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THE ARTIFICIAL SCARCITY AND PRESERVATION OF VIDEO GAMES AS DIGITAL GOODS

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Abstract

The goal of this thesis was to discuss the way digitally distributed games are kept available as cultural heritage. Digital distribution has become an increasingly popular way of dispatching games, but it makes game preservation more challenging. Digital distribution platforms and online games shut down over time, leaving nothing behind if not properly preserved.

A literature review was used to research the history of digital distribution games through several decades. The evolution of these services was examined in order to present advantages, drawbacks and reoccurring patterns.

A survey was done in order to gauge current opinions on the digital gaming market. A small sample of young adults with an interest in gaming were asked about their use of digital games and digital distribution services.

Case studies on game preservation were conducted, analysing cases of digital games being lost and preserved. This was done in order to bring light to game preservation techniques.

The research was successful in summarizing the various facets of digital distribution and its impact of game preservation and bringing awareness to its issues. The conclusion lists potential solutions to help keep digitally distributed games playable in the future.

Keywords

artificial scarcity, digital distribution, game preservation, research

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GLOSSARY

Artificial scarcity describes the scarcity of items despite the technology, production, and/or sharing capacity existing to create a virtually unlimited supply, as well as the use of laws to create scarcity where there otherwise would be none. (Capece 2018.)

Digital distribution is the delivery of digital goods through downloading. Digital distribution happens through **digital distribution platforms** designed to stream downloadable content to its users. (Computer Hope 2020.)

Digital goods are products that are transferred electronically. They are accessed by the purchaser using methods outside of tangible storage media. In the context of this research, "digital good" usually refers to downloadable video game software. (State of Wisconsin 2020.)

Emulation is software that makes a computer act like a different computer. It makes it possible to play older console games on modern devices they were not originally designed for. (Cifaldi 2016.)

Game preservation is the process that puts a game away, encompassing all the files, data and documents, in such a way that it may be playable again at a future time. (Fredley 2019.)

1 INTRODUCTION

In 2020, the game industry generated \$158 billion USD in revenue from digital sales worldwide. That equates to 91% of the industry's revenue that year. (Batchelor 2020.) Following in the footsteps of other forms of entertainment media, video games are shifting towards dematerialized outlets and downloads. Because of the recency of video games in popular culture, they are not widely considered to be cultural heritage on the level of movies and music, and thus, do not benefit from the same academic interest. Essentially, old movies, comics, books and music are usually available to buy legally on multiple platforms, even with minor commercial potential. The same cannot be said of older video games (Cifaldi 2019).

As things stand now, many decisions in the game industry are driven by business, which might not be in the best interest of keeping the history of video games accessible in the long run. In 2018, the Entertainment Software Association (ESA), backed by major game companies such as Electronic Arts, Nintendo and Ubisoft, has made several efforts to prevent the U.S. Copyright Office from exempting libraries and museums to preserve abandoned online games, in fear of losing profit. (Van der Sar 2018.) With the technology at the disposal of the gaming industry, game preservation should be an utmost priority. To put things into perspective, according to the Film Foundation, a non-profit organization dedicated to film preservation, 50% of all American films made prior to 1950 and more than 90% of those made prior to 1929 are lost forever (Mikesell 2017).

The purpose of this thesis is to analyse the challenges that the increasing popularity of digital distribution might pose to game preservation efforts. In this thesis, three different methods are used. Firstly, through literature review, the past of digital distribution is examined as well as advantages and drawbacks are analysed. Secondly, a survey is used to research current opinions on the digital gaming market. Young adults with an interest in gaming are asked various questions about what kind of digital content they have purchased, where they have purchased it, and why they might prefer this method over physical copies.

Thirdly, multiple case analyses are used to gain a deeper understanding of game preservation. Techniques used to preserve digital content are explored, as well as cases where digital content was lost or recovered. The case analyses will go through how these situations came to be and what consequences emerged from them.

2 HISTORY OF DIGITAL DISTRIBUTION IN GAMING

This chapter focuses on presenting the evolution of digitally distributed video games. The digital distribution of games has been around for almost as long as gaming itself. Digital distribution services have often been monetized through subscription costs, limited replayability and exclusive content, as will become apparent in the following examples.

The history of digital distribution goes back to as early as 1983. One of the first experimental forms of digital game distribution was a paid phoneline service for the Atari 2600 called the GameLine (Figure 1). Customers were able to download games for a fee, each limited to 5-10 times per load. (Burns 1983.) The games would also expire a week from purchase. Around 75 titles were available on the service. The GameLine's high costs and low returns made it unsustainable, but ultimately it was discontinued due to the end of the Atari 2600's life cycle and the video game crash of 1983. (Plunkett 2011.)



Figure 1. Print ad for the Atari GameLine service (Control Video Corporation 1983)

The next notable digital distribution services were released nearly a decade later. The Sega Channel, an online game service for the Sega Genesis, was released in 1994. By purchasing a modem add-on and paying a subscription fee, customers were able to download games from a constantly rotating selection of 50–70 games. Some of these games were exclusive to the service. In North America, the Sega Channel was the only way to play Pulseman, Megaman: The Wily Wars and Alien Soldier, which were available as physical cartridges in Japan and Europe. (Buchanan 2012.) The service was shut down in June 1998 (Johnston 1998).

In 1995, the Satellaview add-on was released for Nintendo's Super Famicom. Games and digital entertainment were broadcast via satellite on a regular schedule, requiring subscribers to tune in at specific times to download content. In order to keep players invested, some game content was released episodically as well. Downloaded game data was saved on rewritable 8-megabit memory packs. Most of the games could only be played a limited number of times before expiring. The service shut down in June 2000. (Kemps 2015.)

When it comes to computers, the digital distribution of games started slightly differently than for consoles. The first instance of digitally distributed games on computers happened on dial-up Bulletin Board Systems in the early 90's. User would connect their modems to the server to download and upload games. (Edwards 2016).

In 2003, Valve started Steam, an online platform meant to facilitate the patching process of their multiplayer games such a Counter-Strike (2000). During its infancy, Steam was dedicated to Valve games exclusively. (Plunkett 2013.) Many players did not like that Steam required a constant internet connection in order to function. This is because at the time, only 20% of American households had access to broadband internet. The instability of Steam's authentication servers would cause players to get locked out from playing their purchased games. In 2004, Valve released Half-Life 2 and offered it for purchase on the Steam client as shown in Figure 2. A Steam account was mandatory in order to play. (Sayer & Wilde 2018.)

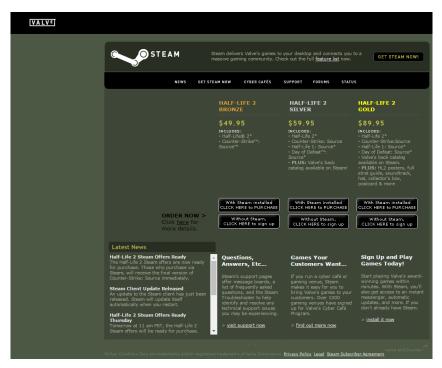


Figure 2. Steam's interface at the time of Half-Life 2's launch, circa 2004 (Sayer & Wilde 2018)

With the implementation of online features during the seventh generation of video game consoles, the Xbox 360 (2005), PlayStation 3 (2006) and Nintendo Wii

(2006) each launched with their own respective digital game stores. The Nintendo Wii's Virtual Console service had a particularly large library of retro titles available digitally. Games had been ported from the NES, Super Nintendo, Nintendo 64, Turbografx, SEGA MEGA DRIVE, SEGA MASTER SYSTEM, Commodore 64, NEOGEO and arcades (Nintendo no date). However, once the Wii Shop shut down in 2018, many of these titles had not been made available on any other platform at the time. They have since become impossible to legally purchase and play. (Bode 2019.)

In 2008, Apple and Google launched the App Store and the Android Market (later known as Google Play) on their smart mobile devices. On these platforms, games were being monetized in a new way with microtransactions, introducing the concept of games as a service. As of 2020, over 22% of all apps in the App Store are games. That translates to 957 390 gaming apps. (Statista 2020.)

In 2020, digital edition versions of the latest gaming consoles were released. The PS5 Digital Edition and Xbox Series S do not support disc-based games of any sort, relying solely on digitally downloaded software. These consoles are both considerably cheaper than their regular counterparts, with a difference in price of around \$100-200. (Byford 2020.)

As shown in Figure 3, digital distribution has constantly been experimented with over the decades and has now become a staple of the industry. It has gone from a novelty add-on to being a defining feature of modern consoles.



Figure 3. Timeline of notable digital game distribution services (Gharbi 2020)

Digital distribution had a rough start due to high costs for both consumer and game companies. Even in the early 2000's, limited access to broadband internet slowed digital distribution down. With the exponential improvement of internet speeds, hardware, and hard drive space, future consoles might function without physical games at all. The current disc-free consoles mark a tipping point in the industry, and could shift the direction of the industry depending on their popularity.

3 ARTIFICIAL SCARCITY

In 1996, digital theorist John Perry Barlow predicted that since the internet was not restricted by material scarcity, a postmaterialistic society would arise. Barlow (1996), quoted from *A Declaration of the Independence of Cyberspace*: "In our world, whatever the human mind may create can be reproduced and distributed infinitely at no cost." Contrary to his belief, nearly all digital environments nowadays retain the concept of property by introducing artificial scarcity. (Lehdonvirta & Castronova 2014, 268.)

Video games are data that can theoretically be replicated infinitely. Printing on a physical format, such as a disc or a cartridge, will result in a finite number of

copies. With digital distribution, this limitation disappears, and the supply can match any amount of demand if so desired. Artificial scarcity can be used to limit this and control the market. In this chapter, the advantages and drawbacks are analysed based on the perceived effects artificial scarcity has on the industry, consumers and its lasting impact on game preservation.

3.1 Advantages

Artificial scarcity is used to generate demand and sales. In social psychology, it is said that consumers perceive scarce products as more valuable than abundant ones (Chen 2020). Artificial scarcity also shifts the consumer's attention away from the loss of money they would be trading for a product to the potential loss of the product (Capece 2018).

On September 3, 2020, Nintendo announced Super Mario 3D All-Stars, a compilation of 3D platform games for the Nintendo Switch. The game would launch on September 11, and only be available for purchase until March 31, 2020. This deadline includes both physical and digital versions of the game. (Nintendo 2020.) Due to the use of artificial scarcity in the availability of this game, sales were moved by the fear of missing out on a rare opportunity to replay older titles. For instance, it includes the first rerelease of Super Mario Sunshine since its original launch on the Nintendo Gamecube in 2002. As a result, Super Mario 3D All-Stars sold 5.21 million copies in under 2 weeks (Nintendo 2020), and even saw its sales increase on its last month of availability (McFerran 2021).

The previous example shows that artificial scarcity as a business strategy draws sales just as theorized. Imposing a limit like this on digital games is especially effective because there is no finite stock that could sell out. As long as there are no server outages caused by high traffic or any other reason, digital sales will always match the demand, and generating demand is one of the advantages of artificial scarcity.

3.2 Drawbacks

Every major video game distribution service reserves the right to remove access to any of its content at any time. This is the main difference in what defines the ownership of digital goods compared to physical copies. A digital purchase does not result in a guarantee or a lifelong ownership, and could merely be considered a long-term renting license. In short, games can be removed from their stores at any time and they are not legally responsible if consumers lose access to digitally purchased content. (Boyle 2017.)

The PlayStation Store's terms of service state that "[they] reserve the right to change or withdraw features, specifications, prices, services and content at any time, without notice to you". Microsoft's usage rules for digital goods are similar: "Microsoft may stop distributing any Digital Good, or add to or reduce the capabilities for any Digital Good, at any time". (Sb.)

These terms and services effectively leave consumers with very little control over the digital content they purchase, with no guarantee that they will remain in their possession years in the future. The fact that entire game libraries can be wiped out without warning is extremely unfortunate from a game preservation standpoint.

4 RESEARCH

The research in this thesis was split into two stages. Firstly, in order to obtain data on consumers' opinions on digital distribution and game preservation, a short survey was conducted. The results were analysed in order to gain an understanding of the public opinion towards the main topics of the thesis. Secondly, two types of case analyses were conducted: one about lost digital content and a second one about resurfaced digital content.

4.1 Survey on consumer behaviour

For the purpose of this thesis, a survey on consumer behaviour relating to digital services was conducted online, gathering a total of 39 individuals. The sample

group consisted of gamers and game design students from Europe and North America, aged 20 to 30. The survey stayed open for a week (see Appendix 1).

The hypothesis of the survey is that a majority of the sample group has purchased digitally distributed games and is in support of game preservation. It can be assumed that their opinion on digital-only console formats will be mixed, if not mostly negative.

The first segment was about buying habits. According to the results, every participant has purchased a game digitally in the past, with 5% saying that they only did so because physical copies were unavailable to them. When asked about their preferences between buying a physical or digital copy of a game, 36% of the participants preferred physical copies, while 23% preferred digital copies. The remaining 41% had no preferences and would pick their copy depending on the situation. When asked about what digital distribution platforms they have used, every single participant had used Steam to purchase games. (Figure 4.)

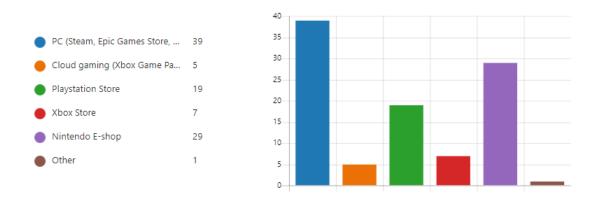
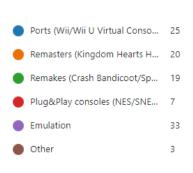


Figure 4. Digital distribution platforms the participants have purchased games from (Gharbi 2021)

The second segment was about their thoughts on game preservations. The participant agreed that efforts should be made to properly archive game data/assets so that game titles may remain playable in several decades. In their opinion, the best ways to keep old games available were emulation (85%), ports (64%), remasters (51%) and remakes (49%) (Figure 5).



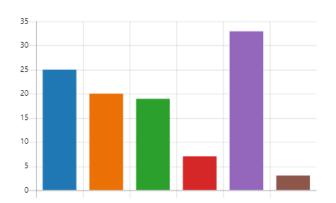


Figure 5. Some of the best ways to keep old games available according to the participants (Gharbi 2020)

It was suggested that game publishers should collaborate with libraries or create their own library of digital content for games they would not plan to rerelease otherwise.

The last question was meant to find out how consumers feel about the new discfree console formats, the PlayStation 5 Digital Edition and Xbox Series S. 64% of the participants had no opinion on the matter. 28% had a negative opinion, and only 8% had a positive opinion. The latter two groups were asked to further explain their reasoning, as shown in Table 1.

Table 1. Summary of positive and negative opinions on disc-free consoles (Gharbi 2020).

POSITIVES	NEGATIVES
 Cheaper due to the lack of disc reader Easier and faster access to games Less physical clutter Having less physical media to produce can be environment friendly 	 Eventually the online services for these consoles will be shut down May lose access to games at any time for any reason No second-hand market: these consoles will inevitably become electronic waste

It can be deduced that while disc-free editions of consoles are perceived as useful to some, they should by no means become the norm due to the planned obsolescence of their services. While the sample size for this survey is small, the participants are all invested in the gaming industry's current state, and so their

opinions can be trusted to offer some insight into an average consumer's perspective. A larger scale survey would be needed to obtain more reliable data to draw conclusions from.

4.2 Lost digital content

This case analysis on lost digital content will cover three examples: (1) The Satellaview software for the SNES; (2) discontinued Massively Multiplayer Online games; and (3) digital-only games. These cases were chosen for further analysis because digitally distributed software is particularly prone to becoming lost content due to the lack of physical copies that can be archived.

St.GIGA, the company behind the Satellaview's broadcasts, would transmit games and entertainment on a schedule. Various exclusive titles were released on the service. Rewriteable, 8-megabit flash memory packs could be used to store the downloaded data, but the episodic releases of games encouraged players to save over old releases with newer ones. Most of the Satellaview's preservation efforts consist of archivists obtaining these used memory packs in hopes that they would still contain readable game data, if at all. (Kemps 2015.)

Massively Multiplayer Online games require servers to host players, which involves constant running costs. MMOs usually shut down once the company behind the game is no longer willing to maintain the game servers, or the game is no longer generating profit. When this happens, players become unable to play the game and all their data becomes inaccessible: characters, items, achievement and friends are all lost for good. (Williams 2020.) A recent example of this is WildStar, a fantasy/sci-fi MMO released in 2014. The game only stayed online for four years before being discontinued. The decision to shut down the game's developer, Carbine Studios, was announced on September 6, 2018, giving the players about a month before the servers shut down on November 28. (Schreier 2018.)

Digital distribution platforms have opened the door to digital-only games: Games that do not get a physical release at brick-and-mortar stores. Releases like this facilitated the spread of indie games. On the other hand, games with no physical releases are very prone to becoming lost media. Scott Pilgrim vs the World: The Game is a side-scrolling beat 'em up game developed and published by Ubisoft. Based on the Scott Pilgrim series of graphic novels by Bryan Lee O'Malley, the game was a tie-in for the 2010 movie of the same name. The game was released digitally for the Xbox 360 and PlayStation 3 in August 2010. The game got delisted in December 2014 for unknown reasons. Until 2020, the game was completely unavailable for purchase. (Greenbaum 2020.) During the time it was delisted, there was no legal way to obtain the game unless it had been purchased before it disappeared from digital platforms. This led to the creation of a market consisting of pre-owned consoles that already had the game downloaded (Figure 6).

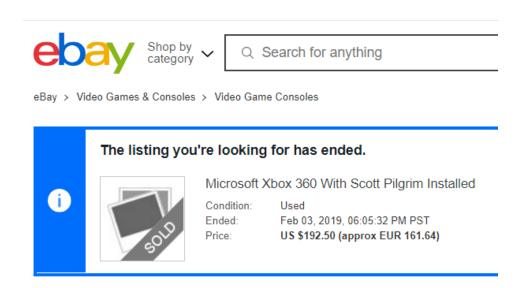


Figure 6. An eBay listing for an Xbox 360 with Scott Pilgrim downloaded (Gharbi 2021)

Alternatively, attempts at emulating Scott Pilgrim vs the World: The Game have been made in order to preserve the game and make it available to those who missed out on the original release (Macgregor 2020).

4.3 Resurfaced digital content

In September 2020, 5 years after getting delisted, Ubisoft announced that Scott Pilgrim vs. the World: The Game would get rereleased on Microsoft Windows, Nintendo Switch, PlayStation 4, Xbox One, and Stadia. (Greenbaum 2020.) Limited Run Games, a company specialising in making limited physical editions of digital games, has stated that Scott Pilgrim vs. the World: The Game had become their biggest release of all time, selling 25,000 copies in less than 3 hours for the Nintendo Switch edition alone (Bogart 2021).

Massively Multiplayer Online games have been successfully made playable again after being shut down, though this is usually at the hand of fans with no affiliation to the companies behind the original games. This is achieved through emulation and reverse-engineering. However, being shut down does not make it legal for anyone to revive an online game, even when no profit is being made with the intellectual property. (Olivetti 2012.) Some institutions, such as libraries, archives and museums, have been granted DMCA exemptions for preserving online games that are no longer available for purchase (Albert 2018). This was protested by the Entertainment Software Association (ESA), which is backed by major game companies. (Van der Sar 2018.)

5 GAME PRESERVATION

In the game industry, preservation is the process of archiving a game. All the things that went into it, including files, data, the source code and documents are put away in such a manner that makes it possible for the game to come back again in the future. (Fredley 2019.) Good practices in game preservation make remastering, remaking and porting games from past decades easier for developers.

Even large game companies are liable to losing their own game data if necessary precautions are not taken. That includes graphical assets, music, and most importantly, the game's source code. Square Enix, the video game company behind the Kingdom Hearts series, lost the source code to the original, titular

game from 2001. In order to make Kingdom Hearts HD 1.5 Remix, the 2013 HD remaster of Kingdom Hearts, Square Enix's developers had to, in their words, "research, to dig out the original game and recreate everything for HD. It was not that easy". (Nomura 2013.)

Most major game developers and publishers preserve their data in some shape or form. Game preservation in the interest of cultural heritage is not the only reason for this, as there have been cases where game data has been completely lost due to natural disasters. In 1995, a massive earthquake struck Konami's Software Development building located in Kobe, Japan. Tons of development data for Metal Gear Solid was lost, along with original artwork from the Castlevania series. (Andersen 2011.)

Microsoft Game Studios makes use of special departments to store all their game software and hardware. Backups of every game published by Microsoft, including the source code and production materials, are stored in many locations that are actively temperature- and humidity-controlled. This practice has been in place for all their games released since the 1970's, and most of the tools used were developed within the company. Microsoft also has plans to transfer games stored on media prior to the year 2000 to more reliable storage solutions. (Lobb 2011.)

Emulation refers to a device or software that is capable of replicating the behaviour of a different device or software. They can be used to run ROM files copied from read-only memory chips of game cartridges and digital releases. Referring back to the survey in chapter 4, 85% of participants considered emulation to be the best and most practical way to preserve old games. It is often conflated with software piracy by game companies. For 17 years, Nintendo's legal website stated that they are not willing to take steps towards legitimizing emulation because it is illegal and promotes piracy (Nintendo 2003). Despite this, Nintendo makes use of emulation with their Virtual Console releases of retro games (Cifaldi 2016) and Super Mario 3D All-Stars (TCRF 2020). No emulator has ever been ruled illegal in a court of law. (Cifaldi 2016.)

6 CONCLUSION

This research was aimed to bring awareness to the challenges game preservation has been facing over the years and how digital distribution has evolved to become what it is now. The two concepts are closely related, and with the inevitable progression towards dematerialized gaming libraries, it is important to be aware of what is to come. It also overviewed what has already been lost, and what is being saved right now.

Video games are cultural heritage that deserve to be properly preserved with long-term benefits taken into consideration. This responsibility falls into the hands of game developers and publishers, who despite having access to many titles sought after by archivists and consumers, are within their rights to keep them vaulted to create artificial scarcity. Emulation has since become the last resort to preserve games that are no longer legally obtainable. The arbitrary availability of ports and rereleases of older titles is one of the biggest factors driving people to emulate. This should encourage further official releases of retro titles.

The survey results, despite the small scale, showed that nearly every participant had purchased digital content. There are a lot of concerns over game preservation as well. More research would be needed to properly gauge the public opinion on game preservation and how consumers feel about game companies' preservation practices, or at least what is currently offered for purchase on digital platforms. None of the current preservation techniques available to consumers are officially supported. Despite this, companies hold the right to remove any digital content purchased by them. It is an uphill battle that could be made a lot easier with the help of the companies in power.

If ports and rereleases are not considered commercially viable, cooperation between game companies and libraries, public archives and museums should be explored. When the US libraries DMCA exemption was renewed in 2018, the ESA opposed it by stating that "public performance and display of copyrighted works to generate entrance fee revenue is a commercial use, even if undertaken by a nonprofit museum" (Van der Sar 2018). In that case, game companies could

incentivize these institutions to share their profits by providing exclusive content for their collections. Creating official museums that they control is also a potential alternative.

In conclusion, the best time to start archiving is today. USBs and hard drives might someday become obsolete hardware, just like floppy disks and flash memory packs before them, so keeping data safe is still important despite how stable the current situation might seem. Thankfully, making backups and sending data over is easier than ever in the present day.

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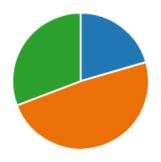
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Table 1. Summary of positive and negative opinions on disc-free consoles. Gharbi, S. 2021.

1. Which of the following best describes your experience as a gamer?

More Details 💮 Insights

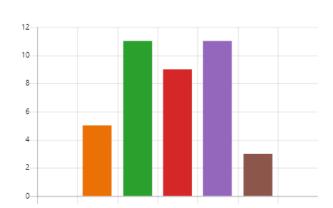




2. Which console generation was your introduction to gaming?

More Details





3. Have you purchased/played digitally distributed games?

More Details

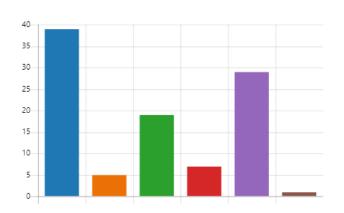
Yes	37
Only when physical copies we	2
● No	0
Other	0



4. Which platforms have you purchased digitally distributed games from?

More Details





5. When purchasing a game, do you prefer a physical or digital copy?





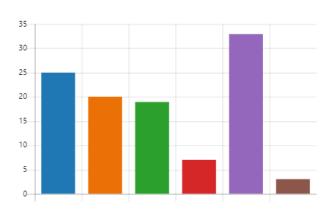
6. How much do you agree with this statement: Efforts should be made to properly archive game data/assets so that game titles may remain playable in several decades.

More Details	1 Insights	
Agree		36
Somewhat	agree	3
Somewhat	disagree	0
Disagree		0



7. In your opinion, what are the best ways to keep old games available? (Select Multiple) More Details

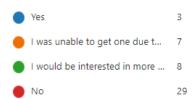


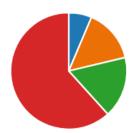


8. Do you own standalone consoles preloaded with retro games, such as the Nintendo Classic Mini and Playstation Classic? Select all that apply.

More Details

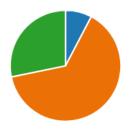
More Details





9. What is your opinion on digital-only console formats like the PS5 Digital Edition/Xbox Series S?

1 Insights Positive 3 Neutral 25 Negative 11



10. If Positive/Negative, specify why.

15 Responses

ID ↑	Name	Responses	
1	anonymous	Less materials used for physical media = more eco-friendly, I think. Also, easier/faster access to games.	
2	anonymous	I like my physical copies, unlike digital, their price drop after awhile	
3	anonymous	That's pretty much planned obsolescence, eventually the online services for such consoles will be shut down, meaning once the console breaks, you completely lose access to the games. Even while the systems are still supported, if the games are connected to cloud services the operators can revome games from stores and theoretically lock you out from your game collection.	
4	anonymous	I prefer to have the option to own physical copies and I don't like that the industry tries to move towards digital-only	
5	anonymous	Not for me, I enjoy being able to buy the disk on sale from brick and mortar stores rather than kinky be able to get the game at the one price through the digital store	
6	anonymous	Concern for the reliability of game servers to continue providing access to owned games once those online services end and/or when consoles have support discontinued for them.	
7	anonymous	I feel more secure when I have a physical copy. With digital only format I always have a sneaking suspicion that ip and license holders can swipe the game away at any time if there is some internal company turmoil.	
8	anonymous	While they're a good idea in theory, people who cannot purchase games digitally for whatever reason are completely unable to play the games they'd want to.	
9	anonymous	It makes obtaining games easier, but relying on a company's servers to be able to play non-mmo games seems unsustainable in the long-term.	
10	anonymous	PS5 Digital Edition is cheaper than the version with the disk reader. It feels more handy to have all of the games online.	
11	anonymous	Would still prefer the option to be able to purchase both a physical or a digital copy.	
12	anonymous	Less physical clutter due to physical games!	
13	anonymous	While they provide a cheaper option to the normal version of a console, you'll be subjected to whatever is taken off the store. Having a healthy mix of both is the ideal option.	
14	anonymous	If companies go extinct, the games will be lost.	
15	anonymous	ownership of digital media concern/ lack of archival availability	