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NFTs: between opportunities and challenges for private investors and major brands

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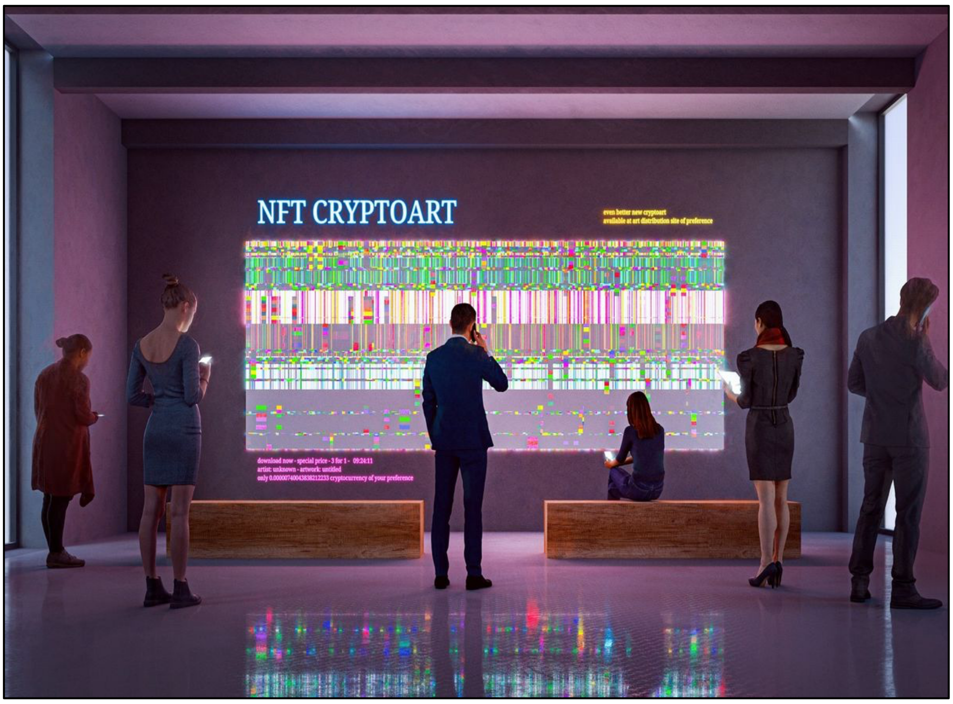

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Abstract

The motivation behind the writing of this thesis is to be found in the curiosity of a university student with a passion for cryptocurrencies and NFTs. It was carried out with the curious gaze of someone who firstly wanted to inform himself in order to quench a personal thirst for knowledge and secondly to elaborate on a work with questions and learning objectives. The research is important for an audience that wants to update and delve into the NFTs market. It is also usable for those who have never heard of it as it provides the necessary definitions and often provides concrete examples close to the reader's own life.

The main issue turns out to be the result of a personal doubt after initial investigations into the subject of NFTs. As the main players, who most often orbit around collections of NFTs, are either large companies that bother to release them or private investors who buy and sell them on a daily basis. It follows that the work has been done considering both points of view and trying to provide the data and comments in an objective manner. The various researches yielded data supporting both theses in that NFTs are both a brand marketing tool for companies as well as a speculative asset for private investors. They generally found that in 2021 the NFT market saw an explosion in terms of popularity and volumes traded. As a result, more and more players approached the NFT and the related blockchain as possible opportunities in relation to their intentions. More and more companies implemented marketing campaigns with innovative methods through NFTs. Simultaneously, several projects became true blue chips of the NFTs and started to develop added value just by owning a piece of the NFT collection. Coming to the conclusion, as well as answering the research question, that NFTs today have various applications and in the future these will be innovated to become everyday and no longer a tool known to a few as today.

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List of abbreviations:

AI	Artificial Intelligence
APE	Ape Coin
BAYC	Bored Ape Yacht Club
CS:GO	Counter-Strike: Global Offensive
DNS	Domain Name System
ETH	Ethereum
EVM	Ethereum Virtual Machine
GUI	Graphical User Interface
ICANN	The Internet Corporation for Assigned Names and Numbers
IPFS	Insurance Premium Financing Solutions
IPO	Initial Coin Offering
ISO	Initial Stock Offering
KYC	Know Your Customer
NFT	Non-Fungible Token
Q	Quarterly
SOI	Special Olympics International
TPS	Transactions Per Second
VR	Virtual Reality

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1 Introduction

We are living in an age where technological innovation is shifting social habits at a dizzying pace, resulting in a potentially unimaginable amount of money, as the biggest companies and investors are paying attention to this type of macro-trend, ready to take advantage of it.

In a world where we have been locked in for about two years for reasons of a global pandemic, it is no longer surprising to learn that the image of a monkey has been sold for sums of money that can easily reach a million dollars (OpenSea, 2022) and when this happens, we undoubtedly recognise that we are talking about non-fungible tokens (NFTs). This is a digital tool based on the blockchain with the purpose of certifying the uniqueness of a file that can range from a tweet to legal documents (Barolini, 2021). This phenomenon has had an exponential growth during the last period afflicted by the pandemic, bringing the volume of dollars exchanged on the various platforms to an increase of +21'350% compared to 2020 reaching $ 17'694'871'721 (Besancia, 2022).In addition, we can comment that the rise is not over but only begun, more and more global figures and brands are taking an interest in the subject trying to ride the wave, such as Nike who decided to buy the start-up RTFKT. Which is a pioneering and innovative brand focused on leveraging NFT, blockchain authentication and augmented reality to deliver unique virtual experiences (Nike Inc., 2021) .As a result, this reality is gaining more and more visibility as can be evidenced by a further statistic, the number of total wallets increased from 89'061 (2020) to more than 2.5 million in 2022 (2'574'302); which implies an increase of 1822% (Besancia, 2022).

The objective of this paper is to first expose the topic of NFTs, starting from their creation, touching on the technical components such as blockchain, mentioning the crypto related to it and ending with the commercialization through online marketplaces. The main focus of the work is to separate the two main actors that interface with NFTs, the private investors who seek to make money on the speculation of these new assets, while on the other hand there are the big brands that use these tools as a means of extending their brand trying to carve out a space in the spotlight for the web3.0 of the future. Being a new market, it brings opportunities and challenges, this paper is a journey through the two actors mentioned above and their use of the same tool for different purposes, trying to give an objective assessment of what purpose NFTs are best suited for.

2 Research question and objectives

Within this short chapter, the research question is set out from which all analysis and comments were then made. Along with it, objectives were formalised to verify that a conclusion and thus an answer to the research question was reached. The consequent research question is "*Are NFTs a brand marketing tool or a speculative asset*".

2.1 Are NFTs a brand marketing tool or a speculative asset?

The motivation that led me to wonder whether NFTs were a brand marketing tool or a speculative asset is to be found in my interest in the world of cryptocurrencies and NFTs. However, I had never had the opportunity to delve into this innovative and unexplored topic. However, I am intrigued by the fact that there are these two types of actors using NFTs as a tool to achieve such divergent goals. So the question arises directly from this doubt and whether NFTs lend themselves more to one use than another. In order to arrive at the answer to the research question, objectives were set. The most important are certainly the formalisation of a definition for the term NFT as a tool that was created only a few years ago and about which many people know nothing at all. Next, to analyse how NFTs are created and sold as well as to define the technical components and the most important markeplaces currently active. In this way, a comprehensive introduction to the NFT sector can be made, providing the basis for understanding it. In addition to answering the research question, the last objective is to analyse the use of NFTs from the perspective of large brands and private investors. Consequently, defining the disadvantages and advantages for both of these figures. This is a sub-objective that leads directly to the reasoning with respect to the research question.

3 Methodology and structure of the work

This thesis will follow a research strategy focused mainly on qualitative information.

In the first phase, the work is more focused on a desk-based part, where a review of the existing literature concerning Non-Fungible Tokens (NFTs) will be carried out. Mainly scientific articles in the most relevant journals concerning the possibilities and challenges of NFTs will be analysed. In addition, several books such as "The NFT Handbook How to Create, Sell and Buy Non-Fungible Tokens" and "The NFT revolution 2022" will be used as they provide a broader range of information than individual journals, touching on upcoming NFT projects and the actual marketing use those major brands are making of them. Another source of information I expect to retrieve is from three different documentaries "Cryptoart Revolution - The NFT Documentary", "Line goes up" and "The Bitcoin Dilemma" which focus on how NFTs will affect the art world, the community and the environment.

As for the second phase of methodology, it is based more on reading and analysing statistical data from market reports. In this sense, the market reports of 2021 and the first four months of 2022 by NonFungible.com were considered.

The structure of the paper is designed to initially provide an introduction to the topic by giving definitions so that even an audience not familiar with NFTs can understand the work. Then the paper expands towards explaining how NFTs are created and sold by defining marketplaces. Subsequently, the structure of the paper focuses towards the central chapter, namely the comparison between the use of NFTs by large companies and private investors. Going into more detail for both points of view, the relative opportunities and challenges are listed with the addition of a small case study where information is highlighted and an analysis discourse can be realised.

Finally, the last chapter is about the future of NFTs and the projects that are already being developed as well as the uses of tomorrow, such as the metaverse, non-bankable assets and digital wallets.

4 A first look at Non-Fungible Token (NFT)

As the first chapter, "*A First Look at Non-Fungible Token (NFT)*", it aims to provide a general introduction to the topic, so as to ensure a knowledge base for readers who have never dealt with the subject before. It specifically goes on to give a definition of NFT, which the work in question uses for all the assumptions and analyses that will follow. In addition, further key concepts for the understanding of the work will be provided, as well as a contextualisation of the topic in the current world as well as a quantification of volumes.

The following sub-chapter focuses on the process of creating NFTs, then deals briefly but concisely with the technical components, a complicated but fundamental topic. Concluding the chapter by dealing with how NFTs are marketed and through which marketplaces it is possible to do so, as there are many, it will be analysed what distinguishes them.

4.1 Definition

In order to answer the question "What are NFTs?" it is necessary to break down and explain the following terms: Fungible Tokens, Semi-Fungible Tokens and Non-Fungible Tokens. As far as the definition of "fungible" is concerned, the Larousse (Larousse, 2022) definition is considered:

"*Refers to things that are consumed by usage and can be replaced by things of the same kind, the same quality and the same quantity*".

From this definition, two interesting insights can be taken into the term 'fungible', which refers to things that can be replaced by another thing of the same kind. To give an example, one can think of two Swiss franc coins from 2022. While the following cue refers to usage, as it is an important but also not entirely clear concept. (NonFungible, 2021)

As far as the term 'Semi-Fungible Tokens' is concerned, however, it can be described as a widespread consumer product that retains an identity on its own. The quintessential example given when speaking of "Semi-Fungible Tokens" concerns tickets for concerts/events or cinema shows. As each ticket has its own specific information, such as date, time, type of event. Consequently, the most important feature is not the asset itself but the series that presents unique characteristics of the "Semi-Fungible Token". (NonFungible, 2021)

As for the term of most interest in the work, i.e. 'Non-Fungible Tokens' also more commonly referred to as NFTs, the definition used from now until the term is as follows:

"*NFTs are unique items verified and secured by a blockchain, the same technology used for cryptocurrencies. An NFT provides authenticity of origin, ownership, uniqueness (scarcity), and permanence for any particular item*."

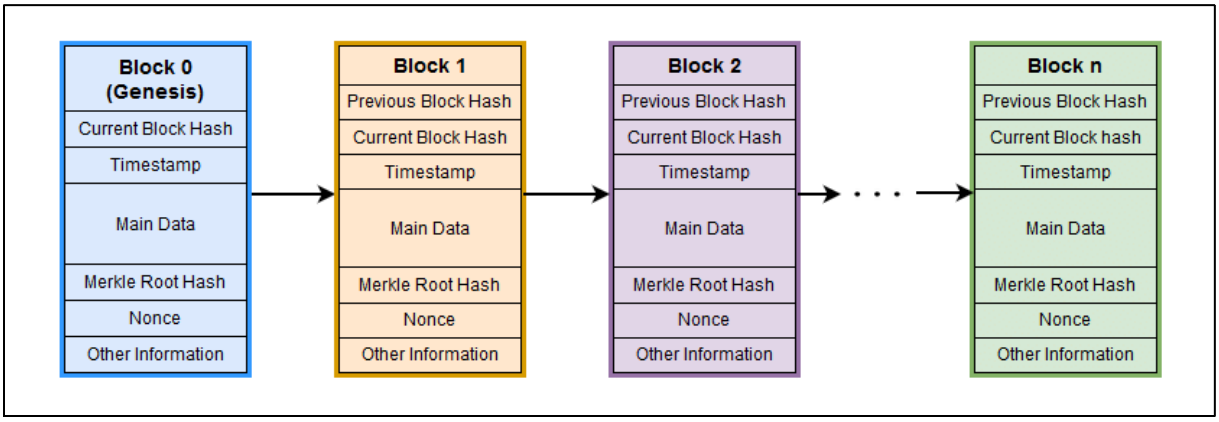
This definition is taken from the book "The NFT Handbook" (Fortnow & Terry, 2021) as it perfectly and comprehensibly encapsulates the NFT in a way that can be understood at first reading even by an audience unfamiliar with the subject. In any case, to elaborate, it can be stated that an NFT is a unique token that cannot be exchanged or replaced with an equivalent token. NFTs are a technological means by which any digital object can be stored and consequently be put into circulation virtually on the blockchain (NonFungible, 2021).

To fully understand the term NFT, it is necessary to analyse each of the terms that comprise 'Non-Fungible Token'.

Starting with the term "Token", which in NFTs is derived from blockchain. This is a key element as the whole system of NFTs is based on it and therefore it is necessary to give a definition and explanation of it as well. According to Investopedia (Investopedia, 2022), a cryptocurrency is nothing more than "a digital or virtual currency that is secured by cryptography" so that we understand that cryptocurrencies, like Bitcoin, are currencies that exist on the internet. With these currencies, one can perform many activities just like with the Swiss franc or the euro, such as: buying and selling products with investment objectives or storing and lending them to earn interest. The key part with cryptocurrencies is that whenever someone wants to perform transactions, such as those mentioned above, they have to be verified. It is precisely this verification process that makes it possible to determine the principal and the volume of cryptocurrency sent. This keeps everything secure and reliable. (Fortnow & Terry, 2021)

When the verification process is validated and thus the transaction is secure and reliable, taking Bitcoin as the cryptocurrency, the verification is carried out by a group of transactions and not by a single one as is usually the case with banks. This group of bitcoin transactions is referred to as a 'block'. It must be considered that each individual block has a certain capacity depending on the cryptocurrency. In addition, as soon as the block is filled with information regarding bitcoin transactions that are taking place, it is appended to the previous verified block. This creates a precise sequence of blocks, a block is generated every 10 minutes or so, creating a chain denoted 'blockchain'. (Fortnow & Terry, 2021)

Figure 1: Blockchain Structure



Source: (Bahalu, 2020)

As can be seen from figure 1 'Blockchain structure', which depicts a simplified representation of the chain of blocks containing different information and which link to the previously verified block. Thus, the blockchain of a cryptocurrency is nothing more than a list of every single transaction, e.g. of Bitcoin, which following the blockchain takes us all the way to the beginning of the transaction. (Fortnow & Terry, 2021)

After analysing the blockchain and what is meant by cryptocurrency, it is time to focus on a key point, namely the differences between 'coin' and 'token', as these terms are often used interchangeably in an erroneous way, as there is an important distinction between the two. In fact, cryptocurrencies that are coins, such as Ethereum and Bitcoin, have their own blockchain on which they are based. While in the other hand, tokens are cryptocurrencies that do not have their own respective blockchain (Fortnow & Terry, 2021). It follows that NFTs being tokens as can be seen from the name, are in fact cryptocurrencies without a blockchain. In fact, most of the NFTs created are based on the Ethereum blockchain, but it is not the only one as there are just as many created and existing on the Binance Smart Chain (Binance, 2022), Solana Blockchain (Georgia, 2022) and others.

Having finished with all the relevant definitions, it is now time to introduce the term 'non-Fungible' and analyse it. According to Dictionary.com (Dictionary, 2022), the term means:

"*Especially for goods to be one of nature as being freely exchangeable or replaceable, in whole or in part only, for another of the same nature*."

Previously, the terms 'fungible' and 'Semi-Fungible Tokens' have already been discussed, with explanatory examples. In this case, one can take diamonds as non-fungible as an example. As, each diamond is unique if one considers the following characteristics, such as: size, colour, clarity and finally the cut. In fact, if one thinks of buying a diamond, it is difficult to think of exchanging it for another diamond as they are unique with subjective peculiarities. In the same way, diamonds are NFTs, i.e. non-fungible and unique, which are difficult to exchange between or replace. For the more sceptical, however, NFTs are not unique as they are on the internet and it is easy to download, copy or share the image on the internet. However, these attempts to replicate the NFT would only result in copies of the original, as the latter is connected to the blockchain via the minting process. That is, in short, when cryptocurrency coins and tokens are created, they are minted. Which specifically refers to the process of enrolling the cryptocurrency on the blockchain at the moment it is created to ensure a certification of origin and to be able to recognise the copyright of the original. (Fortnow & Terry, 2021)

In conclusion, it is important to emphasise that any NFT functions as a cryptocurrency, as seen above, however, there is a substantial difference in addition to those already mentioned. In fact, every cryptocurrency has an established max supply and therefore it follows to have the characteristic described as fungible, such as Bitcoins having a maximum capacity of 21,000,000 coins. On the other hand, NFTs have a maximum capacity of 1, as they are unique. One must think of NFTs as if they were original paintings, where there may be many copies, but the original remains only one. However, there are also multi-token NFTs, which as the name implies are NFTs that are numbered as 1 of 88 and are not unique. (Fortnow & Terry, 2021)

4.1.1 NFTs Categories

It is only right to provide an introduction regarding all the categories of NFTs present. Often one only hears about digital art and collectables, as these are the types most in the media spotlight especially when one hears about very high prices. The categories to be covered in this sub-chapter are the following: digital art and collectables (with their respective declinations), in-game items, digital trading cards, digital real estate, domain names, event tickets and finally tweets. (Fortnow & Terry, 2021)

4.1.1.1 Digital Art and Collectibles

Digital art is a new art form that, as its name implies, only exists in digital form. Clearly, it can be printed as digital, but it is designed to remain so on the Internet.

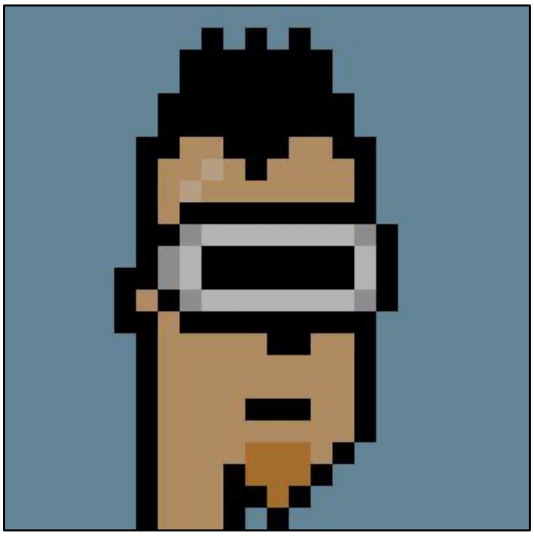
On the other hand, digital collectables are considered similar, and therefore fall into the same category, as digital art in that the creation process and the thinking behind it is the same. The difference lies in the fact that digital collectables are often based on a common theme that unites them. With the increasing visibility of NFTs, many artists have also entered the design of digital collectables. To give examples, digital collectables are like sports cards but in digital format, or they are also simply digitised photos.

More specifically, digital art and digital collectables take one of the following forms:

- Images
- Videos
- Gifs
- Audio
- 3D models
- Books and Prose

The vast majority of NFTs are images, e.g. figure 2 'CryptoPunks #9694' (OpenSea, 2022). These images can contain any type of photograph, whether digitally taken or scanned into a digital format. As such, the images are completely still without any kind of movement. As far as image size and resolution are concerned, there are no limits for NFTs, although some marketplaces have introduced limitations in the files (OpenSea, 2022).

Figure 2: CryptoPunks #9694



Source: (OpenSea, 2022)

If pictures were a popular format of NFTs then so are videos. Especially with the advent of NBA Top Shots NFTs, i.e. video highlights of the finest moments in NBA history. Suffice it to say that the project has reached over $500 million in sales and the most popular NFT is one of LeBron James (NBA, 2022). Clearly, these NFTs are not static images but short videos. This allows the artists and creators of NFTs to include more details, for example if there are cards, the back is often visible as it is a video and not an image. In this way, the possibility of customising NFTs videos is greater, using effects that make the projects more attractive to look at. (Fortnow & Terry, 2021)

GIFs are a specific type of file that is used to make simple videos that loop automatically. GIF stands for Graphic Interchange Format. It follows that the GIF format is ideal for short videos or animations. As mentioned above, since it is a format that favours loops, then GIFs have the advantage of repeating themselves automatically. Compared to videos, GIFs do not have a 'play' button; they start automatically. On the other hand, GIFs also have disadvantages such as the fact that they 'only' have 256 colours. So, in the case of high video quality, the problem is noticeable and diminishes the beauty of NFTs. (Fortnow & Terry, 2021)

Another category of NFTs are audios, in fact, the band Kings of Leon was the first to release an entire album as an NFT, and from it they generated more than $2 million in sales. This was the first initiative and afterwards more and more emerging artists came along and released their songs and albums trying to expand their fan base. (Fortnow & Terry, 2021)

As for 3D models, they are a three-dimensional representation of an artistic object or design. 3D models are increasingly being integrated into various fields of work, such as virtual reality, augmented reality, video games, movies, architecture and medical. (Fortnow & Terry, 2021)

NFTs can also be just text or poems. In some cases, they are whole books directly. Inasmuch as, writers are passing on more options to monetise their values and have come into contact with NFTs. (Fortnow & Terry, 2021)

4.1.1.2 In-Game Items

As far as in-game items are concerned, it must be introduced by saying that they are very often not thought of as a type of NFT. However, it is a very big market with 2.81 billion video games worldwide, and it is a growing sector as it is estimated to reach 3 billion by 2023 (Fortnow & Terry, 2021). Famous examples such as Counter-Strike: Global Offensive (CS:GO) and Dota 2 can be found among this multitude of video games. Such as weapons, armor and skins that can be purchased in game marketplaces. This microtransaction market in video games has reached a very high volume, in fact, a 2021 estimate was that gamers globally spent $34.59 billion buying in-game items (Reasearch and Markets, 2021). As mentioned earlier, items are purchased in in-game marketplaces, which have evolved to allow for buying and selling between players. Generating a secondary resale market, where rare and no longer available CS:GO items were paid around $100,000 to $150,000 (SkinCasher, 2022). Thus, considering in-game items as true NFTs, unique and resalable on the secondary market, and above all with a guarantee of ownership.

4.1.1.3 Digital Trading Cards

It is common to think of trading cards and imagine sports cards or other types of cards coming from a pack. To prune an example of popular digital trading cards there is Magic: The Gathering. A game that reportedly saw more than 35 million players and more than 20 million cards printed in the period between 2008 and 2016 (Wizards, 2022). Such a popular online trading card game it is normal to think that it can be traced back to NFTs, as seen in the previous chapter 4.1.1.2 *'In-Game Items'*. In fact, one game that already fully relies on this new technology is Gods unchaines, where digital collectible cards can be purchased as NFTs or found in packs (Immutable, 2022). As NFTs they can clearly be resold and traded in marketplaces by retailers, generating a secondary market, as well as being played.

4.1.1.4 Digital Real Estate

It is almost a contradiction to think of real estate in a digital format and especially as a type of NFTs, however it is made possible by the introduction of the virtual environment in the last period of time. In fact, there are several virtual worlds on the Internet, such as Decentraland that simulate the real world, explorable through avatars. To convince oneself of how real the digital real estate market is, one only must think that Decentraland has recorded around $50 million in sales of digital pieces of land, avatars, usernames and in-game items (NFT-Stats, 2022). Decentraland over time has grown in popularity as a metaverse, even though the pandemic crisis, reaching record-breaking virtual land sales of $2.4 million (Elizabeth H. , 2021). NFTs, due to their characteristics, are the perfect virtual land transfer tool, especially because of the guarantee of ownership and authenticity, given by the transparent verification on the Blockchain. Another example of a Metaverse platform is The Sandbox, in which all assets are based on NFTs. In fact, digital pieces of land are sold on the OpenSea marketplaces, which will be discussed in more detail below. OpenSea, as if it were a real estate office, also enters the specifications of the digital land as well as the size and positioning in the metaverse (OpenSea, 2022). As, these characteristics can greatly influence the price of land in the metaverse, a topic the paper will discuss in chapter 6.1.1 "*Metaverse*". The Sandbox has sold more than 76,000 NFTs as digital land to date, with an aggregate value of $20 million. The most expensive single sale was about $650,000 for a 'LAND' NFT (Carisbel, 2021).

4.1.1.5 Domain Names

A very important category of NFTs are domain names on the Internet, OpenSea has a section devoted entirely to this type as the Blockchain provides advantages to this technology. In fact, one must subdivide classical domains on the internet from blockchain domains as they are different on several sources (OpenSea, 2022). The domains that are used in everyday life, those ending with ".com" for instance, are considered top-level domains and are managed and controlled by a centralized authority known as The Internet Corporation for Assigned Names and Numbers (ICANN). This organisation sets the global rules for Domain Name Systems (DNS) and keeps a register of who owns the domain names. Clearly, blockchain domains, being a technology that aims to decentralise, are not regulated by an authority. In addition, like cryptocurrencies and classic NFTs, domains are held in crypto wallets, and thus the extension of the latter is ".crypto"' (Fortnow & Terry, 2021).

The main application of domains as NFTs is that as a rule a Bitcoin address has 34 characters, Ethereum has 42, whereas by buying your own name you can have crypto sent directly to the domain name "example.crypto" instead of having to type all those characters and risk getting it wrong. While the secondary application, the one that is gaining in popularity, is that of internet page domains as mentioned earlier, with the particularity of not being subject to a centralised entity. However, this usage is only growing lately because certain search engines only support DNS but using browser extensions one can unlock blockchain domains. (Fortnow & Terry, 2021)

The major advantage of blockchain domains, being NFTs, is that once purchased, they are owned and one does not have to make an annual payment to keep them one's own, as is the case with DNS. There was often a secondary market for reselling domains on the internet for very high sums of money, just think that 'voice.com' was sold for $30 million in 2019 (Elliot, 2019). As mentioned, blockchain domains are in a very primitive stage of use but it is thought the market could grow exponentially, as it has been for the internet. To date, the NFTs market for blockchain domains has seen the transaction for the name 'win.crypto' for a total of $100'000 (Conor, 2021).

4.1.1.6 Event Tickets

It is common to think of tickets for events in paper form, especially to enter concerts or cinemas. However, in recent times more and more digital tickets are being developed that allow greater convenience at the touch of a smartphone. For event organisers, digital tickets also provide advantages in the sale and general organisation of events. However, these kinds of tickets have ensured the development of the secondary resale market, which also includes several illegal ticket manipulation activities. It is estimated, in 2018, that 12% of people who bought event tickets on this unofficial resale market reported receiving fakes, effectively giving the money to the fraudsters rather than the organisers (Megan, 2018).

With NFT tickets, the problems are solved, as there is no need for a centralised body to validate the tickets as they are recognised via the blockchain. As a result, more and more sporting and non-sporting events are considering introducing tickets for events via NFTs as stated by Mark Cuban, owner of the Dallas Mavericks, a team playing in the NBA. (Taylore, 2021)

4.1.1.7 Tweets

In conclusion, the last category of NFTs are tweets, considered to be such after the March 2021 event where the former CEO of Twitter sold his first tweet, as can be seen from Figure 3 'Tweet NFT', for an amount of around $2.9 million (Mike W. , 2022).

Figure 3: Tweet NFT

Source: (Mike W. , 2022)

4.1.2 Contextualisation in the current world

Having provided an initial introduction on the subject of NFTs, it is only right to give a contextualisation as it is not an instrument that appeared overnight. As a matter of fact, within this chapter we give some historical hints of how NFTs came to be by looking at some examples of the early pioneering projects that made history. Afterwards, a picture is given of today's situation, which is seeing a strong following and growing in volume and popularity, both among companies and private investors.

4.1.2.1 History of NFTs

When talking about the history of NFTs, it would be wrong to start telling from 2008, i.e. from when the first blockchains were born. Because it would mean omitting the history of digital art, i.e. the ancestor of blockchain-related NFTs. In fact, one can think of Andy Warhol as the figurehead of 1950s pop art. In those years Warhol changed the concept of art by bringing a fresh air and renewing the opinion of what a piece of art could be.

As a reference figure of digital art, one has to look at the profile of Mike Winkelmann, the pioneer of NFTs who was able to sell a piece of art alone for more than $69 million (Jacob, 2021). In 2007, Winkelmann was inspired by an artist named Tom Judd and decided to create a piece of digital art every day with the intention of starting from scratch and getting better and better as time went on. In doing so, the project took the name Beeple's Everydays, which has more than 5,000 pieces of digital art created over the years. Thanks to Beeple's Everydays, Winkelmann gained popularity as a designer and started working for big brands that appreciated and exploited his work, such as SpaceX, Apple, Nike, Louis Vuitton, Super Bowls and concerts. It can be said that this was the dream of digital artists before the advent of NFTs, namely to create a project and then be selected by big brands for collaborations. The first NFT created by Beeple was released in October 2020 and sold for $66'666 only to be resold for a hundred times that price, $6.6 million a couple of months later (Robert, 2021). After this initial approach to the world of NFTs, Winkelmann a few months later began collaborating with MakersPlace, a marketplace for NFTs, with the intention of creating a drop of his first 5,000 Everydays (Fortnow & Terry, 2021). By turning his first project into NFTs and deciding to put them up for sale, the Wisconsin-born digital artist earned $69 million. In fact, Beeple is considered the predecessor project of NFTs, though not the first, just as Andy Warhol became the figurehead of Pop Art.

However, the history of digital art does not begin with Winkelmann's Everday, but is much earlier. When someone thinks of art, the first thought is usually of paintings, frescoes, sculptures, music and poetry. The history of digital art begins with Desmond Paul Henry in the 1950s, who wanted to visualise his skills. So, by attaching a pen to the end of a mechanical arm and connecting it to a milestone computer of the time via an algorithm, he realised drawings. The curiosity is that in those years computers could not be programmed so the drawing was totally random and changed depending on how tight the mechanical components of the arm were. An example and the first computer artwork that Herny's machine produced can be seen in figure 4 'First artwork from Desmond Paul Herny'. Computer art during those years was not appreciated and respected by the rest of the art community, yet someone decided to believe in it and take the movement forward by creating a community.

Figure 4: First artwork from Desmond Paul Herny

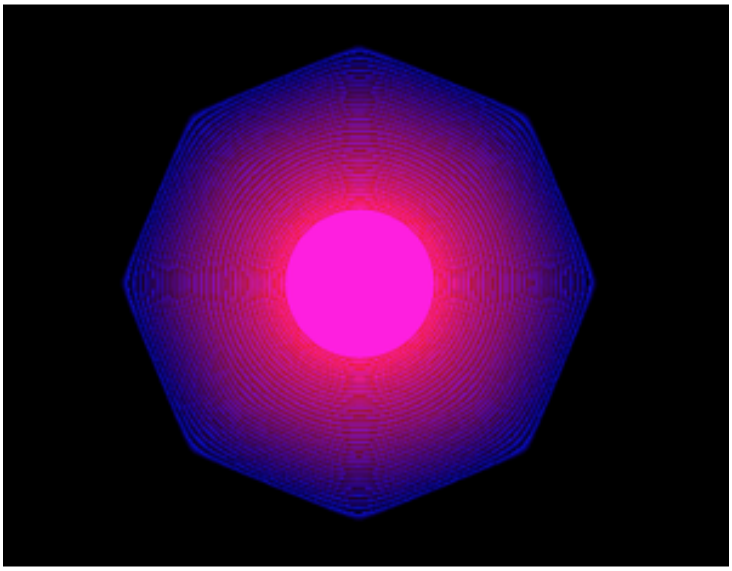
Source: (BBC, 2011)

During the 1960s and 1970s, most digital art was generated by algorithms capable of generating abstract art, however, in 1984, thanks to Steve Jobs, there was a big change in who could make artwork, from engineers to ordinary people. In fact, Jobs released the Macintosh computer, which had the Graphical User Interface (GUI) allowing ordinary people to interact with computers as it was easier through icons and windows. In addition, for the price of $195, one could purchase MacPaint, allowing any artist to try their hand at digital art. In fact, due to the ease of use, digital art took off among artists, finding increasing popularity and creating communities. (Fortnow & Terry, 2021)

Up to this point, speaking of the history of digital art and thus of NFTs, there has been no mention of when it started to make sales. This happened in 2005 with the launch of "Behance.net", the first place on the Internet to share its digital art portfolio and start commercial projects. Consequently, in 2013, there was a very important moment in the history of digital art when The Philipps Auction House and Tumblr supported the first auction of digital art pieces. During the event, 16 artworks were sold for a total of $90,600. Although blockchain technology already existed during those years, there was still no thought of securing the rights of ownership of these digital artworks (Katheryn, 2013). After a year, in fact, the blockchain and art worlds collided, generating the first NFT project in history named Monetized Graphics by Kevin McCoy in 2014. As can be seen in Figure 5 "The first NFT sold", it represents a frame of "Quantum" i.e. the first NFT sold, as a GIF as seen in the chapter 4.1.1.1 "*Digital Art and*

Collectibles". To date, this NFT has still been heard of as it sold in 2021 for $1.4 million (Valentina, 2021).

Figure 5: The first NFT sold



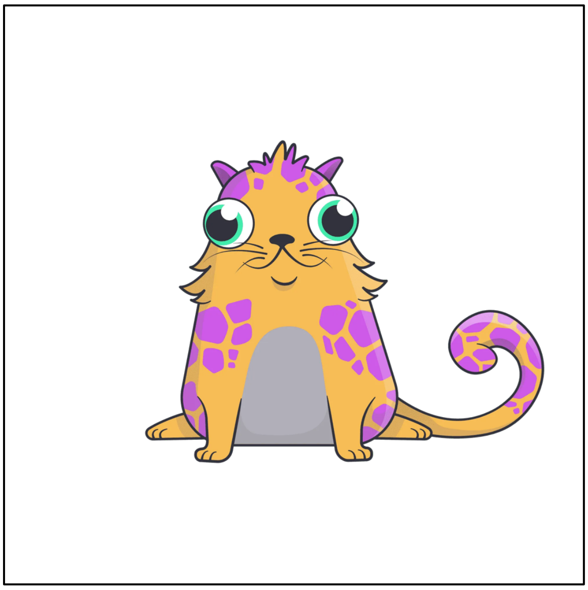
Source: (Valentina, 2021)

McCoy was an artist who went viral thanks to Tumblr, but never received back what he was owed as remuneration and credit for his work. In fact, he was already researching a digital art application with blockchain at the time. During an interview, he said that in the past he had used a blockchain named Namecoin to mine a video clip and buy it in his wallet. However, the first blockchains had technical limitations such as being too small to hold an image. A year later, QuHarrison Terry and Ryan Cowdrey founded 23VIVI, the world's first marketplace that used Bitcoin's blockchain to create proof of ownership. This blockchain compared to Ethereum's blockchain, which is used for most NFTs today, was very slow. (Fortnow & Terry, 2021)

After 2015 people struggled to understand digital art and as a result there was no marketplace to buy and sell, until November 2017 where the first collection of NFTs reached critical mass. The project called CryptoKitties by Dapper Labs is based on the Ethereum blockchain and allowed people to buy, sell and collect a series of virtual images depicting cats. These images supported a game launched with 100 'Founder Kitties', which proved very popular and after a few days there were $1.3 million in transactions for CryptoKitties. This amount took up 15% of Ethereum's network traffic due to the high demand for this game based on blockchain and NFTs (Chevet, 2018). We can see an example of CryptoKitties in Figure 6 "Founder Kitty #18". The game was based on players, owners of at least one CryptoKitties, agreeing on the price for which the two cat breeds would then generate an NFT of one CryptoKitty. One side would take the amount of Ethereum (ETH) and the other the NFT generated based on the characteristics of the two original 'parents'. In fact, NFTs had characteristics that were rare depending on the spread, such as: background, cooldown time, whiskers, beards, stripes and so on. These genetic traits of NFTs are called 'cattributes'. Shortly afterwards, the creators of

CryptoKitties monetised the popularity and success of their project when they received $12 million from investors such as Union Square Ventures and Andreessen Horowitz (Adrina, 2022).

Figure 6: Founder Kitty #18



Source: (NFT'S STREET, 2021)

There is no doubt that CryptoKitties aroused great interest in people having their own digital assets such as NFTs, but the work was continued by the project called CryptoPunks mentioned earlier. Realised in 2017 by Larva Labs, CryptoPunks are 10,000 unique collectible characters designed in the Pixel Art style as can be seen in Figure 2 'CryptoPunk #9694'. In 2021, the OpenSea marketplace estimated the transaction volume of the project at approximately 172,000 ETH, in May 2021 nine Punks NFTs were sold for $17 million. (Fortnow & Terry, 2021)

4.1.2.2 NFTs at present

After providing an initial introduction and following the historical path that allowed NFTs to find themselves in their current position, it is only right to provide a picture of where we are today. In 2021, the word 'NFT' was selected as word of the year by Collins Dictionarys (Collins Dictionary, 2021). Indeed, NFTs are undergoing rapid growth, both in popularity and in uses, by 2020 becoming one of the most popular applications in the field of technology finance. After all, there is no better way to give context to a topic than to set out statistics that highlight the growth of this topic (Bao & David, 2021).

In order to give the correct contextualisation of NFTs in their current state, Table 1 'Performance of NFTs over the past three years' is shown. In order for it to be read and analysed in the correct manner, it must first be given the correct definitions that are used within it. In fact, the term "volume of dollars traded" refers to the monetary value that is exchanged, either by buying or selling NFTs, within the primary market but also within the secondary market, giving an overall volume of the sector. While the term 'Buyers' refers to the number of portfolios that have, during the last year under consideration, bought at least one NFT. It must be made clear that it is therefore not the individual person but the digital portfolio that is considered, as an individual may have more than a single personal portfolio. The same applies to the term 'Sellers' in that portfolios are considered which have sold at least one NFT in the last year under consideration. On the other hand, the term 'Total active wallets' refers to the total number of portfolios that have both bought and sold during the year, as they are considered active, on the other hand, passive wallets are those that do not execute any buying or selling transactions and therefore hold. To end this prelude, "Market capitalisation" refers to the cumulative value of all NFTs in the primary and secondary market. (NonFungible, 2021)

Table 1: Performance of NFTs over the past three years

	2019	2020	2021
Volume of dollars traded	$24’532’783	$82’492’916 +236%	$17’694’851’721 +21’350%
Buyers	44’324	75’144 +70%	2’301’544 +2’962%
Sellers	25’036	31’774 +27%	1’107’796 +3’669%
Total active wallets	55’330	89’061 +61%	2’574’302 +1’822%
Market capitalisation	$123’999’573	$372’203’300 +200%	$16’898’362’987 +4’440%

Source: (NonFungible, 2021)

Having given a brief explanation of the table, it is time to analyse it, providing a clear picture of where NFTs have got to at present. Table 1 "Performance of the NFTs over the past three years" refers to the years 2019 to 2021 as an exposition of the data. Within it one can see that the volume of dollars traded in 2019 was $24,532,783 exposing how a lot of money was already being moved in that year considering that the sector was still in the early stages of popularity and development. However, in the following years we can observe a growth of 236% (2020) and then a real explosion in 2021 where the figure reaches $17'694'851'721 (+21'350%

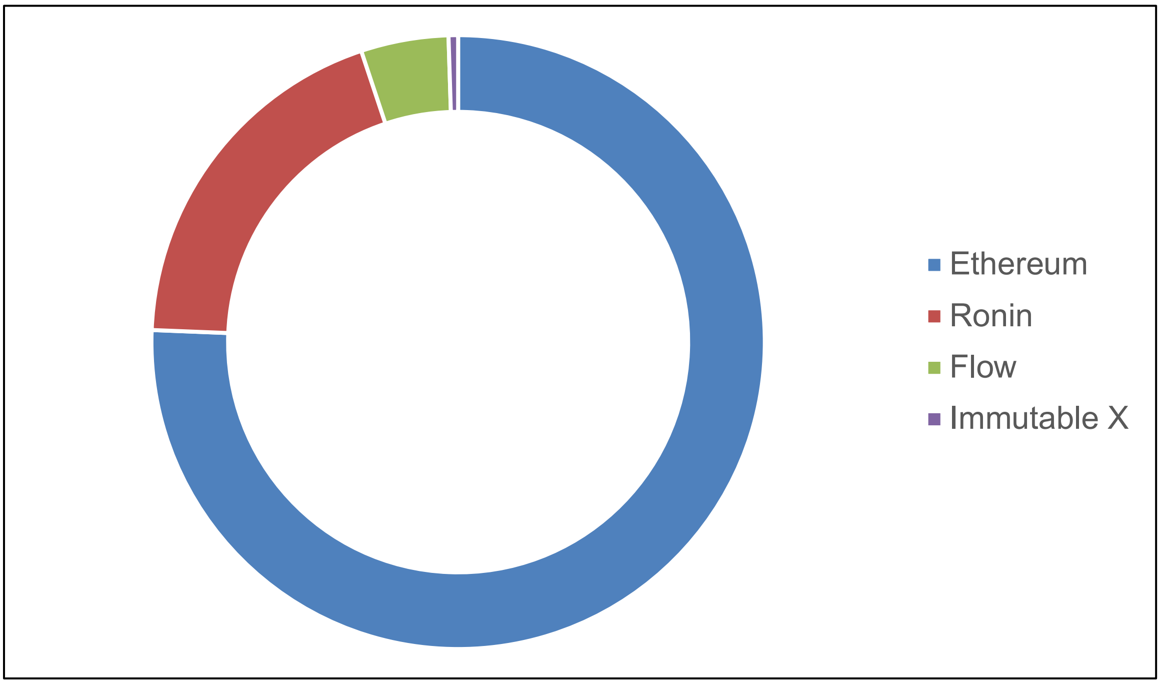
compared to the previous year). Clearly, this figure not only shows how established and recognised NFTs have become by now by people but is incredibly surprising and exponential compared to the growth that had been recorded over the years. A symptom of this growth is certainly an interest in a popularisation of the subject that has allowed NFTs to go from a niche tool, as digital and computer artists as seen in the previous chapter, to something common to even the least experienced people. In fact, the NFTs sector has seen many individuals entering the industry for the first time and gaining notoriety and hype, with the main target groups being private investors and large corporations. Two figures who benefit from the world of NFTs will be analysed in the following chapters. (NonFungible, 2021)

The increase in the popularity of the world of NFTs from 2020 to 2021 has led to a greater number of active portfolios as can be seen from the table the number of buyers has risen from 44,324, who can be considered as early adopters, to approximately 2,301,544 (+2,962% compared to 2020). In contrast, sellers also increased, but less exponentially than buyers, from 25,036 in 2019 to 1,107,796 in 2021. The reason for the higher number of buyers than sellers can be found in the fact that due to the popularity and entry of many people into the world of NFTs in 2021, many of them entered with the aim of making a profit and thus buying their first NFT in that year. Hardly anyone with little knowledge of the subject enters and starts buying and selling in search of profits, moreover as behavioural finance teaches when a purchased project starts to lose value hardly anyone uninitiated registers the loss but continues to hold the NFT in the portfolio with hopes of recovery. (NonFungible, 2021)

At the numerical level of total active wallets, one can actually see how much the NFT sector has grown and get a clear picture of what it is today. That is, with some 2,574,302 (+1,822% vs. 2020) portfolios having bought and sold in the past year. Adding this to the market capitalisation figure, which rose from $123'999'573 in 2019 to $372'203'300 (+200%) in 2020 and then to $16'898'362'987 (+4'440%) as the total value of the NFTs market in 2021. Clearly the popularity of this market has been pushed to the top thanks to the performance of the crypto market as NFTs are associated with it in terms of both currency and blockchain. (NonFungible, 2021)

It can be argued that in 2021, given the above data, the NFTs market has definitely entered a new phase by being recognised as an exponential growth sector. However, in order to interpret this data correctly, it is necessary to consider it in a kind of balancing act, as trading volume and market size have increased dramatically over the years under consideration. On the other hand, however, the growth of Smart Contracts, i.e. an indicator of the number of active projects, has grown more modestly, in fact there has been an increase in the value of important projects rather than a balanced diversification of them. In short, demand in the sector grew strongly while the supply of viable NFTs projects struggled to keep pace and this led to two important consequences. The first concerns the growth of prices, as they are determined by supply and demand and if the former rises so do the prices of NFTs as a market law. While the second consequence relates to a proliferation of new projects referred to as 'quick wins', they are characterised in NFTs that take value immediately but do not add value because it does not persist over time and they cannot compete like the blue chip out there such as Crypto Punks and BAYC. (NonFungible, 2021)

Figure 7: Volume of dollars traded between four of the main NFT blockchain (2021)



Source: (NonFungible, 2021)

Having seen the overview of the NFT sector above, in order to get a general picture of the current situation, it is useful to look at and analyse figure 7 " Volume of dollars traded between four of the main NFT blockchain (2021)". As, it allows us to address the most widely used blockchain in the NFT world in terms of transactions in 2021. In fact, it turns out to be the Ethereum blockchain with approximately $13,599,651,733 in performance, covering 75.4% of the market. Right behind it we find the blockchain called Ronin, which supports NFT projects such as Axie Infinity, taking an important place by occupying 19.2% of the market last year with a volume of $3'451'670'485. As the penultimate most used blockchain in the market, Flow can be observed, it is the blockchain of important projects such as NBA Top Shot, Moto GP and others. It covers 4.6 per cent of the market, or $827,145,801. Finally, we have the blockchain that provides the basis for projects of the calibre of Gods Unchained and TikTok with 0.5%, which consists of a volume of $87,290,895 for Immutable X. (NonFungible, 2021)

4.1.2.3 2022 1st Quarterly

In addition to the data for the past three years, seen above, one can see and analyse the data for the first four months of 2022. This is contrasted with the four-month period of 2021. In fact, in terms of the volume of USD traded (total), an increase of 13.25% from $14,531,875,047 (Q4 2021) to $16,456,945,150 (Q1 2022) can be recorded. Of course, it is difficult to see very high growth rates as between 2020 and 2021 as visible in Table 1 "Performance of NFTs over the past three years". However, the number of sales dropped by 46.96% to 7,447,473 (Q1 2022). This figure sums up the decline in the first four months of 2022 for the NFT sector. In addition, the average price reached $1'057 (Q1 2022), an increase of 80.07% (NonFungible, 2022).

Summarising the situation of the past four months, it can be stated that 2021 was categorised by a circulation of accessible NFT projects related to video game assets (such as Axie Infinity) and consequently this factor stopped in 2022. At the same time, the sector saw the continuation of speculation in the Collectibles segment of NFTs. With the creation and sale of major projects such as Invisible Friends. To conclude, around January 2022 a volume of searches comparable to that of the Ukrainian conflict a few months later was found. This serves to understand the media power that NFTs are increasingly bringing to bear on this sector. (NonFungible, 2022)

4.2 How to create NFTs

Having dealt in chapter 4.1 *'Definition'* with a general introduction to the subject of NFTs, including due definitions, historical background and a contextualisation of the market in both 2021 and the first quarter of 2022, it is only right to go deeper into the subject by beginning the path to understanding buying and selling. Indeed, within this chapter, the aim is to get to know NFTs by starting with the process of their creation, i.e. how they are made and where the artistic ideas behind the designs come from. We will then move on to a short part in which we will discuss the technical components of NFTs, we have already dealt with blockchain in the previous chapter, going into more specifics just to give the necessary explanations to understand the mining process and how it works. Once this more technical part is over, there is the moment when we begin to analyse the marketing process of NFTs, real marketing campaigns realised on innovative platforms and with sales techniques suited to the target. Finally, the chapter will focus on certain marketplaces, arguing the choice of listing them over others and analysing them in detail, as they present contradictory traits among themselves. It will also provide a series of data on the dollar volume circulating in the different marketplaces to conclude the explanation.

4.2.1 Creation process

Assuming that today anyone can make their own collection of NFTs, from the private artist to the big-name brand, each subject has its own motivations and what is needed is the right creative input. In fact, the creative process from scratch does not require any technical skills whatsoever, so as mentioned before, any person can make an NFT. Nevertheless, it is equally important for the creative process to have in mind which aspects of an NFT need to be defined in advance. In fact, creating a NFT includes the definition of the following project-related aspects:

- Main Content
- Name
- Preview Content
- Description
- Unlockable content
- Perks
- Ongoing royalty
- Supply
- External links

In the following sub-chapters, the above-mentioned aspects of setting up a NFT will be addressed.

4.2.1.1 Main content

As a rule, the first step in the creation of an NFT is the definition of the main content as it encapsulates the core. In this case, there are many paths to take and it is up to the creator to choose which one fits best with the project. To date, several major projects have characters as their main content. These can be 3D characters such as Clone X by the artist Takashi Murakami as can be seen in Figure 8 "Takashi Murakami x RTFKT" or 2D characters made by artificial intelligence (AI) such as CryptoPunks (Trace, 2021). In the first case, the realisation is completely in the hands of the artist who one by one realises the NFTs, while on the other hand, there are AI-powered software that allow the realisation of images with different rarities. Specifically, the process is carried out by setting the software with the input of a series of percentages relating to character traits, e.g. that he has white hair, creating de facto rarities. In fact, out of 10,000 NFTs in a project, only 5 per cent will have white hair, and in addition these features are multiple, so the rarer ones may end up randomly in the same NFT making it rarer than others with more common features. The AI-powered software then creates 10,000 NFTs considering the percentages applied to the traits, in fact there is not a lot of artworks but it is definitely a faster and simpler type of art, which thanks to CryptoPunks and BAYC is finding more and more approval (Fortnow & Terry, 2021).

Figure 8: Takashi Murakami x RTFKT

Source: (Trace, 2021)

As mentioned before, one does not need much technical expertise to define the main content of NFTs, the important thing is creativity and initiative in creating a piece of digital art. In addition, there is the possibility of making a drawing using traditional materials and then scanning it to make it digital. The only constraint imposed is that the image must be at the highest possible resolution as certain marketplaces have restrictions in this regard (OpenSea, 2022). This can also be extended to videos, which as mentioned in chapter 4.1 "*Definition*" an NFT can be of many types, as they must be in HD quality and relatively short in order not to exceed the limits of the file.

It is important to emphasise that the main contents of NFTs must be of their own creation, as downloading an image from the Internet with the idea of making it into an NFT entails legal problems in conflict with copyright laws. (Fortnow & Terry, 2021)

4.2.1.2 Name

The name aspect is essential as the market for NFTs is increasingly saturated after the great popularity it has been gaining in the last couple of years. In fact, having a name that manages to catch the eye amidst many other NFTs could be a key factor in terms of sales. It is also important to specify that if it is a unique piece, i.e. not part of a collection of 10,000, the wording (1 of 1) is included in the name. Consequently, if it is a more modest collection in numerical terms, for example (3 of 25) is entered. (Fortnow & Terry, 2021)

4.2.1.3 Preview content

In the case of using an image or GIF as the main content of NFTs, it is not necessary to think of preview content. However, in the case of audio or video files it is necessary, e.g. by creating an image or GIF that can summarise them. Generally, a frame of the video is used as preview content. (Fortnow & Terry, 2021)

4.2.1.4 Description

A further aspect to be considered in the creation process is the description of the NFT as they often want to give more detail than the design, they are usually short and light. As mentioned above, in the case of small collections or one-off pieces, one tends to add a description that reads '1 of 1'. Likewise, the perks mentioned below are usually explained in the description with the various conditions to be met to obtain them. (Fortnow & Terry, 2021)

4.2.1.5 Unlockable content

An NFT project could have unlockable content to only those who take ownership by purchasing an NFT. Unlockable content can be of many types such as an image, a video, a PDF file, credentials for a login, a private e-mail address or tips. (Fortnow & Terry, 2021)

4.2.1.6 Perks

Perks are not a compulsory aspect in NFT projects as they are not related to them on a technical level. However, they do provide an incentive to purchase NFTs and usually increase their value. To explain concretely what perks consist of, we take the example of Gary Vaynerchuk and his NFT project called VeeFriends, which includes particularly interesting perks. VeeFriends is an NFT project of 10,255 units divided according to rarity categories. For example, 9,400 NFTs out of 10,255 are called 'admission tokens' and they guarantee those who own and have purchased them to attend the VeeCon conference for the next three years. The next rarity level of VeeFriends is 555 NFTs called "gift tokens" and they guarantee a minimum of six physical gifts each year for the next three years. Finally, the rarest level includes 300 "access token" NFTs that allow various levels of personal interaction with Vaynerchuk such as brainstorming with him or his private consultations. (Gary, 2021)

In summary, perks can really be anything and give the NFT project a real added value in addition to the NFT itself. As a rule, perks are provided to first purchasers of NFTs and denied to future owners through buying and selling. Or there is also the mode where you have access to the perks on a given date, so whether you are the first or the fifteenth owner, you will be entitled to them. These are cases where the perk is access to a specific event held on that date. (Fortnow & Terry, 2021)

4.2.1.7 Ongoing royalty

An important decision in the creation process is to define the royalty percentage that the creator of the NFT receives. Specifically, the creator continues to collect from the sales of his NFT, which has a royalty percentage each time a sale takes place. It is common to see ongoing royalties hovering around 10% of the price, as if it were too high then it would be a disincentive for future owners if their goal was to realise resale profits. (Fortnow & Terry, 2021)

4.2.1.8 Supply

Clearly in the creation process there is also the decision to supply, as mentioned in chapter 4.1 "*Definition*" NFTs are unique in that they are non-fungible and therefore not exchangeable with something similar. Hence, the supply is generally 1, however, in this sub-chapter, the decision regarding the size of the collections can also be analysed. Very often collections are 10,000 or 5,000 NFTs in case they are made with AI and as far as NFTs made by artists such as the Murakami are concerned, then the collections comprise fewer digital art pieces which are made with a different and longer process. (Fortnow & Terry, 2021)

4.2.1.9 External link

In certain marketplaces such as OpenSea, for example, there is the possibility of linking various external links to NFTs in such a way as to extend the description, for example with an external page where more information is added (OpenSea, 2022). Or, in the case of NFT projects by companies, an external link to the company webpage.

4.2.2 Technical components

Within this nominated sub-chapter, the technical components of NFTs will be addressed in a manner understandable even to those approaching this world for the first time. In order to ensure this, several topics need to be addressed, such as a more detailed explanation of the Ethereum blockchain and smart contracts. Then, still in connection with the Ethereum blockchain, we deal with the two protocols that have made it the most famous for trading NFTs, namely ERC-20 and ERC-721. We end with a short parenthesis on cryptocurrency wallets and finally explain briefly what the process of mining an NFT consists of.

4.2.2.1 Ethereum and smart contracts

Let's start at the beginning of it all, in 2013 when a young 19-year-old developer called Vitalik Buterin decided to create a blockchain by exploiting the strongest features of the Bitcoin blockchain. Consequently, he works on incentivising the scheme for miners, proof of work and hashing, effectively creating the Ethereum blockchain. With it, Buterin's greatest innovation is the introduction of a Turing-complete language. That simply allows the Ethereum blockchain to solve complex codes thanks to the leverage and shared power provided by the incentivised scheme. This feature effectively granted the Ethereum blockchain the ability to theoretically create a decentralised world. In addition, thanks to this Turing-complete language, the Ethereum blockchain was able to develop so-called smart contracts. That is, codes written in the blockchain and run by miners. To give an example of a smart contract and thus a possible code, let us take two parties A and B, where A makes a bet with B on tomorrow's weather: A pays B $10 if it rains tomorrow and B pays A if it does not. The code written in the blockchain would be as follows, if it rains then A owes B $10 and if anything else happens then B owes A $10. It follows that Ethereum's blockchain after reading this code goes and acquires the next day's weather data directly from a trusted site such as www.weather.com, the innovation being that no third party is inserted but everything is done in a decentralised manner. (Chevet, 2018)

It is important to understand that smart contracts have nothing to do with legal contracts, as Buterin states during Ethereum whitepaper (Vitalik, 2022):

"Note that 'contracts' in Ethereum should not be seen as something that should be 'fulfilled' or 'complied with'; rather, they are more like 'autonomous agents' that live inside of the Ethereal execution environment, always executing a specific piece of code when 'poked' by a message or transaction."

Continuing with the aim of improving Bitcoin's blockchain with that of Ethereum, the latter has a faster transaction time (roughly 15 seconds compared to Bitcoin's 10 minutes). There are other differences between the two such as the modified proof-of-work algorithm so as not to guarantee favouritism to those trying to mine cryptos, Ethereum also does not have a market cap as it releases the same amount of cryptos every year. Finally, there is the addition of an international currency called gas that is used to pay transaction costs when they occur on the blockchain. Gas is dealt with later in the paper and for now it is enough to know that it is calculated as a fraction of Ether. (Vitalik, 2022)

Ultimately Ethereum was launched in July 2015 and quickly rose to the top in the blockchain ecosystem given its features and improvements over Bitcoin. It is also appreciated and becomes popular due to the fact that it allows developers to create dApps which as the name suggests are decentralised applications on the Ethereum blockchain. (Chevet, 2018)

4.2.2.2 ERC-20 tokens

Thanks to the introduction of smart contracts on the blockchain such as Ethereum's, the process of innovation has led to the creation of a new type of currency called tokens. Indeed, it is much easier to use the power of the Ethereum blockchain to create new currencies, thanks to smart contracts, than to create one from scratch with the respective blockchain. A currency connected to an existing blockchain is referred to as a token. To render the image well, one can think of tokens as those used in amusement parks. In fact, the characteristic of tokens is that they have value in a certain context and provide access to services. A possible application of tokens can be found in companies that provide services and can request to be paid in that personal currency distributed and managed through the blockchain. Tokens have indirectly caused a settling market to develop where some projects have emerged offering services in exchange for the currency backed by the Ethereum blockchain. A clear example of this is Augur, a betting company where tokens are used to bet on sporting events and in the case of a correct prediction one receives Augur tokens. (Chevet, 2018)

The particularity of tokens is that to be defined as such, they must fall within Ethereum's guidelines, which are explained in the Ethereum Request for Comments #20 also referred to as ERC-20. It is an agreed standard shared by the community that in short defines the basic functions and lists the guidelines that tokens must comply with in order to be accepted as such. Quite simply, an ERC-20 token is in fact a token that follows the ERC-20 guidelines. As mentioned earlier, the innovation of ERC-20 tokens has created a development of the so-called token economy, effectively creating many business models based on these smart contracts by providing services such as insurance, exchange and management of tokens. These business models also support companies like the aforementioned Augur in the Initial Coin Offering (IPO) process, which is very similar to when companies issue their own shares, i.e. the Initial Stock Offering (ISO) (Chevet, 2018). That is, the online launch of the token created by the company to the public that wants to benefit from its services. In 2019, the registration of ICOs reached more than $345 billion for about 474 ICOs, unexpectedly surpassing the funds raised for venture capital in the same year (Coin Insider, 2022). However, most of the ICOs contained a scam system, with the aim of stealing token buyers' money since no services were created on which they could spend it, such as the case of BItconnect that turned out to be a Ponzi Scheme (Jen, 2018).

As for the categorisation of tokens, whether they belong more to the class of commodity or security is a subjective answer depending on the legal framework of a given country. However, tokens can be divided into three categories and considered as theoretical frameworks (John, 2018):

- Utility tokens (or app coins): tokens that allow access to services offered by a company such as Augur mentioned above.
- Security tokens (or tokenized securities): tokens that have their value linked to the value of an existing asset such as a share, a house, art or a financial product such as options or bonds.

- Commodity tokens: this category is the most popular as it groups virtual currencies that are considered to be commodities, e.g. Bitcoin.

4.2.2.3 ERC-721 Ethereum's blockchain

After the innovation mentioned in the previous chapter 4.2.2.2 "*ERC-20 tokens*" of ERC-20 tokens the most important one came later with a new standard for the Ethereum blockchain called ERC-721 created by a Vancouver start-up known as Axiom Zen. The new standard actually provided a technological framework capable of creating a best practice in token issuance and creation. As a result, the ERC-721 standard laid the foundation for NFTs by allowing developers to create digital assets that could be exchanged and tracked on the blockchain. (Chevet, 2018)

4.2.2.4 Minting NFTs

The concept of minting an NFT is recurring in that it is an important step within the technical process leading to the token's registration on the blockchain. The only way to mint an NFT is very simply to write a smart contract, i.e. a programming code. Consequently, after writing the smart contract, there is a need to test it by releasing it on the Ethereum Virtual Machine (EVM). This step is very important because once the programming code is released on the blockchain, there is no way to correct it later. Each NFT is a different contract and gas fees arise from each time a contract is released on the blockchain as a transaction. (Vitalik, 2022)

Today, thanks to the advent of marketplaces like OpenSea, there is no longer a need to write smart contracts and know how to code or perform all the strictly technical tasks attached to NFTs and the blockchain. OpenSea, for example, makes it easy to mint NFTs as the process is outlined in the marketplace and executed automatically when you want to put your digital artwork on the blockchain by making an NFT. (Chevet, 2018)

4.2.3 Commercialisation

As the trend in NFTs grows in popularity, more and more players are interfacing with this fast-growing sector. Indeed, many major brands are known to market NFTs in collaborations with artists who typically depict their products. As well as small and growing companies, which create NFTs projects to be launched on the market in expectation of economic and audience returns. The marketing process of the product is very important in NFTs as it generates a profit if it is implemented correctly towards the target group. The NFT sector has in fact been characterised by the strength exerted on the marketing campaigns of the various projects, as it is new there is a lot of market share to go around. In fact, the success of an NFT-based business does not come by chance or luck but is the result of a series of strategic choices by a team. The tangible example of this are the various NFTs projects launched by celebrities with millions of followers on social media, thus with an existing following, but which failed to receive even a single purchase offer. In fact, the goal of marketing campaigns is to build a relationship with the target audience and share the intrinsic value of NFTs with them. Even more so since there are no functioning algorithms to promote a collection of NFTs more easily and effectively, for example as happens on social networks such as Instagram and Twitter where, thanks to well thought-out hashtags, the content goes viral. In fact, in the NFT marketplaces, there are no such gimmicks to expand one's catchment area and even if one manages to appear on the front page of OpenSea, it is not certain to achieve sales. It follows that the fortune of an NFT collection and its creator, be it a large company or a private artist, lies in the right long-term marketing strategy.

4.2.3.1 Community

Marketing campaigns for NFTs can well be compared to those for sponsoring podcasts, which means that they must be creative as it is very important to build up a community following. Of course, one must decide who the community will be made up of and realise marketing campaigns adapted to target profiles depending on NFT strategies. This factor can also be realised by large companies as it does not necessarily mean that their target customers for goods and services, e.g. Coca Cola with drinks, are the same as those who will buy NFTs. Also, because it is a complicated sector to understand by those who have never heard of it and therefore it is a new concept for many regular customers, it is the task of the company to introduce it to the target audience by explaining the value of owning an NFT. In summary, the common thread of an NFT marketing campaign is to build a community of collectors, it does not have to have a fixed number of people but the important thing is that they are fans of the digital asset to be released. (Fortnow & Terry, 2021)

4.2.3.2 Know your audience

As mentioned above, NFT marketing campaigns are similar to classic product and service marketing campaigns, in both of which it is key to know who you want to serve and what problem you are going to satisfy in your target group. The NFT sector in this sense has taken the factor of establishing direct contact with the public very much to heart. It is common, especially for smaller projects, to see these communities build around official groups on Discord to support the project and increase the number of people. Discord, in a nutshell, is an application that allows various users to create dedicated viral rooms, as in the case of an NFT project, to converse via messaging or phone between the various members offering direct contact with the artist or team running the channel. (Fortnow & Terry, 2021)

4.2.3.3 Education

The moment an established community is created around the NFT project then through direct communication channels the sales strategy shifts more towards an education phase. Education in the sense of teaching the public about the collecting of NFTs and emphasising why a particular company or person has embarked on this project by expressing their interest. In the NFT world over time, terms and patterns have been created that an individual without the proper education would not understand, resulting in the failure of the project as many sales potentials would be lost. One of all terms is the drop format, it refers to the fact that NFT collections are released to the public on a specific date at a specific time and through specific channels, through which people can purchase NFT with the help of a digital wallet (MetaMask) and cryptocurrency. It follows that it is essential to educate the community, especially those with no experience in the field, regarding NFT drops. In this sense, the most used and proven strategic technique is to start creating a lot of hype around the drop, starting already months before the official release and explaining step by step how it will take place and how it will be possible to obtain one's NFT. This will have two positive effects as the community develops both NFT knowledge and passion for the project. Demand for an NFT project is thus created, which determines prices according to the law of the market between supply and demand. The demand is supported and expanded over time with continuous contacts to the target audience until the project is released. Taking the example of one of the most profitable projects to date, CryptoPunks, which we have already mentioned above, has around 70,000 users on the official Discord channel (Larva Labs, 2022).

Monetisation

As soon as an NFT collection has a strong experienced community and it becomes of a certain size, it can be said that the project has a market and therefore a relative demand. One of the many ultimate goals of private artists or large companies is to turn demand into sales and to achieve this there is the final hurdle determined by the selling price. Not forgetting one of the previous chapters where ongoing royalties that allow creators to continue earning a percentage on resale were discussed. The price is usually defined according to community demand and supply, i.e. the quantity of NFTs offered for sale. In addition, there may be other factors that influence the price such as physical experiences related to NFT ownership. Such as in the case of a project by American hip-hop artist A$AP Rocky who released seven NFTs in April 2021. This collection contained one NFT, a unique edition (1 of 1), which contained a song by the artist that had never been released to the public named $ANDMAN (Wilfred, 2021). Or for another NFT guaranteed a studio session with him himself, granting a chance to meet him, the piece was auctioned for more than $50,000 (Wilfred, 2021). In summary, no one in the world knows how much the intrinsic value of an NFT really is, the price is entirely how much someone is willing to pay for it.

On the other hand, the strategy of listing NFTs for free is increasingly developing as more and more people are attracted to the sector, even those with no experience are attracted to it if they do not have to pay. Such is the case with CryptoPunks, all 10,000 of which were delivered for free and now have a floor price of around $127,510 (CoinGecko, 2022). As a result, a project manages to increase its community and related demand. In addition, this also grants an affiliate force as those who manage to resell the NFT obtained for free manage to make a profit easily. It confirms a bond with the project and long-term support for future collections (Fortnow & Terry, 2021).

4.2.4 Marketplaces

The term marketplace has already been used within the work but an explanation of it in detail can be found below. In fact, it refers to a digital platform through which NFTs can be bought and sold. Marketplaces allow users to display and store their NFTs as well as to offer them for sale for a fee of money or cryptocurrencies. Depending on the digital platform, there may be the possibility to mint NFTs directly. The marketplaces, through a fee, takes care of the transfer of NFTs between users. In addition, there are big differences between one platform and another. The biggest differences usually relate to: the type of NFTs they trade, fee percentages, payment options, blockchain on which the NFTs sold are based, and various other rules. Various marketplaces are listed below, arguing why they are mentioned and offering a brief explanation of them. (David R. , 2022)

4.2.4.1 OpenSea

OpenSea is the marketplaces most considered within the paper, especially in the previous chapters, as it is the largest and most popular of all digital platforms. In fact, a visualisation of the data shows that OpenSea treats 15.5 million NFTs and has realised sales of $354 million from 2017 to date (Fortnow & Terry, 2021). The marketplace offers a wide variety of types of NFTs, such as:

- Digital art
- Collectibles
- Music
- Domain names
- Virtual real estate
- Digital trading cards
- In-game items

The buying and selling of NFTs is permitted by various value cryptos such as Ethereum, Solana and USDC. Therefore, currencies such as the US dollar cannot be used. Listing the advantages of OpenSea one can definitely mention the fact that it is the most popular marketplaces, the ease of use by users, the fact that it is free to mint NFTs and finally a fee of only 2.5% for sales. On the other hand, the disadvantages are the following, such as transactions only available with cryptocurrencies and the fact that many NFTs are based on the Ethereum blockchain which often has high gas prices. (David R. , 2022)

4.2.4.2 Rarible

The second marketplace is Rarible, which deals with NFTs such as art, collectibles, video game assets. Rarible has created RARI tokens in-house, which are given as rewards to active users on the digital platform. RARI tokens allow users to interact with the company's decisions through the possibility of voting on policy changes, for example. In addition, in 2021 Rarible starts a collaboration with Adobe with the aim of making the process of verification and protection of metadata easier and faster. This will touch digital content such as NFTs (David R. , 2022). Rarible can be summarised as a large network with solid connections and at the same time continues to follow the intentions of a decentralised mindset. As a disadvantage the digital platform sees like OpenSea the use of only crypto currencies and high gas prices. In addition, Rarible also charges for the minting process of NFTs. As far as Rarible's sales volume is concerned, it reached $28 million in March 2021, of which only $3.7 million in January (Peter, 2021). In addition, during 2021, Rarible surpassed 500,000 registered users in the NFT marketplace, of which 1,911 users perform transactions every week (Peter, 2021).

4.2.4.3 NBA Top Shot

Developed by Dapper Labs, creator of the CryptoKitties discussed in the chapter 4.1.2 "*Contextualisation in the current world*", NBA Top Shot is a marketplace dedicated to the world of basketball, and more precisely the NBA championship as its name suggests. Within the digital platform, NFTs videos depicting important moments in the history of the NBA championship are sold. Clearly NBA Top Shot has seen great popularity brought about by sports fans and fans of both sports and collectibles. In fact, NFTs are purchasable via bundles and thus containing several unknown rarities with a relative pool of release percentage. In addition, users can obtain free NFTs by completing various trials. NBA Top Shot is on the FLOW blockchain, which uses proof-of-stake validation ensuring the marketplace is environmentally friendly. Finally, bundles of NFTs can be purchased by the less cryptocurrency-savvy public as payment methods such as debit or credit cards are accepted. However, this does not allow their transfer to other blockchains such as the more famous Ethereum blockchain. (Fortnow & Terry, 2021)

Following NBA Draft 2022, the marketplace saw a wave of sports collectors and NFT fans, which resulted in a 901.95% increase in sales. This resulted in approximately 50,000 transactions with 5,000 new buyers on 26 June 2022 alone (Early Miner, 2022). In June 2022, the marketplace recorded a sales volume of around $7.67 million, and in any case, it is a digital platform that has surpassed $1 billion in total sales volume (Raphael, 2022).

4.2.4.4 SuperRare

SuperRare is an interesting case of a marketplace where only single editions of NFTs marked as (1 of 1) are sold. This factor establishes it at a high level in the ecosystem of NFTs as art galleries in that NFTs considered 'memes' are not accepted and it is very selective in its acceptance of NFTs to be marketed. As a result, the quality of NFTs within SuperRare is very high and serves as a security motive for investors and users. SuperRare has assembled a very strong and united community that recognises the most important collectors as well as the most influential artists (Fortnow & Terry, 2021). In addition, the digital platform has an editorial section where art articles are written daily. In terms of quantifying SuperRare's sales, as it is a niche marketplace with high quality, the sales volume in the last week (on 26 July) is around $104,000 (NFT-Stats, 2022).

5 NFTs

This chapter sets out to answer the research question "Are NFTs a brand marketing tool or a speculative asset?" and part of the objectives presented in chapter 2 "*Research question and objectives*". As it is structured in two macro sub-chapters, the first part deals with how large brands use NFTs to realise added business value. More specifically, the sub-chapter goes into the opportunities and risks of NFTs for enterprises. Finally, in order to provide a practical example of the topics analysed, a case study of the Coca Cola brand, which realised its own NFT collection to be sold in the market, is dealt with.

On the other hand, the chapter is divided into a further part dedicated to the use of NFTs by investors, i.e. those who treat NFT projects as a potential investment on which to make a profit by reselling them. The structure of this subchapter is similar to the previous one, i.e. the benefits and risks for private investors are contrasted. To conclude, a well-known NFT project called the Bored Ape Yacht Club is discussed in detail, applying its opportunities and risks to private investors.

5.1 Brand marketing through NFTs

In order to ensure maximum understanding of the topic, it is important to give the following definition of brand marketing that Bynder (Bynder, 2022) deals with:

"Brand marketing describes a long-term strategic plan to continuously increase the recognition and reputation of a brand. The goal of brand marketing is to develop an ever-widening base of loyal customers. This is achieved by continuously and consistently communicating brand identity and values in meaningful and engaging ways."

It follows that with the NFT macro-trend, companies have also approached the topic and seen possibilities in it for developing long-term strategies to increase the visibility of the brand and the products and/or services it offers. Indeed, in 2021, when the NFT sector was growing exponentially, several major brands undertook marketing initiatives through NFT projects of all kinds. Internationally known companies in the food industry such as McDonald's and Taco Bell or even the fashion industry moved in this direction, in fact companies such as Louis Vuitton, Gucci and Nike (Kate, 2022). Of course, the strategies related to the sale of NFT are unlimited and different from each other, summarising as follows: from the sale of collectables or limited editions related to the product and/or service offered in order to increase sales. In addition, there are as many brands as possible that base their strategy on building a loyalty relationship between the brand and the consumer in order to raise money for charitable causes (Arun, 2022). While on the other hand, very frequent use of NFT by companies is to spread their corporate image to as many people as possible, telling a story and reaching a new segment of target customers. Finally, for the smaller part there are strategies related to the sale of tickets in the form of NFTs to take part in private live events.

Through these NFT marketing campaigns, one can learn that although the NFT sector is growing, albeit at an immature stage, companies recognise the value of the tool and the attention it attracts. If in 2021 only a few large companies have decided to implement marketing campaigns through NFTs, then in 2022 we can expect a year in which they become much more popular among large brands and beyond. In fact, it is expected that in 2022 marketing campaigns with NFTs will become frequent in the trillion-dollar marketing sector (Arun, 2022). According to an industry article, NFT in the future will be used by marketers to "*create unique brand experiences, increase brand awareness and encourage interaction*" (Kate, 2022).

5.1.1 Opportunities for enterprises

This chapter will discuss the opportunities for businesses provided by the use of NFTs. In fact, ownership opportunities will be discussed insofar as they provide companies with image-related value and, above all, facilitate copyrights. In addition, the positive effect of brand extension when NFT releases are realised is also dealt with. And finally, the marketing campaigns carried out thanks to the NFT strategy and their exclusivity, very often linked to the company's products and services, are discussed.

5.1.1.1 Ownership: logos, domain, documents

The first of the opportunities that will be discussed is inherent in the ownership possibilities that NFTs allow companies. In fact, thanks to the guarantee of obtaining copyrights on an NFT simultaneously, NFTs that are useful within the company and not dedicated to external venidity can be privately realised. For instance, create the NFT of the company logo so as to subscribe it to the blockchain and manage its image rights. The same discourse can also be developed with a view to corporate documents. Specifically, create NFTs of company contracts or invoices in such a way that they can be easily found and are simultaneously owned by the company as creator of the instrument itself (David, Deirdre, & Carissa, 2021). In addition, as already mentioned in chapter 4.1.1.5 "*Domain Names*", domains are already a category of NFTs in themselves that is becoming increasingly popular among companies that want to own their own domain in the ".eth". As a result of this trend, the NFT domain "Amazon.eth" in July 2022 received an offer of approximately $1 million USD (Nancy, 2022). Proof that even major companies are looking around to keep up with what is becoming the corporate and non-business future.

5.1.1.2 Brand extension

Asics, Clinique, Taco Bell, Coca-Cola, McDonald's, Ray-Ban, NFL, Gucci and many other brands are among those companies that will be releasing NFT collections in 2021 and probably also in the future (Kate, 2022). Among these brands, the one common thread that connects them all is in the fact that they are big names and that for the first time in 2021 they have taken an interest and decided to release NFTs. Clearly, all of the companies mentioned above have other vehicles to make money and so it can be said with absolute certainty that they did not make NFTs to make money. In fact, these NFT campaigns were more to be seen as investments as the popularity and interest around the NFT sector increased. In fact, what these large companies gained was interest and interactions from customers or possible new entrants, as brand extension riding on the hype of NFTs was the goal of the campaigns. As such, NFTs allow large companies to generate audiences from those who read the news, the curious, NFT enthusiasts and the brand's affluent customers. In this case, since it is only about creating news and attracting attention around the brand, NFTs do not have to be related to the products and/or services offered. For example, as in the case of Taco Bell the release of NFTs was linked to a fundraising for a charitable cause supporting the education of young teenagers (Arun, 2022).

5.1.1.3 Marketing campaigns

As far as opportunities for NFTs as marketing campaigns are concerned, on the other hand, we speak of NFTs being released strictly in connection with products and/or services. As a marketing campaign the output of such would in itself be a possible increase in sales by covering the investment in marketing. As seen in chapter 4.1.1 "*NFTs Categories*" there are many possibilities to develop NFTs linked to a brand and its products/services. Most companies do not plan to stay in the business of creating and selling digital art in the long run. It is essential to connect the NFT collection to the brand identity so that the corporate perception reaches as many people as possible (Arun, 2022). To take a concrete example of brand marketing through NFT collections, McDonald's realised a promotion through NFT of the limited edition of McRibs in America. The world's most famous fast-food chain exploits NFTs to create excitement and hype about the temporary return of a limited product. The collection contained 10 McRib NFTs made available to customers who retweeted the company's invitation. As a result, some 21,000 people did so in the first few hours and more than 93,000 did so by early 2022 (Kate, 2022).

5.1.2 Risks linked to major brands

After mentioning some opportunities for large companies, it is intellectually correct to also go on to mention the most important challenges in the world of NFTs for brands. Specifically, these are two negative considerations concerning governance as similarly to cryptocurrencies, NFTs also face government impositions. Respectively also from the other point of view, it is a challenge to regulate a new and rapidly expanding technology and the related market in the right way.

5.1.2.1 Legal pitfalls

The first challenge relates to legal pitfalls, i.e. specifically to the fact that the NFT sector is confronted with legal and policy issues in a respective number of areas. The areas most affected by these problems are: commodities, cross-border transactions, know your customer data (KYC). It follows that it is very important for large brands to inform themselves and understand the legal regulations depending on the country in which they are located. In fact, depending on the country, realities can change, such as in India and China where the legal situation related to cryptocurrencies is very strict and this also affects the sales of NFTs. In order to carry out any transaction such as trading, selling, buying through NFTs, companies have to overcome governance difficulties. Legally one can only trade derivatives with a verified currency such as shares and commodities. While tokens legally can only be used with someone person-to-person. There are also countries where the commitment to the new reality of NFTs is visible, such as Malta and France, which are trying to implement laws with the ultimate goal of regulating the service of digital assets. At the same time, in other parts of the world the problem has been bypassed by readjusting existing laws. It follows that from the point of view of large corporations, it is certainly a challenge to enter such a new and unexplored legislative environment in order to exploit the benefits of NFTs. It is crucial to be diligent and informed in order not to create legal problems, which lead to negative consequences such as bad publicity and unnecessary monetary outlays for brands. (Wang, Li, Wang, & Chen, 2021)

5.1.2.2 Taxable property issues

Even as the first challenge, taxable property issues fall under governance considerations. As legally, IP-related products, i.e. online addresses, are considered taxable under the current legal structure. Legal products to IPs are considered products related to art, books, domain names and thus all possible forms of NFTs but in fact NFT-based sales do not fall under it. Although some countries tax cryptocurrencies as property for example as in the US, most regions in the world have not yet arrived at this type of solution leaving a legislative loophole as taxation. In relation, with the expansion of the NFTs sector this legislative loophole has grown larger, consequently increasing the number of financial crimes under the category of 'trading NFTs'. Clearly from the government's point of view, making the sale of NFTs is safe for business in terms of tax consequences. Specifically, it means that the individuals involved should have a tax liability that covers gains related to the ownership of NFTs. Similarly, other categories of exchanges should also be taxed such as NFT-for-NFT, NFT-for-IP and ETH-for-NFT. On the other hand, with regard to high-value collectables such as BAYC and Crypto Punk, a higher tax rate should be applied. In the near future, in order to make sure that everything is in order, especially for large brands, more and more professionals from tax departments will delve into the topic to give advice on developing the regulatory structure around NFTs. With the aim of not causing any problems in a world where innovations are often faster than the regulatory system behind them. (Wang, Li, Wang, & Chen, 2021)

5.1.3 Case study: Coca Cola

Regarding the approach of big brands to the NFT sector as a marketing strategy, there is the case of Coca Cola. The famous soda company decided in July 2021 to implement a marketing strategy through a release of a collection of NFTs. Through the sale of NFTs alone in the three days following the release Coca Cola realised $575'883 USD. (Eric, 2022)

The real motivation for Coca Cola to release a collection of NFTs was for a charitable purpose. In fact, the project was based on raising funds for Special Olympics International (SOI). The goal was to reach out to the virtual world known as Decentraland and get the brand more involved with its blockchain. As they probably realised that the future points towards NFTs even for large companies. In fact, after the first release Coca Cola released a second collection of NFTs in December 2021 in collaboration with a collectibles marketplace called Veve. On that occasion, too, the brand moved further into the world of NFTs and blockchain, making a profit of around $1 million USD. (Eric, 2022)

Returning, however, to the first collection released by Coca Cola of NFTs, it turns out to be the most important one if one wants to talk about marketing through NFTs. The reason for this is to be found in the actual design of the NFTs as they succeeded in taking the brand experience to the next level. Thanks to a collaboration with TAFI, a company specialising in the development of customised avatars and branded digital content. This collaboration resulted in the creation of 'friendship boxes', i.e. boxes with random NFTs inside (Ekta, 2021). In fact, inside these friendship boxes it was possible to find one of the following four possibilities:

- Friendship box: NFT of a vintage Coca Cola fridge, which is in motion and lights up according to what is inside.
- Coca Cola Jacket: a wearable, illuminated Coca Cola jacket as can be seen in figure 9 "The Coca Cola Jacket".
- Sound Visualizer: This is an audio NFT where you can hear the classic "fizz" sound of when you pour Coke into the glass and the "pop" sound of when you open the bottle by uncorking it.
- The Friendship Cart: This is a remake of the 1948 cards and related artwork.

Figure 9: The Coca Cola Jacket

Source: (Ekta, 2021)

In conclusion, it can be said that Coca Cola's entry into the world of NFT is proof that there is no need to have the most convertible product in an NFT collection. On the contrary, it takes a broader vision and a gifted creativity to realise innovative ideas to increase the audience awareness of one's brand beyond the usual marketing channels. Coca Cola and NFTs are proof of this and will continue to be in the future with marketing campaigns aimed at increasing the possibilities of companies.

5.2 NFTs as a speculative asset

Looking at the performance of the NFT sector in the first four months of 2022, it is easy to understand why private investors are a major stakeholder and why the instrument is therefore seen more as a speculative asset than the connotation in chapter 5.1 "*Brand marketing through NFTs*". Between the last quarter of 2021 and the first quarter of 2022, the average price of NFTs saw a growth of +80.07% bringing the figure to the $1'057 USD mark compared to $587 USD (Q4 2021). It is therefore natural given the popularity of the instrument and given the news that attracts the most viewers such as those involving sales of NFTs worth millions of dollars, that users begin to see it as a speculative investment asset. Most, as with stocks and other assets, believe that with luck they can invest in the new Tesla and make a lot of money. (NonFungible, 2022)

The truth is that about 90 per cent of NFT projects are doomed to fail and only a few make it to blue Chip status. That term, originally used in the stock market, refers to companies that can be invested in because they are very worthy and reliable. The same connotation has also been transferred to the NFTs investment sector and an example of blue chip are the CryptoPunks and Bored Ape Yacht Club (BAYC) projects (Mike G. , 2021). These two projects have deserved the name of blue chip as they are the most popular as well as the ones with the highest floor price on marketplaces. The term floor price refers to the average price of the NFT project. In fact, the floor price of CryptoPunks on OpenSea is 67.45 ETH which corresponds to about $103,000 USD while that of BAYC is 72.4 ETH so about $110,000 USD (updated on 30 September 2022) (NFT Price Floor, 2022). Clearly, the price of Ethereum also strongly influences the market for NFTs registered on the Ethereum blockchain. The aim of this sub-chapter is to highlight the possibilities and challenges related to NFTs as a speculative asset by users who buy, sell and trade them in order to make economic profits.

5.2.1 Opportunities for private investors

As stated earlier, a great opportunity of NFTs as a speculative asset is precisely the possibility of high returns when investing in a project that survives and, thanks to the people behind it, manages to create enough demand to raise prices. Likewise, owning pieces of important NFT projects manages to add value as a community of that project. In fact, very often it creates opportunities to make money by networking with others who for instance own CryptoPunks.

5.2.1.1 Possibility of high returns

In order to show the opportunities for great performance, data from the first quarter of 2022 report by NonFungible will be used (NonFungible, 2022). This analysed the global performance of NFT trading from the perspective of realised losses and gains per week. During the period of data recording, so the last two quarters to be precise, the peak profit in a week was $400 USD million while the smallest was $100 USD million. These profits were realised at a time in history when the NFT sector is in the doldrums. (NonFungible, 2021)

Clearly there are different trends in profits and losses depending on the segment. The most important segments of NFTs are as follows: Gaming, Metaverse, Utilities, Art and Collectibles. It follows that the profitability of NFTs is mostly influenced by the strong speculation around the Collectibles segment with a peak of $282 USD million around the first week of February. As for the Gaming segment, in the first four months of 2022, it saw a slowdown with a steady loss in the last 3 months, reaching a high of $13 USD million. While on the other hand, the art sector stabilised around $10 USD million profit per week for the first part of the current year. Finally, with the last segment dedicated to the Metaverse, which saw a significant appreciation at the end of 2021 and then maintained a stable profit between $5 and $24 USD million per week. Although there has been a slowdown in speculation in this segment. (NonFungible, 2022)

These just listed and analysed were the figures for the most recent period (Q1 2022), however most of the profits were made by those who can be described as the innovators of NFTs. In fact, suffice it to say that in 2019 the average price of an NFT was $15.17 USD and then reached $49.18 USD (2020) and with the great expansion in 2021 reaching $807.52 USD. In fact, the luckiest investors have made a fortune from when NFTs were not yet popular to today. Suffice it to say that an NFT from the CryptoPunks project was obtainable at no cost as the artist did not have a financial goal behind it but was more influenced by the art of the project. (NonFungible, 2021)

5.2.1.2 Community

Regarding the second point on NFT opportunities for private investors, it refers to the community. Inasmuch as joining communities of major NFT projects such as CryptoPunks, in addition to being very expensive given the floor prices to obtain one, actually confers an entry ticket to a place in the highest social rank. Today, owning a CryptoPunks is equivalent to having the same social status as someone with a Ferrari. Many celebrities have recognised the value of investing in a project like CryptoPunks, from tennis player Serena Williams via DJ Steve Aoki to model Haidi Klum (Randy, 2022). Becoming part of such a community as a private investor can open up many avenues and enable networking with the aim of making deals and collaborations in order to increase earnings.

5.2.2 Risks linked to the investment profile

Similar to chapter 5.1.2 *'Risks linked with large brands'*, the current section also aims to offer a contrasting view of the opportunities for private investors. In this case, there are two macro-categories of challenges from this point of view and they are as follows: usability challenges and security and privacy issues. The first category refers to the extent to which people evaluate the effectiveness, efficacy and satisfaction with a given product. As already mentioned several times within the work most NFT projects are based on Ethereum and its blockchain and therefore there are many consequences from this. Specifically, there are two main challenges, namely slow confirmation and high gas prices. While on the other hand, the second category concerns user security with regard to data. The two security and privacy issues relate specifically to NFT data inaccessibility and anonymity/privacy issues. (Wang, Li, Wang, & Chen, 2021)

5.2.2.1 Slow Confirmation

Slow confirmation means the NFT-related procedure of sending transactions via smart contracts and related to the transparent handling of transactions such as mint, sell and trade. In fact, the NFT system at present is based on a few thick blockchains as seen in chapter 4.1.2.2 "*NFT at present*", which suffer from low performance due to the amount of data they are forced to process every day. The main consequence of this great stress is a slow confirmation of NFTs. For example, Bitcoin and its blockchain manages to reach 7 transactions per second (TPS) while Ethereum's blockchain, the main one for NFTs transactions, only reaches 30 TPS. This problem is amplified when considering private investors who see the timing of transactions such as mint, sale and exchange lengthening and this can mean the difference between profit and loss. As of today, the Ethereum blockchain requires a redesign of the system as the structure should be optimised to bring improvements. In this sense, Ethereum 2.0 is currently under development, which would seem to have solved this problem of structure inefficiency and which will be discussed further in chapter 6 *'Next Steps'*. (Wang, Li, Wang, & Chen, 2021)

5.2.2.2 High gas fees

Related to the usability challenges is also the one that directly affects the users of NFTs from a monetary point of view. In fact, it is the high gas prices that have become one of the biggest problems for NFT marketplaces. Especially when the users of marketplaces want to mint NFTs and thus go for a large scale of metadata in the blockchain. In detail, each NFT transaction is more expensive than a single, simple transaction due to smart contracts (Wang, Li, Wang, & Chen, 2021). They involve computational resources storage to be processed. To give examples of the average minting costs of the most popular marketplaces, the gas fee for Mintable is up to $900 USD per NFT and transaction. At the same time, there are marketplaces with more affordable gas fees, but still with a significant cost, such as OpenSea, which goes up to $500 USD per NFT and transaction. Valuable turns out to be the marketplace with the lowest cost among the major ones, i.e. $150 USD per NFT and transaction. Such expensive fees are the result of complex operations and great congestion on the blockchain. Clearly linking the issue to the profile of a private investor who wants to make profits through the resale of NFTs means having to consider additional costs that may rise in the future. Given that in 2021 the average cost of a gas fee to mint an NFT was around $50 to $100 USD. (Andy, 2022)

5.2.2.3 NFT data inaccessibility

NFT data inaccessibility concerns the loss of confidence by users in NFTs due to loss or damage of the file. Although most NFT projects have integrated a specialised file safekeeping system such as Insurance Premium Financing Solutions (IPFS). Thus, a service that makes it possible to find content via the address. Specifically, there is the problem that when a user uploads NFT metadata to the IPFS, there is no guarantee that that data is replicated within the nodes. For example, the data could become unreadable and unavailable if the asset stored, an NFT in this case, on the IPFS and the node containing it was disconnected from the network. A further verifying problem is that an incorrect address does not lead to the stored NFT. By doing so, the holder would not be able to prove its rights to the asset. In summary, relying on an external system to store NFTs confers numerous problems and makes the NFT system vulnerable. (Wang, Li, Wang, & Chen, 2021)

5.2.2.4 Anonymity & privacy

Nowadays, the sphere of anonymity and privacy of NFTs is under intensive study. Most NFT transactions are based on the Ethereum blockchain, which manages to provide not quite complete anonymity with respect to the concept of privacy. Specifically, Ethereum users can partially conceal their identities only in the situation where the public is not aware of the correlation between their personal link and their real identity. If this is not the case, all transactions of a known user can be observed knowing to whom that address specifically belongs. Several options that would be effective solutions to this problem of privacy and anonymity have already been tested, to name a few: ring signature, zero-knowledge proof, multi-party computation and others. However, they have not yet been applied to the Ethereum blockchain as they are too complicated and cryptographically primitive. Of course, this great challenge concerning anonymity and privacy also affects the user sphere containing private investors. In this way, anyone who can link the address to the person can keep track of every single detail of every NFT-related transaction at any time. This would imply a risk for those seeking large profits in an increasingly popular sector. For instance, it could be the case of small investors copying strategies, effectively buying more pieces of speculation oriented NFT collections upwards. (Wang, Li, Wang, & Chen, 2021)

5.2.3 Case study: Bored Ape Yacht Club

For more focus on an NFT project that is still considered as a speculative asset, BAYC was chosen as the blue chip as explained in chapter 5.2 *'NFTs as a speculative asset'*. It is only right to give an introduction to the project, it comprises a collection of 10,000 NFTs depicting monkeys in a cartoon style. At present, the floor price, i.e. the lowest price at which one can potentially purchase one of these ten thousand NFTs is approximately $110,000 USD. (Daniel, 2022)

The NFT project was released around April 2021 at a time when the hype and popularity of NFTs in general was growing exponentially. It was initially possible to buy a single NFT for about $190 USD and thus potentially a minimum return of about 57'894% over the current floor price. In addition, one only has to think of how much the private investor who decided to accept an offer for his Bored Ape #3749 fetched 740 ETH (at the time equivalent to $2.9 USD million). (NFT'S STREET, 2021)

This is one of those projects that, for better or worse, any internet active person has seen one of BAYC's NFTs without knowing what they actually were. Also because several celebrities own them and use them as their social profile picture as they feel part of the community. Examples include rapper Eminem, footballer Neymar Jr. and actress Paris Hilton. (Daniel, 2022)

Speaking of Yuga Labs, the company behind this NFT project, it is expanding just as the BAYC ecosystem is expanding with the introduction of a cryptocurrency called Ape Coin (APE). In technical terms, APE is an ERC-20 utility and governance token used solely in the BAYC ecosystem. As a token, it can be used to buy products and services within the ecosystem. The token plays the role of an entry token in that it allows access to games and events developed within the ecosystem. At the time of the release of APE, approximately 150 million tokens were airdropped to BAYC NFT holders at that time. So estimating a single owner of a Bored Ape had roughly 10'950 APEs delivered to them with a value to date of about $4.7 USD and thus received a total of $51'465 USD in APE coins just for owning an NFT. Only one day after the token's release, APE's market capitalisation reached $2 billion with the maximum token total capped at around 1 billion. If one analyses the matter from a private investor's point of view, this is clearly a twofold value because firstly, BAYC NFT holders received money even if not directly liquid but in APE. Secondly, this initiative as well as Yuga Labs' commitment to the development of the BAYC ecosystem raises the prices of NFTs and thus increases the possible gains from a resale. (Qadir, 2022)

As mentioned above, APE can be used to purchase products and services within the ecosystem. It follows that these products and services are limited only to APE owners and are exclusive to them. This is the case with the merchandise collection produced by Yuga Labs, containing sweatshirts, sports shirts, hats, trousers and blankets. The entire collection is inherent to the famous cartoon monkeys and the BAYC logo, yet the only way to buy them is to prove you own a BAYC NFT. It turns out to be an innovative gimmick in those certain items of clothing, although being merchandise and not a collection like Gucci's, can only be purchased by those who own an NFT from the collection. The result is a further development of the ecosystem created by Yuga Labs and a greater financial return from BAYC owners. (Elizabeth L. , 2022)

These kinds of innovative gimmicks are usually presented at limited and exclusive events organised for BAYC members. In fact, one must be a holder of at least one NFT of BAYC to access these events and they take place anywhere in the world, though increasingly around centres of interest such as Manhattan. Exclusive events are structured around an evening of fun, discussion, news and knowledge. As such, they can well be described as social parties where one can use the moment to create interconnections and networking. Clearly, this type of initiative also manages to give added value to those who decide to invest in Bored Ape collections, and with the passage of time, this has been one of the reasons with respect to the price increase. (Jessica, 2021)

In conclusion, the difference between a project that is destined to fail and one that is destined to become a major one is the vision one has of it. BAYC is an NFT project intended to increasingly create an exclusive and extensive ecosystem for its community members. So that they are able to gain benefits as well as added value, be it through free meals, selective events and limited clothing. By doing so, the value of the investment not only grows over time but it is no longer in the investor's mind to sell their NFT as the benefits of owning it are potentially infinite. It also depends on what innovative projects will come along in the future and hence why BAYC has become one of, if not the most popular and most valuable NFT collection within the Blockchain-based ecosystem.

6 Next steps

The following chapter as can be understood from the title 'next steps' is about what is still unknown but already emerging with the various NFT-related projects to come. Consequently, the chapter is divided into two sub-chapters, namely the future of NFTs where a hint is made of the new projects that will see the blockchain-based ecosystem innovate and improve through new applications. While on the other hand, Ethereum 2.0 is described, which is the new version of the blockchain-based cryptocurrency as it makes substantial changes.

6.1 The future of NFTs

The world of NFT, despite being a world known to relatively few at present, is always developing thanks to the many innovations and applications that entrepreneurs can imagine. To date, digital art can be said to be an extremely undervalued asset class. NFT and blockchain have unlimited applications and to think of them only as a speculative tool is wrong because it narrows down the possibilities it guarantees in the future. We are likely to see an NFT-ification of everything from a rare Mercedes Benzes model to NBA season tickets any day now. There are three distinct areas towards which NFTs are innovatively developing and these are: the metaverse, nonbankable assets and digital wallets.

6.1.1 Metaverse

The world of NFT, despite being a world known to relatively few at present, is always developing thanks to the many innovations and applications that entrepreneurs can imagine. To date, digital art can be said to be an extremely undervalued asset class. NFT and blockchain have unlimited applications and to think of them only as a speculative tool is wrong because it narrows down the possibilities it guarantees in the future. We are likely to see an NFT-ification of everything from a rare Mercedes Benzes model to NBA season tickets any day now. There are three distinct areas towards which NFTs are innovatively developing and these are: the metaverse, nonbankable assets and digital wallets. (Fortnow & Terry, 2021)

There are various types of metaverse, but the most concrete and easiest example is provided by the film Ready Player One and its metaverse called The Oasis. The Oasis is a totally online world accessible through a technological device such as Virtual Reality (VR). Within that metaverse in the film, children had the opportunity to go to school and entrepreneurs realised their business ideas. In reality, the metaverse is not yet on the level of the one shown in The Oasis but in the future you never know.

6.1.1.1 Video game metaverses

If one thinks of video games, they are most likely the closest yardstick for imagining what the metaverse, i.e. an online world with its own economy, is all about. A concrete example comes from the series of games related to the top basketball league, NBA 2K22, where within the video game players can interact with each other in unlimited ways. In addition, there is a visitable city where one can find courts, casinos, gyms and much more. Suffice it to say that through your in-game character, the avatar, it takes 45 minutes to walk from one side of the city to the other. Another example of the metaverse in video games comes from one of the most popular games at the moment, Fortnite. It has organised events within its virtual world such as concerts by famous international artists like Marhmello and Travis Scott. In addition to these examples of metaverse in video games there are many others, each of which is characterised by its own currency that allows transactions with in-game items. (Fortnow & Terry, 2021)

6.1.1.2 VR metaverses

As mentioned earlier with The Oasis, it is a metaverse accessible through VR technology and related equipment such as a headset and visor. With this equipment, people can walk and experience the metaverse as a new sensory experience. There are many VR apps that manage to provide a social experience within the metaverse. AltspaceVR is an example of an enterprise that allows acquaintances and non-acquaintances to interact with each other at live shows, group outings and classes. Despite this at present, the VR meta-verses lack people to populate them constantly and in the long term. The main reason is the fact that one has to own the equipment and VR headsets have not yet reached an acceptable level of quality. (NonFungible, 2021)

6.1.1.3 NFTs in the metaverse

A greater focus of NFTs can be had through their use in the metaverse, as the more time spent within an environment, the greater the likelihood of buying something within it. In 2020, gamers spent a total of around $380 USD billion on in-game digital assets. Consequently, it is normal to think that these in-game digital assets can also be sold in the form of NFTs, giving the owners the added value of being able to re-sell items based on rarity, creating a secondary market. The factor that needs to be understood with respect to the metaverse is that the people within it are there for a reason and not to waste time. They certainly derive pleasure and privilege from sharing interests with other members. (NonFungible, 2021)

A further reason why NFTs are inherent with the metaverse can be found in the fact that many people share digital assets and thus innately have the desire to show it to the public. as in the case of MetaKoven, the person who bought Beeple's "Everdays: The First 5,000 Days" for the enormous sum of $69 USD million. MetaKoven turned his NFT into a digital art gallery with the possibility of visiting it in Decentraland, one of the most popular metaverse. (Fortnow & Terry, 2021)

Speaking of most famous metaverse, one of them is The Sandbox, which is a version in which the application of NFTs is already in use. As it is a metaverse based on the Ethereum blockchain providing users with a range of activities such as exploring, interacting and playing video games. As already mentioned in chapter 4.1.1.4 "*Digital Real Estate*" NFTs can be plots of land and be bought and sold in various marketplaces. In the Sandbox, land is called LAND

and by owning one, the user can decide to develop it as he or she sees fit, from a house to a marketplace to an application. Like all other metaverses, The Sandbox has its own currency called $SAND, which can be exchanged for cryptocurrencies and used to buy NFTs such as in-game items. It can be argued that The Sandbox has taken the in-game economy to the next level by introducing NFTs into its metaverse, and this hints at the possibilities of application should the former continue to expand. (Fortnow & Terry, 2021)

For if one reflects on the evolution of human habits throughout history, thanks to smartphones, habits have changed a lot in the last decade. Today, an average person can spend five to six hours a day with a phone in hand. Add to this figure the hours that are spent with computers, televisions, streaming services, and so on. The figure of how much time we spend interacting on the Internet is more striking. The Internet is already preponderant in the lives of all human beings and the evolution of the Internet is the metaverse. The consequent evolution is the displacement of communities into areas where time can be spent together with a virtual component. Consequently, with the metaverse will also come objects within it and so undoubtedly everyone will possess NFTs. (Fortnow & Terry, 2021)

6.1.2 Non-bankable assets

It is only right to first provide a definition regarding non-bankable assets, they refer to extremely rare and valuable assets such as pieces of art, real estate, intellectual property and so on. The reason these newly listed assets are considered non-bankable is because they are illiquid as there are no markets available. Normally, in order to purchase one of those assets, one needs a large investment of monetary resources and most likely has to go through an intermediary to determine the correct value.

With the future of NFTs and a possible application of them in the future, they may stop being related to digital art and focus more on tokenization. By tokenization is meant the fractioning of a physical object and its intellectual property through the smart contracts of NFTs. In this way, any asset can be fractioned among several possible buyers, creating liquidity for what was previously defined as nonbankable assets. This would create liquidity for the approximately $78 USD trillion of nonbankable assets (estimate by Accenture). To give a concrete example, consider the fact that there are not many buyers for the famous 1955 Mercedes 300SL Gulwing which costs about $4.5 USD million and this makes it an illiquid asset. However, the solution could be to create liquidity by splitting ownership of the object into tokens. This would create one million NFTs, which individually represent 1/1,000,000 ownership of the Mercedes with an initial price of $4.5 USD. By doing so with less than five dollars he can own a piece of that car, the concept is very similar to investment funds and their shares. This opens up the market as an illiquid asset becomes liquid and attracts more interested parties creating a market around that asset. As demand increases, so does the price of NFTs as they are limited in number. (NonFungible, 2022)

It does not matter what the nonbankable asset is, any physical object can be broken down into NFTs creating great opportunities for those who find it difficult to sell high value objects. Importantly, the owner does not have to relinquish control over the object as he/she decides to sell only a part of the NFTs, this is very similar to the concept of sub-division into shares of companies.

6.1.3 Digital wallets

Much has been said within the document in relation to digital wallets. However, it is still a developing tool and may find more applications in the future, especially with the increasing popularity of cryptocurrencies and NFTs.

6.1.3.1 Direct marketing strategies

The digital wallet can be considered as the new address and phone number by the marketing sector of companies, as it contains a multitude of confidential information directly linked to the person such as banking information. Knowing the address of a person's digital wallet is equivalent to knowing a person's most important information in modern times. The motivation lies in the fact that digital wallets are the most effective way to get in touch with someone without difficulty. An example might be that if you try to contact an entrepreneur like Mark Cuban to talk about business ideas, there is usually no way but to send a tweet. However, knowing his digital wallet address one could send him an NFT containing a message to have a direct channel of communication. Such a direct communication channel could become the new marketing revolution, as you only have to think of a company sending millions of NFTs directly into the wallets of target customers as a direct marketing strategy. This could be the future of marketing if only there were not still problems inherent in expensive gas fees and a possible introduction of a spam block like e-mail. Nevertheless, it remains a very interesting communication strategy and one on which several companies could develop direct marketing campaigns in the future. (Fortnow & Terry, 2021)

6.1.3.2 The future of payments

There is no doubt that currently peer-to-peer payment applications such as Cash App, PayPal and Venmo are practical and accessible. Certainly using Venmo is easier and faster than using the 42-character digital wallet address. However, as seen in chapter 4.1.1.5 *'Domain Names'*, there is a possibility with NFTs and the blockchain to make it easier to reach a person through information. In fact, if someone wants to send me cryptocurrencies to my digital wallet, they do not need to know those 42-character but can send them to my domain 'AmosCavagna.eth'. In the future, URLs will be the new addresses for sending and receiving payments directly to digital wallets when it comes to cryptocurrencies. This possibility gives companies a new way of doing business by offering services and charging users. The agencies of tomorrow will not need banks and expensive software, with the use of NFTs and related smart contracts it will be possible to transact directly between customers. Clearly, this vision only takes place when people have a digital wallet, but it is closer than expected. As Apple, Samsung and Google have already implemented virtual wallets in their devices, which currently do not allow cryptocurrency payments but focus more on useful documents. The worldwide pandemic of Covid-19 has led to an acceleration in the development of online payment models. These mobile wallets are the conduit to the world of cryptocurrencies and NFTs wallets. (Fortnow & Terry, 2021)

7 Conclusions

As the final considerations of this paper, it is only fair to reconsider its objectives, as the essay played the role of an informant by exploring the new threshold of NFTs. In as much as they have become a very interesting phenomenon after the increase in audience brought about by the explosion during 2021. In this way, more and more people started to inform themselves and enter the NFTs sector. Of all the stakeholder categories, certainly the main and most important ones to date are private investors and large companies. The former are certainly the ones who drive most of the trading volume in NFTs. As their ultimate goal is to buy and resell NFTs in such a way as to be able to make the biggest profit or find the next project like BAYC to make a real fortune. While on the other hand, there are the big companies, who see NFTs more as a marketing tool and therefore invest the economic resources to make an indirect profit back. In fact, the aim is to gain visibility and expand one's brand and then be able to gain more market share and make a profit through the core business. Curious how the same tool can have two such different interlocutors and two such different uses. Hence the related question, and the pivotal point around which the paper was produced.

Are NFTs a brand marketing tool or a speculative asset?

In summary, the answer is certainly not a foregone conclusion as NFTs are both and more. Depending on who is using them, their ultimate purpose can vary and be either a brand marketing tool for companies or a speculative asset for private investors. But as mentioned above, they can also be much more in the future, becoming more and more an everyday reality by implementing payment methods, more direct marketing campaigns and virtual objects within the new evolution of the internet, the metaverse. I conclude by stating that NFTs, with the related blockchain, are one of the most important innovations in the digital sphere in recent years and that it is therefore still too early to find a single application for such an immature and fledgling tool. In the future, there will certainly be many new uses depending on who comes into contact with the reality of NFTs and all its opportunities and challenges.

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