's games library expanded during December and January. In addition to Nintendo's well-known characters, great hopes were placed on *Pikmin*—the latest creation of Nintendo's top game developer, Shigeru Miyamoto, whose earlier successes had included Super Mario Brothers and Zelda.

### **The Microsoft Xbox**

Microsoft's decision to launch a video games console was the greatest bombshell to hit the industry in the new decade. Throughout 2000 and most of 2001, Microsoft's development efforts were the subject of a frenzy of speculation by industry players, outside commentators, and games players. The software giant's entry was seen as symbolizing the emerging potential of video games consoles. As children's toys, games consoles were emerging as the primary tool for electronic entertainment, with a potential to offer movies, music, and many of the communications functions currently performed by PCs.

The Xbox was designed to place Microsoft far ahead of any other games machine in terms of technological capabilities. The *Financial Times* described it as: "Arguably the most powerful games console ever made, developed after consultation with more than 5,000 gamers and games creators, it has a staggering array of features: an internal hard disk with a 733MHz processor, 64 MB of memory, a DVD player, Dolby Digital 5.1 Surround Sound and an Ethernet port that makes it the only game console that's internet-ready and broadband-enabled."<sup>1</sup>

However, despite its state-of-the-art technology, Xbox's technological advantages did not translate into a clearly superior user experience: "Although the Xbox is very good, it doesn't offer a sufficiently different gaming experience from existing consoles.... The technological difference between generations of consoles is getting smaller all the time, and all three consoles now on the market in the US (Xbox, GameCube, PS2) have great

graphics. It's hard for the average player to tell the difference.”<sup>2</sup> The industry had long recognized that blockbuster games generated console sales; this was becoming ever more true. And, as with all newcomers to the video games industry, software availability was Xbox's major weakness. When Xbox was launched in the US in November 2001, 19 games were available. Although this was substantially more than the GameCube, it paled in comparison to PS2's more than 200 titles. Moreover, Xbox also lacked the recognizable characters owned by its established rivals, such as Mario Brothers and Lara Croft. As Nick Gibson, games analyst at Durlacher, observed: "By the time Microsoft and Nintendo complete their global launches in 2002, Sony will have built up an installed base of over 25m units compared to 4m to 5m for the others at best. This momentum, combined with strong developer and publisher support, gives Sony an unassailable lead in this console cycle." Xbox's US launch was successful with 1.5 million sold in the six-week Christmas shopping period.

Xbox's biggest challenge was to make a major dent in PS2's market share in Japan. Microsoft's Japanese launch of Xbox was a major event for Microsoft. Bill Gates was present to sell the first Xbox in Japan, on February 22, 2002, and in the week prior to the launch, Microsoft released 12 new games for Xbox. Priced at ¥34,800 (\$259.3), the Xbox cost 17 percent more than PS2 and 39 percent more than GameCube. However, Xbox's reception in Japan was disappointing for Microsoft. In its first three days, 150,000 units were sold of the 250,000 that were shipped (PS2 had sold 720,000 in its first three days). Soon after the launch, a number of consumers began making complaints that the Xbox was scratching their CDs and DVDs. Microsoft's hesitant response to these complaints alienated many Japanese consumers and retailers. Moreover, none of Xbox's initial games releases proved to be major hits with Japanese games players.

## THE VIDEO GAMES MARKET IN MAY 2002

### Market demand

As summer 2002 approached, the world video games industry was moving into a period of expectancy and uncertainty. Most forecasts showed the market to be on the threshold of its biggest ever expansion phase. Each generation of games consoles had surpassed its predecessor in terms of unit sales (see Figure 1). Despite their hesitant start, the 5<sup>th</sup> generation 128-bit machines (PS2, GameCube, and Xbox) would surpass the unit sales of all the 32/64-bit machines (PS1, Saturn, and N64). Industry sales for 2002 were estimated at between \$25 billion and \$31 billion, although the breakdown between hardware and software sales varied greatly between different market analysts. There was consensus over the importance of the industry within the entertainment sector: sales of games software would rival the film industry's box office receipts (see Figure 2).

The increasing revenues generated by the industry throughout its history was a contrast to most of the high-tech sector, in which increasing unit sales were typically more than offset by declining unit prices. The prices of games consoles fell sharply within each generation of players, but across the generations prices had remained fairly steady. New products were typically introduced at around \$200-\$300, with prices eventually falling to between \$100 and \$200. However, by far the greater portion of revenues was generated by software whose unit prices remained around the \$50 level.

Market expansion was primarily the result of the success of the hardware and software manufacturers in expanding the industry's user base. From its initial teen and pre-teen customers of Atari, games machines had gradually expanded their demographic penetration:

Gaming is no longer the province of children and teenagers. According to a survey carried out by the Interactive Digital Software Association, 60 percent of Americans play games, either on consoles, handheld devices, or PCs. Of those gamers, 61 percent are adults, 43 percent women, and the average age is 28. Figures from Europe and Japan tell a similar story. A generation that grew up with games has simply kept on playing. And as gamers age, their disposable income increases, making gaming an extraordinarily lucrative market.<sup>3</sup>

While children who grew up playing video games continued to do so as adults, game preferences changed greatly with age. Adolescents were more concerned with what was "in" and "hot." The adult market was composed of numerous niches, each with an interest in a different type of game. Adults liked titles that fit in with their lifestyle and interests. Sports-based games were very popular among adult males. Among older players, "The Sim" that simulated family life, those based on TV shows (such as "Who Wants To Be a Millionaire?"), and those based on professional sports were popular.

Despite the breadth of the market, gaining market leadership depended critically upon gaining the support for the core, games-playing enthusiasts. This group numbered about 7 to 12 million individuals within the US. They were mostly males and between the ages of 12 and 30 years old. Many read game magazines like *EGM*, *GamePro* and *Next Generation*, and were linked by their own web sites that communicated news, views, and reviews of new hardware and software.



## Software

Video game console makers (“platform providers”) each licensed third parties to develop software for use with their respective game-playing systems. Typically, the software developer submitted a prototype for evaluation and approval that included all artwork to be used in connection with packaging and marketing of the product. The platform providers usually retained the right to limit the number of games and approve timing of release under manufacturing and licensing arrangements. Home video game production was based on estimated demand for each specific title, with on-hand inventories depending on seasonal variations in demand during the market life of a specific game title. At the time that a newly developed game was approved for manufacturing, the developer had to provide the platform manufacturer with a purchase order for that product and an irrevocable letter of credit for 100 percent of the purchase price. Initial orders generally required 30 to 75 days to produce depending on the platform. Reorders of cartridge games had required approximately 50 days for manufacturing. This figure had been reduced to 14 days for CD-ROM-based games. Shipping of orders required an additional 3 to 10 days, depending on the mode of transport and location of the software producer.

Increasing demand for multi-featured, action-packed game titles had driven up the cost of developing new game titles in the last five years. In the early 1990s, publishers customarily spent around \$300,000 to develop a game for PC, Super NES, or Genesis systems. In 1998, the average budget was around \$1 million per game, and many complex games, with all kinds of multimedia features, entailed even higher development costs. The development costs for some games had exceeded \$10 million (e.g. Origin’s *Wing Commander IV* was a high-profile example). The advent of 128-bit consoles had further added to the sophistication and cost of software development. By 2001-2002, development costs were typically \$2 million to \$5 million per game. A successful title could bring in \$200million to \$300 million—similar to box office revenues from a blockbuster movie. However, like movies, the success rate was low—a minority of games covered their development costs, while a mere handful provided the money-spinning blockbusters. Games software was an almost-entirely a sunk-cost business: development costs ran into the millions of dollars, but production costs were between \$1 and \$2 per copy.

The software side of the video game industry focused on several competitive weapons: product quality and features, compatibility of products with popular platforms, brand-name recognition, access to distribution channels, marketing effectiveness, reliability and ease-of-use, price and technical support. Given the substantial cost of product development and of the marketing required to support best-selling titles, significant financial resources were increasingly becoming a major competitive asset.

Competitive forces in the entertainment software and video game marketplace had increased the need for higher quality, distinctive entertainment software concepts. Competition for titles, themes, and characters from television, movies, and other media as the basis for “hits” resulted in higher development costs for software producers. Substantial non-refundable advance licensing fees and significant advertising expenses also increased the financial risk involved. Moreover, the ability to incorporate compelling story lines or game experiences with full-motion video, digital sound, other lifelike technology, and ease of use presented artistic as well as technical challenges that added to the cost equation.

The profits received by the console manufacturers were also derived—almost exclusively—from sales of software. The billions of dollars spent by each of the manufactures on their 126-bit consoles was recouped through the sales of software rather than the sales of hardware: the selling price of the consoles failed to cover the cost of manufacture, let alone the cost of development. However the licensing fees paid by the games publisher to the console manufacturer were typically about \$10 per copy. The result was strongly cyclical earnings of the hardware companies. The launch of a new console would result in massive cash outflows. Even after a successful market launch, booming hardware sales would typically result in continuing loses since the manufacturer’s revenues from consoles would barely cover the cost of goods sold. It was when a healthy installed base had been established that the manufacturer was able to begin recouping the investment made. Thus, Sony’s installed base of 30 million PS2s at the end of May 2002 and a similar number of its original Playstations still in use gave it a huge financial advantage over Nintendo and Microsoft.

The development of video games required a blend of technology and creative talent. The development process included game development and design, prototyping, programming, art, computer graphic design, animation, sound engineering, technical writing, editorial review, and quality assurance. It took 12 to 24 months (occasionally longer) to complete a new title with a new engine, and 6 to 14 months to make existing titles compatible for play on a different platform. Many games were based on characters and themes that were either owned by the game developer or licensed from third parties. Software companies had to grapple with several strategic issues when embarking upon a new development project: (1) what development and distribution agreements to arrange, (2) whether to acquire content from outsiders or create original content with an in-house group, (3) which game-playing platform to develop for, and (4) how to attract and retain their key creative and technical talent.

The most common strategy in creating a new title was for a software publisher to hire a developer. The developer was responsible for creating and programming the game and assuring the quality of the product. The publisher handled manufacturing, packaging, marketing, and distribution issues. The publisher bore the risk of unsold

inventory if the title was a failure in the marketplace. Generally, game developers were paid a royalty based on wholesale revenues. Royalty payments varied greatly, but typically ranged from 5 to 15 percent.

Many developers were attempting to publish their own titles. Affiliated label and co-publishing programs had become a popular means for small companies to publish their own titles and maintain their independence. Under an affiliated label program, a developer handled marketing and publishing, while a co-publisher dealt with distribution. In return, the developer received a royalty of up to 75 percent of wholesale revenue. A variation on the affiliated label program was expected to become the distribution method of choice.

The licensing fees paid by software publishers for exclusive rights to the intellectual property of media companies and sports organizations grew substantially between 1998 and 2002. Securing the license to produce a game based on a hit movie (e.g. Harry Potter) could cost several millions of dollars. In the sports market, licenses paid to sports leagues (NFL, NHL, MLB, NBA, MLS) typically involved an up front payment, plus a royalty of 5 to 15 percent of the wholesale price for each unit sold. Many large entertainment conglomerates were setting up interactive divisions to create titles based on their own property.

### **The competitive situation, May 2002**

During Spring 2002, competition in all three major markets—North America, Japan, and Europe—was intensifying. For Nintendo and Microsoft, the next six months would be critical. If they were to retain the support of software developers and retailers and recoup a significant proportion of their development and launch costs, it was essential that they grabbed a substantial share of new hardware sales in all three major markets. For Sony, the key was to utilize its incumbency advantage of installed base and huge library of titles to thwart its two rivals. In March 2002, Sony cut the US price of its PS2 from \$299 to \$199 and made similar cuts in other countries. Microsoft responded by cutting the price of its Xbox from \$299 to \$199, and Nintendo reduced its GameCube from \$199 to \$149. Despite PS2's problematic launch, it was clearly established as market leader with an installed base of 30 million worldwide as compared to about 4.5 million each for GameCube and Xbox.

However, it was too early to declare Sony the winner. The advent of network gaming had the potential to upset the competitive situation. Online games playing had become increasingly popular on PCs and most forecasters anticipated that interactivity would be the next big wave for dedicated games consoles. However, as the games have raced ahead in sophistication, dial-up modem links have become increasingly unsatisfactory in providing interactivity. The different manufacturers were pursuing different Internet strategies. Sony and Nintendo had developed adapters for their consoles that allowed internet access, while leaving it to service providers, cable companies, and others to provide infrastructure and host games. Microsoft had adopted a more pioneering approach. It had announced the establishment of Xbox Live to support online games through a \$2 billion dedicated network. Subscription fees would be paid directly to Microsoft.

While Sony and Nintendo's approach involved less capital outlay and greater flexibility to adjust to the network technologies and billing systems of different countries, other analysts viewed Microsoft's strategy as a potential winner. Not only would it give Microsoft control over the provision of software, such a network would impart Microsoft a distribution system for a wide array of entertainment products, including movies and music.

**Table 1. U.S. Retail Sales of Hardware and Software by Console Type, 1990-2001 (\$, millions)**

|                                      | 1990         | 1991         | 1992         | 1993         | 1994         | 1995         | 1996         | 1997         | 1998         | 1999         | 2000         | 2001         |
|--------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| <b>Nintendo</b>                      |              |              |              |              |              |              |              |              |              |              |              |              |
| NintendoES                           | 2,904        | 1,833        | 720          | 370          | 102          | 34           | 15           | -            | -            | -            | -            | -            |
| Super NES                            | -            | 560          | 1,733        | 1,890        | 1,471        | 823          | 514          | 243          | 137          | 20           | 0            | -            |
| N64                                  | -            | -            | -            | -            | -            | -            | 490          | 1,690        | 2,032        | 1,887        | 1,532        | 804          |
| GameCube                             | -            | -            | -            | -            | -            | -            | -            | -            | -            | -            | -            | -            |
| <b>Sega</b>                          |              |              |              |              |              |              |              |              |              |              |              |              |
| Genesis                              | 280          | 586          | 1,090        | 1,706        | 1,490        | 719          | 294          | 180          | 0            | 0            | -            | -            |
| Game Gear                            | -            | 91           | 162          | 219          | 318          | 135          | 77           | 34           | 13           | 0            | -            | -            |
| Sega CD                              | -            | -            | 61           | 232          | 215          | 30           | 0            | -            | -            | -            | -            | -            |
| 32-X                                 | -            | -            | -            | -            | 107          | 63           | 0            | -            | -            | -            | -            | -            |
| Saturn                               | -            | -            | -            | -            | -            | 140          | 368          | 311          | 148          | 0            | 0            | -            |
| Dreamcast                            | -            | -            | -            | -            | -            | -            | -            | -            | -            | 1,160        | 820          | 182          |
| <b>Sony</b>                          |              |              |              |              |              |              |              |              |              |              |              |              |
| PlayStation                          | -            | -            | -            | -            | -            | 375          | 1,254        | 2,525        | 3,161        | 2,882        | 2,087        | 1,157        |
| PlayStation2                         | -            | -            | -            | -            | -            | -            | -            | -            | -            | -            | 493          | 3,762        |
| <b>Microsoft</b>                     |              |              |              |              |              |              |              |              |              |              |              |              |
| X-box                                | -            | -            | -            | -            | -            | -            | -            | -            | -            | -            | -            | 540          |
| <b>Other</b>                         |              |              |              |              |              |              |              |              |              |              |              |              |
| Atari Lynx                           | 32           | 40           | 32           | 13           | 3            | -            | -            | -            | -            | -            | -            | -            |
| Atari Jaguar                         | -            | -            | -            | 7            | 64           | 52           | 0            | 0            | 0            | 0            | -            | -            |
| 3DO-based                            | -            | -            | -            | 29           | 238          | 252          | 24           | 0            | 50           | 50           | 10           | 0            |
| Phillips CD-I                        | -            | -            | 49           | 78           | 64           | 54           | 138          | 21           | 0            | 0            | -            | -            |
| <b>Total hardware &amp; software</b> | <b>3,216</b> | <b>3,110</b> | <b>3,847</b> | <b>4,534</b> | <b>4,066</b> | <b>2,686</b> | <b>3,174</b> | <b>5,004</b> | <b>5,541</b> | <b>5,999</b> | <b>4,942</b> | <b>6,445</b> |
| <b>Sales Composition</b>             |              |              |              |              |              |              |              |              |              |              |              |              |
| Hardware                             | 31%          | 37%          | 40%          | 37%          | 34%          | 34%          | 43%          | 43%          | 36%          | 22%          | 32%          | 46%          |
| Software                             | 69%          | 63%          | 60%          | 63%          | 66%          | 66%          | 57%          | 57%          | 64%          | 78%          | 68%          | 54%          |
| Total                                | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         | 100%         |

Sources: IDC, Gerard Klauer Mattison & Co., and case writer estimates

**TABLE 2. Relative costs: Playstation and Nintendo 64, 1997.**

|                              | <i>PlayStation</i> | <i>Nintendo 64</i> |
|------------------------------|--------------------|--------------------|
|                              | \$                 | \$                 |
| <i>Hardware</i>              |                    |                    |
| Graphics subsystem           | 35.83              | 29.11              |
| Central electronics          | 51.51              | 78.16              |
| Audio subsystem              | 25.71              | 10.02              |
| Card MVA                     | 16.27              | 10.98              |
| CD-ROM subsystem             | 48.50              | --                 |
| PCB                          | 12.09              | 2.55               |
| Other                        | 23.54              | 29.10              |
| <b>Total</b>                 | <b>213.45</b>      | <b>159.92</b>      |
| <i>Software</i>              |                    |                    |
| Cost to software developer   | 12.00              | 34.00              |
| of which: manufacturing cost | 1.50               | 12.00              |
| royalty fee                  | 7.50               | 19.00              |
| developer's variable cost    | 3.00               | 3.00               |
| Wholesale price              | 30.00              | 45.00              |
| Retail price                 | 40.00              | 60.00              |

Source: CIBC Oppenheimer

**TABLE 3. Worldwide Sales of 32-, 64-, and 128-Bit Hardware Systems, 1994-2000 (millions of units)**

| <b>Unit Sales</b>                |             |             |             |             |             |             |              |
|----------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|
|                                  | <b>1994</b> | <b>1995</b> | <b>1996</b> | <b>1997</b> | <b>1998</b> | <b>1999</b> | <b>2000</b>  |
| United States                    | -           | 1.0         | 4.8         | 11.8        | 13.5        | 9.0         | 7.3          |
| Europe                           | -           | 0.6         | 1.9         | 4.4         | 6.4         | 6.4         | 4.7          |
| Japan                            | 0.8         | 3.6         | 6.6         | 7.0         | 6.9         | 6.6         | 5.1          |
| Rest of World                    | 0.0         | 0.3         | 0.8         | 1.5         | 1.9         | 2.0         | 1.8          |
| <b>Total</b>                     | <b>0.8</b>  | <b>5.4</b>  | <b>14.1</b> | <b>24.7</b> | <b>28.7</b> | <b>23.9</b> | <b>18.9</b>  |
| <b>Cumulative Installed Base</b> |             |             |             |             |             |             |              |
| United States                    | -           | 1.0         | 5.8         | 17.6        | 31.1        | 40.1        | 47.5         |
| Europe                           | -           | 0.6         | 2.4         | 6.9         | 13.2        | 19.6        | 24.3         |
| Japan                            | 0.8         | 4.4         | 11.0        | 18.0        | 24.9        | 31.4        | 36.5         |
| Rest of world                    | 0.0         | 0.3         | 1.1         | 2.6         | 4.6         | 6.6         | 8.4          |
| <b>Total</b>                     | <b>0.8</b>  | <b>6.2</b>  | <b>20.3</b> | <b>45.0</b> | <b>73.7</b> | <b>97.6</b> | <b>116.7</b> |

Sources: Gerard Klauer Mattison & Co., and IDC

**TABLE 4. Comparison of the 128-bit games consoles**

|                      | <i>Sega Dreamcast</i>   | <i>Sony PlayStation2</i>  | <i>Nintendo GameCube</i>  | <i>Microsoft X-Box</i>                                |
|----------------------|---|---|---|---|
| CPU                  | 200 Mhz SH4 Hitachi-made RISC processor                         | 294 Mhz 0.18 micron custom CPU manufactured by Toshiba                            | 485 Mhz 0.18 micron IBM "Gecko" processor derived from Power PC | Intel P3 733Mhz                                       |
| Polygons per second  | 3 million; 1 million with curved surfaces, fogging and lighting | 66 million; 16 million with curved surfaces; 36 million with fogging and lighting | 6 to 12 million real-world polygons                             | 100 million with all effects on                       |
| Storage              | 1 gigabyte GD-ROM (a proprietary double-density CD-ROM)         | 4.7 gigabyte DVD-ROM  | 4.7 gigabyte DVD-ROM  | DVD-ROM<br>Also, hard drive                           |
| Graphics             | 128-bit 3D graphics   | 128-bit 3D graphics   | 128-bit 3D graphics   | Nvidia NV-25 running 300MHz 256-bit graphics pipeline |
| DVD movie player     | No  | Yes   | No  | Yes   |
| Memory bus bandwidth | 800+ megabytes/second   | 3.2 gigabytes/second  | 3.2 gigabytes/second  | 6.4 gigabytes/second                                  |
| Modem                | 56kbps  | None  | None  | Broadband modem                                       |

Source: Nintendo Next Generation Comparison Chart

**TABLE 5. Estimate of the World Video Game Market in 2002**

|  |                             |
|--|-----------------------------|
|  | <i>\$, billions</i>         |
| Total industry sales                                       | 31                          |
| Of which, hardware   | 22                          |
| Software   | 9                           |
|  | <i>Millions of units</i>    |
| Cumulative unit sales by model                             |                             |
| PlayStation2   | 48.4                        |
| GameCube   | 15.1                        |
| X-Box  | 6.9                         |
|  | <i>\$, millions</i>         |
| Sales of PC games  | 8,500 (down 8.5% on 2001)   |
| Sales of games for mobile phones, PDAs, and interactive TV | 873 (100% increase on 2001) |

Source: Informa Media Group

**APPENDIX. Financial Data on the Leading Hardware Manufacturers**

**NINTENDO**

*(Yen, billions)*

|                                | 1992 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|--------------------------------|------|------|------|------|------|------|------|------|------|------|
| Total sales                    | 562  | 497  | 429  | 401  | 463  | 534  | 573  | 531  | 463  | 555  |
| - Consoles                     |      |      |      |      |      |      |      | 30   | 99   | n.a  |
| - Handheld                     |      |      |      |      |      |      |      | 123  | 190  | n.a  |
| - Console software             |      |      |      |      |      |      |      | 129  | 64   | n.a  |
| - Console software             |      |      |      |      |      |      |      | 139  | 165  | n.a  |
| - Royalties                    |      |      |      |      |      |      |      | 14   | 8    | n.a  |
| Operating income               | 157  | 104  | 86   | 133  | 115  | 172  | 156  | 145  | 85   | 119  |
| Income taxes                   | 94   | 59   | 50   | 74   | 50   | 88   | 165  | 108  | 71   | 77   |
| Net income                     | 87   | 53   | 42   | 60   | 65   | 84   | 86   | 56   | 97   | 106  |
| Cash and cash equivalents      | n.a. | 343  | 397  | 483  | 542  | xxx  | 639  | 594  | 825  | 895  |
| Total current assets           | n.a. | 519  | 498  | 571  | 660  | xxx  | 809  | 810  | 958  | 1038 |
| Total assets                   | 517  | 591  | 579  | 650  | 736  | 849  | 893  | 933  | 1069 | 1157 |
| Total current liabilities      | n.a. | 140  | 108  | 136  | 170  | xxx  | 189  | 169  | 225  | 212  |
| Total liabilities              | 147  | 110  | 137  | 172  | xxx  | 893  | 933  | 231  | 219  |      |
| Total shareholder equity       | 329  | 444  | 465  | 513  | 564  | 633  | 700  | 757  | 835  | 935  |
| Capital expenditures           | n.a. | 162  | 224  | 252  | 298  | 388  | 354  | 436  | n.a. | n.a. |
| Return on av. total assets (%) | 18.5 | 10.1 | 7.2  | 9.8  | 9.4  | 10.6 | 9.9  | 6.1  | 9.7  | 9.5  |
| Return on av. equity (%)       | 30.0 | 13.2 | 9.2  | 12.3 | 12.1 | 14.0 | 12.9 | 7.7  | 12.2 | 12.0 |

**SEGA**

*(Yen, billions)*

|                                      | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998   | 1999   | 2000   | 2001    | 2002   |
|--------------------------------------|------|------|------|------|------|------|--------|--------|--------|---------|--------|
| Net sales:                           | 213  | 347  | 354  | 333  | 346  | 360  | 331    | 226    | 339    | 243     | 206    |
| - Consumer products                  | 135  | 229  | 236  | 188  | 170  | 164  | 114    | 85     | 186    | 116     | 85     |
| - Amusement Centre operations        | 41   | 59   | 62   | 74   | 82   | 88   | 95     | 92     | 75     | 79      | 69     |
| - Amusement machine sales            | 36   | 58   | 52   | 61   | 85   | 98   | 124    | 91     | 74     | 52      | 53     |
| - Royalties on game software         | 0.4  | 1    | 4    | 9    | 10   | 9    | 4      | 2      | n.a    | n.a     | n.a    |
| Cost of sales                        | 151  | 252  | 270  | 257  | 271  | 285  | 271    | 202    | 290    | 218     | 145    |
| Gross profit                         | 62   | 95   | 84   | 76   | 75   | 75   | 60     | 24     | 49     | 25      | 62     |
| Selling, general and admin. expenses | 23   | 33   | 37   | 45   | 46   | 44   | 64     | 62     | 89     | 77      | 47     |
| Operating income                     | 39   | 63   | 47   | 31   | 30   | 31   | 7      | 4      | (40)   | (52)    | 14     |
| Net income                           | 14   | 28   | 23   | 14   | 5    | 6    | (36)   | (32)   | (52)   | (418)   | (18)   |
| Total assets                         | 226  | 295  | 301  | 426  | 441  | 387  | 369    | 426    | 375    | 284     | 244    |
| Total shareholders' equity           | 90   | 117  | 165  | 176  | 178  | 179  | 122    | 81     | 81     | 92      | 84     |
| Financial ratios                     |      |      |      |      |      |      |        |        |        |         |        |
| Return on average assets (%)         | 8.2  | 10.8 | 7.8  | 3.9  | 1.2  | 1.3  | (9.7)  | (8.1)  | (15.7) | (115.2) | (7.5)  |
| Return on average equity (%)         | 16.7 | 27.1 | 16.5 | 8.3  | 3.0  | 3.1  | (24.0) | (32.0) | (60.1) | (375.0) | (20.5) |

**SONY***(Yen, billions)*

|                             | <b>1993</b> | <b>1994</b> | <b>1995</b> | <b>1996</b> | <b>1997</b> | <b>1998</b> | <b>1999</b> | <b>2000</b> | <b>2001</b> | <b>2002</b> |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Sales and operating revenue | 4,001       | 3,744       | 3,990       | 4,592       | 5,663       | 6,761       | 6,804       | 6,687       | 7,315       | 7,578       |
| <i>of which:</i>            |             |             |             |             |             |             |             |             |             |             |
| --Games                     | n.a         | n.a         | n.a         | 201         | 408         | 700         | 760         | 631         | 661         | 1,004       |
| Operating income (loss)     | 131         | 107         | (167)       | 235         | 370         | 526         | 348         | 241         | 225         | 135         |
| <i>of which:</i>            |             |             |             |             |             |             |             |             |             |             |
| --Games                     | n.a         | n.a         | n.a         | n.a         | n.a         | 117         | 137         | 77          | (51)        | 84          |
| Pre-tax income              | 93          | 102         | (221)       | 138         | 312         | 459         | 378         | 264         | 266         | 93          |
| Income taxes                | 50          | 79          | 65          | 77          | 164         | 215         | 178         | 95          | 116         | 65          |
| Net income (loss)           | 36          | 15          | (293)       | 54          | 139         | 222         | 179         | 122         | 17          | 15          |
| Capital expenditures        | 251         | 196         | 251         | 251         | 298         | 388         | 354         | 436         | 465         | 327         |
| R&D expenses                | 232         | 230         | 239         | 257         | 283         | 318         | 375         | 394         | 417         | 433         |
| Net working capital         | 367         | 616         | 538         | 816         | 844         | 1,151       | 1,127       | 974         | 831         | 779         |
| Stockholders' equity        | 1,428       | 1,330       | 1,008       | 1,169       | 1,459       | 1,816       | 1,824       | 2,183       | 2,315       | 2,370       |
| Total assets                | 4,530       | 4,270       | 4,224       | 5,046       | 5,680       | 6,403       | 6,299       | 6,807       | 7,827       | 8,186       |

*Source:* Company annual reports

## NOTES

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<sup>1</sup> Sathnam Sanghera, “Out of the box at last,” Creative Business Section, *Financial Times*; Nov 20, 2001.

<sup>2</sup> Ibid.

<sup>3</sup> “Console wars.” *The Economist*, June 22, 2002, pp. 71-72.