

**TECHNOLOGY
INNOVATION
&
GAMING LAW
2024**

Loot Boxes

Background.

More than 3.2 billion people play video games worldwide. In the U.S. alone, 65% of adults regularly play video games. The average video game player spends 13 hours per week playing video games. The video game industry is currently estimated to have a value of about \$300 billion. This industry is larger than the movie and entertainment industry (estimated at \$90 billion). With an industry this large, competition is fierce and the incentive to drive revenue is significant.

Traditional Video Game Revenue Models

In 1972, Pong, the first commercially successful video arcade game was launched. Pong as a tennis style game simulator. Players would control a video paddle on either side of an electronic net to hit a video ball back and forth. A simulation can be found at <https://www.ponggame.org/>. The arcade game was simple, but popular and ushered in the era of popular video gaming. Each cabinet cost at least \$3000 in 1972 (approximately \$22,000 today).



In 1978, Space Invaders, the next big successful arcade video game was launched. Each space invaders cabinet cost at least \$2000 in 1978 (approximately \$9,500 today) Space Invaders featured a game layout where players controlled a gun emplacement that they could move along the bottom of the screen to shoot down invading aliens descending from the top of the screen. The game increases in speed over which increases the challenge to players. To view and play a version of this game visit <https://www.free80sarcade.com/spaceinvaders.php>.

Traditionally, arcade games were sold to bars and arcades and operated like all other coin operated amusements. Each play would cost the player 25¢, and early video games were wildly successful at bringing a return on investment for the locations that placed these machines.

Video game arcade consoles were popular throughout the 1980s, but their popularity declined in the 1990s. Arcade game cabinets ranged in price from \$2000 - \$20000 during the 1980s (\$6000-60,000 today). Coinciding with the rise of the popularity of video games was the rise in the adoption of home computers and home game consoles.

Early Home Gaming Consoles

Just as Pong led the arcade cabinet video game revolution, it also led the home gaming console revolution. In 1975, Atari, the inventor of Pong, developed a home console version of its game.



Originally marketed through Sears catalog and retail store sales, the Pong games were priced at \$98.95 (today \$560) but also required an AC adapter for \$7.95 (\$43,46). The home Pong consoles used an analog connection to home television sets. 150,000 units of the Pong home console were sold in 1975. These consoles only played the Pong game and were not adaptable for playing other games. Revenue was made solely from the sale of game consoles.

In 1977, Atari introduced the Atari Video Game System (VCS) or Atari 2600. The VCS featured a computer microprocessor (MOS 6502) that would later power home computers from Atari, Apple, Commodore and others, a swappable game cartridges, and ports for using different accessory controllers, including joysticks and paddle wheels (like pong). The 8 bit graphics were crude by today's standards and not nearly as crisp as arcade game consoles.

In 1977, the VCS was marketed under the Atari Brand as well as the Tele Games brand of Sears. The Sears and Atari units were identical except for cosmetic decals. The original price at launch was \$199 (about \$1000 today). A Combat game cartridge was included with each console as its initial game.

Approximately 400,000 VCS systems were sold in the first year.



While the VCS was not the first home cartridge based game system (that title belongs to the Magnavox Odyssey), it was the first to open up to third-party development and licensed game content. This altered the financial model for video game console makers and began the creation of the home video game software studio.

EARLY HOME COMPUTERS

Simultaneously with the rise of home video game consoles was a rise in the adoption of home computers, albeit at a much slower pace. In the early 1970s, coinciding with the introduction of affordable microprocessors, hobbyists began making home computers. Initially, commercialization of home computers was by way of providing kits. The Altair 8800 was the first kit to reach some level of popularity. In 1975, MITS began offering the Altair 8800 base kit for commercial sale at \$439 (about \$2500 today). The base kits needed additional components to be complete, and the total cost of building a functioning computer with a keyboard and a cassette storage interface was estimated to be about \$1500 (\$8600 today). The kit would still need assembly, soldering and skill, but when complete, the user would have a 4 kilobyte machine with an intel 8080 cpu, and a version of the BASIC programming language developed at Dartmouth. The Altair 8800 did not contain any video hardware. It could be programmed using the front panel or through a standard serial (RS232) terminal. The Altair 8800 also provided the first standardized home computer hardware bus (the S-100), which spawned a small industry of add-in card



manufacturers. The Altair 8800 also created a small industry of clones, the most famous of which is the IMSAI 8800 that made an appearance as the home computer used in the 1983 movie War Games. Finally, the Altair 8800 inspired the founders of both Apple and Microsoft to start their journeys into home computing and home computing software.

While the Altair 8800, and its clones, were popular with hobbyists and enthusiasts, a total of about 5,000 kits were sold, it did not see significant market penetration into homes and schools.

In 1977, the first home computer to sell in significant numbers was introduced. It was the Apple][computer. Apple Computers was started in 1976 and had initially build a home computer kit based on the MOS Technolgoies 6502 CPU (like the Atari VCS). The Apple 1 was sold as a motherboard only kit, leaving the hobbyist that purchased the kit to compete the population of the motherboard, and to build their own cabinet and interfaces. The kits were had made by the founders of Apple and approximately 79 were sold at a price of \$666.66 (about \$3,600 today).

In 1977, Apple introduced its second computer the Apple][. The Apple][was somewhat revolutionary as it could be purchased as a completed computer with a case, keyboard, color video circuitry, ram, built in BASIC programming interpreter, and 4k to 48k of RAM. The entry price for the Apple][in 1977 was \$1,298 (about \$5200) today.

Home computers would now emerge from enthusiast and computer club users to actual users in homes and schools. Apple was not alone in its development of home computers, Commodore introduced the PET computer in 1977 and Tandy introduced the TRS-80 home computer in 1977.



Initially, the Tandy machines were the top seller among home computers. However, in 1978 Apple created a relatively inexpensive floppy disk controller that really set the Apple][apart from its competitors. The use of floppy disks changed average load times from being measured in hour or half hour increments to just a few minutes.

With color and reasonably priced disk drives, the Apple][surpassed the TRS-80 and PET computers in sales in 1978. Simultaneously, the home brew software industry was quickly becoming a significant business. Games were a part of this revolution. In 1978 game studios such as Activision and Epyx began

to produce games for both the Atari VCS and disk based Apple][computers. Video games in the home were becoming a significant industry in their own right.



In 1979, the first electronic spreadsheet (VISICALC) was published, and home computers found their way into businesses. This further pushed adoption of microcomputers into homes and small businesses as bookkeeping and mathematical modeling once reserved for large computer and dedicated programs could be accomplished on home microcomputing

devices. In 1979, Atari introduced its first home computers to compete with Apple, Tandy and Commodore. The Atari 400 & 800 systems had an Apple][like all in one case, but added cartridge software loading similar to the VCS; however, like many other early computer systems the Atari systems never reached the popularity of the Apple][.

In 1979, Apple introduced the Apple][+, which started with a base of 16k of memory and could be equipped with as much as 64k of memory. Combined with VisiCalc and a maturing video game publishing industry, the Apple][+ quickly outsold the original Apple][and became the most widely used computer in schools in the United States and elsewhere.

In 1981, IBM entered the personal computer market with the IBM 5150 PC. Unlike Apple, Commodore and Atari, IBM chose the Intel 8088 microprocessor as the central processor of its computer (successor to the 8080 used in the Altair). IBM priced the PC at \$1585 (about \$5200 today) with 16k, color graphics and a keyboard but no screen or disk drives. A monochrome IBM PC setup with one disk drive started at \$2800 (about \$9600 today), color systems were significantly more expensive. The IBM PC was significantly more expensive than the Apple][computers of the time. At that time, the Apple]['s graphics maxed out at 16 colors with a resolution of 280 x 192 pixels, while the IBM optional Color Graphics Adapter (CGA) graphics cards could display black and white graphics at a resolution of 640x200 pixels and 16 color graphics at a resolution of 160x100 pixels. Not surprisingly, the IBM 5150 PC did not



sell well at first. To promote sales IBM began bundling PC sales with mainframe and mini-computer sales to businesses. For businesses, the IBM PC was a big savings over the IBM 5100 microcomputer that IBM had been selling since 1975 and had a price tag as high as \$20,000 per computer. This saved the IBM PC and IBM developed subsequent models.

In 1983, Atari faced its first significant competition from newcomer Nintendo. The Nintendo Entertainment System launched the NES in July of 1983 in Japan and it overtook the Japanese market by storm, supplanting the Atari 5200 (successor to the Atari 2600) as the top gaming machine in Japan. In response, Atari developed the Lynx portable gaming system and accelerated development of the Atari 7800 gaming console.

In 1984, the next big revolution in the home computing market occurred. Apple introduced the



Macintosh, which featured a graphical windowed computing environment with a what-you-see-is-what-you-get interface. IBM introduced the Enhanced Graphics Adapter (EGA), which could display 16 colors simultaneously from a pallet of 64 colors at a resolution of 640x350 pixels. Meanwhile, Atari introduced the 7800 gaming console, and manufacturers (particularly in Japan) began designing the next generation of home gaming console. That same year, an independent company called the Amiga Corporation provided

a demonstration of its forthcoming computer called the Amiga which had a maximum resolution of 1024x800 pixels and could display up to 4096 colors. The Amiga Corporation was founded by former engineers from Apple and Atari. The prospect of the Amiga had game developers excited as the expected resolution and color palette of the Amiga would exceed that of cabinet arcade machines of the time.

Meanwhile, game developers were pushing hardware manufacturers for better hardware on which to run games. In 1985, Atari introduced the Atari ST, to compete with the Apple Macintosh which provided a graphical windowed user interface, but in 16 colors with a resolution of 320x200 pixels or black and white at a resolution of 600x400 pixels. Apple's Macintosh had a higher resolution of 512x342 pixels, but could not display any color. Game developers flocked to the Atari ST for game development given the superior choice of color and resolution for game development.

In 1987, IBM developed the Video Graphics Array (VGA) controller card, which provided 16 color graphics from a pallet of 256 colors at a resolution of 640x480. Outside of Apple, VGA became the defacto video standard for computers and monitors. Meanwhile, Commodore, known for low cost computers in the early 1980s purchased the Amiga Corporation and released the Amiga 1000 computer. The Amiga 1000 surprised many game developers by making good on the promises of the 1984 consumer electronics show. While many games were ultimately developed on or for the Amiga, the computer gained only nominal success in the U.S., but was a significant success in Europe.

By the late 1980s, game development publishers such as Activision, Electronic Arts, and Ubisoft had a strong foothold in both console gaming and personal computer gaming. By the 1990s, the IBM PC, or its subsequent clones, had become the defacto personal computer and Nintendo and SEGA (both Japanese companies) dominated the home console market.

Games were still sold on a per copy basis and arcade versions were sold in large cabinets for use in commercial arcades and similar settings. Revenue was solely dependent on game sales and cabinet sales. Most games were sold on floppy disk in retail stores or through mail order outlets. By the late 1990s, the personal computer market was dominated by computers running Microsoft DOS (PC clones). About that time, former engineers from Silicon Graphics (a maker of industrial 3D focused workstations) introduced a new set of VGA and 3D standards under their new company 3D/FX. Meanwhile Nintendo also started working with Silicon Graphics for its forthcoming home console, the Nintendo 64.

Meanwhile, Sony, who had been a supplier to Nintendo and worked on developing a new home gaming console with Nintendo, ultimately brought its own home gaming console to the market in 1994. The Sony Playstation incorporated many of the components the company proposed to Nintendo for its next generation console, such as the use of CD rom storage for games rather than game cartridges. Sony launched the Playstation in December 1994 and it was a huge success. It became the first home gaming console to sell more than 120 million units.

In 1997, Cavedog Entertainment created a new innovation for video gaming when it introduced downloadable content ("DLC") for their game Total Annihilation. While Cavedog did not charge for its DLC, the industry took notice as it appeared a new revenue source for gaming had been found.

Not to be left behind, SEGA worked with Microsoft to develop a competing game console that incorporated CD-ROM and GD-ROM (an alternative to DVDs) to store games. Most importantly, unlike any prior gaming console, the SEGA Dreamcast featured a built in modem for internet and online play. While SEGA originally worked with 3D/FX for a new graphics chip, it instead settled on a less powerful graphics chip from NEC along with a 64 bit RISC CPU from Hitachi. Introduced in 1998, the Dreamcast sold 1.5 million units in the U.S., but competition in 2000 from Sony's PS2 caused a sharp drop in sales in 2000. However, the Dreamcast did usher in the era of modern online gaming as it was the first home gaming console to support multi-player games online. This also means that some of the first online video game contests and tournaments were held using Dreamcast game consoles.

In 2001, Microsoft, who had worked with SEGA on the dreamcast, saw the success of the Sony Play Station 2, and decided to compete with Sony using their own gaming console. Microsoft planned to leverage their PC based gaming interfaces for a new console device that was essentially based on PC technology. The first Xbox featured an intel Pentium III CPU, an Nvidia GeForce 3 graphics processor (Nvidia having purchased 3D/FX the year before), and it incorporated an ethernet connection to allow for online gaming at broadband speeds. To support online gaming, Microsoft created Xbox Live as a service and it allowed online game sales as well as head-to-head and tournament play online.

While the home console market was moving online with video game play and sales, the PC market did much the same. In actuality, personal computers such as the Altair 8800 and Apple][had external modems that could be used to communicate over phone lines between computers. There were several text based games that could be played on a turn-by-turn basis that were popular with enthusiasts. However, such games were generally slow with each player getting one turn per 24 hour cycle. In 1987, the Atari ST featured a multiplayer game called MIDI Maze that allowed computers connected by the musical interface MIDI to play against one another. MIDI Maze predates most network standards and required the players to run a cable between their computers. In 1991, a multi-player tank battle game called Specter was introduced on the Apple Macintosh and allowed play over Apple Talk networks. Apple Talk was an early networking standard used by Apple to connect computers, storage devices and

printers and predates adoption of TCP/IP networks outside of university, research and government installations.

The first popular multi-player PC game was DOOM, which allowed up to 4 people on a common local area network (LAN) to play against one another in 1993. Following Doom, many other PC games incorporated multi-player options for LAN play. LAN parties became a thing, and multi-player gaming gained significant traction. However, because broadband internet access wasn't widely available until the mid 2000s, multi-player online games were generally restricted to LAN gaming and gaming using the Sega Dreamcast. As late as 2007, less than half of the U.S. population had adopted broadband internet access.



In 2007, Apple introduced another computing innovation with the iPhone. The iPhone was essentially the marriage of a computer and a cell phone. Prior to the iPhone, most cellular phones had built-in software and no options to add or alter the software on the phone. The iPhone used a scaled down version of the Apple Macintosh operating system. The Apple Macintosh operating system was based on FREE BSD which itself was a clone or variation of the UNIX operating system originally developed by AT&T. Because this was essentially a computer operating system, it opened up the prospect of third-party application development, including 3rd party games. Because the iPhone was primarily a communications device, games for the iPhone could be multi-player from the inception of the platform.



Like all markets, competition is never far behind. In 2007, the Android operating system was unveiled by Google. The Android operating system had been in development since 2003 and was based on the LINUX computer operating system. LINUX is an operating system designed to be a clone or a variant of the UNIX operating system (sort of like Free BSD). Android was designed to be an operating system for the Open Handset Alliance, long before the introduction of the iPhone. In 2005, Google purchased Android. In 2008, the first phone using the Android OS was released by phone maker HTC. The Android OS bears a striking resemblance to the iPhone OS released on the Apple iPhone a year earlier. However, as the Android OS was in development prior to the iPhone OS, it is unlikely that there was any copying, and given the common roots of both systems as UNIX clones or adaptations, it is not surprising that their ultimate implementations are similar.

The two primary phone operating systems have significant differences. Apple's iOS is tightly controlled by Apple and is designed in conjunction with Apple hardware for tight integration. Google's Android OS is more open and runs on a wide variety of hardware and is used not only in smartphones, but is also used in automotive entertainment hardware (Audi, GM, Hyundai, Honda, Volvo, Pioneer, Kenwood, and others), media players, book readers, cameras (Nikon), networking routers, smart TVs, and DVD players.

The Changing Revenue Model

Loot boxes and Micro-transactions.

As mentioned, game developers earn money from selling licenses or copies of their games. Since the early days of home computers, the software purchasing model has remained fairly constant. However, with constantly connected computing devices (home consoles, computers, and smart phones), game developers saw another opportunity for revenue generation, in-game sales.

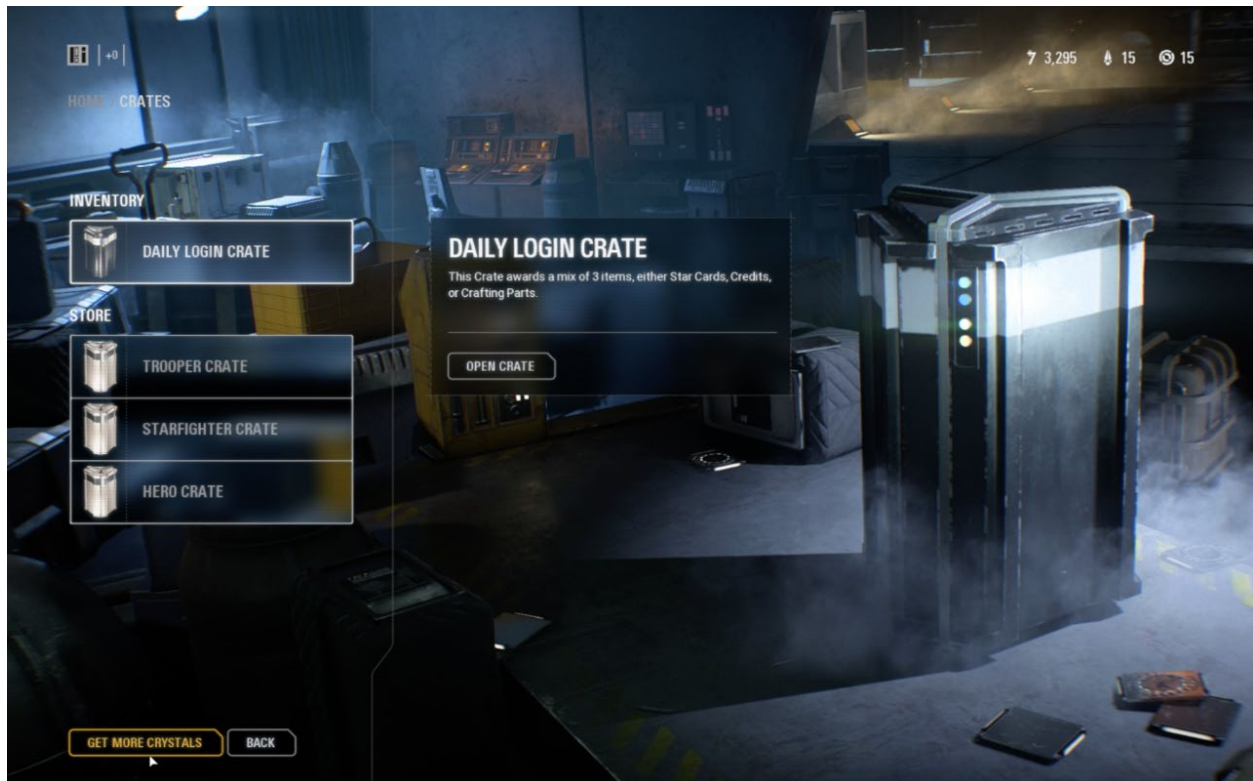
Loot boxes

Originally, loot boxes appeared in games as early as the late 1990s. These were in-game opportunities for added game enhancements. For example, if you were playing a first-person shooter game, like Half-Life, you may come across a box that once opened contains added health, ammunition, or a helpful weapon. In their inception, these loot boxes were helpful for game play and were simply part of the game. Depending on the skill level of the player, such boxes may, or may not, be necessary to continue playing the game. Often, the boxes will contain items a player does not need. Since the boxes were just part of the game-play, and there was no charge for opening or accessing such objects, there were no issues raised by their inclusion in games.



Today, however, several games include loot boxes but only permit accessing the boxes with some sort of payment, either to open the box or to purchase a key to open the box. The most famous, or infamous, issue was raised by the Electronic Arts Game, Star Wars Battlefront 2. Battle Front 2 is a first-person-shooter game in which players battle each other or in game elements to achieve a series of goals. However, in game play, players earn "crystals" for achieving in-game milestones. The crystals may then be used as currency for opening loot boxes during game play. Game players soon discovered that the crystals that could be earned from milestones were minimal and insufficient to open many loot boxes or

crates in the game. In addition to earning crystals in game play, players can purchase crystals with real money through in-game purchases.



Gamers quickly learned that to unlock all the features of the Battle Front 2 game, a player would need to spend about \$2100 or play for more than 4,528 hours. In addition, those estimates are based on each box or crate providing something useful to the player that the player does not already have in their character inventory. Since the loot boxes or crates have random items or objects in them, and since players have no idea what is in a box or crate before opening the box or crate, it is entirely possible that the crate will contain an object the player neither wants or needs.



Is this Gambling?

Electronic Arts faced criticism that the loot crate system in Battle Front 2 was gambling. Electronic Arts countered that the game could be won without purchasing crystals, but would not deny that a perfect player would be required to play the game for more than 4500 hours to unlock all crates.

Ultimately, Electronic Arts altered the progression mechanism in the game to allow progression without the requirement to make purchases. Additionally, Electronic Arts initially turned off the microtransaction components of the game. A check of the game on November 19, 2023 revealed that no micro transactions were available for the PC version of the game purchased through the STEAM game distribution store.