19. CD-ROM Games

Carl Therrien

While it became a standard relatively recently, disc-based storage goes a long way back in the history of video game distribution. The term encompasses a wide range of technologies, from magnetic floppy discs, analog laserdiscs, to a variety of digital optical media. Of the latter, the CD-ROM enjoyed the strongest following and the longest lifespan; as of 2006, a significant number of PC games are still burned on CDs. When it became the most common video game distribution format in the mid nineteen-nineties, the compact disc was already a standard in the music industry. In contrast to the magnetic tapes used for the distribution of albums and movies, optical discs allowed relatively fast, random, non-linear access to the content. But these features were already common in the realm of cartridge-based video game systems; the ROMs in Atari 2600 or Super Nintendo game cartridges were directly connected to the system's working memory and could be read instantly. The CD drive optical head couldn't compete; as a matter of fact, optical discs introduced the infamous "loading" screen to the console gamer. Video games benefited first and foremost from the storage capabilities of the CD-ROM. While the CD format shares its core technical principle with the more recent DVD standard (found in the Xbox and PlayStation 2) and other dedicated formats (such as the Dreamcast's GD-ROM and the Gamecube optical disc), this chapter will focus solely on the integration of CD-ROM technology and its consequences on game design and development.

In 1980, Sony and Philips agreed upon the specifications of the audio CD format. This agreement, known as the "red book" standard, was followed in 1985 by a "yellow book" specifying the data structure of CD-ROM technology. In 1986, a single 12 cm diameter disc could hold 550 megabytes; as of 2006, the same disc can hold up to 700 megabytes. In the mid nineteen-eighties, even the biggest players in the industry couldn't possibly produce enough content to fill the extra space. In order to better understand the importance of this storage increase, a comparison with the formats commonly used when CDs were introduced will prove more useful than technical definitions of kilobytes and megabytes. Cartridge size for home consoles were commonly referred to in megabits; converted back to megabytes, the storage space available to what is known as the 16-bit generation appears relatively meager: up to 2.5 megabytes for the Turbografx-16's TurboChip (or HuCard), 4 megabytes for the Sega Genesis' cartridge, and 6 megabytes for the Super Nintendo Entertainment System's cartridge. On the personal computer side, the largest games at the beginning of the 1990s required a handful of high-density floppy disks (1.44 megabytes per disk). Of course, these sizes were adequate for most of the games produced of that generation. But at the same time, new ways of producing game assets were emerging: digitization of sound/picture/video, and computer-generated imagery (CGI). The ability to integrate this variety of assets defines one of the most salient buzzwords of the CD era: "multimedia". In reality, "multimedia" was associated first and foremost with the development of full-motion video (FMV). This fascination for a cinema-like illusion of motion actually led to a multitude of video compression techniques, typically specific to a given developer, with no actual norms in terms of image quality, frame rate, and

proportion of the animation on the screen. The introduction of the CD-ROM format created a need to expand the content, and many different strategies emerged. Before presenting these strategies, we will review the major CD-based gaming systems and their specifications.

CD-Based Gaming Systems

For the personal computer user, CD-ROM Gaming began as early as 1987, with the release of Cyan's *The Manhole*. However, the high cost of CD-ROM drives resulted in a smaller user base for the technology during the first generation of CD-based gaming systems. In 1989, NEC was the first to bring CD technology to the console world. Its Turbografx-16/PC Engine CD-ROM peripheral could transfer data at a rate of 150 kilobytes per second, a feature known as the 1X standard. Since there are 1024 kilobytes in one megabyte, and considering the total storage on a CD (about 650 megabytes), this transfer rate might appear insufficient. But this would not be the system's worst performance bottleneck. Being an add-on, the Turbografx-CD depended on the original console's display and processing capabilities. The Turbografx-16 could handle typical 2-D gaming tricks (such as sprites and parallax scrolling) with ease and display most of the 512 available colors on screen at once with a few technical tweaks, but its work and video memory (8 and 64 kilobytes respectively) were not suited to the multimedia ambitions of the CD era. The same could be said of Sega's CD add-on for the Genesis/Megadrive, introduced in 1992 to the American market. While it provided a faster CPU and a significant increase in memory, the display was limited to 64 on-screen colors in most situations. Graphic adapters on IBM PC and compatible systems were more capable: cards compliant with the 1987 VGA standard, for instance, could display 256 simultaneous colors from a palette of 262144. In 1989, Fujitsu released the FM Towns computer in Japan. Built with cutting-edge PC technology (but incompatible with PC software), its most touted feature was indeed the integrated 1X CD-ROM drive. Back in the United States, the Software Publishing Association (including Microsoft, Dell, and Creative Labs) was also working on a standard dedicated to multimedia applications and games. In 1990, the association establishes the Multimedia PC (MPC) norm, which consists of a configuration guideline for PC CD-ROM users. Finally, the Commodore CDTV and Philips CD-I (both released in 1991) introduced a third category of products, in between home computers and game consoles, designed to bring a larger array of multimedia applications to the living room.

Interestingly, many of these first generation CD-based gaming systems were upgraded one way or another: NEC issued various system and memory upgrades on TurboChips and some Sega CD games would take advantage of the 32X Genesis add-on. Fujitsu released many versions of the FM Towns, including the FM Towns Marty in 1991, the first console with an integrated CD drive. NEC would soon follow with its Turbo Duo in 1992, a new design for a system essentially equivalent to the Turbografx-CD with the latest system card. The MPC norms were reevaluated in 1993, the same year the 3D0 Company and Commodore launched their CD consoles. Featuring a 2X CD-ROM drive, the 3D0 and Amiga CD32 could be upgraded to read the MPEG-1 movie standard developed by the Motion Picture Expert Group. With the U.S. release of the Sega Saturn and the Sony PlayStation in 1995, developers now had the technical means to integrate good quality FMV in their CD games: 2X transfer rate, sufficient work/video memory, and graphical processors that could display millions of colors. The multimedia capabilities of CD gaming matured, but at the same time, these systems were among the first to hardwire real-time 3-D manipulation. It is interesting to note that, notwithstanding their relative abilities, FMV games appeared on most of the CD systems mentioned in this short overview. Now that the major players have been presented, it is time to introduce the most significant strategies explored by game developers in order to exploit the potential of the CD format.

Extended Games, Extended Play?

The real advantage of CD-ROM technology, as we have seen, resides in its massive storage space. The actual quality of gameplay-related assets depends on the global competence of any given system. Of course, from the Turbografx-CD to the PlayStation, these assets constantly grow richer with detail and thus become more data intensive; while this evolution can be addressed by the CD format, it cannot be seen as a direct consequence of its introduction. In this section, we will attempt to answer the following questions: what type of content was produced to fill up the extra space? Which parts of the gaming experience and which genres were the most suited for this expansion? We will present two tendencies in game design that can be directly associated with the advent of CD-based gaming systems. Even though the different features that we will examine may be discussed in terms of technological challenge, one must not interpret the following presentation as a historical account of successive phases; FMV games, the most challenging from a technological standpoint, were produced from the very beginning of the CD era.

The expression "extended game" aptly identifies our first tendency. From a production standpoint, the examples in this category follow two distinct ideas: add extra content around the game spaces, or add "more of the same" game spaces. Considering the roots of CD-ROM technology as an audio-playback device, the addition of CD-quality musical pieces "around" the game world is no surprise. Audio tracks were read directly from the CD as the player progressed through the levels, with no additional cost in terms of system resources. Consequently, this feature could easily be integrated in any game. CD music became the main attraction of early CD games (such as Cyan's *The Manhole*, the first game distributed on CD-ROM in 1987) and the most frequent addition to preexisting games converted to a CD system. Memorable examples include *Gate of Thunder* (shoot-em-up, HudsonSoft, 1992, Turbografx-CD), *The Terminator* (platform game, Virgin, 1993, Sega-CD), *Fighting Street* (fighting game, HudsonSoft/Capcom, 1989, Turbografx-CD), *Loom* (graphic adventure, LucasFilm Games, 1991, FM Towns) and *Secret of the Monkey Island* (graphic adventure, LucasArts, 1992, PC CD-ROM). The second frequent CD-related addition "around" the game world also prospered in a great variety of game genres. While cut-scenes in-between game levels were already common in the early 1990s and surfaced quite early in the history of video games (most notably with *Pac-Man* in 1980), CD-ROM technology quickly became an incentive to include full-motion video cut-scenes created with computer-generated imagery, live-action video, or both. Minimally, developers would add an animated introduction sequence to action-oriented games. On the other hand, extensive use of this feature eventually came to be associated with certain genres and series; Japanese role-playing games, most notably *Final Fantasy VII* (SquareSoft, 1997, PlayStation) and the *Command and Conquer* series (*Red Alert*, Westwood Studios, 1996, PC CD-ROM) are noteworthy examples.

CD music and FMV cut-scenes both complement the gaming experience. The third strategy to "extend" games obeys a different logic, since it provides more game spaces and variety. Typically, developers would include extra levels for a game previously available and/or integrate more variety from one level to the other (*The Terminator*, Virgin, 1993, Sega-CD; *Zool*, Gremlin, 1993, Amiga CD32). At first glance, the seminal CD-ROM adventure game *Myst* (Cyan Worlds, 1993, PC CD-ROM) appears to follow the same logic. By the nature of its gameplay, the graphic adventure genre had a different representational economy than action-oriented games; the game world is usually depicted through a series of fixed, but very detailed, game screens. While *Myst* oriented the adventure genre into its "brain-teaser" branch, its most striking feature resides in the multiplication of completely unique game screens. From this perspective, *Myst* is clearly part of what we have called the "extended games" tendency; it adds content to an existing game genre without affecting the gameplay fundamentals. But at the same time, this particular extension affects how we perceive the game world in a way the

narrative load of adjacent cut-scenes, the beauty of an orchestral score, and the extra thrills of additional levels don't. *Myst* doesn't increase the actual size of this world, but rather its density. It is also devoid of the repetition that usually plagued games with first-person exploration such as the *Eye of the Beholder* (Westwood studios, 1990) or *Ishar* (Silmarils, 1992) role-playing game series, while retaining the same continuity. In *Myst*, the world becomes saturated with detail; it partially achieves a certain representational variability that is at the heart of the second tendency associated with CD-ROM gaming.

Contemporary to *Myst*'s release, Trilobyte's *The 7th Guest* (1992, PC CD-ROM) made a statement about what CD-ROM technology could achieve. In the game's haunted house, the player assumes the role of a floating point of view whose identity constitutes the notorious final revelation. One may argue that the depiction of this point of view floating from one exploration node to the other is a first clue to the mystery, but it is obviously the technical aspect that deserves our attention here. Trilobyte managed to develop a system capable of streaming intensive graphical information (high resolution 256 color pre-rendered animations, with more than 10 frames per second) directly from the CD. In the gaming industry, there might have been as many FMV techniques as there were developers, but one thing is certain: the more-or-less convincing illusion of motion is indeed a central element of the "saturated world" tendency. By saturated, we refer to a significant increase in verisimilitude, an illusion abstracted from the typical shortcomings of video game representation such as repetition and rigidity of motion. Another early feature of CD-gaming complies with this definition: digitized voices. "Talkie" versions of popular adventure games were edited on CD, including *Indiana Jones and the Fate of Atlantis* (LucasArts, 1993, PC CD-ROM) and *King's Quest V: Absence Makes the Heart Go Yonder!* (Sierra On-Line, 1992, PC CD-ROM). Like FMV, digitized sound proposes an illusion forever changing as it evolves through time. Both illusions would come together in the ideal of interactive cinema. Many clones built on the *Myst* and *The 7th Guest* models had no significant human presence to speak of. But the explosion of live-action FMV games shows that the human figure could only linger backstage for so long. Games such as *Under a Killing Moon* (Access Software, 1994, PC CD-ROM), *The Beast Within: A Gabriel Knight Mystery* (Sierra On-Line, 1995 PC CD-ROM) and *Ripper* (Take-Two Interactive, 1996, PC CD-ROM) rely on character interaction as much as the typical graphic adventure game; as a matter of fact, these games required up to 6 CDs to store all the live-action sequences. Earlier examples include *Sherlock Holmes Consulting Detective* (ICOM Simulations, 1991, released on PC CD-ROM, Turbografx-CD and Sega CD) and *It Came from the Desert* (Cinemaware, 1991, Turbografx-CD).

The fascination for gameplay-integrated FMV spread way beyond the predictable graphic adventure enclave. American Laser Games brought their arcade laserdisc titles to home gaming systems (*Mad Dog McCree*, 1993; *Crime Patrol*, 1994) and many other live-action shooters were produced for the Sega CD (*Surgical Strike*, *Tomcat Alley*, Code Monkeys, 1993 and 1994 respectively). Shooting courses using CGI were also common, with key titles appearing in the major formats (*Rebel Assault*, LucasArts, 1993, PC CD-ROM; *Sewer Shark*, Digital Pictures, 1992, Sega CD; *Microcosm*, Psygnosis, 1994, Amiga CD32; *Cyberia*, Xatrix, 1996, 3DO). Some racing games also had pre-rendered courses whose display would be affected by the player's speed (*MegaRace*, Cryo Interactive, 1993, PC CD-ROM). Even platform games were produced; side-scrolling 3-D levels integrated slight point-of-view modifications at specific moments (*Bram Stoker's Dracula*, Psygnosis, 1993, Sega CD; *Time Commando*, Adeline Software, 1996, PlayStation). However, the most unlikely genre to undergo FMV treatment is undoubtedly the fighting game. In *Supreme Warrior* (Digital Pictures, 1994, 3DO) and *Prize Fighter* (Digital Pictures, 1994, Sega CD), live-action sequences depict street fights and boxing as seen through the eyes of the protagonist.

In the global production landscape, however, action games were clearly outnumbered, and few actually acquired critical or popular recognition. This failure

can partially be explained by a gameplay discrepancy between FMV CD-ROM games and contemporary prime examples in any given genre. As the industry began its transition towards real-time 3-D mechanics, and as the virtual worlds' visual representation could be affected more by the user's manipulations, the worlds depicted by FMV appeared fixed and rigid even compared to most 2-D games of the time. In FMV shooters, the player would typically control a simple crosshair on top of the movie sequence, and exploding targets were presented on separate shots, whereas any 2-D side-scrolling shooter could dynamically integrate the player's animated avatar and the havoc it created in a single, continuous scene. Movie sequences couldn't be altered and manipulated with ease, and many action games ended up relying on *Dragon's Lair* (1983) gameplay mechanics (hit the right key at the right moment). Even adventure games eventually frustrated players; live-action conversation sequences couldn't be assimilated and skipped as easily as their text-based predecessors, changing the typical pacing of the genre. Ultimately, these worlds were not only saturated with detail, but also with authorship, and the creators' authority over the experience was a reflection of the authority exerted by the technology itself.

In the end, CD-ROM technology did affect the face of gaming for a few years. Its massive storage capabilities led developers to embrace the latest visual attraction, and this emphasis on FMV favored slow-paced genres and/or simpler gameplay mechanics. With the CD-ROM, the quality of in-game assets increased but at the expense of gameplay itself. This regression of game language in favor of verisimilitude evokes the introduction of sound in filmmaking technology. And just as film language eventually integrated the new expressive resources more seamlessly, the gaming industry found a way to develop the ideal behind FMV through techniques more suited to the nature of games. Nowadays, the assets incorporated in a real-time 3-D world are so data-intensive that many games nearly fill up the 8.5 gigabytes available on a double-layer DVD. Already, a new generation of optical media is available; a single PlayStation 3 Blu-ray disc can store up to 50 gigabytes of information. Even though the increase factor is nowhere as significant as it was when CD technology was integrated in the early 1990s, this storage space exceeds the needs of most current productions. It remains to be seen if and how this extra storage will affect production strategies, favor certain types of contents and genres, and, ultimately, if it will play the same decisive role as the CD-ROM did in the tendencies that defined its generation.

References

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