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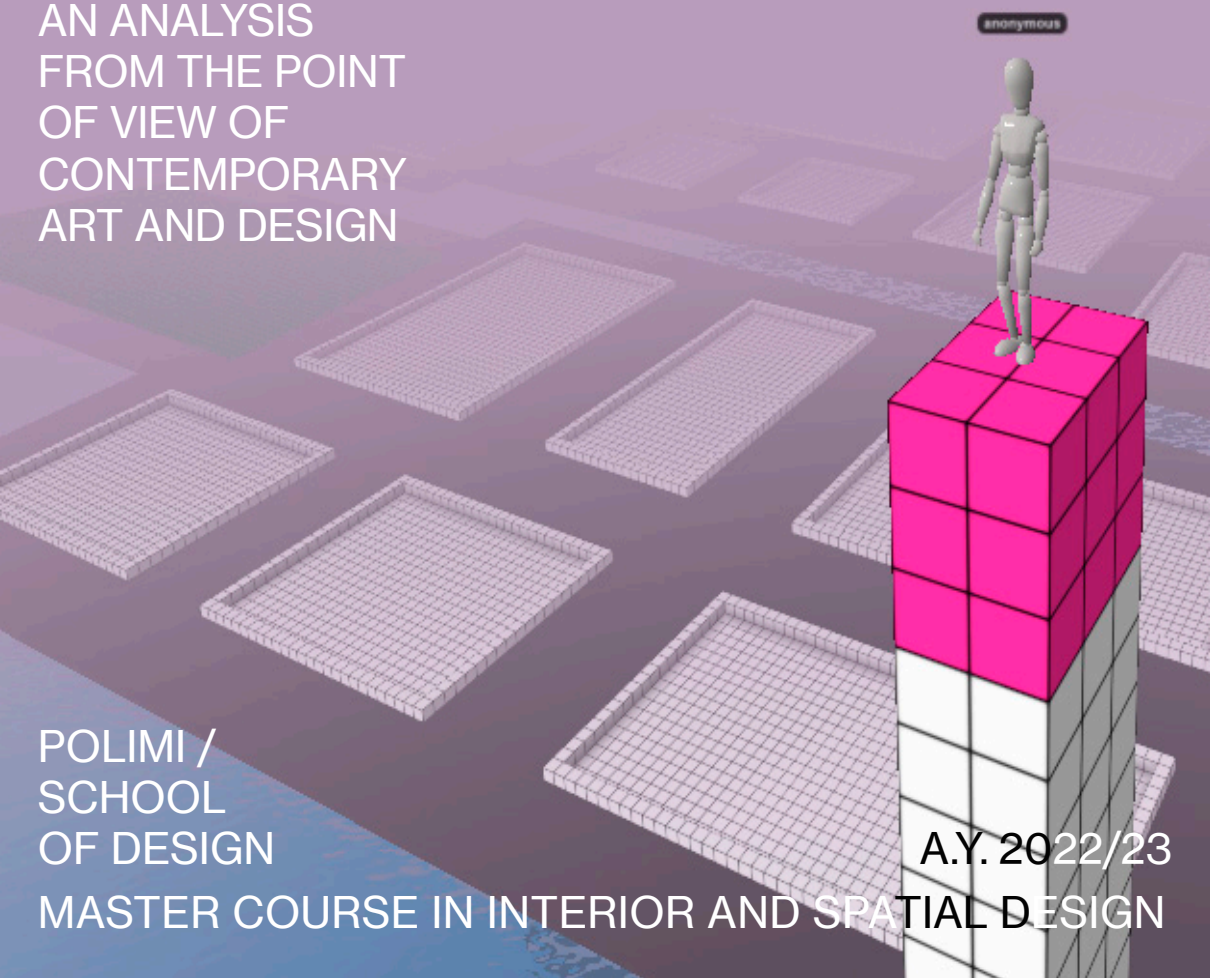
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NFT ART AND  
METAVERSES.  
AN ANALYSIS  
FROM THE POINT  
OF VIEW OF  
CONTEMPORARY  
ART AND DESIGN

POLIMI /  
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**NFT ART AND METAVERSES.  
AN ANALYSIS FROM THE POINT OF VIEW  
OF CONTEMPORARY ART AND DESIGN.**

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Supervised by Luca Guerrini



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**ABSTRACT** / Since 2021, the NFT phenomenon has shaken the art world, confounding critics and intriguing investors. This research aims to shed light on this technology, its origins, and its development. Through a critical look at the relationship between contemporary art and design, this document operates a screening of what is confused as art as a result of the conventional name "NFT art" – not all NFTs are art. Despite belonging apparently to contemporary art, this phenomenon is enormously linked to design, so much so as to stimulate a hybridization that indissolubly intertwines the two fields.

For the compatibility given by their blockchain nature and the ease of being exhibited or used, NFTs have close contact with the metaverses: virtual worlds designed as meeting places.

The concept of “metaverse” is also often commonly misunderstood, but deserves to be explored in depth by designers because it constitutes a great opportunity to envision original environments and exploit spatial architecture without physical constraints.

In this research, the essence of both phenomena is investigated by looking for their connections, with a particular interest in the artistic, exhibition, and spatial fields.



# WHAT ARE NFTS *and how they were born*

(Chapter)

→ 1

- / What NFT means
- / How they were born; context, objective, timeline
- / Main categories of NFTs  
(Gaming NFTs, Collectibles, Utilities, Artworks)
- / The approach to the intangible

## C1 / What are NFTs and how they were born

The word NFT became very frequently used in 2021, receiving the title of “Word of the year 2021” in the annual lexical examination of the Collins Dictionary.<sup>1</sup>

The three letters stand for Non-Fungible Token and identify a digital certificate based on a cryptocurrency.

It is a system that allows the marketing of intangible goods by certifying the authenticity of the wares, while the blockchain records the currency transactions, ensuring their execution.

The core of the new blockchain-based technology is the possibility of making an infinitely-reproducible item, freely downloadable from the web, unique and, as such, salable as a single. The NFTs and their related virtual items, such as artworks, are visible to everyone, but only the buyer can declare owner status.<sup>2</sup> Therefore, every digital item can be certified and sold through these certificates, even 3D items, pictures, codes, services, voice recordings, and written thoughts.

To speak about NFTs, it is essential to clarify what cryptocurrency is.

First of all, it is a virtual currency; therefore, it is intangible, not experienceable, and not visible: it consists of a line of 1s and 0s on the screen.

Every digital currency is secured by cryptography, which means it needs a specific code key to be read, and this system makes counterfeiting very difficult.<sup>3</sup> Crypto currencies are based on blockchains, like Bitcoin and Ethereum; to better understand, it can be useful to visualize this technology as a network of nodes in which every node conserves some information. The strength of this system is the decentralization of data because its division into many nodes allows more robust protection of information.

Unlike a physical currency, a virtual one does not belong to any government authority, which preserves it from changes due to the geopolitical system of single countries.<sup>4</sup>

The invention of crypto coins dates back to 2009, when Satoshi Nakamoto - a mysterious unknown character or group of people - launched Bitcoin, and in 2022 more than 1000 cryptocurrencies already exist. At present (April 2022), the most common ones are Bitcoin (BTC), Ethereum (ETH), Ripple XRP (XRPU-SD), Binance Coin (BNB), and Tether USD (USDT), but many more are growing daily. Nakamoto meant their creation to make online payments more accessible, but until the creation of NFTs, they weren't used as a proper currency, but rather as an investment, in a similar way to shares on a stock exchange.<sup>5</sup>

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1 David Shariatmadari, “Get Your Crypto at the Ready: NFTs Are Big in 2021,” dictionary blog website, Collins Language Lovers Blog (blog), November 2021, <https://blog.collinsdictionary.com/language-lovers/get-your-crypto-at-the-ready-nfts-are-big-in-2021/>.

2 “What Are NFTs, How to Buy & Are They Safe? Here Are All Answers,” The Economic Times, November 18, 2021, <https://economictimes.indiatimes.com/news/how-to/what-are-nfts-how-to-buy-are-they-safe-here-are-all-answers/articleshow/87764235.cms?from=mdr>.

3 Alex Hern, “Bitcoin and Cryptocurrencies – What Digital Money Really Means for Our Future,” The Guardian, January 29, 2018, <https://www.theguardian.com/technology/2018/jan/29/cryptocurrencies-bitcoin-blockchain-what-they-really-mean-for-our-future>.

4 “La Blockchain Spiegata Semplice. Definizioni, Funzionamento, Applicazioni e Potenzialità,” Blog.Osservatori.Net (blog), n.d., [https://blog.osservatori.net/it\\_it/blockchain-spiegazione-significato-applicazioni#caratteristiche](https://blog.osservatori.net/it_it/blockchain-spiegazione-significato-applicazioni#caratteristiche).

5 “Cosa Sono Le Criptovalute?,” cmc markets, n.d., <https://www.cmcmarkets.com/it-it/impara-come-operare-con-criptovalute/cosa-sono-le-criptovalute#:~:text=Il%20bitcoin%20%C3%A8%20considerato%20la%20prima%20criptovaluta%20mai%20creata%2C%20ed,crea%20il%20bitcoin%20nel%202009>.

The fact that cryptocurrencies constitute a system independent of any government institution enlarges their conception as a development of private commerce and a detachment from the usual politics-based economies. The creation of an independent economic system on the web highlights the will to cover shortcomings and problems of the real world through the creation of a parallel virtual one. The blockchain was the fundamental base also for the development of metaverses, that literally embody the “mirror” principle.

## How they were born; context, objective, timeline

The first-ever NFT sold was created in 2014 by the artist Kevin McCoy, supported by the technology entrepreneur Anil Dash.

The meeting between the two took place in the context of the “Seven on Seven” conference, in its fifth edition, organized in the New Museum in New York by Rhizome, to connect artists and technology experts, asking them to produce something together. Rhizome is a relevant art organization based at the New Museum dedicated to born-digital art and culture, which monitored - and still does - the potential evolution of the merge of art and technology.

During the conference, the creators presented a new technology for monetizing graphical works for the first time; the presentation wasn't supposed to include any sale of NFTs, but the request of the public to have proof of a transaction brought to the first official sale: McCoy sold live to Dash the gif Excerpt of cars for the value of 4 dollars - the lowest price he sold artwork for, he said.<sup>1</sup> It did not take much time for McCoy to take back: in 2021, A still from Quantum (2015) was sold as one of the earliest NFTs at Sotheby's, for \$1.47 million.<sup>2</sup>

Even if cryptocurrencies were invented long before NFTs, the latter have consistently enhanced their use and diffusion by giving investors the possibility to buy digital items, virtual goods, instead of physical assets. Therefore, NFT trends allowed cryptocurrency to gain a significant push. The first protagonists of the wave could probably be identified in collectible series.

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1 Bruno Pitzalis, “Quando e Come è Stato Acquistato Il Primo NFT: Tutta La Storia,” *Artribune*, November 26, 2021, <https://www.artribune.com/progettazione/new-media/2021/11/primo-acquisto-nft-new-york/>.

2 Shanti Escalante-De Mattei, “Sotheby's, Artist Kevin McCoy Sued Over Sale of \$1.5 M. NFT,” *ARTnews*, February 7, 2022, <https://www.artnews.com/art-news/news/sothebys-kevin-mc-coy-quantum-nft-sale-lawsuit-1234618249/>.

2009 invention of Bitcoins, first cryptocurrency, by Satoshi Nashimoto



2014 invention of NFT technology and first public presentation at the New Museum, Mccoy + Dash



2017 launch of Cryptopunk series

2017 launch of Cryptokitties series



2018 Cryptokitty sold for \$1,9 millions



2021 Mccoy sold NFT at Sotheby's for \$1.47 million

2021 Beeple sold for \$69,3 millions "Everydays: The First 5,000 Days"



2022 Crash of cryptocurrencies

## Main categories of NFTs

Currently, NFTs develop in different categories. According to Bruno Pitzalis' ranking in May 2022, they are, in descending order of sales, Gaming NFTs, Collectibles, Utilities, Artworks.<sup>1</sup>

### *Gaming NFTs*

The gaming world lends itself well to the commerce of NFTs since a consistent online-based community constitutes it. According to a statistic published in 2020 by Newzoo, one of the most reliable sources of game data, there were 2.69 billion gamers worldwide.<sup>2</sup> The increase of players and the number of games played in the last years led to a natural integration of blockchain commerce in platforms that were already tapping into online commerce of different kinds. The purchase of non-NFT in-game items was already diffused but limited to the use within the single game in which they were bought.

The blockchain system allowed the connection of many game worlds with a unique identity and the ability to transfer the player's history and the record of his investments to all of them.

### *Collectibles*

Collectibles could be described as virtual trading cards with clear concepts and subjects, usually very graphically communicative. Each collectible has a different story; some involve evolutions and games, others constitute a status and give access to privileges or closed communities, parties, networks, and events of different kinds, working as a ticket or a membership card.

The first one to become famous worldwide was Rare Pepe, with the launch of the Rare Pepe Wallet in 2016. This collectible is significant for understanding the mediatic process behind the popularization and the diffusion of images typical of the contemporary web and the uncontrollable power of sharing.

Unlike many collectible series designed from scratch to be sold as NFTs by a team of designers or entrepreneurs, Rare Pepe was born as a comic entitled Boy's Club, drawn by Matt Furie in 2005, much before its NFT diffusion. The character is a green frog whose characteristics quickly gave it iconic status and was quickly transformed into a successful meme.

Through its viral diffusion on the platform Reddit, and its consequent download and modification by multiple users, the frog detached from the original narrative and changed its moral; its original motto was "Feels good, man," which changed to "Feels bad, man" in 2009 in many memes, which gained attention as a parallel, and more spread, version.

From 2011 on, some social media pages were opened with its name and an online community coalesced around it; thereafter fan art exploded drastically, even reaching the alt-right movement, with which Pepe has been commonly associated since 2015.

Lawsuits and fundraising followed to save the frog's identity, which had become a communicative figure that could be varies in countless ways and entered into people's affection.

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1 "Talk: NTF e Arte, Bolla o Rivoluzione?" (Talk with 4 speakers, Volvo Studio Milano, May 4, 2022).

2 Newzoo, "Global Games Market Report," n.d., <https://financesonline.com/number-of-gamers-worldwide/>.

In 2016, the developer Joe Looney opened the Rare Pepe Wallet and minted the first virtual Pepe cards as NFTs. The Wallet created a direct channel to buy, sell and store the assets using a currency called PepeCash. The platform's creator has nothing to do with the illustrator of the frog, which highlights how far the image's property went from the original creator.<sup>3</sup> In total 1,774 official cards were released across 36 series.<sup>4</sup>

The collection of Pepees in a unique project made them reach very high prices, and some of them were sold in the 2nd Edition of Native Digital by Sotheby's in October 2021, like Peppenopoulos for about \$3'650'000, and Rarepepe (Nakamoto Card) for \$239'400.<sup>5</sup>

Another emblematic example of collectibles is CryptoKitties: digital illustrations of cartoon animals associated with the features of cats.

They were created in 2017 and gained success very quickly; according to VentureBeats, a website that publishes estimates about the tech world, in March 2018 it had 1.5 million users who were responsible for \$40 million worth of transactions on its platform.<sup>6</sup>

To understand the importance of the wave, it is enough to mention that just one year after their birth, in 2018, a CryptoKitty was sold as artwork at an auction in New York for \$140'000.<sup>7</sup>

Dapper Lab, the studio who invented them, created the cats admittedly with a business purpose. In an interview published by the CryptoKitties official account on the platform medium.com, the illustrator Guile Gaspar explained that the company searched for a subject able to intrigue a broad audience, and the cat appeared to embody well the perfect character to please many people.<sup>8</sup> This declaration makes explicit a typical connotation of NFT art: the wish to create a product with an aesthetic value that does not deal with an art movement; instead, it can open a new market field.

Kitties are not only pleasant images and huge investments: they also have a game side that involves players in the first person.

Once a colorful cat is bought, it is possible to cross it with someone else's to create new rare versions. This evolution is regulated by an algorithm that works as a genetic code. Every cat has a specific pre-set of attributes that are automatically combined during the cross between cat species giving birth to mixed races.

Other pioneer collectibles that mainly directed the market growth at its beginning are Curio Cards (05/2017), Crypto Punks (09/2017), and MoonCatRescue (09/2017) - respectively, depicting cartoon objects, pixelated people, and again cats.

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3 Jason Bailey, "Rare Pepe Wallet & The Birth Of CryptoArt," Artnome, January 25, 2018, <https://www.artnome.com/news/2018/1/23/rare-pepe-wallet-the-birth-of-cryptoart>.

4 "Rare Pepe Directory - Rare Pepees on the Bitcoin Blockchain," accessed February 28, 2023, <http://rarepepedirectory.com/>.

5 "Most Expensive Non-Fungible Tokens (NFTs) Sold on Sotheby's Metaverse Worldwide as of April 2022, by Price Realized," Statista, April 2022, <https://www.statista.com/statistics/1235929/sotheby-s-metaverse-most-expensive-nfts-sold-worldwide/>.

6 Dean Takahashi, "CryptoKitties Blockchain Sensation Raises \$12 Million," March 20, 2018, <https://venturebeat.com/commerce/cryptokitties-blockchain-sensation-raises-12-million/>.

7 Michael Connor, "Another New World," Rhizome, March 3, 2021, <https://rhizome.org/editorial/2021/mar/03/another-new-world/>.

8 Guile Gaspar, "Meet Guile Gaspar, the Human behind the Cats," Medium, May 4, 2018, <https://medium.com/cryptokitties/meet-guile-gaspar-the-human-behind-the-cats-b0ddadaa8d7a>.

A crucial point about the diffusion of collectibles is that they are frequently associated with art NFTs, even if they embody the concept of trading cards that deal with another background: one of graphic design and illustration. The use of the word “art” for them melds two worlds - with different histories and purposes - into one, creating perplexity in the critic world.

To understand the prominent business orientation of collectibles, a quote from CryptoKitties’ Official Website emblematically highlights the lack of a deeply-thought project:

“So why cats?”

“Pop quiz, hotshot: why not?”<sup>9</sup>

### *Utilities*

Utilities NFTs are digital items that enable the owner to access specific privileges.

Although they can apply to different fields and therefore open the doors to different services and opportunities, the concept they embody most is that of concert tickets.

Whoever buys a ticket can access a concert, and there will be as many tickets as chairs in the concert hall. In the same way, the number of utility NFTs minted will be according to how many people are intended to benefit from the privilege.

A concrete example among those that have had significant success is Bored Ape Yacht Club: a collectible series born in April 2021. It consists of illustrations of cartoon monkeys, generated by an algorithm, that grant their owners access to a private online club and exclusive in-person events; the virtual image becomes both a status and a key to an allocated community. Among the investors in Bored Apes there are Paris Hilton and Justin Bieber<sup>10</sup> and many other VIPs.

The latest years count already many fields that took their first steps in utility NFTs. In music, for example, Kings of Leon pioneered NFT music albums in March 2021 by releasing “When You See Yourself” only on the Web. There were multiple packages among which fans could choose that included different combinations of services in addition to the tracks download, like the digital graphics and a limited edition of the physical vinyl album.<sup>11</sup>

Another example comes from the sports world, which invested in NFTs too by selling specific experiences. The Fanzone Sports Club offers different subscriptions, such as gold, black, and diamond, allowing people access to services such as pre-sale access to NFT Drops, members-only community meetings, digital fan experiences with athletes, free merchandise, and benefits to increase Collect-to-Earn & Game Rewards.<sup>12</sup>

There is an infinite possibility of development of this kind of NFTs; they formally

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9 Guile Gaspar, “Meet Guile Gaspar, the Human behind the Cats,” Medium, May 4, 2018, <https://medium.com/cryptokitties/meet-guile-gaspar-the-human-behind-the-cats-b0ddadaa8d7a>.

10 Ben Arnon, “NFT - Il Futuro è Impostato Su Valore, Innovazione e Utility,” Cryptonews, March 7, 2022, <https://it.cryptonews.com/exclusives/utility-future-of-nfts-it.htm>.

11 Alex Hern, “Kings of Leon to Release New Album as a Non-Fungible Token,” The Guardian, March 4, 2021, <https://www.theguardian.com/music/2021/mar/04/kings-of-leon-to-release-new-album-as-a-non-fungible-token>.

12 “Fanzone Sports Club: The Right Pass for Me,” fanzone.io, accessed August 12, 2022, <https://www.fanzone.io/it/fanzone-sports-club/>.



work as the others, but by providing a new service to the owner, they constitute an effective link between the virtual world of cryptocurrencies and the tangible world of services.

### *Artworks*

NFTs concerning the art world is one of the most-discussed categories, although not the vastest. They consist of digital visual items of any kind, from 3D graphics to vectorial drawings, photos, videos, recordings, etc.

Like the other NFTs, they certify the property of an infinitely reproducible file; everyone can benefit from the artwork, download it, print it, or use it as a screensaver, even if they don't own it. This does not generate any problem for utility NFTs because they provide a service just to the owner while being visible to anyone. Still, it becomes a crucial problem when the NFT concerns a visual or auditory enjoyment of the item.

The differences from the previous categories are mostly the kind of project and the aim.

These NFTs consist of digital images that fluctuate between art and design. As the two disciplines typically suggest, they are digital representations of the abstraction of a concept with a strong aesthetic component. Their final function has no utility implications, if not the visual, and sometimes auditory or immersive use of the work.

Art NFTs are attracting many big investors, especially from the cryptocurrency world, that see in them a possible evolution of the art market and a fruitful investment.

The history of NFTs has already collected many emblems. To give an example of the possible quotations, Pak's works could be a good yardstick. Aside from Beeple, Pak is currently one of the most notable artists in the NFT environment; one of Pak's works, Metarift, known by the marketplace MakersPlace's community as "visual meditation" was sold in March 2021 for \$904,413.47.<sup>13</sup>

Not all these NFTs reach SUCH high quotes on the market; some examples from the Ninfa Gallery in Milan, that works with young emerging figures of the field show another side of an active market. For example, Shad, who defines himself as a "dark art photographer," sold *Under the Black Sun* (08119C) for 0.74 ETH (\$1,212 on 28/02/23)<sup>14</sup> and the fine artist AnnaDart put *Exhibit B2* on sale for 0.20 ETH (\$331 on 28/02/23).<sup>15</sup> Further examples of NFT artworks can be found in chapters three and four, that include a broader discussion on the topic.

The use of the noun "art" to describe this category of NFTs immediately associates the virtual images to the critique context of contemporary art, because so far, they mainly have been developed following visual design purposes. Aside from the critique of the content in the initial stage of "crypto art," NFTs constitute a potential consistent development of the digital art sale. Before them, it followed the legal procedures designed for physical artworks, procedures which were incomplete for its needs since they were not structured for it.

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13 "Le 5 Opere NFT Più Costose," Art Rights Magazine, March 30, 2021, <https://www.artrights.me/le-5-opere-nft-piu-costose/>.

14 Shad, *Under the Black Sun* (08119C), 2022, 2022, [https://ninfa.io/nft/@Shad/Under-the-Black-Sun-\(08119C\)-513](https://ninfa.io/nft/@Shad/Under-the-Black-Sun-(08119C)-513).

15 AnnaDart, *Exhibit B2*, n.d., n.d., <https://ninfa.io/nft/@AnnaDart/Exhibit-B2-443>.

## The approach to the intangible

Inevitably, one of the aspects stimulating more reasonings on NFTs is their intangibility.

In the case of assets related to metaverse and Gaming, the digital purchase of a virtual asset allows the most fluid linearity of virtual processes, keeping the user entirely in one dimension. For example, I could use digital money to buy a 3D hat for a digital avatar and wear my purchase in the metaverse. In this way, the whole process is on the same level and strengthens the concept of replacing the tangible reality with the virtual one completely.

By analyzing NFT art, the reasoning gains complexity.

With assets that have an aesthetic and not-directly-functional purpose, the first frequent objection regarding collecting is about the way to exhibit and enjoy the purchased work. If the user owned an exhibit space in the metaverse, the process would work as the purchase mentioned above. Still, not all collectors are assiduous frequenters of parallel worlds.

Considering the consistent affluence of investors before the decrease of prices of the assets in the spring of 2021 - the so called "burst of the bubble" - and their frequent provenance from the business field instead of the art one, we can assume that a large part of the crypto art purchases had the goal of investing to gain a subsequent return and not to prize the artistic value of the works, therefore the issue of exhibiting is not really relevant.

However, a change has already occurred in favor of the quality of the artworks due to the outbreak of the market. Now, investments are often directed towards purchasing works to pander to personal taste instead of to the investment itself!

In these first years of balance between the real and virtual dimensions, NFT works are often exhibited also in a physical reality, and in exhibitions and museums an automatic association with the exhibition practice of hanging paintings on the wall frequently arises. Exhibiting NFT artworks often follows the canons and objectives of the pictorial class of works, but with the difference of needing an energy-powered screen to be enjoyed.

The potential of digital art is greatly and largely unexplored through the NFT phenomenon. Still, the spread of the idea of enjoying digital pieces in the same ways as physical art opens up a broad discussion on the superficiality of digital platforms' current use and development.

Similarly, metaverses often trace real cities and buildings; avatars move in a realistic way and dress as they dress in reality; the activities that people can perform do not vary from the real ones: every aspect has the tendency to mirror the physical world.

One example among many of re-creation of reality is Clubs in the Metaverses: virtual places in which to go dancing and chatting. An episode of Subcultured, produced by PBS Digital Studios and published on the related YouTube channel, explains how these places serve as a refuge for socially marginalized people in reality and help to create interconnected communities.

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1 "Talk: NTF e Arte, Bolla o Rivoluzione?" (Talk with 4 speakers, Volvo Studio Milano, May 4, 2022).

The clubs visited by PBS are Shelter, Rizumu, Club O, and Beat Syndicate, but the Metaverses have already been crowded with similar places for years.

Rizumu was founded in 2018 and has gained significant popularity in the years following the pandemic. In April 2020, the chat room had about 18,000 users connected simultaneously, reaching 90,000 in January 2022.<sup>2</sup>

Despite the social facilitations highlighted by the interviewees, frequenters of the world of virtual clubbing or active members in its constitution, the activities carried out during the events are strictly similar to those perpetuated in reality, namely: dancing, meeting people, and listening to music. The design of the spaces is closely similar to that in reality, and so is how the characters move in space.

What attracts the frequenters of virtual nightclubs is the absence of prejudice, since an avatar represents them; therefore, the majority of the constituent community, especially in the first years of popularity of the phenomenon, consists of individuals sensitive to discrimination in the real world and most likely victims of it: "virtual reality offers an escape when real life gets hard."<sup>3</sup>

The physical enjoyment of artwork and attendance in person of a real, physical nightclub have in common a type of sensory involvement that is more complete than their virtual counterpart, given by the sense of smell, touch, and greater fluidity of movement. In addition, they provide for a complete psycho-physical presence and consequently the acceptance or ascertainment as a fact of one's immutable physical presence - which can include defects, pathologies, deformations, and traits that might not be felt as part of the self temporarily.

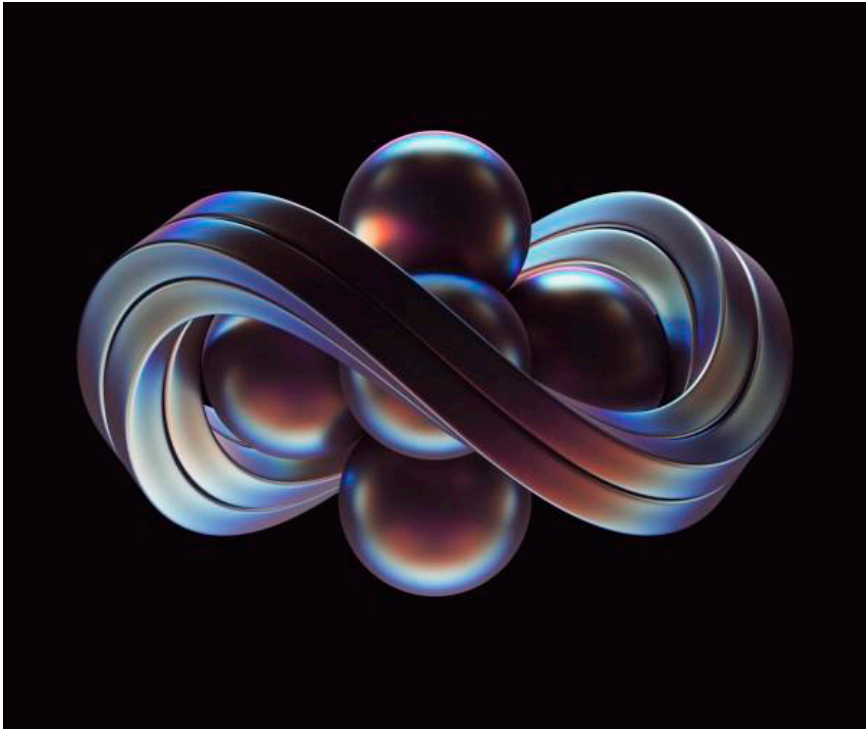
This kind of use of the new world undoubtedly allows greater ease in understanding it and consequently greater comfort in living it, but it does not fully develop its potential. The Metaverse would seem to constitute - in its primordial forms - an extra-world aimed at the salvation of those who feel wrong in reality rather than an integrative platform that allows overcoming distance, time, and gravity.

Intangibility, or it would be better to say reduced sensoriality, is therefore not experienced as an acceptable or potentially advantageous symptom of an integrative reality. It is indeed a handicap to overcome in a system that aims to equalize reality in all respects.

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2 I Went Clubbing in Virtual Reality: Raves of VRChat, Subcultured, 2022, <https://www.youtube.com/watch?v=ZRPjgSrQ8gA>.

3 I Went Clubbing in Virtual Reality: Raves of VRChat, Subcultured, 2022, <https://www.youtube.com/watch?v=ZRPjgSrQ8gA>.



Metarift, PAK



Exhibit 2, AnnaDart



Under the Black Sun (081119C), Shad

# HOW TO GENERATE TOKENS

*and how they work*

(Chapter)

→ 2

- / How to generate tokens
- / How to process the transition
- / Why they have been created
- / How they changed the market
- / Environmental sustainability

## C1 / How to generate tokens

Tokens are generated through the process of mining. The term derives from the extraction of precious materials from the ground to produce physical money, but it consists of a programming process made through computers.

Mining a cryptocurrency means setting all the connections on the blockchain needed to create the coin, and it consists in solving a computational puzzle.

The basic concept of cryptocurrency is its peer-to-peer essence. There is not a unique agency in charge of producing all the coins; rather, the progression of the token generation is based on single programmers that gain through the mining process.

The production started with independent professionals using their own hardware, the so-called “Solo Mining.” The major disadvantage was the extended time to generate a valid block because of the limited possibilities of hardware owned by one person.

In 2011, “Pool Mining” met this need. It consists of the association of more professionals that share their hardware resources to have more computational power for solving problems during the generation.<sup>1</sup>

Due to the fast growing of the field, nowadays, Pool Mining has reached a more industrialized level: the Mining Farm.

Mining Farms are real agencies set for cryptocurrency production; they look like big industrial sheds filled with enormous quantities of hardware aligned on basic libraries similar to scaffoldings. Unlike Pool Mining, which develops on a decentralized collaboration system, farms are contradictory to the concept of decentralization, in fact they “centralize” energy and economic power in a single industry.

The advantage of farms is the incomparable computational power they collect, but the difficulty of managing so many graphics cards is their heat production. For this reason, the cold north of Europe, such as Iceland, is gaining much attention for this kind of business.<sup>2</sup>

Mining Farms also represent an interesting linguistic shift; both words composing the unit have an independent meaning dealing with producing a good. “Mining” is connected to the extraction of minerals, whereas “farm” derives from the breeding sector.

The combination of terms belonging to the primary and secondary economic sectors is the identification form of a business from the service industry.

What looks like just a linguistic game is highlighting a substantial change in the economy.

Another language deformation related to the word “mining” occurs in Italian. In fact, “mining cryptocurrencies” is translated with a different shade of meaning from the mineral world: it is Italianized by the verb “minare,” whose meaning is “to undermine.”

The economic income from the production of cryptocurrencies is based on the percentage of the stock value of the coin, and in specific cryptocurrencies, it

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1 Suman Ghimire, “Analysis of Bitcoin Cryptocurrency and Its Mining Techniques” (University of Nevada, Las Vegas, 2019), <https://digitalscholarship.unlv.edu/thesesdissertations/3603>.

2 Ioan Bitir-Istrate, Cristian Gheorghiu, and Miruna Gheorghiu, “The Transition towards an Environmental Sustainability for Cryptocurrency Mining,” in E3S Web Conf. Volume 294, 2021, 2021, <https://doi.org/10.1051/e3sconf/202129403004>.

is limited to the overall production limit. In the case of Bitcoin, for example, the system is structured on the maximum quantity of 21 million, whose creation has not been completed yet. To date, only 18,9 million Bitcoins have been mined, and it required 13 years; the missing part is supposed to take more time to be generated. The last Bitcoin is supposed to be created in February 2140, in more than one century. Foreseeing the increase of the computational capacity, the Bitcoin system constituted a halving of the income that the miners will get from the generation every four years.

The first block production was rewarded 50 BTC (bitcoins), that in March 2012 correspond to more than 1'900'000 USD, whereas in May 2020, the income for every block was 6,5 BTC, about eight times less; in 2024, it will reach 3,5 BTC.

When Satoshi Nakamoto designed the system, he set all the rules, including them as coded DNA in the first "genesis block"; therefore, changing the currency's limitation is impossible.

It is likely that there will never be a situation where all the bitcoins will be circulating, since in 2022, it is estimated that 20% of bitcoins have disappeared. Some owners have lost their credentials for accessing their virtual wallets, and Chainalysis estimates that the amount reaches 3,7 million BTC lost on the web.<sup>3</sup>

As previously mentioned, to date, many different cryptocurrencies have been generated; the most common for NFT commerce is Ethereum, invented in 2013 by Vitalik Buterin, a Russian developer based in Canada.

At this historical moment, the value of Ethereum is significantly lower than that of Bitcoin, but the principle of conception is the same.

The significant differences between the two currencies are that Ethereum does not have a limit of generable tokens, unlike Bitcoin, and it is possible to accomplish many more operations with it compared to the older cryptocurrency.<sup>4</sup>

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3 Pierangelo Soldavini, "I Bitcoin Emessi Sono Il 90% Del Totale, Il 20% è Sparito per Sempre," Il Sole 24 Ore, December 27, 2021, [https://www.ilsole24ore.com/art/i-bitcoin-emessi-sono-90percento-totale-circa-20percento-e-sparito-sempre-AETWwp4?refresh\\_ce=1](https://www.ilsole24ore.com/art/i-bitcoin-emessi-sono-90percento-totale-circa-20percento-e-sparito-sempre-AETWwp4?refresh_ce=1).

4 "Che Cosa Sono Gli Ethereum?," Criptoaluta.It, n.d., <https://www.criptoaluta.it/ethereum/cosa-sono#:~:text=Ethereum%20nasce%20nel%202013%20per,russe%20ma%20cresciuto%20in%20Canada>.



## How the transaction works

The economy of cryptocurrency is based on the possibility of online trading. The thruster of the system is, therefore, the speed of the transaction; in the stock milieu, the game's rules are speed and the continuous change of value.

The basic form of transaction is common to all cryptocurrencies and consists of transferring tokens from one private wallet to another.

When the transaction is required, the nodes send a message, which has to be forwarded by miners to the other nodes. The transaction price must include a fee denominated Gas, which covers the amount of computational power needed for making the transfer.

The miners receive a part of that fee, and the other is burned.

The Gas fee is paid in ETH, but it is calculated in the gwei unit, which corresponds to 0.00000001 ETH. The required amount for processing a primary transaction is 21000 units of gas.

Once completed these passages, the transaction is complete and indelibly traced in the blockchain. Even if the transaction concept is the same for all the currencies, each of them has some internal peculiarities. For example, in the case of Ethereum there are two kinds of transactions: the normal and the internal. They both elaborate a smart contract on the Ethereum network, and they differ in the kind of transaction, and a part of the code called a function selector, which is just present in the internal ones.<sup>1</sup>

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<sup>1</sup> Corwin Smith, "TRANSACTIONS," ethereum.org, January 3, 2022, <https://ethereum.org/en/developers/docs/transactions/#:~:text=An%20Ethereum%20transaction%20refers%20to,takes%20place%20within%20a%20transaction>.

## Why they have been created

The context in which cryptocurrencies were born is the economic crisis of 2008.

The real estate market had been unbalancing the American financial field since 2000; the interest rate increase flanked the augmentation of housing prices.

This provoked the so-called “housing bubble burst”: people could not afford the high housing prices, consequently decreasing demand.

In a short time, the housing crisis reached the European economy, causing a drop in income and employment. Finally, trade interdependencies between countries led to a heavy reduction in world trade.<sup>1</sup>

In this difficult economic situation, creating the first cryptocurrency appeared as a new potential chapter of the world economy. Its unpolitical features were aimed to detach the new market from the international banks' dynamics.

The data relative to the number of cryptocurrencies in circulation is readable transparently on the net, and its creation through single miners spreads its power on different unbound points worldwide.

The system is thought to be independent of any possible centralization, and it is flexible to changes. The Hard cap of Bitcoins, so its limitation, is setting a good base for increasing the value of tokens; as for the other limited resources, such as gold, the demand will rise, and the offer will diminish. In fact, tokens have strengths and weaknesses: if the physical currencies were replaced with cryptos, the economy would probably face deflection.<sup>2</sup>

Apart from forecasts, the disruptive character of the first cryptocurrency is its innovative attempt to set a virtual parallel economic world that could keep on even in case of a bank crisis.

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1 “LA CRISI FINANZIARIA DEL 2007-2009,” Sito della Commissione Nazionale per le Società e la Borsa, CONSOB, n.d., <https://www.consob.it/web/investor-education/crisi-finanziaria-del-2007-2009>.

2 “LA CRISI FINANZIARIA DEL 2007-2009,” Sito della Commissione Nazionale per le Società e la Borsa, CONSOB, n.d., <https://www.consob.it/web/investor-education/crisi-finanziaria-del-2007-2009>.

## How they changed the market

In history there have already been attempts to introduce the concept of stateless money; a remarkable case was during the discussion about the currency to adopt in Europe, in 1975. The German economist Herbert Giersch proposed introducing a currency that could circulate parallel to the single national currencies and compete with them instead of substituting them.

Over the years, the idea of a detached currency was elaborated by many economists and was always more shaped as virtual money until it concretized in the launch of Paypal in 1999 by Peter Thiel.<sup>1</sup>

All these projects and prototypes aimed to decentralize the monetary system to make it stronger and independent of internal policies and international relations. Still, Bitcoin created ten years later, was the first currency to properly embody the meaning that we give to “virtual currency” today and opened a new era in the economy.

Since the beginning, Bitcoins have attracted many investors, but their best flowering can be seen in recent years. From the beginning of 2020, crypto-assets have grown seven times and reached over €2.5 trillions on aggregate by late 2021 considering all 16 thousand of existing cryptocurrencies.<sup>2</sup> In 2021, the most prominent cryptocurrencies globally were Bitcoin (about 875 billion dollars)<sup>3</sup> and Ether (about 386 billion dollar).<sup>4</sup>

In 2023 they correspond respectively to 458 billion dollars (BTC) and 190 billion dollars (ETH).<sup>5</sup>

Nevertheless, these currencies are still considered volatile since they kept their level significantly higher than silver and gold, and they constitute a potential danger for the global economy if not kept under control.<sup>6</sup>

According to a statistic published by Statista, the top five countries owning assets in 2020 were emerging market and developing economies, while the strongest economies occupied the last positions.<sup>7</sup>

For example, Libya, Syria, and Palestine have increased online searches for Bitcoins and Ethereum to the detriment of gold and property.

In places where it isn't easy to access foreign currency, there is intense cri-

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1 Quinn Slobodian, “Cryptocurrencies’ Dream of Escaping the Global Financial System Is Crumbling,” *The Guardian*, July 5, 2021, <https://www.theguardian.com/commentisfree/2021/jul/05/cryptocurrencies-financial-system-digital-future>.

2 Lieven Hermans et al., “Decrypting Financial Stability Risks in Crypto-Asset Markets” (Published as part of the Financial Stability Review, May 2022, May 2022), [https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205\\_02-1cc6b11b4.en.html#toc3](https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205_02-1cc6b11b4.en.html#toc3).

also in: Pierangelo Soldavini, “Non Solo Bitcoin: C'è Una Criptoaluta Balzata Del 1.300% Nel 2021 Sull'onda Della DeFi,” *Il Sole 24 Ore*, December 31, 2021, <https://www.ilssole24ore.com/art/non-solo-bitcoin-c-e-criptovaluta-balzata-1300percento-sull-onda-defi-AEKS2g5>.

3 CoinMarketCap, “Historical Data for Bitcoin,” accessed March 1, 2023, <https://coinmarketcap.com/currencies/bitcoin/historical-data/>.

4 CoinMarketCap, “Historical Data for Ethereum,” accessed March 1, 2023, <https://coinmarketcap.com/it/currencies/ethereum/historical-data/>.

5 CoinMarketCap, “Today's Cryptocurrency Prices by Market Cap,” March 1, 2023, <https://coinmarketcap.com/>.

6 Lieven Hermans et al., “Decrypting Financial Stability Risks in Crypto-Asset Markets” (Published as part of the Financial Stability Review, May 2022, May 2022), [https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205\\_02-1cc6b11b4.en.html#toc3](https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205_02-1cc6b11b4.en.html#toc3).

7 International Monetary Fund, “The Crypto Ecosystem and Financial Stability Challenges,” October 2021, <https://www.imf.org/-/media/Files/Publications/GFSR/2021/October/English/ch2.ashx>.

minality related to cash hoarding, and there are limitations on lending by high-street banks, crypto looks like a safer choice. Moreover, the pandemic increased this phenomenon and induced banks to make fewer loans.<sup>8</sup>

The effect of the diffusion of crypto in weaker economies could be beneficial, even if risky, but it would accelerate cryptoization, unbalancing the capital flows.

In fact, even if these economic canals are increasing and improving, they lack shock absorbers that could eventually provide liquidity when needed.

Since the virtual currencies are parallel to an already set money system, the situation could easily fall on national/continental currencies and unbalance them significantly. Specifically, using cryptos as everyday currency and broader involvement of financial institutions would increase the overall spillover potential for the economy.<sup>9</sup>

The Financial Stability Board (FSB) has already warned about the need to monitor the evolution of cryptocurrencies, especially stablecoins - the cryptocurrency designed to have a relatively stable price.<sup>10</sup>

The abovementioned leave the investors vulnerable to operative and high credit risks and an imbalance of liquidity.<sup>11</sup>

Currently, the risks are small, but they would significantly rise if the crypto world intersected more with the real economy, for example, by offering physical services. According to J. Selby, "in such a scenario, a decline in value of the collateral could lead to margin calls, borrower/lender defaults and reduced borrowing, potentially affecting economic activity."

Other worries raised by the experts concern public political issues, such as money laundering, ransomware, and cybercrime. Moreover, an intense focus falls on the climate impact of mining.

To monitor the economic impact of cryptocurrencies, the EU is evaluating the Commission's proposal for the MiCA Regulation. Published in 2020, it has not yet been approved and, therefore, will not be applied before 2024. It would aim to support the innovation and the potential of crypto-assets in a way that communicates and preserves investors and overall global financial stability.<sup>12</sup>

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8 Philip Inman, "Cryptocurrencies Rise in Popularity in World's Conflict Zones," The Guardian, February 9, 2021, <https://www.theguardian.com/technology/2021/feb/09/rise-in-popularity-of-cryptocurrencies-in-worlds-conflict-zones>.

9 Lieven Hermans et al., "Decrypting Financial Stability Risks in Crypto-Asset Markets" (Published as part of the Financial Stability Review, May 2022, May 2022), [https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205\\_02-1cc6b11b4.en.html#toc3](https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205_02-1cc6b11b4.en.html#toc3).

10 "Stablecoin," in Oxford Languages, n.d., accessed March 1, 2023.

11 Jenn Selby, "Crypto Assets Market 'Poses Threat to Global Financial Stability,'" The Guardian, February 16, 2022, <https://www.theguardian.com/technology/2022/feb/16/crypto-assets-market-global-financial-stability-board-report>.

12 Lieven Hermans et al., "Decrypting Financial Stability Risks in Crypto-Asset Markets" (Published as part of the Financial Stability Review, May 2022, May 2022), [https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205\\_02-1cc6b11b4.en.html#toc3](https://www.ecb.europa.eu/pub/financial-stability/fsr/special/html/ecb.fsrart202205_02-1cc6b11b4.en.html#toc3).

## Environmental sustainability

The basis of the environmental impact of NFTs lies in the processes of token mining and transacting and in NFT minting. Both need to be fed by consistent energy drawn from national productions. The consequence are the unbalance of the energetic resources and the carbon emission.

Since tokens constitute an online payment system, the consumption of an amount of energy is given for granted, but recent data demonstrate how incomparable the quantities are.

Raynor de Best, a Specialist Expert of Financial Services at Statista, compared the energy consumption of Bitcoin transactions with the VISA payment system, highlighting their significant discrepancy: the energy consumed for one BTC transaction is equal to that needed for 100'000 VISA ones.<sup>1</sup>

For this reason, experts discussed with concern the possibility of Crypto becoming a general payment currency since it would quickly put the energetic global system in danger.

Despite being unable to make specific forecasts, Cryptocurrencies experts hypothesize that it could more likely remain an investment security currency that gives independent financial stability, instead becoming equal to current state currencies or continental currencies.<sup>2</sup>

To understand the scale of the energy problem, we might think about the annual Bitcoin carbon footprint as that of a relatively small European country.

The annual estimate of carbon production per year of Bitcoin mining is 65.4 megatonnes of CO<sub>2</sub> (MtCO<sub>2</sub>);<sup>3</sup> in 2019, Greece produced 56.6 MtCO<sub>2</sub>, which represents 0.19% of global emissions. We might imagine adding a new country on earth that emits CO<sub>2</sub> but does not produce oxygen.

The energy problem was the first to be considered by politicians since it put national energy consumption in danger. Iran banned mining in June 2021 after it provoked blackouts and introduced the risk of a possible nuclear reactor shutdown.<sup>4</sup>

Also China has been one of the first countries to react since it is significantly involved in the problem. In April 2021, it hosted 75% of the world's mining, whose energy need adds seriously to the energetic Chinese crisis.<sup>5</sup>

The Chinese government had already faced an amplification of the power shortage problem after the pandemic due to many factors; some of them are the construction boom, the national push to reduce carbon emissions that led hundreds of coal mines to shut down, and climate problems that compromised

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1 Raynor de Best, "Bitcoin Average Energy Consumption per Transaction Compared to That of VISA as of April 25, 2022" (Statista.it, April 25, 2022), <https://www.statista.com/statistics/881541/bitcoin-energy-consumption-transaction-comparison-visa/>.

2 Quinn Slobodian, "Cryptocurrencies' Dream of Escaping the Global Financial System Is Crumbling," *The Guardian*, July 5, 2021, <https://www.theguardian.com/commentisfree/2021/jul/05/cryptocurrencies-financial-system-digital-future>.

3 Alex de Vries et al., "Revisiting Bitcoin's Carbon Footprint," *Joule* 6, no. 3 (March 2022): 498–502, <https://doi.org/10.1016/j.joule.2022.02.005>.

4 Quinn Slobodian, "Cryptocurrencies' Dream of Escaping the Global Financial System Is Crumbling," *The Guardian*, July 5, 2021, <https://www.theguardian.com/commentisfree/2021/jul/05/cryptocurrencies-financial-system-digital-future>.

5 Laura He, "Bitcoin Falls as China Takes Aim Once Again at 'extremely Harmful' Crypto Mining," *CNN Business*, November 16, 2021, <https://edition.cnn.com/2021/11/16/investing/bitcoin-china-crypto-mining-crackdown-intl-hnk/index.html>.

some productive mining areas.<sup>6</sup> Moreover, crypto trades are perceived as a risk to the national economy and an easy way for people to evade strict national controls on capital.

Finally, the country declared the objective of reducing carbon emissions before 2060, which becomes a more demanding challenge considering Bitcoin mining consumption. All these factors led China to establish a crypto crackdown in May 2021 and to control the blockchain trades in the country strictly.<sup>7</sup>

The consequence of the ban is backfiring on global emissions.

A study by A. de Vries, U. Gallersdoerfer, L. Klaaßen, and C. Stoll correlated an augmentation of carbon emission timely consequent to the Chinese crack-down.

The Chinese regions in which mining was more diffused were originally Sichuan and Xinjiang. The first one is a wet area, notably known for its hydro-power; therefore, it was an ideal zone for mining during the wet season. During the rest of the year, miners moved to the coal-dependent province of Xinjiang and Inner Mongolia.

The impossibility of mining in China after May 2021 led miners to other countries, such as Kazakhstan and the United States, that make significant use of fossil fuels.

The coal resources in those countries appear to emit more carbon than the Chinese ones, especially in Kazakhstan, whose data show that the share of natural gas in the electricity mix went from 15% to 30.8%.

According to the researchers, the average carbon intensity of electricity consumed by the Bitcoin network may have increased from 478.27 gCO<sub>2</sub>/kWh on average in 2020 to 557.76 gCO<sub>2</sub>/kWh in August 2021,<sup>8</sup> so the 16.62%.

The phenomenon of migration of miners related to weather and climate conditions is not isolated in the pre-mentioned area. Blockchain coders actively occupy the areas close to the Arctic Circle because of their natural cooling conditions that help preserve computers.

The National Energy Authority of Iceland's report on Electricity consumption in 2019 shows that data centers absorb 5% of the total national consumption. The data becomes heavy when compared to other crucial utilization categories: Agriculture 1%, Residential 4%, Services 6%.<sup>9</sup>

Anyways, both fossil energy, as in Kazakhstan and in the USA, and renewable ones, as the Sichuan's hydric and Iceland's geothermic, have pros and cons for miners.

The first one is not sustainable and creates severe issues to global warmth; moreover, it is a finite resource, inextricably linked by trade policies. The renewables sources, instead, are intermittent. A Bitcoin ASIC miner has a con-

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6 Laura He and Manveena Suri, "China and India Face a Deepening Energy Crunch," CNN Business, October 12, 2021, <https://edition.cnn.com/2021/10/12/economy/china-india-coal-power-shortages-intl-hnk/index.html>.

7 Laura He and Manveena Suri, "China and India Face a Deepening Energy Crunch," CNN Business, October 12, 2021, <https://edition.cnn.com/2021/10/12/economy/china-india-coal-power-shortages-intl-hnk/index.html>.

8 Alex de Vries et al., "Revisiting Bitcoin's Carbon Footprint," Joule 6, no. 3 (March 2022): 498–502, <https://doi.org/10.1016/j.joule.2022.02.005>.

9 Talnaefni Orkustofnunar, "Electricity consumption in Iceland 2019," February 9, 2021, <https://orkustofnun.is/gogn/Talnaefni/OS-2020-T013-01.pdf>.

stant energy requirement that cannot be easily entirely covered by green energy.<sup>10</sup>

What is sure is that such intense energy consumption and its annex carbon production are not sustainable for the planet in the current environmental conditions.

Narrowing the field of view on NFTs, Quartz published an interesting comparison between the carbon footprint of the printing and shipping of an artwork and the emission of the minting of an NFT and its transaction.

Even if the shipping involves more passages and workers, and considering that the amount of carbon emitted for some minting passages is not clear, the difference looks impressive.

The print shipping produces 2.3 kg of CO<sub>2</sub>, obtained by considering printing, packing up, driving to the shipping store, a van sorting, two plane sortings, the transfer to the local hub, and finally to the address of the buyer. Considering that the emission of a typical gasoline-powered car in the US driven along 100 m is 41 kg of CO<sub>2</sub>, this amount of carbon looks very low.

The average emission calculated for a hypothetical NFT transfer is at least 91 times bigger than the print send: 211 kg of CO<sub>2</sub>.<sup>11</sup>

According to the research published on Medium by the computational artist and engineer Memo Akten on December 2020, the precise steps of the process emit as follows:

Minting: 142 kWh, 83 KgCO<sub>2</sub>

Bids: 41 kWh, 24 KgCO<sub>2</sub>

Cancel Bid: 12 kWh, 7 KgCO<sub>2</sub>

Sale: 87 kWh, 51 KgCO<sub>2</sub>

Transfer of ownership: 52 kWh, 30 KgCO<sub>2</sub>

The values are variables according to many factors, but this overview gives an idea of the scale of the problem: on average, each NFT minted consumes around 340 kWh and emits 211 KgCO<sub>2</sub>.

Akten asserts that, in general, the single NFT's footprint is equivalent to an EU resident's total electric power consumption for more than a month, which in turn corresponds to the emission of a two-hour flight.<sup>12</sup>

Carbonfootprint.com estimates that the global average ecological footprint per inhabitant is 4.79 tons of CO<sub>2</sub>.<sup>13</sup>

Based on this data, we could convey that the average annual consumption of a human being on the earth is equal to the minting of 227 NFTs.

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<sup>10</sup> Digiconomist, "Bitcoin Energy Consumption Index," 2022, <https://digiconomist.net/bitcoin-energy-consumption>.

<sup>11</sup> Erin Davis, "The Carbon Footprint of Creating and Selling an NFT Artwork," Quartz, March 26, 2021, <https://qz.com/1987590/the-carbon-footprint-of-creating-and-selling-an-nft-artwork/>.

<sup>12</sup> Memo Akten, "The Unreasonable Ecological Cost of #CryptoArt (Part 1)," Medium, December 14, 2020, <https://memoakten.medium.com/the-unreasonable-ecological-cost-of-crypto-art-2221d3eb2053>.

<sup>13</sup> "Free Carbon Calculators," Carbon Footprint, September 8, 2022, <https://www.carbonfootprint.com/>.

Considering the heavy impact of NFTs, the sustainability of NFTs production and trading has to be taken into significant consideration.

Memo Akten suggested some logic ways to improve the carbon footprint of NFTs dealing with the selection of low-impact blockchains and the change of minting habits. For example, improving the use of sidechains would be fruitful: minting on more sustainable blockchains instead of Ethereum and not moving NFTs later would make the process more efficient.

Many more sustainable chains exist and have minimal emissions and proactive carbon offset approach; some examples are Algorand, Tezos, Polkadot, Hedera, and Hashgraph.

The communication between sidechains happens through Bridges, which makes one blockchain ecosystem compatible with another. By giving the possibility to go from ETH to other less impactful chains without losing data, they help to reduce emissions.

Another less impactful practice is Lazy Minting, which consists of not creating the NFT before its sale; minting it just in case of a successful transaction would allow the use of just the needed amount of energy and not waste it on a non-sold asset.<sup>14</sup>

So far, sustainability has not been the center of interest of the companies working in the NFT field. Still, a discreet amount of initiatives have already been structured to have a lighter impact.

Parallel to low-impact blockchains, there are many low-impact marketplaces, which base their entire system on sustainable currencies. Some renown ones are hic et nunc, structured for the sale of digital art and based on Tezos, KodaDot for the sale of collectibles on the Kusama/Polkadot blockchain, and Viv3 based on Flow, Voice based on EOSIO.

Also, many eco-friendly platforms of other kinds are growing on the net, such as OneOf, launched by Dapper Lab, a music-focused NFT platform running on Tezos.

A controversial side of the sustainable attempt is the set of nature-saving NFTs. These are structured projects aimed at preserving the natural environment through fundraising based on the blockchain to take advantage of the recent influx of investors. The controversy lies in the significant emissions we have seen necessary for transitions and minting, which at first glance perplex the project's validity.

GainForest is one example. It is a decentralized non-profit fund that aims to reward sustainable nature stewardship through AI technology. Its goal is to monitor the evolution of nature to be able to accelerate its conservation.

The platform mints "NFTrees," virtual 3D trees - that investors will obtain once they purchase the donation. The virtual trees evolve according to live data captured in real life by drones and satellites and track the impact on the donation over time.

Local communities committed to the stewardship of the natural area receive real-time funds.

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<sup>14</sup> Memo Akten, "A Guide to Ecofriendly CryptoArt (NFTs)," GitHub, February 4, 2022, <https://github.com/memo/eco-nft>.



Another non-profit initiative is TrashPiles: a charity fundraising project committed to the ocean-cleanup fundraising campaign TeamSea. TrashPiles also avails itself of the sale of NFTs and donates a percentage of the income to the cause. It is based on Solana, which is known as an environmentally conscious blockchain, self-declared to consume less energy than two Google searches per transaction.

A similar startup is Moss.Earth: a climate tech startup helping to offset the carbon footprint by tokenizing small forest areas. Every private and Business representative can buy an NFT to recover its general emissions and figuratively take care of their piece of the Amazon forest. The collected amounts are devolved to Amazon preservation projects that use them to plant new trees and preserve the environment.

Greenverse is structured in the same way but is instead a metaverse. It has yet to be launched and consists of the digital reproduction of the earth mapping. Everybody can buy an NFT piece of land valued according to its carbon emission potential, biodiversity, and mineral content and gain digital citizenship. The system grows on the idea of creating a zero-emission metaverse that can, in its turn, help to contrast climate change, and it pioneers the “preserve-to-earn” concept.<sup>15</sup>

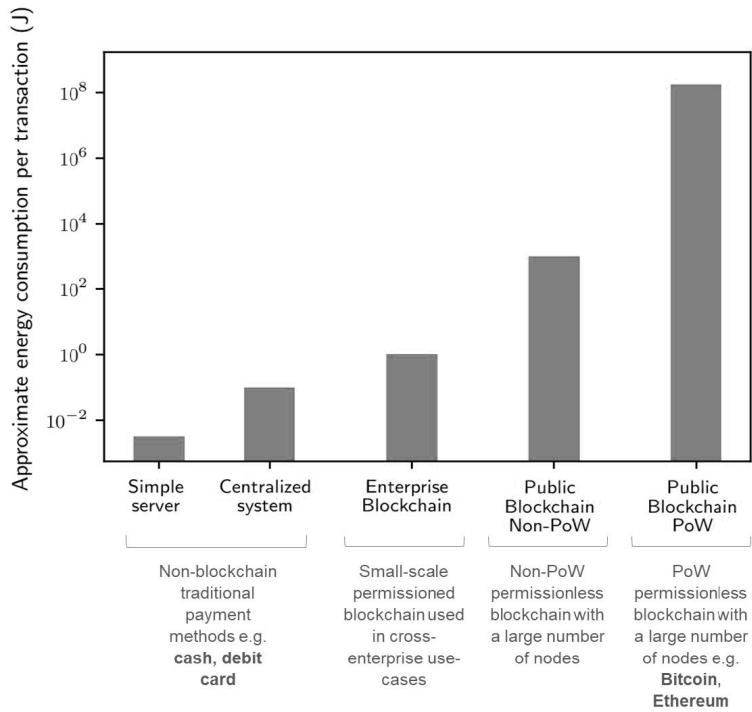
The effectiveness of these projects leads to overcoming the controversy that underlies them, as the results are measurable in the already launched platforms.

It is true that cryptocurrencies have opened a new and fruitful market, parallel and therefore not tangent to the concrete one; it is avant-gardist to design systems that implement fundraising for ethical causes. On the other hand, however, these same systems are threatening the exact pursued causes.

So, while applauding these realities that seek potential planetary sustainability in technological development, the doubt inevitably remains that consistent carbon production due to minting is the best expedient for safeguarding the planet.

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15 Kanya Pandey, “Can NFTs Be Used to Combat Climate Change?,” Jumpstart Mag, March 31, 2022, <https://www.jumpstartmag.com/can-nfts-be-used-to-combat-climate-change/>.



The Energy Consumption of Blockchain Technology; Beyond Myths.  
 (Sedlmeier J., Ulrich Buhl H., Fridgen G., Keller R., 2020)

# NFTS *and Art*

(Chapter)

→ 3

- / Bits and prices
- / Towards the Art Market
- / Designers as artists?
- / NFT artists as barbarians
- / Contaminating and transforming
- / Uncertain forecasts

## Bits and Prices

Since the invention NFTs in 2014, the market has become easily accessible for digital creators coming from any background.

The NFT market has developed parallel to art auctions, digging a shortcut to the sales, initially undertaken by creatives who have already dealt with digital design for different reasons. Before NFTs were born, the Web was already brimmed with static images, GIFs, and videos created by artists, designers, professionals, and amateurs. Therefore, there was probably a community speaking a common visual language and connecting through social networks, such as Telegram.<sup>1</sup> The outcomes were freely downloadable and exchangeable and hardly ever offered any earning opportunity, at least not directly through the Web.

The evolution of this displaced community goes parallel to the spread of crypto-currencies since the birth of Bitcoin<sup>2</sup> in 2009. Moreover, their development as an investment system does not differ notably from that of NFTs today. In this respect, the NFTs formalized the union between two communities that already existed autonomously in the network. They created an advantage for both crypto-investors, who had a new market to tap into, and digital content creators, who could finally get paid for their work.

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1 Massimo Franceschet et al., "Crypto Art: A Decentralized View," Arxiv data base by Cornell University, June 11, 2019, 20. <https://arxiv.org/abs/1906.03263#>

2 Satoshi Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System," [www.bitcoin.org](http://www.bitcoin.org), January 3, 2009. <https://bitcoin.org/bitcoin.pdf>.

## Towards the Art Market

In 2018, some pioneering galleries, such as SuperRare, started tokenizing digital content and hosting the creators on their platforms. As usual in any gallery, they began exhibiting, advertising, and selling these contents as artworks.<sup>1</sup> In this context, the NFT mechanism operates through the oldest capitalist lever, the private ownership of the asset. Specifically, as David Joselit states, “the NFT deploys the category of art to extract private property from freely available information”.<sup>2</sup> In this respect, it seems to subvert the cornerstones of the web: to share and freely avail of its content. One might talk about a betrayal.

This “betrayal” however, is described as a form of “liberation” from the “traditional” art system. Hailed as an instrument of redemption, it is allowing artists to promote themselves by skipping bottlenecks and limitations of the past. As Jason Bailey states: “Unlike the traditional art world, [crypto] artists did not seek permission from gallerists, agents, auction houses, or other gatekeepers to share and sell their work. Instead, leveraging the blockchain, they [...] decided on their own to show their work and make it available”.<sup>3</sup>

Apparently, the process is seen exclusively from the market’s perspective as a direct encounter between supply and demand. Creatives of any kind can practice this new way of trading art, and potentially reach high quotations quickly, be they amateurs or professionals. Similarly, on the buyers’ side, no barrier selects art connoisseurs; therefore, investors involved come from very mixed cultural backgrounds. Since NFTs are based on the Ethereum network, they can only be bought by using this new digital money. Consequently, buyers are often investors of these currencies, who see crypto-art works as a new way to diversify their crypto-wallet.

Auction houses have always acted as a filter for the art system, selecting the most valuable works and certifying their authenticity. In the NFTs market, which equally valiantly allows the second point, there is no filter relating to the artistic quality of the works. Therefore, the new selling system works as a double-edged sword. On the one hand, it allows more creatives to become well known and acknowledged as professionals. On the other, it determines a highly variable quality of artworks on sale by setting open access to everybody.

In 2021, the art world assisted in the first encounter of the two leading auction houses with the NFT sale system, and the result was the legitimization of NFTs in the art world.<sup>4</sup> Christie’s was the first, in March 2021, to sell the piece *Everydays: the First 5000 Days* by Beeple for 69 million dollars.<sup>5</sup> In April 2021,

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1 Massimo Franceschet, “Crypto art: nascita e caduta di un movimento artistico,” *lavoce.info*, August 23, 2021.

2 David Joselit, “NFTs, or The Readymade Reversed,” *October* 175 (Winter 2021): 3–4, [https://doi.org/10.1162/octo\\_a\\_00419](https://doi.org/10.1162/octo_a_00419).

3 Jason Bailey is an art and tech blogger (Artnome.com), and co-founder and CEO of NFTClub. Quoted in: Franceschet et al., “Crypto Art: A Decentralized View,” 8.

4 “Collect NFT Art History,” Nifty Gateway website, n.d., <https://niftygateway.com/collections/portraitsfamindoe>.

5 Alessandro Vinci, “La prima opera NFT battuta all’asta da Christie’s aggiudicata per 69,3 milioni di dollari,” *Corriere della Sera*, March 15, 2021, [https://www.corriere.it/tecnologia/21\\_marzo\\_15/prima-opera-nft-battuta-all-asta-christie-s-aggiudicata-693-milioni-dollari-7bc-8da70-8477-11eb-bffe-e0da654e6bc0.shtml](https://www.corriere.it/tecnologia/21_marzo_15/prima-opera-nft-battuta-all-asta-christie-s-aggiudicata-693-milioni-dollari-7bc-8da70-8477-11eb-bffe-e0da654e6bc0.shtml).

Sotheby's sold *The Switch* by Pak, reaching \$1,444,444.00, and *The Pixel* for \$1,355,555.00.<sup>6</sup> Considering the novelty of the system, the figures involved are undoubtedly considerable; the sale of Beeple with Christie's made him one of the three most valuable living artists.<sup>7</sup>

Christie's auction was one of the most influential triggers of the global propagation of NFT art. Its role in spreading the knowledge of NFTs was so significant that it raised doubts that specific interests drove it. Crypto-investors – as Domenico Quaranta claims – have demonstrated the safety and potential of acquiring crypto art and have attracted new people to the market, while auction houses have opened their portal to all crypto-investors that had never been able to invest in assets before.<sup>8</sup>

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6 “The Fungible Collection,” Sotheby's, April 14, 2021, <https://www.sothebys.com/en/digital-catalogues/the-fungible-collection-by-pak>.

7 Vinci, “La prima opera NFT battuta all'asta da Christie's aggiudicata per 69,3 milioni di dollari.”

8 Quaranta, “Code as Law. Contemporary Art and NFTs.”

## Designers as artists?

The protagonist of this outbreak of the market, Mike Winkelmann, alias Beeple, is a peculiar emblem of the American dream. He defines himself as a graphic designer on his website<sup>1</sup>. Before selling his works as NFTs, Beeple was already a name in digital design, working for companies such as Louis Vuitton, SpaceX, Apple, Nike, Samsung, Coca-Cola, and Sony. Moreover, in 2016, he authored the animations used during the convention of the Democratic Party that nominated Hilary Clinton as the presidential candidate.<sup>2</sup>

Everydays: the First 5000 Days is a unique collage of different images produced in a single day for 5000 days. The graphics appertain to various styles that the author experimented with through the years and accorded to the amount of time he had. Most of them are made using 3D graphics programs, such as cinema 4D; only a few are hand-drawn. The scenes frequently depict abstract utopian/dystopian scenarios or represent acknowledged characters from politics and cartoons.<sup>3</sup>

Metakovan, the winner of Christie's auction about this NFT, declared that the value of the artwork was the time devoted to its creation, 13 years. In his words: "Techniques are replicable, and skill is surpassable, but the only thing you can't hack digitally is time. This is the crown jewel, the most valuable piece of art for this generation."<sup>4</sup>

The art connoisseur inevitably recalls how conceptual artists delved into the topic of time in the 1960s. In 1966, On Kawara started painting his Today series, also called Date paintings. They consist of a squared canvas painted in red, blue, or dark gray with the date it was made in white. The date is written according to the language and conventions of the place where Kawara made it. Each painting is provided with its cardboard storage box, sometimes lined with the front page of a local newspaper. He made a Date painting almost every day for years and built the box. The canvas was destroyed if he could not finish the work by midnight.

In 1965 Roman Opalka began painting an infinite series of numbers on canvases. Starting from the left top corner to the right bottom one, he drew lines of numbers taking up counting where he left off the previous day. The title was always 1965/1-∞. Over the years, the ritual changed in some ways. The color of the background, initially black, from 1968 on became grey as less symbolic. From 1972, it started turning slowly towards white by adding 1% more white in each detail, planning to reach the moment to paint in white on white. In 1968, he introduced a tape recording of himself reading the numbers as he painted them and began taking a self-portrait photo per day after finishing the canvas.<sup>5</sup>

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1 Mike Winkelmann, "Beeple's Personal Website," personal website, n.d., <https://www.beeple-crap.com/>.

2 Gabriele Gargantini, "Da Dove è Sbuato Beeple," *Il Post*, March 27, 2021, <https://www.ilpost.it/2021/03/27/beeple-nft/>.

3 Kyle Chayka, "How Beeple Crashed the Art World," *The New Yorker*, March 22, 2021, <https://www.newyorker.com/tech/annals-of-technology/how-beeple-crashed-the-art-world>.

4 Anna Brady, "Revealed: Metakovan, Pseudonymous Founder of 'Crypto-Exclusive Fund' Metapurse, Is the Buyer of Beeple's \$69.3m NFT," *The Art Newspaper*, March 12, 2021, <https://www.theartnewspaper.com/2021/03/12/revealed-metakovan-pseudonymous-founder-of-crypto-exclusive-fund-metapurse-is-the-buyer-of-beeples-dollar693m-nft>.

5 "Opalka 1965/1 - ∞; Détail 993460-1017875," n.d., <https://www.metmuseum.org/art/col>

The names of these artists resound loudly while looking at Beeple's *Everydays: the First 5000 Days*. Neither the author nor the collector seems to have deep knowledge of the history of art, and – all exceptions considered – this is emblematic of the NFT world. Both artists and buyers frequently encounter the art field for the first time and approach it from a different perspectives. Most likely with the eyes of the business.

Nevertheless, after Christie's auction, all the news spotlight pointed Beeple in the center of the scene, and he started changing his perception of his work. In a recent interview published by the Italian newspaper *la Repubblica*, he declared that he has always considered himself an artist, defining the artist as "the one who expresses himself and that is it."<sup>6</sup> It might sound like an assertive definition, but by framing better the character of Beeple, it is clear that his artistic knowledge is particularly in keeping with his statement. Interviewed by *The New Yorker* in 2021, he declared not to have an idea of what "abstract expressionism" is, and this is just one of the examples through which Winkelmann has openly admitted his ignorance in the field. Beeple's move from design to art is not based on a rich curriculum or a critique evaluation. Instead, it stands on the sales: it demonstrates why the NFT market can become a shortcut to the art world.

The paths of other important figures of the NFT art market similarly start from different fields than art. The following are some examples from the collectible world. The Larva Labs, the authors of the *CryptoPunks* collectible series in 2017, is a duo of creative American engineers.<sup>7</sup> Their project pioneered NFT creations and provided the basis for the ERC-721 token standard, now primarily adopted by most crypto artists.<sup>8</sup>

The creator of *CryptoKitties*, Dapper Lab, is a company that specialized in video games; in their LinkedIn profile, they describe themselves as "The serious business of fun and games on the blockchain."<sup>9</sup>

The collectible series of *Bored Ape Yacht Club* is also a child of business. The series is signed Yuga Labs, and the two founders go under the pseudonyms of Gargamel and Gordon Goner. Gargamel, later revealed by *BuzzFeed News* to be named Greg Solano<sup>10</sup>, was a writer and editor before entering the NFT commerce. Gordon, Wylie Aronow, was planning to study in an M.F.A. program, but before starting it, he entered cryptocurrency trading and found his new business with Gargamel. As declared in an interview published in *The*

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lection/search/666092.

6 Dario Pappalardo, "L'artista Beeple: "La Vita è un Mix fra Realtà e Digitale. Gli Nft saranno come le Email", *La Repubblica*, April 23, 2022, [https://www.repubblica.it/cultura/2022/04/23/news/artista\\_beeple\\_nft\\_terzo\\_piu\\_quotato\\_al\\_mondo-346611132/](https://www.repubblica.it/cultura/2022/04/23/news/artista_beeple_nft_terzo_piu_quotato_al_mondo-346611132/).

7 Domenico Quaranta, *Surfing with Satoshi. Art, Blockchain and NFTs* (Ljubljana: Aksioma, 2021), 207.

8 "CryptoPunks," Larva Labs website, n.d., <https://www.larvalabs.com/cryptopunks>.

9 Dapper Labs. "Dapper Labs Profile," LinkedIn, n.d., <https://www.linkedin.com/company/dapper-labs/?originalSubdomain=ca>.

10 Katie Notopoulos, "We Found The Real Names of Bored Ape Yacht Club's Pseudonymous Founders," *BuzzFeed News*, February 5, 2022, <https://www.buzzfeednews.com/article/katie-notopoulos/bored-ape-nft-founder-identity>.



New Yorker, they are both "literary nerds."<sup>11</sup>

Regarding NFT works not included in a collectible series, it is also easy to identify creators whose background is external to the art field. Among the most well-known NFT creators, Mad Dog Jones started his career on Instagram. His real name is Michah Dowbak, and from the beginning, he posted digital collages made by modifying pictures and hand drawings of cityscapes. Dowbak began his career in a completely diverse environment; he graduated in human kinetics and started working in a care center. Instagram allowed him to train his creative side. He declared in an interview: "I was like, if I want to do this professionally, what do I need to do? Well, I need to get a bunch of followers on Instagram. I need to get people excited about my art."<sup>12</sup>

The generation of NFT creators, natives of social networks, frequently uses Instagram as a springboard for the market. FEWOCiOUS is another emblem of the phenomenon. His real name is Victor Langlois, and he is a transgender person. He started selling his works about the topic of transition in 2020 when he was 17, and already in 2021, Christie's noticed him and organized his first NFTs auction. In a short time, Langlois reached a very high quotation on the market, at 2 million dollars.<sup>13</sup>

On the opposite side of Gen-Z creators, there are the works of the 87-years-old comics drawer José Delbo in the top list of sales, collaborating with the painter Trevor Jones for an oil painting version of one of Delbo's inked drawings of Batman. The background of the two deals with the figurative field, but in different ways. If Delbo lived an entire career in comics, Jones started his formal career in art aged 30, when he enrolled in the Edinburgh College of Art. He worked in other fields to support his passion for painting until he entered the NFT world.<sup>14</sup> Delbo and Jones' Genesis's value is \$19,714,400.00 in May 2022 on MakersPlace.

Selected from a much longer list of NFT authors, these shortly sketched profiles talk about a cohesive community grown up on the Web that fundamentally forged its aims, methodologies, and operating rules. In the art world, these authors look like foreigners; instead, digital design is – with its multifaceted complexity – the field of their breeding. In this respect, the NFT world seems to open a large field of experimentation in which designers can proficiently operate, thus contaminating the traditional art world.

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11 Kyle Chayka, "Why Bored Ape Avatars Are Taking Over Twitter," *The New Yorker*, July 30, 2021, <https://www.newyorker.com/culture/infinite-scroll/why-bored-ape-avatars-are-taking-over-twitter>.

12 Nick Narigon, "Mad Dog Jones: At the Forefront of the Art World's Digital Revolution," *Tokyo Weekender*, September 26, 2019, <https://www.tokyoweekender.com/2019/09/mad-dog-jones/>.

13 Steven Kurutz, "Teens Cash In on the NFT Art Boom," *The New York Times*, August 14, 2021, <https://www.nytimes.com/2021/08/14/style/teens-nft-art.html>.

14 Jessica Klein, "A Crazy Success Story: Trevor Jones' NFT Gamble Pays Off," *CoinDesk*, April 26, 2021, <https://www.coindesk.com/markets/2021/04/26/a-crazy-success-story-trevor-jones-nft-gamble-pays-off/>.

## **NFT artists as barbarians**

We may see NFTs as part of a process Alessandro Baricco calls "barbarism."<sup>1</sup> Baricco, an acknowledged Italian writer deeply involved in cultural and political debate, analyzed how new products and behaviors – basically coming from the USA – have subverted the consolidated European culture, thus opening it to a new value system. According to his interpretation, these disruptive phenomena always stand on standard codes powerful enough to break the established rules of the past.

Baricco identifies three main characteristics of barbarism: a) the advent of a new technology; b) the simplification of an existing system; c) the use of a new language.

An example given by the author is the diffusion of American wine. Baricco explains how before 1966, France and Italy dominated the international wine market. In the 1960s, an American entrepreneur, Robert Mondavi, launched an autochthonous production of wine in California. American climate conditions had never favored the natural process of grape maceration. For this reason, no one had ever produced wine there before. The premise for implementing the new wine business was the introduction of a new technology that could make the process feasible: the invention of cooling systems. Moreover, the new enological product took a transversal way to market compared to the typical European wine: American wine framed a new clarity of flavor and smell, differing fundamentally from the complexity of European ones.

The new product was remarkably drinkable and of immediate understanding and pleasure. These features paved the way for the whole American market. Moreover, they were so effective that many other wine producers adopted them worldwide. Even the ancient European homelands of wine began to produce similar wines to meet the taste of these new customers. Today in China, Mexico, and South Africa, countries with no enological history, the most common wine is this kind. American wine has approached the enological field transversally, which made it disruptive. The critical point was that the new product was custom-made for target people who were not used to distinguishing wine complexities, therefore they could better appreciate an easy-to-understand taste.

Baricco's pattern is easily identifiable in the case of NFTs. The new technology is the NFT certificate, which responded to the necessity of selling the consistent amount of digital images circulating on the web. Crypto-art adopts a new approach to the image, which is conceived for the screen vision, although still printable. Moreover, the images often involve movements, like GIFs and videos, and today, they are frequently also navigable through particular technologies, such as Virtual Reality. For it to become a market, it required a legitimization of the sales of files, no longer prints, which predisposed to the complete virtualization of the process. The NFT technology may be the green light for the start of the digital image market, as was air conditioning for the production of American wine.

The Blockchain was a predictable destination, as it was a trade exclusively developed in digital. Moreover, crypto-currencies are overtly apolitical, so the global expansion of the market is easily predictable, and the new way of buying art pieces becomes consequential for all the crypto-investors, which brings the second characteristic of barbarism: the simplification of an existing system.

For buying a digital image, it is enough to access one of the numerous platforms, such as OpenSea, Nifty Gateway, Foundation, and Rarible, and log a private digital wallet. It is necessary to buy some crypto-currencies for setting up a wallet for the first time, but once done, the log-in is as easy as logging in to any other website. Once entered the platform, the buyer can scroll through many digital images, choose one or more, and process the payment. The blockchain records the owner's status as soon as the token transfer ends. Just a couple of clicks to be a collector.

The process is easy for the seller as it is for the buyer. The speed seems crucial: "having the right idea and using a generative computer-aided process, the author can quickly produce one piece, instantaneously upload and exhibit it [...] and, if lucky, sell it in a matter of minutes".<sup>2</sup> After a few easy passages, the artwork is on the network, and buyers can directly access it. Therefore, system usability and speed are at the base of the growing interest of both sellers and buyers.

The last characteristic of barbarism is the adoption of a new common language, not yet easy to define completely. NFT artists share with digital ones "a territory that is by its nature extremely hybrid."<sup>3</sup> They face, in fact, issues about the use of technologies that have been central to digital art for decades and to internet art more recently.<sup>4</sup> Therefore, we may adopt for NFT art a distinction already outlined by Christiane Paul for digital art between works using technology as a tool, independently from the content created, and works delving into the expressive potential of technology as a *medium*.<sup>5</sup>

These categories, however, rest upon a traditional art perspective that does not grasp the very nature of the most successful – at least commercially – NFT works. NFT art was born in a digital context of uncontrolled diffusion of images. The ease of exchanging pictures online, which has been the base of the birth of the digital creators' communities, is the beginning of a process of desacralization of the image.<sup>6</sup> The most successful photos on Instagram and the best memes on 4Chan are also the most shared, downloaded and reinterpreted. This endless flow is a fundamental tool for value creation. Therefore, to go viral, most artworks wink to a visual culture made of interactive games, comics, fantasy movies, and sticker collections that are familiar and meaningful to the barbarian generation.<sup>7</sup> Especially to teen crypto artists, who star-

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2 Franceschet et al., 2019, "Crypto Art: A Decentralized View," 11-12.

3 Christiane Paul, *Digital Art* (London-New York: Thames & Hudson, 2003): 8.

4 Rachel Greene, *Internet Art* (London-New York: Thames & Hudson, 2004).

5 Paul, *Digital Art*, 8

6 Valentina Tanni, *Memestetica* (Roma: Nero Edizioni, 2020), 113-117.

7 Dal Dosso, Silvia, "Cats, Frogs and Cryptoartists: What if Auteur .jpgs Become a Luxury Good," *Institute of Network Culture*, March 11, 2021. <https://networkcultures.org/longform/2021/03/11/cats-frogs-and-cryptoartists-what-if-auteur-jpgs-become-a-luxury-good/>

ted as amateurs and now reorientate their careers on NFTs as professionals.

The NFT certificate translates the art market contract into the computer language. It is not simply a matter of legal ownership. According to Gary Vaynerchuk, president of the creative and media agency Vaynerx, in the contract you can put “anything you want. An artist can make an NFT and put in the contract that it allows you [...] to get the paint buckets that he used. I’m sure that if NFTs were around when Jackson Pollock was around, and you could get the empty paint buckets, [...] those buckets would be worth just as much as the paintings. This is a game-changing technology because of the contract underneath the ‘collectible’.”<sup>8</sup> Apparently, NFTs subvert the very nature of what an artwork is.

Finally, NFTs speak the language of stock exchanges and finance. “In fact – as Massimo Franceschet and Giovanni Colavizza state – crypto artworks and crypto coins are made of the same matter.”<sup>9</sup> Therefore, figures, diagrams, and quotation graphs become essential to the NFTs imagery. Galleries such as OpenSea quote the bid and ask price and trend of each artwork displayed on their website.<sup>10</sup> Crypto venture funds provide potential buyers with an updated analysis of the market.<sup>11</sup> Similar to Robert M. Parker’s 100-point rating system for wines that opened the wine market to Americans, quotations are now an easy way to compare NFTs artworks’ value.

Barbarians do not act randomly. We may criticize their sharp market-oriented approach and their bowing to the dictates of neoliberalism. However, if we delve a bit more into the issue and look at this community in the light of the “Institutional Theory of Art” by George Dickie,<sup>12</sup> we may see that the protagonists of the NFT phenomenon have developed a system of value independent from the art world. The categories of “interesting,” “pleasing,” or “meaningful” they share seem entirely different. Paraphrasing Baricco, barbarians find the instructions for using art in places that are NOT the art world.

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8 Gregory Bobillot and Joe Sinclair, “Soaring NFT Sales Redraw the Art Market,” Financial Times Films, November 29, 2021, <https://www.ft.com/video/2cfc76ad-5e03-4230-97da-aae-12a9681cb>.

9 Franceschet et al., “Crypto Art: A Decentralized View,” 12.

10 “OpenSea,” n.d., <https://opensea.io>.

11 Richard Chen, “Cryptoart Market Data,” n.d., <https://cryptoart.io/data>.

12 George Dickie, *Art and the Aesthetic* (Ithaca: Cornell University Press, 1974).

## Contamination and Transformation

Undoubtedly, the NFT art phenomenon is not a blunder, but the way it will develop is not yet precisely predictable. Alessandro Baricco describes the evolution of “barbarism” with the metaphor of “the sunny side up fried egg”: the yolk represents the elite of the art bubble, whereas the egg white is all the rest of the potential users. Both parts undoubtedly constitute the egg, and the first is always the minority compared to the second. When a substantial transformation starts from the egg-white side, the yolk inevitably shakes. The people on the yolk side are usually skeptical about the phenomenon, while those on the egg-white side react enthusiastically.

It is what happened in the case of NFT art. Through galleries and auctions, the connoisseurs who had long ignored digital design creations immediately looked sideways at the growing reality of new market platforms<sup>1</sup>. In this respect, Christie's and Sotheby's first move seemed much more like a speculative bet than an inclusive strategy. Paradoxically, opening the most acknowledged temples of art commerce to NFT works fueled the debate about the newcomers. After the skyrocketing prices paid in the auctions of spring 2021, big art world names are now reconsidering their initial disregard for NFTs. Many galleries retraced their steps, trying to include some NFT artists, who partly decided to enter traditional systems and partly proceeded on the trajectory of decentralized commerce.<sup>2</sup> The process is in progress. Nevertheless, it is hard to say whether the NFT community has entered the art world or is still standing on the threshold.

At the base of the conflict between the traditional art world and the NFT one, there is the hybrid multidisciplinary provenance of the creators who frequently have their background in business studies, engineering, communication, or graphic design. They are the nieces and nephews of the democratizing process of the 1960s, in which “for the first time ever – as John Berger states – images of art have become ephemeral, ubiquitous, insubstantial, available, valueless, free.”<sup>3</sup> This process helped them learn how to manipulate visual content according to the Avant-Garde strategies without any formal training. Until they shared their creations on social networks for free, the art world ignored the phenomenon. Now that they claim a position in the system, their production becomes controversial.

NFT authors are only a tiny segment of a much broader mass of unknown visual creators that, as Avant-Garde artists, steal, paste-up, remix, and use nonsense and irony. “Art thus experiences its own retaliation: after more than a century of continuous and brazen appropriation of materials, languages, and ideas from other worlds – such as music, cinema, television, advertising, pop culture, but also objects and behaviors of daily life – art itself becomes the object of appropriationist practices.”<sup>4</sup>

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1 Quaranta, Domenico, Bruno Pitzalis, Serena Tabacchi, Andrea Bonaceto, “NFT e Arte, Bolla o Rivoluzione?” (talk, Volvo Studio, Milano, May 4, 2022).

2 Quaranta et al., “NFT e Arte, Bolla o Rivoluzione?”

3 John Berger, *Ways of Seeing* (New York: Viking Press, 1973).

4 Tanni, *Memestetica*, 96 (translated by the author).

If we look at NFT works with the eye of the art connoisseur and compare them to the complexity of contemporary art research, they may seem superficial. In fact, as claimed by Domenico Quaranta, they did not add a particular value to the artistic debate.<sup>5</sup> The surface, however, is the experiential space of the web. The best NFT artworks are similar to boards that help us surf the whole experience they embed. These experiences belong to no more than a couple of generations that, if not digital natives, have mostly grown up in the digital world.<sup>6</sup> They talk about collecting stickers, playing with videogames, coding and masterly using computer applications, twitting, sharing emotions on social networks, investing in crypto-currencies, and finally betting on their commercial value in a virtual auction. If we think that works of art are “embodied meanings,” according to Arthur Danto’s definition,<sup>7</sup> we must admit that NFT works do not delve into the very questions of human life. Instead, they frame their significance in the culture of a limited, primarily western community of people. Deliberately or not, these people reshaped their experience of the arts through digital technology and design.

It is essential to acknowledge that both NFT artists and investors are surfing the wave of crypto-currencies from within. Figures of the NFT art market, many investors such as the Metakovan mentioned above, and some crypto-artists, before the introduction of art in the crypto-currencies world, were crypto-investors and economy experts. Therefore, we are not facing an equal merge of digital art and crypto-commerce; rather, it would be more accurate to define the phenomenon as the insertion of digital design products in the crypto business: players and rules are native to the economic side of the blockchain.

A heated discussion broke out between NFT supporters and detractors from Christie’s and Sotheby’s auctions.<sup>8</sup> The former made unrealistic claims about an age of prosperity for both artists and investors out of the tight control of institutional gatekeepers. The latter complained about crypto-investors’ rapacity and suggested alternative strategies for digital artists to enter the market.<sup>9</sup>

The blockchain, like any technology, is not neutral; instead, it necessarily reflects the ideologies of its creators. Shaping the trade of NFTs on the model of the stock market undoubtedly exacerbates a process of commodification of art that dates back decades. In his widely famous documentary “The Mona Lisa Curse” of 2008, Robert Hughes regretfully states: “there’s a tendency for people to say that art is just art and we shouldn’t commodify it and treat it as something that isn’t an asset. The truth is that, for thousands of years, art has been an asset. It’s been very tied up with our financial systems.<sup>10</sup>” Globalization, especially in the 1990s, pushed the phenomenon even further,

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5 “Talk: NTF e Arte, Bolla o Rivoluzione?”

6 Marc Prensky, “Digital Natives, Digital Immigrants,” *On the Horizon* 9, no.2 (October 2001): 1-6.

7 Arthur C. Danto, *What Art Is* (New Haven: Yale University Press, 2013).

8 Michael Connor, “Another New World,” *Rhizome*, March 3, 2021, <https://rhizome.org/editorial/2021/mar/03/another-new-world/>.

9 Geraldine Juárez, “The Ghostchain. (Or Taking Things for What They Are),” *Paletten* 325 (December 5, 2021), <https://paletten.net/tidskrift/paletten-nr-325>.

10 Robert Hughes, *The Mona Lisa Curse*, London: Channel 4, 2008.

## Uncertain forecasts

From the beginning of significant sales, investors started questioning whether NFTs constituted a speculative bubble or a potentially stable market in its earlier evolution. Massimo Franceschet claimed that the bubble had already burst in May 2021: from that moment on, the sales dropped and, therefore, the price of NFTs<sup>1</sup>. Confirmation could be found almost one year later, in April 2022, when the first tweet by Jack Dorsey, bought in March 2021 by the entrepreneur Sina Estavi for \$2.9 million, reached in a new auction the maximum offer of \$14,000. Something was changing in the market.<sup>2</sup> Just one month later, not only NFTs went through a dramatic meltdown on the market, but also the whole cryptocurrency system on which their success was built seemed to collapse.<sup>3</sup>

Paul Vigna, a reporter for The Wall Street Journal, discussed the crash in the WSJ Podcast on May 4, 2022, asserting that NFTs will evolve into more “tangible” assets with the retreat of speculators. In Vigna’s opinion, the buyers will no longer search for NFT artworks for their potentially increasing value but for their genuine interest in the products.<sup>4</sup> In this perspective, the market rules will finally bring to a selection of artworks, letting the prices of consistent projects grow.

NFTs belong to a category of products that the philosopher Nelson Goodman carefully identified in 1968, distinguishing between autographic/non-replicable artworks and allographic/replicable ones. We can “speak of a work of art as autographic – states Goodman – if and only if the distinction between original and forgery is significant; or better, if and only if even the most exact duplication of it does not thereby count as genuine. If a work of art is autographic, we may also call that art autographic. Thus painting is autographic, music non-autographic, or allographic”.<sup>5</sup> Goodman also puts literature, dance, and architecture within the same category. However, we may expand the field to reproducible media, such as photography, video, product design, and all the works based on instructions, performance, or software.<sup>6</sup>

Allographic art embraces a great variety of goods within the design sphere. Moreover, the criterion for establishing the identity of allographic works is a notational scheme or system, which allows us to affirm that pieces sharing specific, clearly identifiable characteristics are the same kind of work<sup>7</sup>. If we focus again on design: the digital formats and software in visual design,

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1 Franceschet, “Crypto art: nascita e caduta di un movimento artistico.”

2 Andrea Nepori, “Are NFTs Really Doomed?,” Domus Web, May 10, 2022, <https://www.domusweb.it/en/news/2022/05/09/the-nft-market-has-cooled-down-and-thats-good-news.html>

3 David Yaffe-Bellany, Erin Griffith, e Ephrat Livni, “Cryptocurrencies Melt Down in a ‘Perfect Storm’ of Fear and Panic,” The New York Times, May 12, 2022, <https://www.nytimes.com/2022/05/12/technology/cryptocurrencies-crash-bitcoin.html>.

4 Luke Vargas, “NFT Sales Are Flatlining. Is This the Beginning of the End?,” Wall Street Journal Podcast, May 4, 2022, <https://www.wsj.com/podcasts/google-news-update/nft-sales-are-f...-the-beginning-of-the-end/dff5b977-9cae-4b14-8b4a-1b4b3c95e59e>.

5 Nelson Goodman, *Languages of Art: An Approach to a Theory of Symbols*, (Indianapolis: The Bobbs-Merril Company, 1968): 113.

6 Domenico Quaranta, *Surfing with Satoshi. Art, Blockchain and NFTs* (Ljubljana: Aksioma, 2021), 144.

7 Goodman, *Languages of Art*, 122.

the technical drawings in product design, the implementation methods and manuals for service design are a few correspondences. Potentially, the NFT market is open to trading all these files.

The allographic work, which is reproducible on a large scale and is typical of an economy of distribution, is worthless without a certificate of authenticity. Therefore, the certificate plays a fundamental role in many respects: fixing the number of copies, which is entirely arbitrary; defining the value, and consequently the price in sales. For a long time, copyright has provided designers with this certificate, which now may be replaced by NFTs. Other allographic arts experienced less formalized and protected protocols.

There is a long history of experimentation with the sale of digital artworks, from The Thing, a bulletin-based system (BBS) operating in New York in the early 1990s, to Art.Teleportacia, established by the artist Orlan Lialina in 1998 as the "First Real Net Art Gallery," which was – and still is – a website (currently one of several). From Rhizome, founded by artist Mark Tribe as a listserv in 2003 and affiliated with the New Museum of New York City, to Postmasters Gallery in Tribeca, trading in digital art since 1991 and in NFTs in recent years. They all relied on trust, negotiation, and authentication forms that are not substantially different from NFT market ones. However, the NFT market was the first to solve the problem of the secondary market for digital media.<sup>8</sup>

Similarly, certificates were introduced in performing art, procedural art, and conceptual art. Marcel Duchamp is the forefather of this procedure with his Tzanck Check, a fake handwritten check he gave his dentist in 1919. In 1958-62, collectors buying in gold one Zone of Immaterial Pictorial Sensibility by Yves Klein only received a paper receipt, which, however, they had to burn to incorporate the work into their "sensitivity."<sup>9</sup> Sol Lewitt's Wall Drawings series (1967-2007) were nothing but careful instructions about how to make the drawings. All these legal acts asserted the immaterial nature of the artist's work. In some respects, if we compare them to NFT certificates, they look at the market from the opposite perspective. Especially Conceptual Art, in the words of Benjamin Buchloh, "managed to purge artistic production of the aspiration towards an affirmative collaboration with the forces of industrial production and consumption."<sup>10</sup>

In 1971, the Dutch curator and merchant Seth Siegelaub and the attorney Robert Projansky created an actual contract for the sale of art, The Artist's Reserved Rights Transfer and Sale Agreement, which had to protect the rights of artists, particularly in the case of an artwork's resale, reproduction, or rental. "In contemporary terms, it is an open-source project which anyone can use."<sup>11</sup> Siegelaub and Projansky's contract framed the context of art negotiation by addressing the anarchical art market of the time. Nevertheless, "few

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8 Michael Connor, "Before the Boom," Rhizome, March 12, 2021, <https://rhizome.org/editorial/2021/mar/12/before-the-boom/>.

9 Tina Rivers Ryan, "Token Gesture," *Artforum* 59, no. 7 (May 2021): 65–66.

10 Benjamin H. D. Buchloh, "Conceptual Art 1962-1969: From the Aesthetic of Administration to the Critique of Institutions," *October* 55 (Winter 1990): 142.

11 Quaranta, *Surfing with Satoshi. Art, Blockchain and NFTs*, 165.



artists ended up adopting it,"<sup>12</sup> as the social and economic conditions were not mature yet.

Fifty years later, the binomial NFT certificate/crypto-currency does not solve, as we have seen, all the issues of artworks authentication. It is even possible that crypto-currency is not the optimal technology for addressing them. "The potential energy comes much less from the specific capabilities of blockchain than from the way interest in NFTs has galvanized people to radically restructure how the art market could work if they started from square one."<sup>13</sup> NFTs are potentially powerful tools for reshaping the author/collector relationship. Mainly if we focus on smart contracts as formalized information, authors could negotiate not only legal issues but also social, environmental, and cultural ones. As the artist Sara Ludy does: she recently revised the sales split to better support the gallery's staff.

In this respect, the new system "does open up a conceptual space that seems to prompt this type of thinking."<sup>14</sup> Since they seem deeply involved in the new market, designers can play a crucial role in reshaping smart certificates to fit their professional needs.

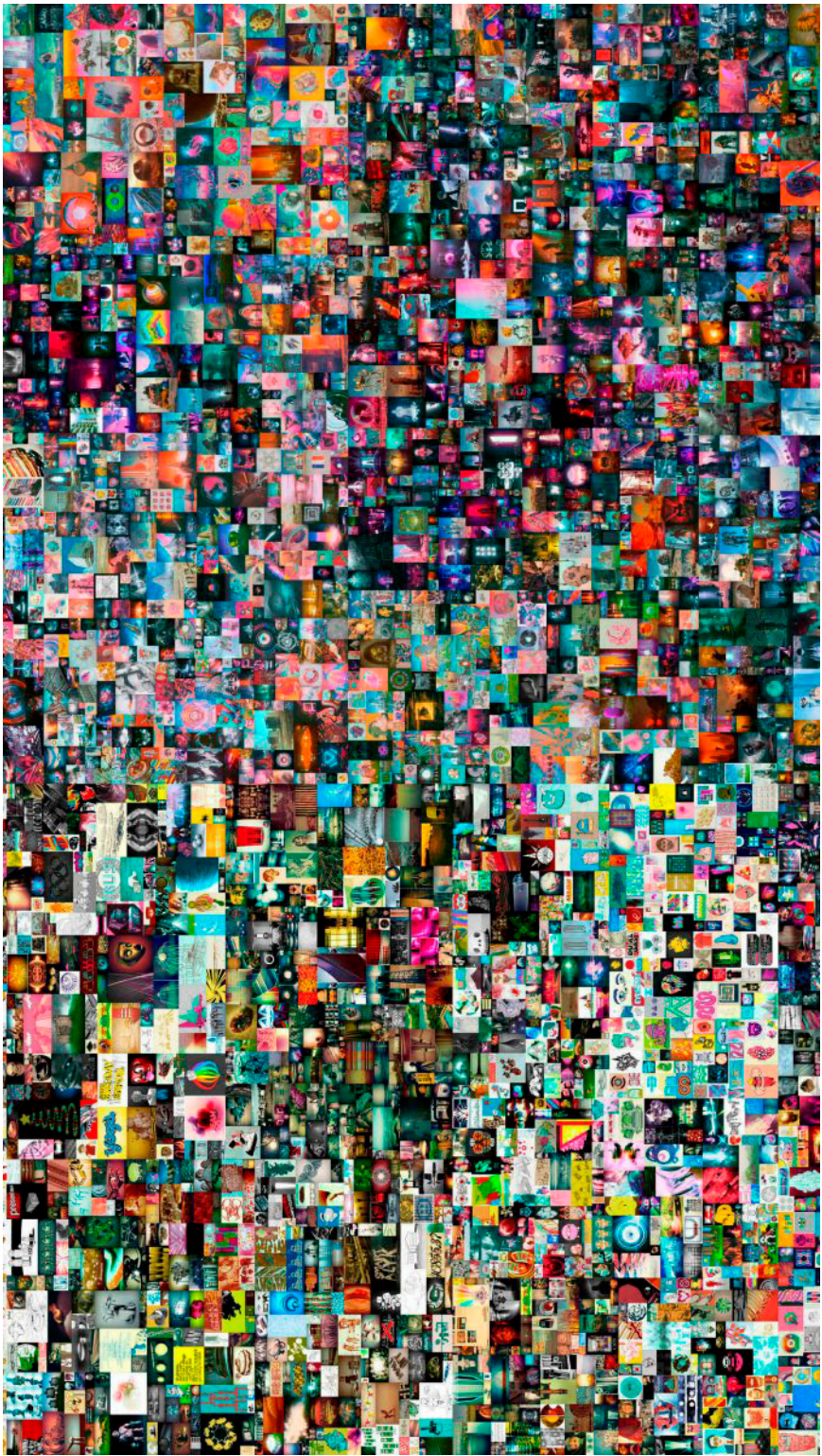
It took almost forty years for Mondavi's intuition to become a standard of international wine appreciation, although it was only a matter of macerated grape juice aging in bottles. Art, on the contrary, is an essential part of Western culture; therefore, it will take long before we see a substantial change. The first move, however, has already been made.

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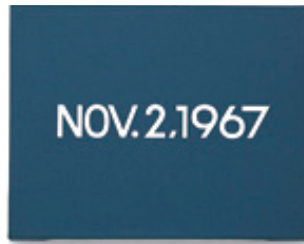
12 Quaranta.

13 Tim Schneider, "Will NFTs Revolutionize the Art Market or Repeat Its Greatest Failures? These 4 Factors Will Determine Their Fate," Artnet, March 11, 2021, <https://news.artnet.com/market/nft-revolution-four-factors-1950645>.

14 Schneider.



Everyday: the First 5000 Days, Beeples, 2021



Date paintings, On Kawara, 1966-2014



1965/1-∞. Opalka 1965-1995



The Switch by Pak, 2021



The Pixel by Pak, 2021





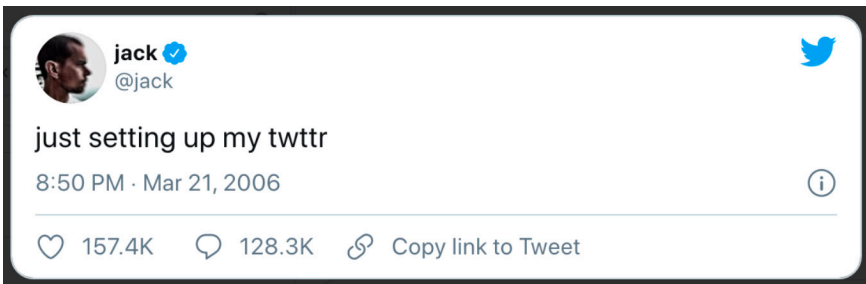
Year 5, Age 18 - I taught myself how to fly, Fewocious, 2021



Year 2, Age 18 - My Mama's Dream, Fewocious, 2021

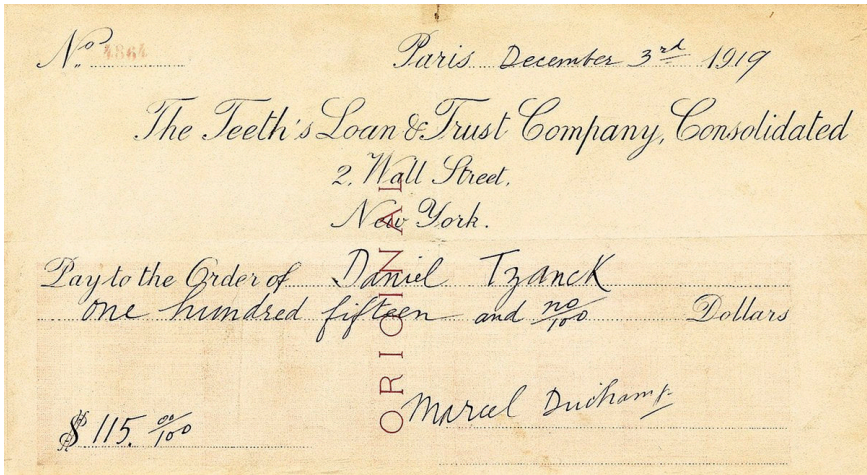


Delbo and Jones' Genesis 2020

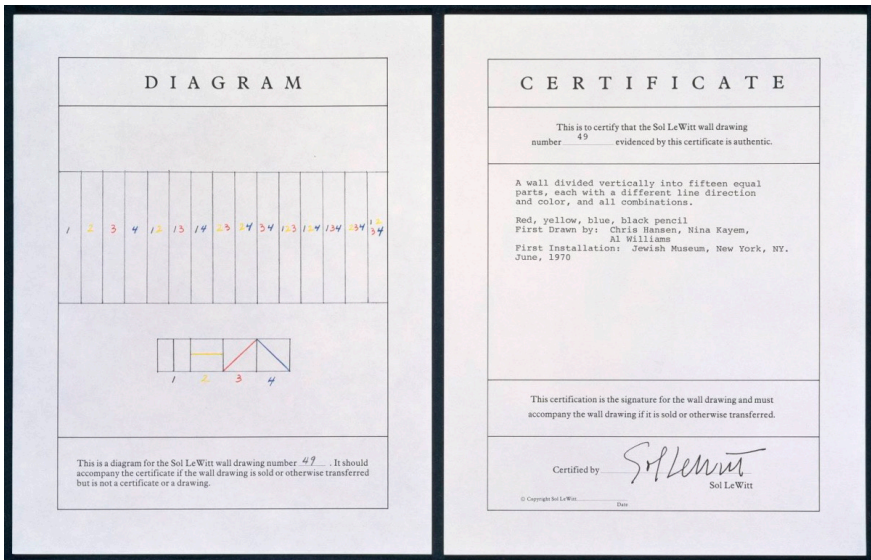


2022, first tweet by Jack Dorsey





Tzanck Check, Duchamp 1919.



Wall Drawings series, Sol Lewitt's (1967-2007) - contract



Wall Drawings series, Sol Lewitt's (1967-2007) - execution at the Tate Gallery

# LANGUAGES *and Styles*

(Chapter)

→ 4

/ Main artists and different kinds of  
languages in NFT art



Although nascent, the world of NFT art already has widespread languages, all developed from the fundamental one of the codes.

New works are minted daily, so the evolution of styles is a subject in frenetic movement and challenging to capture. From 2014 to today, however, it is possible to glimpse the aesthetic macro-areas that emerge on the surface of the bottomless NFT sea.

Since coding is the shared language, a broad category of NFT plays literally with different kinds of - visual - codes, such as numbers, words, and sentences. Emblematic is art by Rhea Myers, minted at the dawn of the NFT art in 2014. The piece consists of a gift switching from the script "this contract is art" to "this contract is not art" each time a transaction is made. Another example is Kevin Abosch's work; he frequently plays with numbers and not-decryptable codes. The series Hexadecimal Testimony (2020) is an explicit example of his style.

From the very beginning of NFTs, the aseptic presence of codes has been flanked by the rigid one of geometry. The very first NFT minted in history, Quantum, by Kevin McCoy in 2014, is a transforming colorful octagon. Many other artists start their work from geometry in a more or less productive way. Among them, Tim Maxwell develops dense Escherian spaces in black and white.

In addition to lines and codes, one of the most frequently diffused visual languages comes from cartoons or comics. This is the case of Cryptokitties and memes like Rare Pepes. A significant part of collectibles belongs to this category, like Curio Cards and CryptoTitties, but also artists like Migrating Lines surf on this style, creating single cartoon-style NFTs not belonging to any series.

Remaining in the two-dimensional context, numerous artists developed their style, becoming masters of vectorial drawing. Andrea Bonaceto draws psychedelic flows of colors, Fewocious follows the same flow, whereas Snowfro is a very different example of the use of vectorial drawing amplified by colors in a significantly more dry way.

The 3D style is also at the base of a vast number of NFTs, and it develops in different thematics.

First of all, the 3D style is precious for landscapes, frequently utopic and dense of details, as in the case of Andrea Siconolfi's. Also, architecture and interior spaces are often sculpted in 3D, as in Seasons by Blake Kathryn (2020) and in the works by Mad Maraca, as the invisible city, Diomira minted in 2021. Following another theme, the 3D style of Japanese anime and hentai is very used by artists bringing on research about bodies and avatars. An emblematic example is Hardmetacore's work, which highlights the reasoning behind the transformation of the body by designing very weirdly comely avatars. Interesting works are also Waarp's, based on the role of human beings in real and virtual space.

Finally, 3D is used to design objects and single entities, as in the case of the flower collection of Ondrej Zunka titled THE FLEUR - Encyclopædia Botanica Digital (2022). Zunka is also a renowned artist in the digital fashion field; he designed virtual pieces for crucial brands such as Prada, Adidas, and Puma.

The 3D can also interlace other flows, as in the case of Refik Anadol; his im-

mersive rooms' aesthetic and concept represent an essential step in testing a new kind of interaction with the artwork. Moreover, he is one of the most famous exponents of data representation.

This constitutes both a trend and an urgent need in the design field because the massive flow of collected data needs to be transformed into a communication system and a language. Some artists transform information into art. An example is his work *Renaissance Dreams* (2021), which put together in an immersive flow millions of data collected online about colors of specific artworks deformed by the upload of their pictures.

The challenge of machine learning is also very likely involved and generates or develops different kinds of aesthetics. Larva Labs' *CryptoPunks* are generated by an algorithm that, in fact, automatically churned out as many as 10,000 of them. Therefore, the technological tool is the artificer not only of the style but also of the visual result.

On the contrary, some other artists respect a more scientific approach and use Artificial Intelligence. Robbie Barrat, for example, pursues a research-led approach to AI to produce his disquieting figures.

Another category is posthumously tokenized works that were not born as NFT but have subsequently been minted and sold in this way. This is the case of *Untitled (Flower)*, tokenized in 2021 by the Andy Warhol Foundation.

The crypto-art world mainly consists of digitally-created images, but NFTs are also perfect for selling photography and videos probing new languages. In the panorama of NFTs given by the "Decentral Art Pavilion" in Venice in 2022, we can see pictures made by photographers with very different backgrounds and styles. One of them is Danilo Falà, from the field of fashion photography, known for his campaigns for Calvin Klein, Gucci, Fendi, Missoni, and Red Valentino, among others. Another well-known photographer who exhibits in Venice is Michael Yamashita, famous for his National Geographic shoots. In addition, the pavilion hosts pictures by Stefano Tiozzo, who started his career as a dentist and left it when he became famous on Youtube through his travel blog. Therefore, the field of photography sold through NFTs is already frequented by a consistent and diversified number of professionals who all contribute to changing its technology panorama and variegated style palettes.



The Story Never Ends (frame), Marcel Kohler, 2021

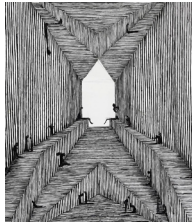
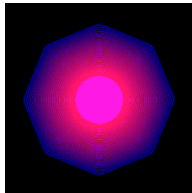
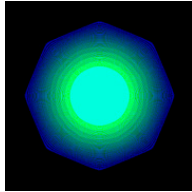
# LANGUAGES

## Summary

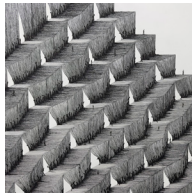
This contract is art

Rhea Myers, is art, 2014.

Kevin McKoy, Quantum, 2014.



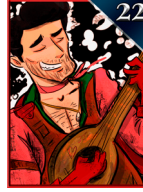
Tim Maxwell, Shattered Opportunities, 2022  
ink on board.  
Outside The Cave, 2023  
ink on board.



GEOMETRY

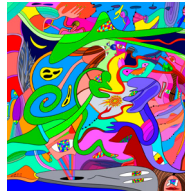


Layne Lafrance, Crypto Kitties, 2017.



Robek Worlds, Curio Card 22, 2017.

CARTOONS AND COMIX



Andrea Bonaceto, Soul, 2022.



Fwocious, Year 4, Age 17, 2021.



Snowfro, Chromie Squiggle #173, 2020



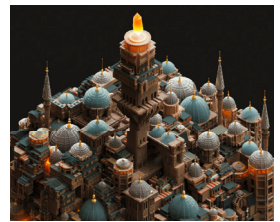
Andrés Reisinger and Alex Proba, 2022

3D LANDSCAPES AND INTERIOS

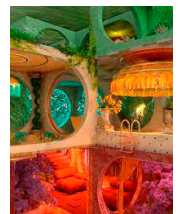
Annibale Siconolfi, O2 Distribution System, 2017.



Annibale Siconolfi, O2 Distribution System, 2021.



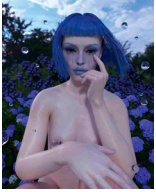
Blake Kathryn, (frame from) Seasons, 2021.



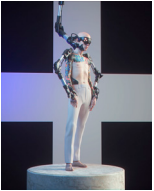
VISUAL CODES



Hardmetacore,  
Cry Blue Baby,  
2021

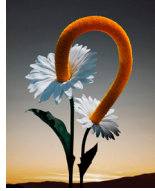


WAARP,  
Exoskeleton Prototype,  
2021



3D CHARACTERS  
AND HENTAI

3D OBJECTS  
AND IDS

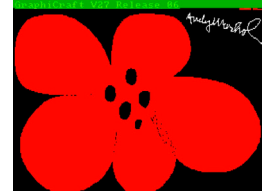


Ondrej Zunka,  
The Fleur,  
2022.

- Connexa Chamemilla.
- Pilus Torquent
- Toxic Exaryum
- Vomitus Flos
- Tulipa Nodatus

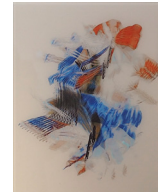


Refik Anadol,  
Machine Hallucination:  
Nature Dreams,  
2021



Andy Warhol,  
Untitled (Flower),  
minted in 2021.

Barrat Barrot,  
Duo,  
2021,  
oil on canvas.



Michelangelo Buonarroti,  
Tondo Doni,  
minted in 2021.



GENERATIVE



The Story Never Ends (frame), Marcel Kohler, 2021

# THE METAVERSE

*or the new wonder world*

(Chapter)  
→ 5

- / Metaverse or metaverses
- / From games to social platforms
- / Skeuomorphism and comfortable habits
- / Lights in the cloud of troubles
- / Metaverse for companies
- / The approach of the Four
- / From real to authentic
- / Social sustainability
- / Terrestrial impact
- / Epitomization

## Metaverse or metaverses

Since its beginning in the science fiction field, the metaverse has been presented as the digital copy of the world. The writer Neal Stephenson was the first to use this word in the book *Snow Crash* (1992)<sup>1</sup>, shaping around the term a virtual planet twice the size of the Earth. His metaverse was a world organized around the Street, an equator-like ring on which activities aligned and developed on the surface of the Planet.

Today, the noun “metaverse” usually refers to a freely accessible digital environment that allows social gathering, but a broadly accepted definition is missing. According to the Merriam-Webster dictionary, the word derives from the blend of “meta-” and “universe” “Metaverse,”<sup>2</sup> literally “beyond the universe.” The singular form “metaverse,” which is frequently used, represents the idea of a single platform in which to develop all the aspects of virtual life; this form is flanked by the plural, “metaverses,” which, in fact, represents the current situation of the multiple existing platforms.

At the current state, having a single metaverse platform is fundamentally a utopic vision; the potentially achievable system that comes closest to this concept is the interconnection of the many existing platforms through a single account. Its advantage would be to access every service and web space with the same information. Consequently, all the account activities and online purchases could be accessed anywhere. However, the platforms that already make the web crowded have long histories and consistently different purposes, which hinders the possibility of, and their interest in, interconnecting.

Since the major characters involved in web3 – the latest evolution of the web, based on decentralization, blockchain technologies, and token-based economy – have different ideas of how to shape the metaverse, it is a priority to assert that the definition of “metaverse” the authors will use is: a digital system accessible by embodying an avatar that allows the synchronous presence of many users and their interactions. In other definitions, the parameters of avatars and synchronous presence are frequently challenged, but the most relevant ambiguity lies in the structure of the platforms<sup>3</sup>. In fact, in addition to the digital worlds accessible in virtual reality, some systems allow the synchronous co-presence of avatars through mixed reality while equally satisfying the author’s definition.

Avatars can be linked to a digital wallet or be “guests,” embodied just for a single visit to the virtual world and not recording any history of the game. The guest account gives a free possibility to explore the Metaverse, but the whole experience of it depends on the possibility of buying NFTs. As in the real world, every side of life involves money: from clothes and accessories to tickets for concerts, games, real estate, furniture, decorations, and so on.

The Metaverse looks like a fruitful expansion for all the real-life brands and fertile land for new fashion, design, events, and many more kinds of startups that specialize just in the virtual dimension. Instead, the role of art is still widely debated; it ranges from the sale of NFTs with auctions in virtual worlds to their exhibition to even the creation of entire virtual worlds, but so far, it se-

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1 Neal Stephenson, *Snow Crash* (New York: Bantam Spectra., 1992).

2 “Metaverse,” in Merriam-Webster.Com Dictionary, accessed December 26, 2022, <https://www.merriam-webster.com/dictionary/metaverse>.

3 Leighton Evans, Jordan Frith, and Michael Saker, *From Microverse to Metaverse*, Emerald Points Ser. (Emerald Publishing Limited, 2022).



ems to play a role comparable to that of other NFT genres, i.e. based mainly on trade, rather than research.<sup>4</sup>

Among the virtual worlds, the name Horizon Worlds stands out: the metaverse developed by Meta. Though not among the earliest nor notable for being particularly innovative, this metaverse deserves to be mentioned first because of its mediatic relevance. When Facebook changed its name to Meta on 28th October 2021,<sup>5</sup> the concept of metaverse gained global interest, immutably changing its earlier condition of elitist web reality unknown to the general public. This massive mediatic movement gave origin to a significant misunderstanding: often, everything dealing with the metaverse is associated with the company, both in its functional and aesthetic setting. Horizon Worlds by Meta was launched in December 2021, and it is one of the youngest among the most famous metaverses.<sup>6</sup>

The first created platforms corresponding to our definition of metaverse are Active Worlds (1995) and Second Life (2002). Second Life is the most renowned because, in its early age, it gained significant interest from visionary brands, such as Adidas,<sup>7</sup> universities, and even political entities, such as Swedish Embassy,<sup>8</sup> which built their headquarters there. Unlike Active Worlds, which in 2022 looks like a ghost town,<sup>9</sup> Second Life has had a constant number of users, and recently, it has even increased. In October 2022, it had about 200,000 active users every day and 500,000 active monthly,<sup>10</sup> more than double the 200,000 monthly users of Horizon Worlds.<sup>11</sup>

The concept of Horizon Worlds is very similar to Second Life's; they both consist of a social platform focused on people gathering and virtual purchases. They both have no ludic purpose but a video game-like aesthetic, and the access to the virtual world is through a customizable anthropomorphic avatar. Therefore, compared to Second Life's approach to virtual reality, Meta's doesn't look like adding much.

Within the ambiguity the new name of Meta brought on, there is a further imprecision. During Meta Connect 2021 – the yearly online conference of the company to communicate its objectives to the public – its full strategy for its metaverse was presented, and Zuckerberg talked about gaming platforms,

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4 Domenico Quaranta, *Surfing with Satoshi. Art, Blockchain and NFTs* (Ljubljana: Aksioma, 2021).

5 Ryan Mac, Sheera Frenkel, and Kevin Roose, "Skepticism, Confusion, Frustration: Inside Mark Zuckerberg's Metaverse Struggles," *The New York Times*, October 9, 2022, <https://www.nytimes.com/2022/10/09/technology/meta-zuckerberg-metaverse.html>.

6 Salvador Rodriguez, "TECH DRIVERS Facebook Takes a Step toward Building the Metaverse, Opens Virtual World App to Everyone in U.S.," *CNBC*, December 9, 2021, <https://www.cnbc.com/2021/12/09/facebook-opens-horizon-worlds-vr-metaverse-app-.html>.

7 Richard Siklos, "A Virtual World but Real Money," *The New York Times*, October 19, 2006, <https://www.nytimes.com/2006/10/19/technology/19virtual.html>.

8 Stina Bengtsson, "Virtual Nation Branding: The Swedish Embassy in Second Life," *Journal For Virtual Worlds Research* 4 (September 2011), <https://doi.org/10.4101/jvwr.v4i2.2111>.

9 "Active Worlds," *MMO Stats*, accessed January 6, 2023, <https://mmostats.com/game/active-worlds>.

10 Andrea Daniele Signorelli, "Nel Metaverso Non c'è Nessuno," *Italian.Tech*, October 13, 2021, [https://www.italian.tech/2022/10/13/news/nel\\_metaverso\\_non\\_ce\\_nessuno-369564246/](https://www.italian.tech/2022/10/13/news/nel_metaverso_non_ce_nessuno-369564246/).

11 Jeff Horwitz, Salvador Rodriguez, and Meghan Bobrowsky, "Company Documents Show Meta's Flagship Metaverse Falling Short," *The Wall Street Journal*, October 15, 2022, [https://www.wsj.com/articles/meta-metaverse-horizon-worlds-zuckerberg-facebook-internal-documents-11665778961?mod=hp\\_lead\\_pos3](https://www.wsj.com/articles/meta-metaverse-horizon-worlds-zuckerberg-facebook-internal-documents-11665778961?mod=hp_lead_pos3).

hardware devices, work meeting revolution, educational implementation perspectives, and many more varied technological themes without distinguishing them from Horizon Worlds. The result is an unclear understanding of what Meta refers to when talking about “metaverse.”

On Meta's website, Horizon Worlds<sup>12</sup> is described as an “ever-expanding social universe” accessible using the Meta Quest headset – Meta's hardware device for Virtual Reality (VR) – which guarantees customers a better experience than through a two-dimensional fruition on a monitor.

This testifies to a general tendency of many social metaverses which have the aim of expanding reality through VR technology predominantly. Today the limited diffusion of headsets, due to their high price and the side effects caused by their prolonged use, hinders the immersive use of platforms by a great number of people, who access the platforms mostly in 2D from computers or consoles. Indeed, according to the CEO of the metaverse Spatial, Anand Agarwala, 80% of Spatial's users use a computer or mobile.<sup>13</sup> Also, Meta Quest has faced criticism, especially from Meta's employees, who declined the CEO's invitation to hold their meetings in VR<sup>14</sup> because of its cumbersomeness.

Headsets are an open battlefield for the biggest technology companies. In addition to the Meta Quest mentioned before, confirmed rumors assert that Apple is developing a device able to switch between VR and Augmented Reality (AR).<sup>15</sup> Google, ever since the first pair of Google Glasses tested in 2013, also has been working on AR viewers, which, in the near future, will be significantly implemented.<sup>16</sup> Along with the big companies, many other firms are also launching new headsets; Valve Index, produced by the gaming company Valve Corporation, is at the top of the headset ranking by Tech Radar. HTC and Playstation are also competing for first place.<sup>17</sup> The intensity of this competition is strongly connected with the development of the metaverse because the type of access profoundly influences its shape. Therefore, winning the race guarantees dominance in a new market and the possibility to directly influence the users' experience of a new kind of web that is still undergoing construction. This can be illustrated briefly by the difference in approaches of Meta and Microsoft: the former has specialized in VR devices and therefore is building a complete virtual world that allows the user to be isolated from his real surroundings and co-present with other users in the common platform; the latter, which is working on MR, is designing a metaverse that preserves the direct experience of the real environment while adding extra virtual elements in it, developing the metaphor of teleportation technologically. **IMG**

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12 The Metaverse and How We'll Build It Together -- Connect 2021, 2021, [https://www.youtube.com/watch?v=Uvufun6xer8&ab\\_channel=Meta](https://www.youtube.com/watch?v=Uvufun6xer8&ab_channel=Meta).

13 Steven Levy, “What If the Metaverse Is Better Without Virtual Reality?,” *Wired*, October 14, 2022, <https://www.wired.com/story/plaintext-metaverse-better-without-virtual-reality/>.

14 Ryan Mac, Sheera Frenkel, and Kevin Roose, “Skepticism, Confusion, Frustration: Inside Mark Zuckerberg's Metaverse Struggles,” *The New York Times*, October 9, 2022, <https://www.nytimes.com/2022/10/09/technology/meta-zuckerberg-metaverse.html>.

15 Charlton Charlton, “Apple's Work on RealityOS 'Wrapping Up' as Focus Turns to Suite of AR/VR Apps Ahead of Headset Launch,” *MacRumors*, November 14, 2022, <https://www.macrumors.com/2022/11/14/realityos-work-wrapping-up-as-focus-turns-to-apps/>

16 Google's Plan for the Metaverse, YouTube video, 2021, <https://www.youtube.com/watch?v=nmujd3SgwdE..> Microsoft is developing its version too, HoloLens, but focusing on Mixed Reality (MR). “HoloLens 2,” Microsoft, accessed December 6, 2022, <https://www.microsoft.com/en-us/hololens/buy>.

17 Michael Benetti, “I Migliori Visori VR Del 2022: Oculus Di Meta, PlayStation VR, Valve Index e Oltre,” *Techradar.Com*, December 1, 2022, <https://global.techradar.com/it-it/best/migliori-visori-vr>.

## From games to social platforms

Matthew Ball, one of the greatest connoisseurs of the digital ecosystem and investor in the future of new technologies identifies the following two main categories of metaverse: *game-like* and *non-game-like*.<sup>1</sup> Game-like metaverses are gaming platforms that developed thanks to an advantageous combination of user attendance, increased social purposes and decreased gaming reasons, and the farsighted response of the developers who intuited and accompanied the evolution.

Their main purpose is to generate engagement through interactive narrative development; therefore, the narrative component of games lays the basis for all design choices. A notable example is Fortnite, which according to the statistics of Osservatoriometaverso, currently has 250.000.000 monthly active users, which makes it the most frequented metaverse of all.<sup>2</sup>

Fortnite was launched in 2011 but began its exponential rise in 2017, the year in which a new game mode called Battle Royale was introduced; it allows the so-called Player versus Player (PvP) game instead of the traditional Player versus Environment (PvE) one.<sup>3</sup> As a result of this upgrade, many people began to attend the game without fighting each other, creating meeting communities. In this mode, Epic Games introduced live events, such as fight shows, movies, and concerts – emblematic cases were the ones of Marshmello, Travis Scott, and Ariana Grande – thus laying the foundations for an increase in engagement.<sup>4</sup>

As exceptional events of mixes of social modalities, by comparing them, it is possible to read the swift evolution of the use and, above all, of the conception of Web3 technology.

Marshmello performed in February 2019 on a virtual stage. The spatiality of the concert and the fruition worlds through the avatars are very similar to the real ones, except that it is possible to approach the stage and move around with greater freedom. The performance was live both from the performer's side and from the users; as in real concerts, the artist and the public converged in one place simultaneously. The response was very consistent, reaching 10.7 million people.

In the case of Travis Scott in April 2020, there was a complete overthrow of the spatiality and the idea of fruition of the musical event. In this case, the concert was pre-recorded, so the moment of execution did not correspond to that of reproduction.

This allowed the creators to design scenes beyond the canonical spatiality of the stage, making the listeners an integral part of the performance. They could, in fact, move in all directions of a space devoid of gravity, unlike the previous one, which took place "on the ground," designed in the artist's image. Engagement on the platform was 12.3 million people.<sup>5</sup>

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1 M. Ball, *The Metaverse: And How It Will Revolutionize Everything* (WW Norton, 2022), <https://books.google.it/books?id=fPyqzgEACAAJ>.

2 "Utenti Del Metaverso," Osservatorio Metaverso, accessed December 29, 2022, <https://osservatoriometaverso.it/progetti/statistiche-sul-metaverso/>.

3 The Fortnite Team, "Announcing Fortnite Battle Royale," Epic Games, September 12, 2017, <https://www.epicgames.com/fortnite/ko/news/announcing-fortnite-battle-royale>.

4 Diego Barbera, "12 Milioni Di Persone Hanno Seguito Il Concerto Virtuale Di Travis Scott Su Fortnite," *Wired*, April 24, 2020, <https://www.wired.it/gadget/videogiochi/2020/04/24/concerto-travis-scott-fortnite/>.

5 Diego Barbera, "12 Milioni Di Persone Hanno Seguito Il Concerto Virtuale Di Travis Scott

The Ariana Grande concert in August 2021 also brought an upgrade: it was designed as a game in which scenarios and potential interactions with space constantly change.

The radical evolution from a battle game to a social interaction scenario is, however, not detached from its primary conception; the type of interaction with space, in all metaverses, is, for now, faithful to the constant direct interaction with phenomena and bound to the movement limits of the avatars (and to the corresponding advantages, such as flying).

The result is a constant over-stimulation of the senses, those involved, which leads to constant action. By their origin, therefore, metaverses are never platforms for the wait but consistently fast platforms for action.

Non-game-like metaverses are fundamentally social platforms, virtual spaces that allow people to meet and talk. They are frequently business-based, but they are constituted by decentralized and centralized systems. This means that some are controlled by several figures, and some are owned and directed by a single company. Some relevant decentralized examples are Second Life (2002), Spatial.io (2016), Decentraland (2017), and centralized ones are VRChat (2017) and Horizon Worlds (2021).

Gaming platforms and social platforms fundamentally differ in their aim. In the former platforms, architecture and design are accurately conceived to evoke a precise narrative and induce gamers to specific actions. In the latter ones, people can gather freely as if these virtual environments were a new contemporary cities. Therefore, the design of spaces focuses on the best conditions to induce social interaction. The challenge is shaping these new virtual meeting places effectively.

To study the spatial connotations of the platforms, we analyzed 55 popular metaverses, divided according to their immersiveness (VR or desktop view), belonging to a blockchain system, and primary purpose (gaming or sociality). Our survey focused on the spatial features of the sites, on their degree of adherence to the spatiality of the physical world (three-dimensionality, gravity, climate), with interest in understanding the reasons and purposes for their design choices and the exploited or non-exploited potential of virtual spaces. We identified three main sub-groups: copy-worlds, generally called mirror worlds,<sup>6</sup> semi-copy worlds, and experimental worlds.

Mirror worlds are virtual copies of Earth that could be envisioned as the immersive evolution of satellite mapping websites, but with the intent of a metaverse. Their structure and aesthetics is similar to Google Earth and its twin Bing Maps, but their primary aim is to be meeting places instead of documentarist 3D maps. Even if the photorealistic effect unites them all in a specific category, these metaverses have consistently different structures. The most direct approach to mirror worlds is that of the blockchain-based Earth2 (2020). This metaverse comprises a perfectly rendered terrestrial landscape where users can browse through different transportation. The platform replicates a land market. Users can buy a plot corresponding to a specific

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Su Fortnite," Wired, April 24, 2020, <https://www.wired.it/gadget/videogiochi/2020/04/24/concerto-travis-scott-fortnite/>.

6 David Gelernter, *Mirror Worlds or the Day Software Puts the Universe in a Shoebox: How Will It Happen and What It Will Mean* (USA: Oxford University Press, Inc., 1991).

place on the Earth and build on it. Due to the absence of avatars, which will be introduced shortly following an agreement with Ready Player Me,<sup>7</sup> the aesthetic coherence is not compromised by any unrealistic element.

On the contrary, Hoppin' World (2020) is distinguishable for its cartoon-like avatars, similar to Horizon World's, contrasting with the realistic video environment in which they move. This platform allows users to explore places on earth through 360° videos uploaded by other users. Therefore, the landscape looks alive and populated by real people recorded on the clips. Unlike other metaverses, it is not designed from a technical point of view, as it does not stand on a geometric mesh.

Semi-copy worlds, instead, hold an intermediate position on design choices between mirror worlds and gaming metaverses. They are social platforms designed to recall some literal features of the real world but with a cartoon-like or video-game-like aesthetic. We can distinguish three main aesthetic threads: pixel art, Disney-like, and cyber-punk. The pixel art aesthetics derives from the first videogames design and has many examples in the gaming field; the most emblematic are Minecraft (2011) and Sandbox (2012). The Disney-like thread, instead, is based on a modification of archetypes typical of cartoons with very different levels of abstraction. Decentraland (2017), Spatial.io (2016), Cryptovoxels (2018), and ChatVR (2017) appertain to this aesthetic. Cyberpunk metaverses are instead hyper-realistic scenarios massively inspired by science-fiction literature and movies. Many platforms in this category make use of the powerful computer graphics engine Unreal Engine 5, such as Netvrk (2016), Bloktopia (2021), and Wilder World (2021).

Regardless of their aesthetics, semi-copy worlds host buildings with doors and windows, furnished with chairs, tables, and beds, as in real-life houses. In April 2022, even the first bathroom line for the metaverse was launched, "Meta-Loo," inevitably causing hilarity<sup>8</sup>.

Each metaverse is clearly distinguishable aesthetic-wise. The following diagram illustrates the type of appearance through the parameters of Imagination and Fidelity<sup>9</sup>. Mirror worlds would be located in the lower right quadrant – low imagination, high fidelity – whereas semi-copy worlds would be located in the three other quadrants.

The third category of virtual environments we identified is experimental worlds. They constitute a small minority of non-game-like virtual worlds, designed without reality-mimicking, and experiencing virtual spatiality more radically. Unsurprisingly, these proposals challenging the physical world's limits deal with contemporary art and target people inclined to the unknown. For example, Bika Rebek from Some Place Studio, whose spaces look like extraterrestrial universes made of extra-large human-world elements and foams, put a different perspective on the design of virtual spaces.<sup>10</sup>

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7 E2Analyst, "Earth2 and Ready Player Me Team up to Bring the Ultimate Metaverse Experience!," Medium, December 18, 2022, <https://medium.com/planet-earth2/earth2-and-ready-player-me-team-up-to-bring-the-ultimate-virtual-reality-experience-atbef60d9af6>.

8 Taye Rowland-Dixon, "Introducing the World's First Toilet in the Metaverse - the 'Meta-Loo,'" The Verge, March 29, 2022, <https://vergemagazine.co.uk/introducing-the-worlds-first-toilet-in-the-metaverse-the-meta-loo/>.

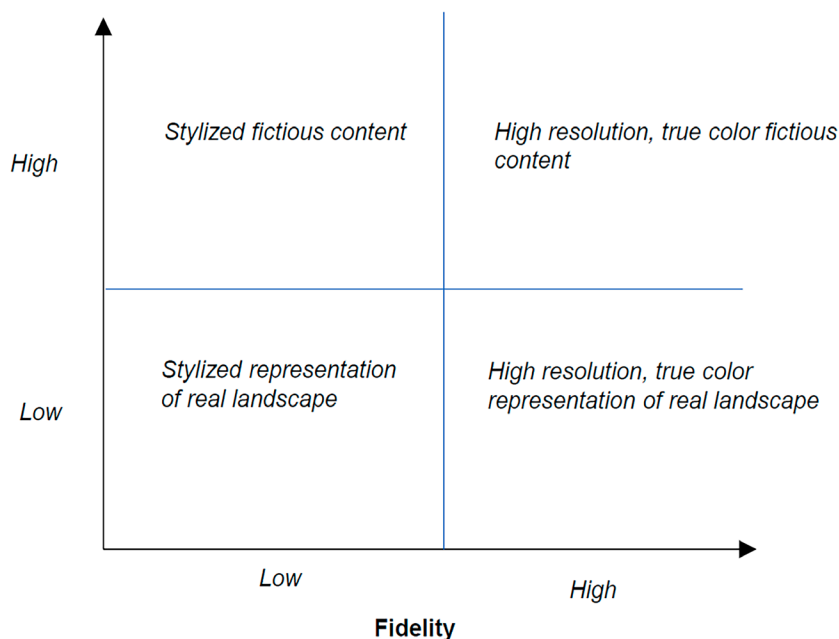
9 Stefan Seidel et al., "Designing the Metaverse," 2022, <https://doi.org/10.24251/HI-CSS.2022.811>.

10 Bika Rebek, "Architects and Their Role in the Metaverse," ENTERING THE ROOM - A Research Platform for Exploring the Digital as a Medium., June 2022.

Similarly, Markéta Gebrian presents on NEOS VR platform the experimental project Bodily Metaverse of Lisbon, an artistic interpretation of Lisbon city center reshaped as an immersive virtual world. The VR environment enables “non-constructible and non-gravitational elements of architecture to be designed as floating floors, transposable elements, and teleportation features” and tests “the new opportunities that social VR brings to architecture design”.<sup>11</sup>

Frequently, virtual spaces corresponding to this category are not metaverses per se. Instead, they are worlds inside larger systems or independent platforms, such as New Art City, a brilliant example of a virtual space that doesn't mimic reality. It is a curated virtual gallery, whose exhibitions show free-floating elements in the space, with no perceivable limitation of distance nor connotations recalling the familiar human environment (New Art City, n.d.).

### Imagination



Designing Metaverse artifacts - Designing the Metaverse, Seidel et al., 2022

<sup>11</sup> Markéta Gebrian, Miloš Florián, and Sara Eloy, “Designing the Bodily Metaverse of Lisbon,” in *Virtual Aesthetics in Architecture* (New York: Routledge, 2021).

## Skeuomorphism and comfortable habits

For decades, computer scientists and engineers have been working to produce a metaverse that could constitute “a compelling alternative realm for human sociocultural interaction.” In a list of “four features that are considered central components of a viable metaverse,” Dionisio and his colleagues put realism in the first place. The primary design effort – they state – should focus on shaping a “virtual space sufficiently realistic to enable users to feel psychologically and emotionally immersed”.<sup>1</sup> Therefore, from their perspective, there is no alternative to realism, as it provides effective foundations for the whole program.

The phenomenon of reality-mimicking is called skeuomorphism. The Oxford Dictionary defines it as “the use of symbols or other objects on a computer screen that look or sound like a physical object in order to suggest their purpose”.<sup>2</sup> While skeuomorphism is justified in video games by the presence of a narrative and gaming purpose, it becomes questionable in other metaverses as it shrinks the imaginative potential offered by technology.

Limitations that exist in the physical world do not exist in the digital one.<sup>3</sup> The metaverse is not subject to the rules of physics, therefore, devoid of gravity and climate problems. Natural phenomena do not obstacle construction, and there is no need to protect from rain: roofs are not needed, neither sheltering from cold or heat nor walls, if not as a visual limit. There is no need for furniture or urban and architectural elements to “live” in the metaverse.

In a world where the body does not feel fatigued, there is no need to sit or lay down to rest; food has no meaning, and no action is physically dangerous. From this point of view, the metaverse looks like the new paradise for advertising and sales: it is an audiovisual world in which the possibilities for action fall fundamentally on what you see, hear and possess; the only physical action allowed is moving in a certain direction, walking or flying, and at most, in some metaverses, winking. In many platforms, much of the world can be reached by teleportation, a connotation that efficiently exploits the fluidity of the virtual, making the road connections ephemeral.

As much as one may use the metaphor of “living in the metaverse,” it is hard to perceive its spaces as lively ones. As discussed in the book *Lost Zone*. Hiking the dawn of the Metaverse, some virtual worlds are likely to look – and be – abandoned since they don’t respond to real needs.<sup>4</sup> Exploring Active Worlds (AW), these authors moved across an abandoned land with all the connotations of a post-apocalyptic scenario, even with intact buildings. AW is the oldest metaverse, but the spaces that are currently visible, built in the last twenty-eight years, do not differ from the skeuomorphic design approaches of contemporary worlds. General users have built the urban structures; therefore, the scenario represents a non-curated accumulation of undefined and undefinable cultures. The authors encountered streets, cities, private and

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1 John David N. Dionisio, William G. Burns, and Richard Gilbert, “3D Virtual Worlds and the Meta Orlds and the Metaverse: Curr Erse: Current Status and F Ent Status and Future Possibilities,” in *ACM Computing Surveys* 45, 2013, 38 pages, <http://dx.doi.org/10.1145/2480741.2480751>.

2 “Skeuomorphism,” in *Oxford Learners Dictionary*, accessed January 2, 2023, <https://www.oxfordlearnersdictionaries.com/definition/english/skeuomorphism>.

3 Stefan Seidel et al., “Designing the Metaverse,” 2022, <https://doi.org/10.24251/HI-CSS.2022.811>.

4 Andrea Belosi and Joana Rafael, *Lost Zone. Hiking the Dawn of the Metaverse* (Foligno, Italy: Viaindustriae Publishing, 2022).

public constructions, cult buildings, and natural landscapes, an entire world that looks like a memorial of a lost society.

The continuous accumulation of these buildings recalls the Junkspace theorized by Rem Koolhaas (2006): a space resulting from careless planning that is transformed with the expansion of urban areas and characterizes contemporary cities. According to Koolhaas, Junkspace creates apparent unity but is actually a dividing space as it defines collectivity through the lack of well-defined shared rules; it is detached from the individual, an absent space which people can only perceive as an autonomous evolution: Man is only a witness, a “reluctant participant”.<sup>5</sup> In Koolhaas’ opinion, Junkspace may transform the world into an immense public place without limits, language, and form. So it seems to have happened in the ruins of Active Worlds, and may happen to other metaverses built on the same approach.

Belosi & Rafael (2022) also raise the problem of the inconsistency of the metaverse, which looks, in their opinion, like a “literal simulacra of the real world.” Although many professionals share this point of view, there is a general difficulty in implementing a more visionary approach. Bjarke Ingels, the founder of BIG Architects, showed an experimental method of conceiving architecture in the metaverse. He was the first to design a virtual building: Viceverse, the headquarter of the digital agency Vice Media in Decentraland. Ingels described as an “architect’s dream” the absence of physical constraints, budget, and law regulations, which is verifiable in his virtual work that stretches the construction in an otherwise physically impossible way.<sup>6</sup>

Virtual architecture is the ideal dimension also for Zaha Hadid Architects (ZHA) studio, which designed the general layout and all the buildings of the state of Liberland on Mytaverse as a meeting point for crypto companies and events.<sup>7</sup> Both Viceverse and Liberland are architecture projects that look like IRL buildings in their concept phase, so before static and budget calculations, but they are still human-based buildings. Architects must still carry out a commission; consequently, experimentalism is limited by the client’s vision. Moreover, even visionary studios like these seem resistant to abandoning the canons of architecture in favor of creating completely innovative experiences worthy of the possibilities of contemporary virtual technology.

Unlike BIG and ZHA, George Bileca, CEO of Voxelarchitects, a metaverse architecture studio, stated in Domus magazine that mimicking the real world gives newcomers “a chance to adapt to this space by offering them a reassuring environment”.<sup>8</sup> In supporting the skeuomorphic trend in the metaverse, Bileca sounds more pragmatic and determined to favor a perspective of comfort for the users. But is comfort in the metaverse really given by chairs and bathrooms? And also, is comfort the best concept to pursue in designing it?

One main reason for the skeuomorphic approach is the ease of welcoming

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5 Rem Koolhaas, Junkspace (Quodlibet, 2006).

6 Lucia Brandoli, “Viceverse: The Office in the Metaverse Designed by BIG,” Domus Web, March 8, 2022, <https://www.domusweb.it/en/news/2022/03/08/viceverse-the-office-in-the-metaverse-designed-by-big-for-vice-media-group.html>.

7 Elisa Massoni, “Utopia Tech,” Interni Magazine, April 28, 2022, <https://www.internimagazine.it/approfondimenti/utopia-tech/>.

8 Andrea Daniele Signorelli, “Who Is Designing the Architectures of the Metaverse?,” Domusweb, February 9, 2022, <https://www.domusweb.it/en/news/2022/02/09/the-metaverse-real-estate-market-from-investment-to-design.html>.



virtual people in an environment with known functions. Still, other factors could have influenced this process. The search for ease may come from the designers themselves, who are not trained to imagine non-human spaces and may find the mimic approach a more straightforward design method. Indeed, in web3, professionals from different fields approach art and design without appropriate education. The creative economy in the metaverse can provide equal opportunities for professional and emerging architects and people with entirely different backgrounds.<sup>9</sup> Therefore, coders or computer engineers can fill the role of urban planners and architects of the metaverse. Moreover, in many virtual platforms, such as Minecraft (a game-like metaverse), and Active Worlds (a non-game-like metaverse), the users are allowed to build structures on their own, which adds variety and stylistic indefiniteness.<sup>10</sup>

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9 Marília Matoso, "Metaverso: Um Terreno Fértil Para Arquitetos," Digital portal on architecture and design, Tabulla, March 2, 2022, [http://tabulla.co/metaverso-um-terreno-fertil-para-arquitetos/?utm\\_medium=website&utm\\_source=archdaily.com](http://tabulla.co/metaverso-um-terreno-fertil-para-arquitetos/?utm_medium=website&utm_source=archdaily.com).

10 Marília Matoso, "Metaverso: Um Terreno Fértil Para Arquitetos," Digital portal on architecture and design, Tabulla, March 2, 2022, [http://tabulla.co/metaverso-um-terreno-fertil-para-arquitetos/?utm\\_medium=website&utm\\_source=archdaily.com](http://tabulla.co/metaverso-um-terreno-fertil-para-arquitetos/?utm_medium=website&utm_source=archdaily.com).

## Lights in the cloud of troubles

The analysis conducted on the spatial features of the most popular active metaverses led us to understand that they depend on three main factors: the development of the technology adopted, the aim pursued, and the design culture of creators.

As far as technology is concerned, in addition to the constant development of computer graphics and programs, the choice of the technology of use is predominant for constructing these worlds. VR technology is one of the possible directions. For now, however, VR devices, as well as being prohibitive from an economic perspective, cause motion sickness,<sup>1</sup> so many users of the metaverse choose to enter screen mode. In our survey, 31 metaverses out of 55, more than half, are accessible only through the screen, which leads us to think that these platforms do not estimate VR as essential for development. The elitism and cumbersomeness of current headsets hinder projects based on immersive use, which can only grow by introducing lighter and more easy-to-use devices.

From a spatial point of view, the common thread of most of the investigated metaverses is the inclination to simulate the real world. Although the levels of interpretation and the aesthetics adopted vary substantially, the tendency toward realism is dominant. Not only have architecture and cityscape been replicated, but also the real estate market, which frequently leads the aim of many metaverses to speculation on lands and propriety prices.<sup>2</sup>

The aim of the single metaverses inevitably leads their design approach and justifies spatial choices. In game-like metaverses, whose purpose is creating involvement in the game, the design follows a specific narrative and fosters identification. Instead, in non-game-like worlds, which do not respond to any declared need, except social encounters and trade, the design of spaces becomes a unique tool to create value.

Still, in many cases, spatial research is limited to trivializing archetypes and a set of clichés. In contrast, mimesis could be an inspiring approach to conjure up scenarios that lead to reflection as an exercise to visualize the future, for example, in the Solarpunk direction.<sup>3</sup> The metaverses we defined as cyberpunk have great potential to evoke science-fiction scenarios and make cinematographic environments experienceable.

Aside from experimental metaverses, whose approach exploits the absence of physical limits to create a spatiality detached from the real one and leads users to new cognitive experiences based on art and space research, the lack found in the most significant number of cases is that of references to visual culture. The opportunity of the variety of visual and design cultures, an enormous wealth of metaverses globality, often seems neglected.

Being the virtual worlds created by professionals from fields that often have nothing to do with the design culture, and given that architects and desi-

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1 Ben Lawson, "Motion Sickness Symptomatology and Origins," vol. Handbook of Virtual Environment: Design, implementation, and applications, 2nd ed. (Boca Raton, FL: CRC Press, 2014), <https://doi.org/10.1201/b17360-29>.

2 Jason Schreier, "Companies Are Spending Billions on a Metaverse That Makes No Sense," Bloomberg (blog), February 11, 2022, <https://www.bloomberg.com/news/newsletters/2022-02-11/the-metaverse-makes-no-sense-and-here-s-why>.

3 Flavio Pintarelli, "Solarpunk's Utopian Architectures," Domus Web, September 19, 2020, <https://www.domusweb.it/en/architecture/gallery/2020/09/16/solarpunks-utopian-architectures.html>.

gners entered the sector after the creation of platforms, the methodologies and references typical of spatial design research still need to be integrated. Therefore, the creative potential that the virtual world allows, both for the absence of gravity and physical phenomena and its narrative and interpretative possibilities, could be exploited much more to add value to users' experience.

## Metaverses for companies

Big companies look at the virtual world as an immense blank canvas in front of which to build color shops: an open unexplored market.

They can anyway be distinguished into two categories: the companies that use the Metaverse as a tool for advertising and those that directly shape people's experience with it.

The first group is constituted of brands with a particular foresight and propensity for the new. They are companies specialized in the production of physical goods that are looking for platforms where to advertise it. An example is Nike, which created its world on Roblox, Nikeland, in which it is possible to play and interact with other people; on the same platform, Vans opened a virtual skate park named Vans World, and Gucci created its Gucci Garden that intercepted 19.9 million visitors just in its first two weeks.<sup>1</sup>

In addition to creating worlds in the metaverses, some companies tested NFT-based campaigns. In 2021, Gucci created an NFT version of a handbag to be sold for a higher price than the physical one,<sup>2</sup> Adidas launched a limited collection in NFT, too.<sup>3</sup> Coca-cola experimented with the creation of another link between the physical and digital reality by launching the Byte limited edition flavor inspired by the gaming world; on the can, there was a QR-code that gave access to a series of mini-games on Fortnite.<sup>4</sup> The intercommunication between virtual engagement and physical service is a diffuse tactic in metaverses and video games: Deliveroo included a delivery service in the Animal Crossing game that provided the users with coupon codes for real-world deliveries.

The trust in the Metaverse brand communication is so strong that many emergent companies set their brands exclusively on the Metaverse, especially in the field of luxury fashion. The investments are as high as even Vogue dedicated its attention to the emergent virtual fashion realities. M. McDowell, in April 2022, reported the evolution of the some significant new brands: Rst-Iss by Charli Cohen, Natasha Franck's *Eon*, and *Aglet*;<sup>5</sup> many more names are already famous, such as *SpaceRunners*, *Auroboros*, and *DressX*.

The second group of companies is composed of those that create and manipulate digital means, such as the so-called Four: Amazon, Apple, Facebook, and Google.<sup>6</sup> They are all recognizable brands, which have already gained credibility, and are actively involved in people's daily lives.

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1 Giampaolo Colletti and Fabio Grattagliano, "Brand in Azione per Conquistare Nuovi Mondi Nel Metaverso," *Il Sole 24 Ore*, September 11, 2022, [https://www.ilssole24ore.com/art/brand-azione-conquistare-nuovi-mondi-metaverso-AEano2rB?refresh\\_ce=1](https://www.ilssole24ore.com/art/brand-azione-conquistare-nuovi-mondi-metaverso-AEano2rB?refresh_ce=1).

2 Azad Abbasi, "What We Can Learn From Top Brands Already In The Metaverse," *Forbes Agency Council*, July 15, 2022, <https://www.forbes.com/sites/forbesagencycouncil/2022/07/15/what-we-can-learn-from-top-brands-already-in-the-metaverse/?sh=3ee660393a70>.

3 Abbasi.

4 "Coca-Cola® Creations Gaming-Inspired Coca-Cola® Zero Sugar Byte," Coca-Cola Company, April 4, 2022, <https://www.coca-colacompany.com/news/coca-cola-creations-zero-sugar-byte-launch>.

5 Maghan McDowell, "Metaverse Fashion Companies Are Pulling Millions in Funding," *Vogue Business*, April 19, 2022, <https://www.voguebusiness.com/technology/metaverse-fashion-companies-are-pulling-millions-in-funding>.

6 Scott Galloway, "The Four. I Padroni. Il DNA Segreto Di Amazon, Apple, Facebook e Google" (Hoepli, 2020).

Their interest in the Metaverse strictly deals with the development of the hardware that allows people to live it, which constitutes a new business perspective.<sup>7</sup>

The Four are some of the main investors in the virtual worlds, followed by other big companies such as Microsoft, NVIDIA, and Alibaba.<sup>8</sup>

Paraphrasing an insightful essay by Scott Galloway, these companies have more intelligence and computing power than needed for the Apollo 11 mission on the Moon, and they use it to sell the new Nissan.<sup>9</sup> At this stage, much of this power is concentrated on constructing virtual worlds in order to develop tools to access them in the most immersive way.

Through the analysis of their use of the metaverse, it looks clear that the approaches to the new digital worlds are different based on the power of companies; this still highlights, at this stage, the existence of a direct link between commerce in the Metaverse and the real-world brand system. While emerging brands can rent spaces and build their showrooms, and well-known big brands create worlds in their image, the Four generate the Earth and give people sight: they shape entire platforms and create the tools that allow users to experience the virtual world, defining exactly how they interact with it.

To analyze the Four, Galloway declines the three areas in which brand communication sets: heart, genitals, and brain. Facebook develops in the heart section, as it is structured to bring users closer to people they love or simply know and to facilitate contact with them. Instead, Apple belongs to the genital category as a generator of status, which elevates the individual on the scale of sex appeal. The brain is instead tickled by Google, which portrays itself as a paladin of the free and democratic dissemination of culture.

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7 Andrea Daniele Signorelli, Alessio Carciofi, and Martina Pennisi, "Death Meta – Lotta All'ultima Parola Sul Futuro Del Metaverso" (Cariplo Factory, Milano, November 12, 2022).

8 Market Trends, "Top 10 Big Tech Companies Contributing to the Development of the Metaverse" (Analytics Insight, July 23, 2022), <https://www.analyticsinsight.net/top-10-big-tech-companies-contributing-to-the-development-of-the-metaverse/>.

9 Galloway, "The Four. I Padroni. II DNA Segreto Di Amazon, Apple, Facebook e Google."

## The approach of the Four

### VR, AR

The Facebook company, who changed its name to Meta in October 2021,<sup>1</sup> generating an overall increase of attention on the concept of “Metaverse,” explained its perspectives in a video titled “The Metaverse and how we’ll build it together,”<sup>2</sup> which accurately ranges between all the abovementioned three communication areas.

Meta begins his 77 minutes of communication by exploring social connections, thus taking root in its primary area of expertise: the heart. After having extensively described how the Metaverse facilitates affection, it moves on to the macro field of gaming, which instead appeals to the genitals. As an extension between the genitals and the brain, we get to the category of work and conclude ultimately with the brain, talking about how the virtual world could facilitate learning and teaching.

Metaverse looks to be sold as a facilitator of the totality of life, as a parallel world that can empower all sides of the ego and all its needs.

Zuckerberg speaks firsthand in front of the scenery of an impeccably rendered nature that opens the horizon from enormous windows of a house whose fireplaces are very frequently framed; Zuckerberg himself looks like an avatar, making the hybridization of the real and the virtual world concrete and unconsciously explicit.

The message is: anyone can have all this.

The metaverse for Meta is, therefore, the world of dreams; it is the playful essence of life. Even working becomes light, and so becomes moving in meeting rooms where avatars can float without gravity and look exactly like how they want.

Meta’s idea of the metaverse is that of a world intensely connected with the real one, in constant communication with it, which resembles a playful hybridization of the concept of teleportation.

As previously mentioned, the interest of the Four in virtual reality is consistently dependent on their production of hardware<sup>3</sup>. In the case of Meta, the most relevant is the Meta Quest Pro headset launched in October 2022. Initially known by the name “Oculus,” this technology is at the center of the product design research of the company.

In December 2022, the price of the latest version on the official website is €1799,99. The previous version, Meta Quest 2, reports the price €399,99. Even if the Quest 2 is consistently more accessible than the latest version, it cannot be considered a consumer device for gaming. According to CNBC, most of the apps haven’t even been optimized for the Pro version yet, which makes it not-performing as well as prohibitively expensive.<sup>4</sup>

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1 Ryan Mac, Sheera Frenkel, and Kevin Roose, “Skepticism, Confusion, Frustration: Inside Mark Zuckerberg’s Metaverse Struggles,” *The New York Times*, October 9, 2022, <https://www.nytimes.com/2022/10/09/technology/meta-zuckerberg-metaverse.html>.

2 The Metaverse and How We’ll Build It Together -- Connect 2021, 2021, [https://www.youtube.com/watch?v=Uvufun6xer8&ab\\_channel=Meta](https://www.youtube.com/watch?v=Uvufun6xer8&ab_channel=Meta).

3 Andrea Daniele Signorelli, Alessio Carciofi, and Martina Pennisi, “Death Meta – Lotta All’ultima Parola Sul Futuro Del Metaverso” (Cariplo Factory, Milano, November 12, 2022).

4 Sofia Pitt, “Meta’s New Headset Is a Very Expensive VR Experiment That Doesn’t Have a Target Audience,” *CNBC*, October 11, 2022, <https://www.cnbc.com/2022/11/10/meta-quest-pro-review.html#:~:text=At%20%241%2C500%2C%20it's%20far%20too,ready%20for%20professional%20use%2C%20either.>

The review published in the Wirecutter section of the New York Times on November 2022 positioned still in the first place the performance of the Meta Quest 2, over the overall panorama of headsets, highlighting its easy usability and its broad accessibility to games and experiences.<sup>5</sup> In the presentation video, Zuckerberg explained also many more technologies in which the company is investing, mostly related to movement.

The first mentioned is Project Cambria, a technology that makes a greater expressiveness of the avatars possible. Meta is also working on simplifying mixed reality, for example, with the Passthrough API, which allows to the overlap of a virtual image on the real context visualization. The final perspective of it looks towards Project Nazaré, the ultimate project of augmented-reality glasses. Many more technologies are mentioned in the research of the company that do not necessarily deal with the metaverse.

### *AR, MR*

The philosophy of Google seems to be more concrete in the hardware aspect.

In an interview published on the Wall Street Talks Youtube channel, the company's CEO, Sundar Pichai, stated a disinterested position in intervening directly on the metaverse, which is, in his opinion, an evolution of the internet independent from companies, but concretely present in the facilitation of users in accessing it.<sup>6</sup>

Pichai declared computers adapt to people, opposite point of view of Zuckerberg's, who is creating new digital worlds that envision inevitably people adapting to the computer progress - as proof, the complaints of Meta's workers about the invite to use the company's headsets for meetings instead of making normal videocalls.<sup>7</sup>

The revolution that Google envisions is therefore related to making communication easier and more tangibly authentic through the use of AR and mixed reality (MR), instead of Meta's perspective of meetings in the VR isolated immersivity of Horizon Worlds, embodying game-like unrealistic characters. According to Pichai, the Metaverse is the evolution of computing in an immersive way,<sup>8</sup> in fact Google's closer investments to the Metaverse are in the field of the AR.

Google have started different glasses-related research projects, each one working in a different evolution of the iconic Google Glasses launched in 2013, that never reached a sufficient diffusion. One of the earliests is Google Daydream, launched in 2016, that allows a VR immersion of mobile videogames: it consists in a headset in which to insert the mobile phone.<sup>9</sup> Another example, more in line with the new corporate philosophies, is Project Iris, that forsees a different way to approach AR though a device similar to VR headsets.

Instead, the direct evolution of Google Glasses in this first step focused in the

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5 Signe Brewster, "The Best VR Headset," New York Times, October 21, 2022, <https://www.nytimes.com/wirecutter/reviews/best-standalone-vr-headset/>.

6 Google's Plan for the Metaverse, YouTube video, 2021, <https://www.youtube.com/watch?v=nmujd3SgwdE>.

7 Ryan Mac, Sheera Frenkel, and Kevin Roose, "Skepticism, Confusion, Frustration: Inside Mark Zuckerberg's Metaverse Struggles," The New York Times, October 9, 2022, <https://www.nytimes.com/2022/10/09/technology/meta-zuckerberg-metaverse.html>.

8 Google's Plan for the Metaverse.

9 Meet the New Google Daydream View, YouTube video, 2017, <https://www.youtube.com/watch?v=xSnkjqdsUE>.

facilitation of the verbal communication. The AR technology allow the users to see in their lens-frame the written live speech of his/her interlocutor, translated in the chosen language;<sup>10</sup> anyway, many more functions are still waiting to be added to the glasses.

Project Starline instead, develops on MR and consists in an experimental screen communication method that allows the user to see a 3D model of the person they are communicating with, giving the feeling of seeing the real person behind a glass.<sup>11</sup>

All these technologies are not strictly related to virtual worlds and it looks clear that Google's idea of the Metaverse is completely distinct from that of Meta.

Anyway while Google invests mainly on the hardware, Alphabet, its parent company directed by the same CEO, is broadening its gaze on the Web.3 by optimizing Google's digital wallet system: Google Wallet.<sup>12</sup>

## AR

Amazon's approach to the metaverse is still undeclared and mysterious, but analysing its recent projects it looks closer to augmented reality.

The company launched a new function in its app named Amazon AR View, that allows to see the products from its shop in the environment the mobile camera is framing.

Amazon's purpose is product-centered, therefore it is most probable that its investments will be in systems that invite people to buy and make purchases easy.

If the company has not dealt with the metaverse yet, it has anyway approached the world of gaming. In 2022, it launched Amazon Cloud Quest. It has the didactic purpose of making users understand the Amazon's AWS cloud computing infrastructure by solving technology-based puzzles.<sup>13</sup> The game is playable on normal screens and it does not involve VR experiences; though, it shows Amazon's interest in the actual gaming-scene.

## VR+AR, AR

Being Apple always on the crest of the new wave, it has already launched several products related to the subject.

First of all, the company has integrated augmented reality capabilities into iOS SDK, which means that the mobile devices are ready to approach the AR apps, that in fact have already started populating the Apple Store.

Moreover, Apple is working on its own glasses, both in the VR and AR direction, but the company has not made any official announcement of the launch yet. The rumors have been confirmed in early 2022 by references to it found in the App Store. The project looks to take two main shapes:<sup>14</sup> the first

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10 Project Starline: Feel like You're There, Together, YouTube video, 2021, <https://www.youtube.com/watch?v=Q13CishCKXY>.

11 Breaking down Language Barriers with Augmented Reality, YouTube video, 2022, <https://www.youtube.com/watch?v=ijObFX9HXeE&list=PL590L5WQmH8dUdwu3ZWuy5xh8j2iGgApr&index=3>.

12 "Alphabet - Product & Business Updates," Alphabet Investor Relations, accessed December 5, 2022, <https://abc.xyz/investor/#product-and-business-updates>.

13 "Amazon Metaverse; Amazon's Vision Entering the Metaverse," metamandrillo - metaverse information, accessed December 5, 2022, <https://metamandrill.com/amazon-metaverse>.

14 Charlton Charlton, "Apple's Work on RealityOS 'Wrapping Up' as Focus Turns to Suite of AR/VR Apps Ahead of Headset Launch," MacRumors, November 14, 2022, <https://www.macrumors.com/2022/11/14/realityos-work-wrapping-up-as-focus-turns-to-apps/>.



is a single device, RealityOS, that will give the possibility to switch easily from VR to AR; the second is a work-in-progress pair of glasses that will deal only with augmented reality, and will probably be controlled by a gesture system; as according to Apple philosophy, the glasses will most likely pair with an iPhone rather than possessing a separate powerful processor.<sup>15</sup>

## MR

Aside from the Four, the work of Microsoft is particularly relevant.

Microsoft ambitious project is composed by two elements, hardware and software: Microsoft HoloLens and Microsoft Mesh.

HoloLens looks like a VR headset but with transparent glass lenses; instead, they are an MR device. In December 2022, the basic version of the product, already in its second model, costs \$3,500 on the official website.<sup>16</sup> The device is powered by the software Microsoft Mesh, that structures an expansion of the world to be accessed with the MR glasses.

A part from technical details, what makes it different from other companies' glasses, is the concept they pursue: *teleportation*.

The slogan is "here can be anywhere", and the entire advertisement campaign is based on the potential omnipresence.<sup>17</sup> What Microsoft reads in the future of the Metaverse is a very concrete use of technology to implement meetings and collaborations through the augmentation of actions, in order to transform the concept of presence into something intangible but completely interactive.

Through the overview of the approaches to the Metaverse of the five more relevant companies of the contemporary digital era, it is possible to make some considerations about the perspectives of its development in the near future.

Meta is the company investing the most on virtual reality, whereas the others looks disinterested in it. None of them seems to work on projects entirely related to VR; so far, among these companies, only Microsoft is working on MR. The general perspective is therefore that of an augmented world that keeps a constant visual and physical contact with the real one. The way the other companies are unanimously taking is that of AR and they are mainly detaching from the gaming world, to focus more on private communication and work meetings.

None of the companies, a part from Meta, have shaped a virtual world of any kind and they all mostly focused on hardwares, as Apple, Microsoft and Google, or virtual systems functional for their sales, in the case of Amazon.

While Apple and Microsoft were born as technological products brands, and Amazon deals with commerce, Google and Meta are the two companies that could fight for the supremacy in the social field. According to the collected data, Google is taking a responsibility-step back from the evolution of the internet, which it openly leaves in the hands of the users of Web.3. Therefore, Meta is in first line in trying to give its shape to the metaverse.

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15 "Apple VR Headset; What We Know About Apple VR Gear So Far," metamandrillo - metaverse information, n.d., <https://metamandrill.com/apple-vr-headset/>.

16 "HoloLens 2," Microsoft, accessed December 6, 2022, <https://www.microsoft.com/en-us/hololens/buy>.

17 Introducing Microsoft Mesh, 2022, [https://www.youtube.com/watch?v=Jd2GK0qDtR-g&ab\\_channel=Microsoft](https://www.youtube.com/watch?v=Jd2GK0qDtR-g&ab_channel=Microsoft).

## From real to authentic.

Since a significant part of the information from the surrounding pass through our eyes, developing a stronger trust in the image is a natural evolution. The major part of data that we consciously process is reached by the visual and auditory channels,<sup>1</sup> even if, at the same time, we receive infinite impulses through touch and smell from our surroundings.

The common strategy of brands to communicate their identity with images or videos is based, in fact, on this principles of human perception; nowadays, it also relies on the limitations of technology, which is not yet able to stimulate in a good way the other senses.

The sense of sight is so relevant that, typically, to prove our witness of an event, the sentence used is "I saw it" because, since ancestral age, sight has always been a witness of truth. When we believe without seeing, we "trust blindly."

As a result of the development of digital and especially of the internet, this trust has been put into considerable difficulty. Fake news has proliferated with new communication systems on a larger scale, and necessarily as the ease of knowledge increased, so did the distortion of truth too. In certain cases, such as the conspiracies groups proliferating online, we might even talk about faith.

The transition from the "visual trust" related to media communication ("I saw it") to the spiritual "blind creed" is straightforward. A Neuromarketing study by Martin Lindstrom proves that the brain areas activated seeing products such as iPhone and Coca-Cola are the same to be stimulated by the vision of religious symbols such as crosses or the bible.<sup>2</sup>

Since social media and networks are consistently part of the transformation of brand communication, we can assume that they fall in some way into this era's fragmented and complex sphere of spirituality.<sup>3</sup> For example, in the 21th century in western society, social networks have gained a relevant place in the constitution of communities, which have always been the matter of religions. Today, this role looks to be taken by Web3, that is basing its entire system on communities.

The topic of vision and faith is crucial in the process of distinguishing the truth; a relevant example are various shamanic communities in Nepal, such as the Tamu's, that have a peculiar philosophy of mixing equally real life and virtual reality<sup>4</sup>. Shamans do not distinguish real life from the oniric one, and therefore, they live in both dimensions. Eating a fruit and taking a walk on the moon are considered equally true; likewise, Shamans may have some children on earth and others in dreams, but they consider all of them authentic. Their concept of reality is distorted from that commonly considered in the

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1 Anna Esposito, "The Perceptual and Cognitive Role of Visual and Auditory Channels in Conveying Emotional Information," May 9, 2009, <https://link.springer.com/article/10.1007/s12559-009-9017-8>.

2 Martin Lindstrom, *Neuromarketing. Attività Cerebrale e Comportamenti d'acquisto*, Apogeo (Apogeo Education, 2009).

3 Jim Towe, "God's Universe Beats Mark Zuckerberg's Metaverse," *Wallstreet Journal*, November 4, 2021, <https://www.wsj.com/articles/god-universe-beats-mark-zuckerberg-metaverse-poverty-conferencing-charity-christianity-11636036806>.

4 Piers Vitebsky, *Gli Sciamani Viaggi Dell'anima, Trance, Estasi e Rituali Di Guarigione* (EDT, 1998).

western society. What we would call real, so “something that [...] actually exists and is not imagined, invented, or theoretical”<sup>5</sup> is not the basis of what they consider *authentic*.

The same thing would happen with the Metaverse, which was born as a parallel reality but aims at indissolubly interlacing with the real; the conceptual transition will therefore be from trust in the real to that in the authentic.<sup>6</sup>

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5 “Real,” in Collins, accessed January 20, 2023, <https://www.collinsdictionary.com/it/dizionario/inglese/real>.

6 Alessio Carciofi, *Vivere Il Metaverso* (Roi Edizioni, 2022).

## Social sustainability

The transcendence of the Metaverse scenario also deals with avatars. Its etymology derives from the Sanskrit avatarana, which means “descent,” with the meaning of the incarnation of divinity.<sup>1</sup>

In virtual reality, the avatar reverses the process: the human being manifests himself in an incorporeal visual form.

The idea of personifying a virtual body is significant from the point of view of the psychological approach to interpersonal relationships. The virtual body is a property linked to the wallet - aside from trial versions, that are temporary bodies on loan. As the owners of their representative shell, users can modify it as they want, thereby apparently becoming what they want.

However, the whole process is based on trade, so to improve your look, you need to invest money in customization, for example, to acquire special features and items to wear; the centrality of capitalism concretizes in the parallel world of the Web without hiding its purpose; in Web3, Descartes' proposition would immediately become: Possideo ergo sum. I own, therefore, I am.

Being represented by another non-body is one of the main reasons why the virtual worlds attract the public. It is an effective way to overcome situations of discomfort with one's natural body, whether they are of physical origins - such as handicaps - or psychological - insecurity or dissatisfaction with one's appearance.

In fact, the detailed panorama of nightclubs described by PBS denounces how regulars have difficulties in social integration in the real world and believe they are overcoming the state of discomfort by impersonating an avatar.<sup>2</sup>

In addition to the social benefits mentioned above, changing shape, albeit virtually, has a favorable reference to the self-image. A study by the researcher Claire Prescott shows how having a projected image of themselves guides children to become that image. N. Yee and J. Bailenson talked about it as the Proteus effect, which pushes the user to accomplish the expectations that one would have from the character they play, in this case, the avatar.<sup>3</sup>

Psychological and medical researches report many other benefits of the virtual life. A study by the Medical Center of Washington University that had to do with individuals who had suffered burn injuries found that playing games in virtual reality caused a distinctly relieving effect in patients, higher than that of the morphine.<sup>4</sup> As Alessio Carciofi observed, if the effect of relieving physical pain is so potent, how much more powerful can it be against the “pain of everyday life”?<sup>5</sup>

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1 “Avatar (n.)” in Online Etymology Dictionary, September 30, 2022, <https://www.etymonline.com/word/avatar>.

2 I Went Clubbing in Virtual Reality: Raves of VRChat, Subcultured, 2022, <https://www.youtube.com/watch?v=ZRPjgSrQ8gA>.

3 Nick Yee and Jeremy Bailenson, “The Proteus Effect: The Effect of Transformed Self-Representation on Behavior,” *Human Communication Research* 33 (July 1, 2007): 271–90, <https://doi.org/10.1111/j.1468-2958.2007.00299.x>.

4 Christopher V. Maani et al., “Virtual Reality Pain Control during Burn Wound Debridement of Combat-Related Burn Injuries Using Robot-like Arm Mounted VR Goggles,” *The Journal of Trauma* 71, no. 1 Suppl (July 2011): S125-130, <https://doi.org/10.1097/TA.0b013e31822192e2>.

5 Alessio Carciofi, *Vivere Il Metaverso* (Roi Edizioni, 2022).

The immersion amplifies feelings and notions. Playing a battle game in front of a screen by pressing a couple of keys to move around the game is a different experience than moving your whole body to defend yourself from a sword attack by a 1:1 character running toward you. Of course, the emotion is stronger.

The change in the physical approach to technology has always reflected a psychological change. An example is the radical shift introduced by the first iPhone, which was “no longer a functional object but an extension of the human;”<sup>6</sup> it gave the possibility to perform many actions and extend the ease of distance communication to people’s hands. Another point was the step from cell phones with buttons to touchscreen ones; if the former proposed a safe and categorical interaction, touchscreens allowed access to the most fluid two-dimensional spatiality. VR and AR headsets are the next step, which will allow the web to extend into the third dimension, to which will be added the fourth, that of time, since the Metaverse is a constantly evolving world that never stops.

The amplification does not only concern the emotional sphere but also the communicative one. To leverage this strong engagement, companies build their virtual worlds in their image on Roblox, for example, or invest in AR/XR advertising on Spheroid Universe. Immersion makes every communication more perceptible and makes it become part of a more concrete spatial intimacy than through a flat screen.

However, the implication of this phenomenon for users is particularly risky mainly from two points of view: overstimulation and truth.

In this document, with Overstimulation is intended an excessive amount of stimulation caused by the visual or physical interaction with technology. The concept becomes immediately clear while wearing a VR headsets, that amplify the visual stimulation: people frequently reacts with sense of nausea and dizziness after a few minutes.<sup>7</sup> The technology of the headsets is in significant development, because the spread of the Metaverse depends on their ease; therefore, it is assumed that these reactions will be minimized in a short time. However, researchers have already discovered real damages provoked by the effect of screens on the development of the human body.

A 2020 study funded by the US National Institutes of Health showed that in children exposed to screens for more than seven hours a day, the cerebral cortex becomes thinner.<sup>8</sup>

Another research published in Preventive Medicine Reports in 2017, reports that spending more than six hours a day in front of a screen, whether television or computer, can predict depression levels in adults.<sup>9</sup>

Considering that these data relate to the use of two-dimensional devices at a

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6 Marzia Mortati, “New Design Knowledge and the Fifth Order of Design,” *Design Issues* 38 (October 2022): 21–34, [https://doi.org/10.1162/desi\\_a\\_00695](https://doi.org/10.1162/desi_a_00695).

7 Ben Lawson, “Motion Sickness Symptomatology and Origins,” vol. *Handbook of Virtual Environment: Design, implementation, and applications*, 2nd ed. (Boca Raton, FL: CRC Press, 2014), <https://doi.org/10.1201/b17360-29>.

8 Mai-Han Trinh et al., “Association of Trajectory and Covariates of Children’s Screen Media Time,” *JAMA Pediatrics* 174, no. 1 (January 1, 2020): 71–78, <https://doi.org/10.1001/jamapediatrics.2019.4488>.

9 K. C. Madhav, Shardulendra Prasad Sherchand, and Samendra Sherchan, “Association between Screen Time and Depression among US Adults,” *Preventive Medicine Reports* 8 (2017): 67–71, <https://doi.org/10.1016/j.pmedr.2017.08.005>.

greater distance from the eyes than that of immersive helmets, we can imagine that the constant use of VR could potentially even aggravate the damage. In addition to the intangible damages in the first person, some can be empirically experienced and linked to the psychology of online sociality.

Established that each interaction system has both positive and negative sides, a study by the University of San Diego found a considerable correspondence between the use of social networks among teenagers and the number of suicides in the 2010-2015 period.<sup>10</sup>

As previously introduced, the Metaverses are developing as community places that allow the development of a new virtual sociality; therefore, they are a three-dimensional expansion of social networks. Always maintaining a hypothetical level of logical analysis, it is likely that social issues related to social media will also be amplified, as the experience is more realistic and maintains its complete temporal immersion. Meta's CTO, Andrew Bosworth, also reported this concern and warned that the Metaverse could turn into a toxic environment for people, especially women, and minorities.<sup>11</sup>

Not only the psychological burden resulting from social interactions is expected to increase, but the patrimonial value will be constantly associated with it: as mentioned by Andrea Venturelli, founder of the Web3 consultancy company Decripto, as in social networks people's reputations are already attackable 24/7, so will be people's assets in the Metaverse.<sup>12</sup>

Next to overstimulation, the second category of problems deal with the truth. In this case, the amplification of phenomena resulting from immersion has to do with fake news and teaching.

For the first point, the issue is similar to that on social networks: information will not only pass faster, given the facilitation of communications but will also be perceived with a new trust filter. Moving from the consideration of the real to that of the authentic, it is inevitable that there will be a greater openness to virtual events, consequently, less skepticism; therefore, Web3 is the perfect territory for the proliferation of fake news.

Since the Metaverse develops in 4 dimensions, communicating the truth will require quadrupled attention. Meta paints the future of the dissemination of knowledge in virtual rooms, imagining that users can immerse themselves in scenarios from other eras and experience them firsthand<sup>13</sup>. From the point of view of completeness, one could compare immersive reality to a Wagnerian Gesamtkunstwerk, as videogames are. The Assassin's Creed game had already developed this concept in 2007, but without VR headsets, boasting a fair amount of historical accuracy.

Walking in ancient Rome and dealing with the customs, clothes, and historic architecture in a participatory way would allow an all-encompassing involvement of students and all interested users. At the same time, every mistake made in the design would take on many times more weight. The main difficulty would then be distinguishing realistic, immersive worlds from playful ones that

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<sup>10</sup> Jean M. Twenge et al., "Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time," *Clinical Psychological Science* 6, no. 1 (2018): 3-17, <https://doi.org/10.1177/2167702617723376>.

<sup>11</sup> Hannah Murphy, "How Will Facebook Keep Its Metaverse Safe for Users?," *Financial Times*, November 12, 2021, <https://www.ft.com/content/d72145b7-5e44-446a-819c-51d67c5471cf>.

<sup>12</sup> Alessio Carciofi, *Vivere Il Metaverso* (Roi Edizioni, 2022), p- 139

<sup>13</sup> The Metaverse and How We'll Build It Together -- Connect 2021, 2021, [https://www.youtube.com/watch?v=Uvufun6xer8&ab\\_channel=Meta](https://www.youtube.com/watch?v=Uvufun6xer8&ab_channel=Meta).

therefore have no claim to scientific accuracy, as stated by Kavya Pearlman, chief executive of the XR Safety Initiative.<sup>14</sup>

To be open to the incredible potential of the metaverse but not to be overwhelmed by it, a certain amount of critical spirit and skepticism is necessary, but not only. Aside from the need to check and govern the content, there is that of governing behaviors, which is way more difficult, according to Brittan Heller, founder of the Center for Technology and Society, and lawyer at Foley Hoag.<sup>15</sup>

For this purpose, a whole new system of platform regulation will be needed. Online safety is nowadays a broadly discussed topic that confines the concepts of privacy and censorship. In 2020 Facebook, which was not Meta yet, hypothesized to record what is happening in the metaverse constantly, which would be stored locally on a user's virtual reality headset. In this way, in case of bad behavior reported by a user, a human reviewer could immediately assess and take appropriate action.<sup>16</sup> The constant record of the Metaverse, though, crashes with privacy. Meta, Apple, and Google have already been the subject of multiple discussions about data treatment and their AI filtering systems. The failure of AI is notably frequent even in Web2, as in the case of Facebook's AI in 2009, which failed to catch a problematic live video of Christchurch terror attacks.<sup>17</sup> Other frequent AI issues deal with pictures stored in backup platforms. In 2022, a father in the USA was flagged as a criminal by Google because he took pictures of his naked toddler for the doctor.<sup>18</sup> These are just two examples among hundreds; social platforms are commonly known to be systematically lacking in control.

Aside from the potential beneficial contribution that the metaverse could give people, it is fundamental to point out the consistent health and psychological and social risks it can constitute. Building a new connected world means calling into question all the balances of reality, connected to the individual user and society, in terms of legislation.

From Meta to Cambridge, several theories and manifestos have already proposed methods for building a healthy metaverse.

Those of Meta resemble family values and are the following: Never Surprise People, Provide Controls that Matter, Consider Everyone, and Put People First<sup>19</sup>.

The Cambridge University study formulated ten values, therefore more specific but equally vague and plausible: [The Metaverse] Is open and accessible, Is honest and understandable, Is safe and secure, Is driven by social equity and inclusion, Is sustainable, Values privacy, ethics, and integrity, Guarantees data protection and ownership, Empowers diversity through self-expression,

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14 Hannah Murphy, "How Will Facebook Keep Its Metaverse Safe for Users?," Financial Times, November 12, 2021, <https://www.ft.com/content/d72145b7-5e44-446a-819c-51d67c5471cf>.

15 Hannah Murphy.

16 Hannah Murphy.

17 Hannah Murphy.

18 Kashmir Hill, "A Dad Took Photos of His Naked Toddler for the Doctor. Google Flagged Him as a Criminal.," New York Times, August 21, 2022, <https://www.nytimes.com/2022/08/21/technology/google-surveillance-toddler-photo.html>.

19 Meta, "Responsible Innovation Starts with Privacy.," About Meta, accessed October 15, 2022, <https://about.meta.com/metaverse/responsible-innovation/>.

## Terrestrial impact

One of the most substantial concerns about the Metaverse is that it is largely blockchain-based. Consequentially, all the sustainability problems raised and discussed in the previous chapters apply also to the virtual platforms.

The expansion of the metaverses, intended as virtual worlds, will inevitably augment its impact on the Earth. Intel Company foresees an increased needed power of 1000 times,<sup>1</sup> which would also involve a significant relative multiplication of currency transactions. This means that we will need more power to run the metaverses and more power to let currencies circulate. Although the environmental weight of the virtual world is clear, it is rare to find statements of concern from those who are creating it.

Zuckerberg does not mention any preventive measures for energy consumption in his presentation but makes an interesting allusion to how the Metaverse can lighten the impact of air transit.<sup>2</sup> This is a common defense argument in favor of virtual benefits. The possibility of meeting online, as has already been ascertained with the spread of video calls and smart-working, helps reduce travel for work. Nonetheless, tourism also suffers the technological influence, albeit in a more integrative rather than alternative way. In Web2, there are already virtual museums, online shows, live streaming, and many other substitutes for the reasons of tourist travel, especially in the cultural sector. Since the concept of Meta-tourism has already been raised in the Metaverse, saving the planet from aerial carbon emissions is an easy argument.

That the metaverse has the goal of making us stay more at home, as also argued by Mauro Martino,<sup>3</sup> seems verifiable from many points of view. Still, it is firmly contestable that the motivation is ecological.

An aspect of staying at home is that it is easier to invest more money online to purchase physical goods, for example on Amazon, and digital ones. This condition seems advantageous for all businesses that invest in the Metaverse; therefore, it can lead to hypothesize that it could be a much more felt motivation by companies compared to the prospect of eliminating the carbon emissions of air transit.

Furthermore, it is necessary to take into account that technologies, as always seen in the phenomena of the past, integrate into society by finding a balance.<sup>4</sup> Therefore, even considering that the metaverse can replace the totality of international physical transits is utopian. In any case, given the consumption of the blockchain, even with a decrease in flights, carbon emissions would be particularly consistent.

A \$1 billion investment in Bitcoin produces the same carbon emissions as 1.2 million petrol-powered cars<sup>5</sup>. Given that flights produce more than six times the amount of carbon of cars, a \$1 billion investment in Bitcoin would corre-

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1 Chaim Gartenberg, "Intel Thinks the Metaverse Will Need a Thousand-Fold Increase in Computing Capability," The Verge, December 15, 2021, <https://www.theverge.com/2021/12/15/22836401/intel-metaverse-computing-capability-cpu-gpu-algorithms>.

2 The Metaverse and How We'll Build It Together -- Connect 2021, 2021, [https://www.youtube.com/watch?v=Uvufun6xer8&ab\\_channel=Meta](https://www.youtube.com/watch?v=Uvufun6xer8&ab_channel=Meta).

3 Meet the Media Guru | Mauro Martino, 2022, <https://www.meetcenter.it/it/lecture/mauro-martino/>.

4 Meet the Media Guru | Michel Reilhac, 2022, <https://www.meetcenter.it/it/lecture/michel-reilhac/>.

5 Andrew Fenton, "Bank of America Analysts Slam Bitcoin: Buying 1 BTC Is 'like Owning 60 Cars,'" Cointelegraph, March 18, 2021, <https://cointelegraph.com/news/bank-of-america-analyst-slams-bitcoin-buying-1-btc-is-like-owning-60-cars>.



spond to 200,000 flights on average.

Even companies built to sustain the ecology of transport are subject to the fascination of the blockchain; Tesla, for example, invested \$1.5 billion BTC, equivalent to adding 1.8 million petrol-powered cars onto the roads. The scent of money is always more pleasant than that of clean air.

DNB made a comparison of the consumption of energy of different paying methods. According to their data, in 2020 the climate impact of a single bitcoin transaction could be estimated to equal about 402 kg of CO<sub>2</sub> emissions;<sup>6</sup> the current value of 1 BTC corresponds to 22 thousand dollars average (March 2023). Making a proportion between the energy consumption of 1 BTC (10<sup>8</sup> J) and its emission (402 kg), and the energy consumption of a corresponding amount of dollars, 22'000 \$, (10<sup>-2</sup>), we will get the result of the corresponding emission of 0,000000402 kg in the transaction.

By now, the scientific literature is full of data that speak clearly about the impact of the blockchain on the Earth and its comparison to the essential problems of the current historical moment gives goosebumps. A study published by Scientific Reports in September 2022 proves that the climate damages provoked by the average (2016-2021) of the worldwide transit of Bitcoins correspond to that provoked by the worldwide production of beef as a share of the market price. This value can also be compared to that of gasoline and natural gas generation.<sup>7</sup> Ultimately, it looks evident that the whole blockchain system, including the metaverse as it is set up now, is adding, in a brief time, a new environmental problem equal to those that have plagued the Earth for decades.

Paradoxically, what is light as it is non-material weighs almost more than the material itself.

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6 Juan Pablo Trespalacios and Justin Dijk, "The Carbon Footprint of Bitcoin," DNB Analysis' Series, by De Nederlandsche Bank (Amsterdam: De Nederlandsche Bank n.v., 2021), chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.dnb.nl/media/1ftd2xjl/the-carbon-footprint-of-bitcoin.pdf.

7 Benjamin A. Jones, Andrew L. Goodkind, and Robert P. Berrens, "Economic Estimation of Bitcoin Mining's Climate Damages Demonstrates Closer Resemblance to Digital Crude than Digital Gold," Scientific Reports 12, no. 1 (September 29, 2022): 14512, <https://doi.org/10.1038/s41598-022-18686-8>.

## Epitomization

This multifaced analysis shows the metaverse as a blurred concept with several interpretations. One is that of decentralized Web3 developers that emerged from the underground of the net and are creating the whole blockchain system piece by piece; another is that of videogame creators that opened their virtual worlds to events and social gathering; others are that of Meta that sees the future in game-aesthetic social platforms directed by single companies, and that of Microsoft, and similarly Google and Apple, that focus on the augmentation of the real and do not rely on virtual platforms.

What looks to be a common root is the need to make communication over long distances easier. The aim is not to sell new physical products - even if among the big companies, there is open competition for the best devices - but to sell new systems.

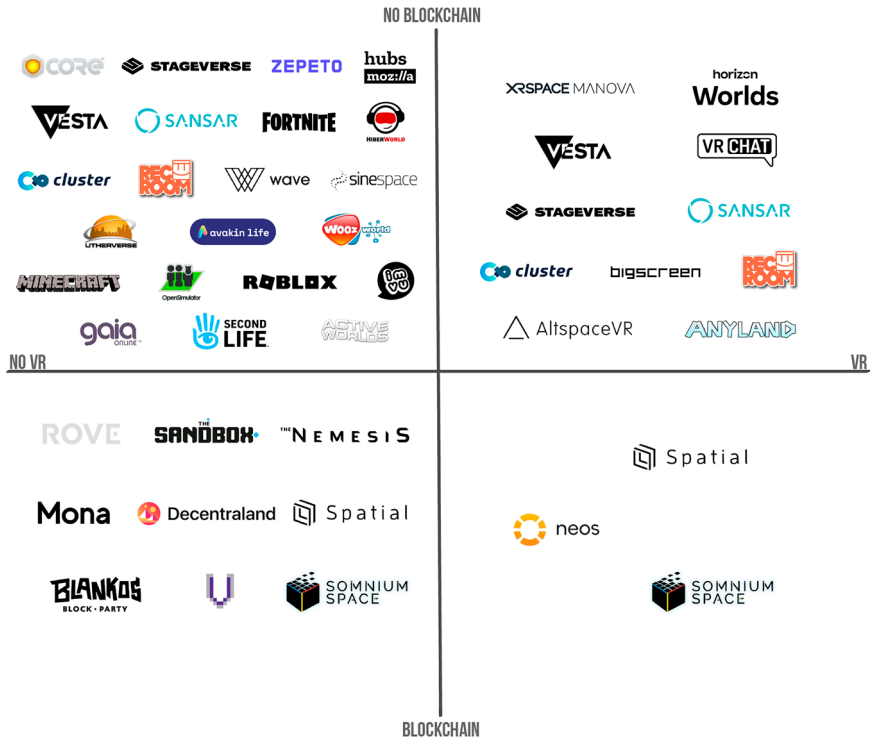
We can deduce that an increase of popularity of the metaverse, could be consequence of the need of “escape” pushed by the pandemic: many people realized their necessity and their will to be somewhere else than home but could not travel. Even aside lockdowns, that of finding easier ways to travel has been an open challenge for years and the solution now could be: not (physically) travel at all.

As explained in the chapter, the saving of time and transportations emission corresponds to a crucial energetic request, which is not sustainable in the current world energy system.

The amongous investments of companies and the realistic nature of many of the communication systems proposed under its name, leave no doubts about a potential fruitful evolution of the concept of metaverse. However, the form, or more likely the forms, it will take is not yet foreseeable, even if the promises of mixed reality seem to be a consistent solution to many current needs. Unlike it happened with smartphones' revolution, it is interesting to observe the awareness that the world has in approaching this new transformation of communication,<sup>1</sup> that hopefully will drive entrepreneurs to solve its main potential danger at the beginning: sustainability, politics and the social control of the platforms.

# MAP OF THE METAVERSE 2022

vincos.it



From Vincenzo Cosenza, Vincos Blog, <https://vincos.it/map-metaverse/11>

# LIST OF METAVERSES

*analyzed for this survey*

## **VR, No blockchain (18)**

- Ⓔ Unreal Engine (1998)
- ⊖ Roblox (2006)
- ⊖ Fortnite (2011)
- Ⓔ Anyland (2012)
- § AltspacVR (2013) - closed March 10, 2023
- ⊖ Bigscreen VR (2016)
- § Netvrk (2016) (based on Unreal Engine)
- ⊖ Rec Room (2016)
- § VR Chat (2017)
- § Stageverse (2017)
- Ⓔ Sansar (2017)
- § Cluster (2017)
- § Vesta (2018)
- § Mozilla hubs (2018)
- § Frame VR (2020)
- § Hoppin' World (2020)
- § Horizon Worlds (2021)
- § Manova World (2022)

## **Desktop, No blockchain (19)**

- § Active Worlds (1995)
- § Second Life (2003)
- Ⓚ Gaia Online (2004)
- § IMVU (2004)
- Ⓔ Minecraft (2009)
- Ⓚ Wooworld (2010)
- Ⓔ GTA online (2013)
- Ⓚ Avakin Life (2013)
- ⊖ Utherverse (2014)
- Ⓔ Rec Room (2016)
- ⊖ Wave (2016)
- § Sinespace (2016)
- ⊖ Hiberworld (2017)
- § Cluster (2017)
- § Zepeto (2018)
- ⊖ Core (2021)
- § Stageverse (2021)
- § Mytaverse (2021)
- § Martix (2022) (art metaverse)



- § social
- Ⓔ gaming
- ⊖ social+  
gaming
- Ⓚ kids

## **Desktop, Blockchain (7)**

- θ The Sandbox (2012)
- Ⓔ Sorare (2018)
- § Cryptovoxels (2018)
- θ Blankos (2020)
- θ The Nemesis (2021)
- § Mona (2021)
- § Rove (2022)

## **VR, blockchain (9)**

- § Spatial (2016)
- § Somnium Space (2017)
- § Decentraland (2017)
- Ⓔ Axie Infinity (2018)
- § Neos (2018)
- § Earth2 (2020)
- § Over the Reality (2020)
- § Blocktopia (2021)
- § Spheroid Universe (2021)



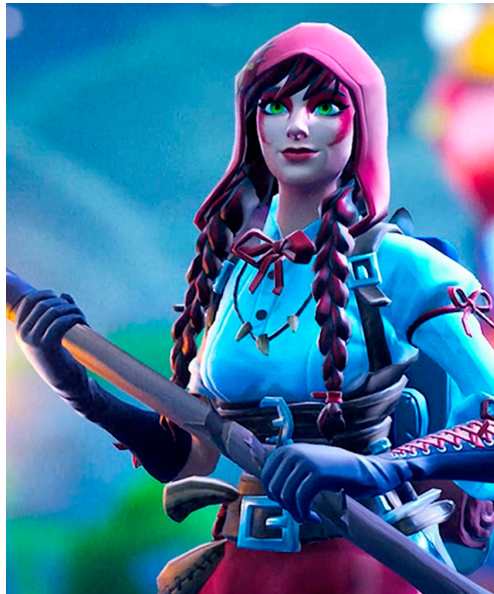
- § social
- Ⓔ gaming
- θ social+  
gaming
- Ⓚ kids

# FORTNITE

## 2017



matrix: gaming / social  
blockchain-based: NO  
VR: YES





**FORTNITE**®

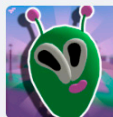
# ROBLOX 2006



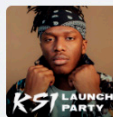
matrix: gaming / social  
blockchain-based: NO  
VR: YES



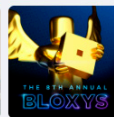
## Attività amici



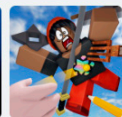
[👍] Gioco di Oggetti Gratis!  
👍 90% 👤 492



Festa di lancio di KSI  
👍 72% 👤 69



8a edizione dei Bloxy Awards  
👍 89% 👤 238

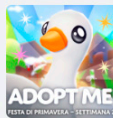


Lancia cose e persone  
👍 76% 👤 11.8K

## Gioco di ruolo nella vita reale



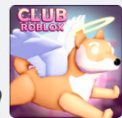
Brookhaven RP  
👍 87% 👤 503.6K



Adopt Me!  
👍 83% 👤 125.8K

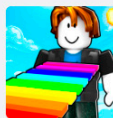


Pesce d'Aprile  
👍 91% 👤 77.8K



Club Roblox 25 MINUTES!  
👍 90% 👤 17.3K

## Platformer Obby



Parkour Obby  
👍 63% 👤 2.7K



LA FUGA IN PRIGIONE DI  
👍 59% 👤 23.6K



Mega Easy Obby  
👍 62% 👤 909



BABY BOBBY'S  
👍 47% 👤 12.5K





# MINECRAFT 2009



matrix: gaming  
blockchain-based: NO  
VR: NO



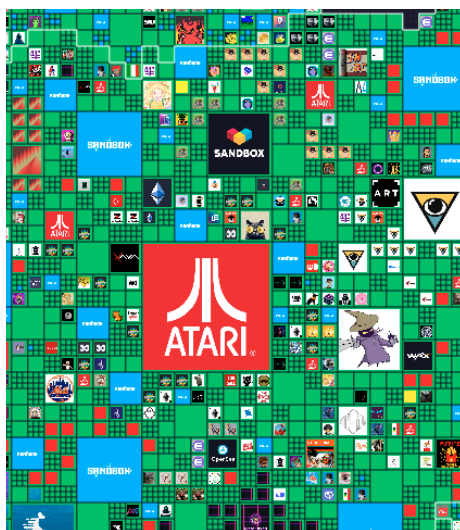
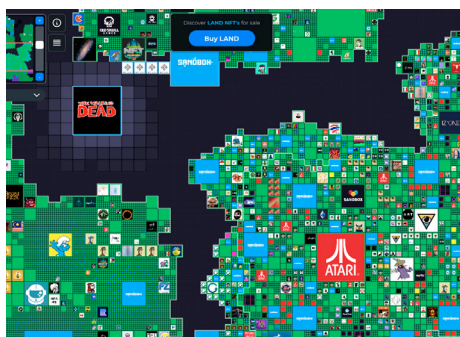




# SANDBOX 2012



matrix: gaming / social  
blockchain-based: YES  
VR: NO



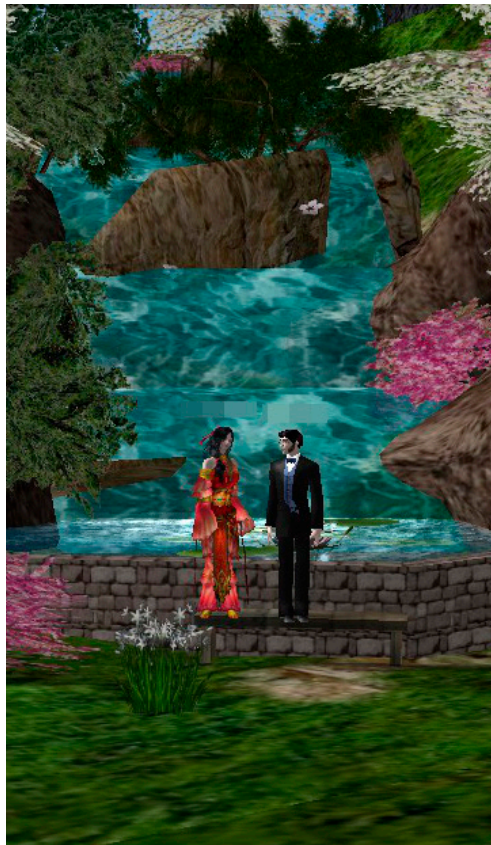


# ACTIVE WORLD

## 1995



matrix: social  
blockchain-based: NO  
VR: NO







Own your own  
trial world for 30  
days free

Maintain a contact  
list to keep in touch  
with your friends

Locate and join other  
citizens anywhere in  
Active Worlds

Invite  
for  
to  
ly

Build your own  
home in  
cyberspace

Send telegrams  
to other citizens

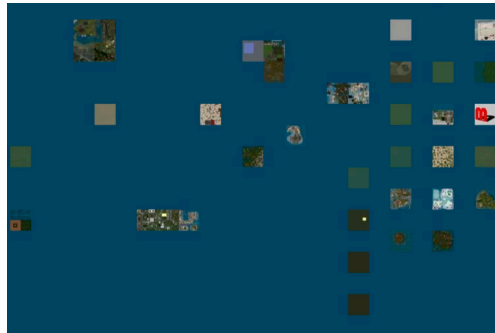
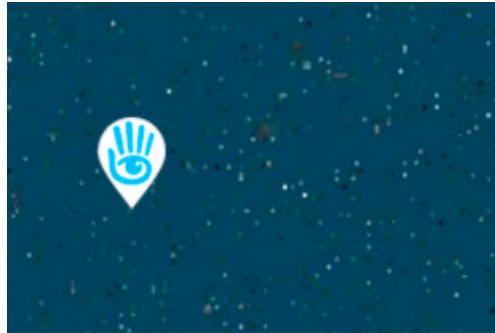
Your construction  
remains under your  
control and cannot be  
deleted by other's

ride  
world  
world

# SECOND LIFE 2003



matrix: social  
blockchain-based: NO  
VR: NO







- Mode
- Statistics
- Whereplace
- Avatarland
- Camera's controls
- Destinations
- Area search
- Search
- Debug settings
- Preferences
- Appearance
- Inventory
- Photocost camera
- Photocosts
- Group chat

Conversations - Nearby Chat

seconds!

Renay Chat [10:21] Meahua Simoni: bye everyone

[10:21] neenep Awep: (Granny Daviau) Happy SL48

[10:21] American Hon on Story: (Sancele

(Sobhousaely, was nice to see you both )

Wha!! (Crimo (a lighter) ...+)+Excuse Me

Viki! (Crimo (a lighter) ...+)+Excuse Me

[10:21] Sherry Singer: Great to see you guys.

[10:21] SKATER Headrick: lol

HELLO kity

AWA bye warren

(Sobhousaely) lol

[10:21] Louise Francoise de Dampierre Heslinas:

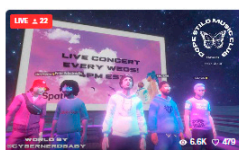
# SPATIAL 2016



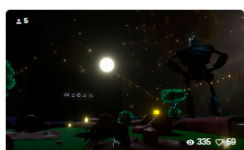
matrix: social  
blockchain-based: YES  
VR: YES



Your Spaces



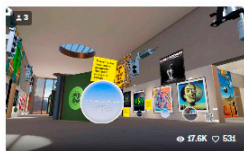
**STILO WORLD** by Cybernababy  
DOPE STILO



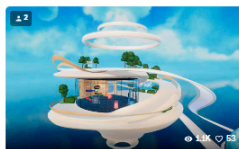
**PressBe's Backyard Theater**  
PressBe



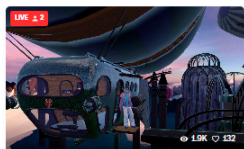
**HARLEM FILM HOUSE**  
BOOGIE



**metaverse tattoo convention**  
donkersL.eth



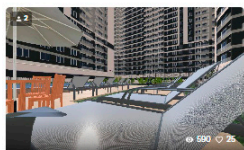
**Energie in Viaggio**  
Buzzoola



**The Tower**  
detach



**META TAROT READINGS**  
ar113



**Gran Kazzas Sacomù Club**  
Inovação Grupo Kallas



Tyrone

Y. GBCamelo

Bil Escobar

Y. GBCamelo

Y. GBCamelo

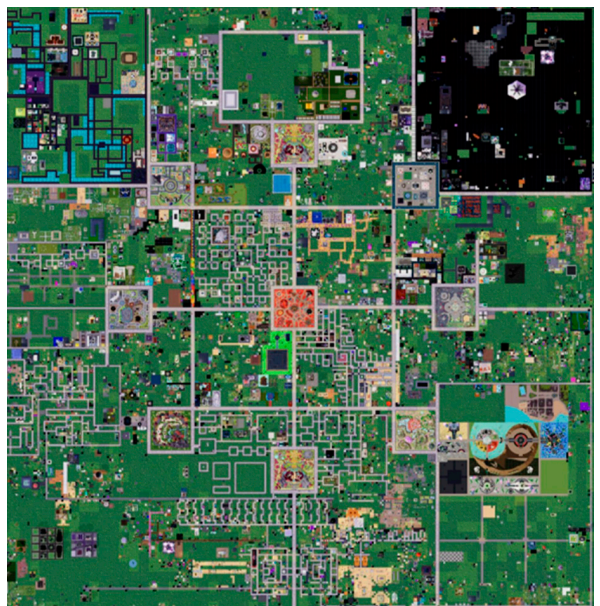
Y. GBCamelo



# DECENTRALAND 2017



matrix: social  
blockchain-based: YES  
VR: YES





# HORIZON WORLD 2018



matrix: social  
blockchain-based: YES  
VR: NO



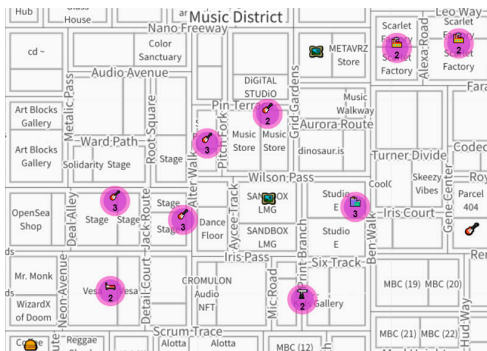
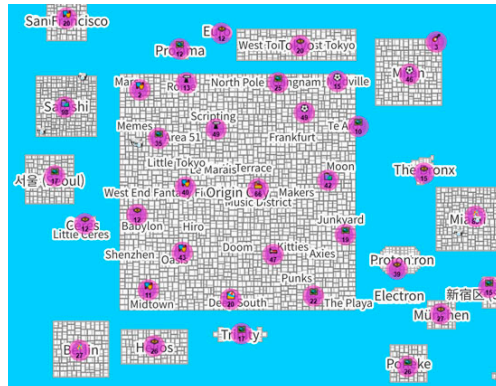
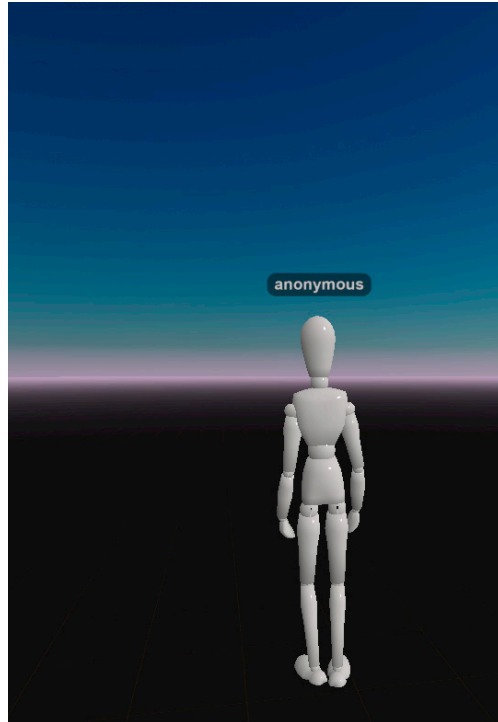




# CRYPTOVOXELS 2018



matrix: social  
blockchain-based: NO  
VR: YES



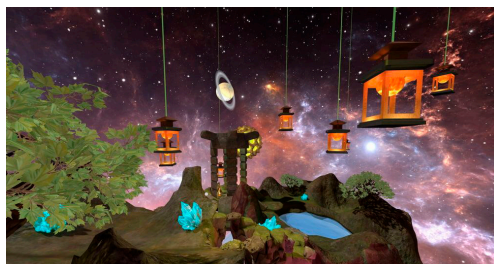


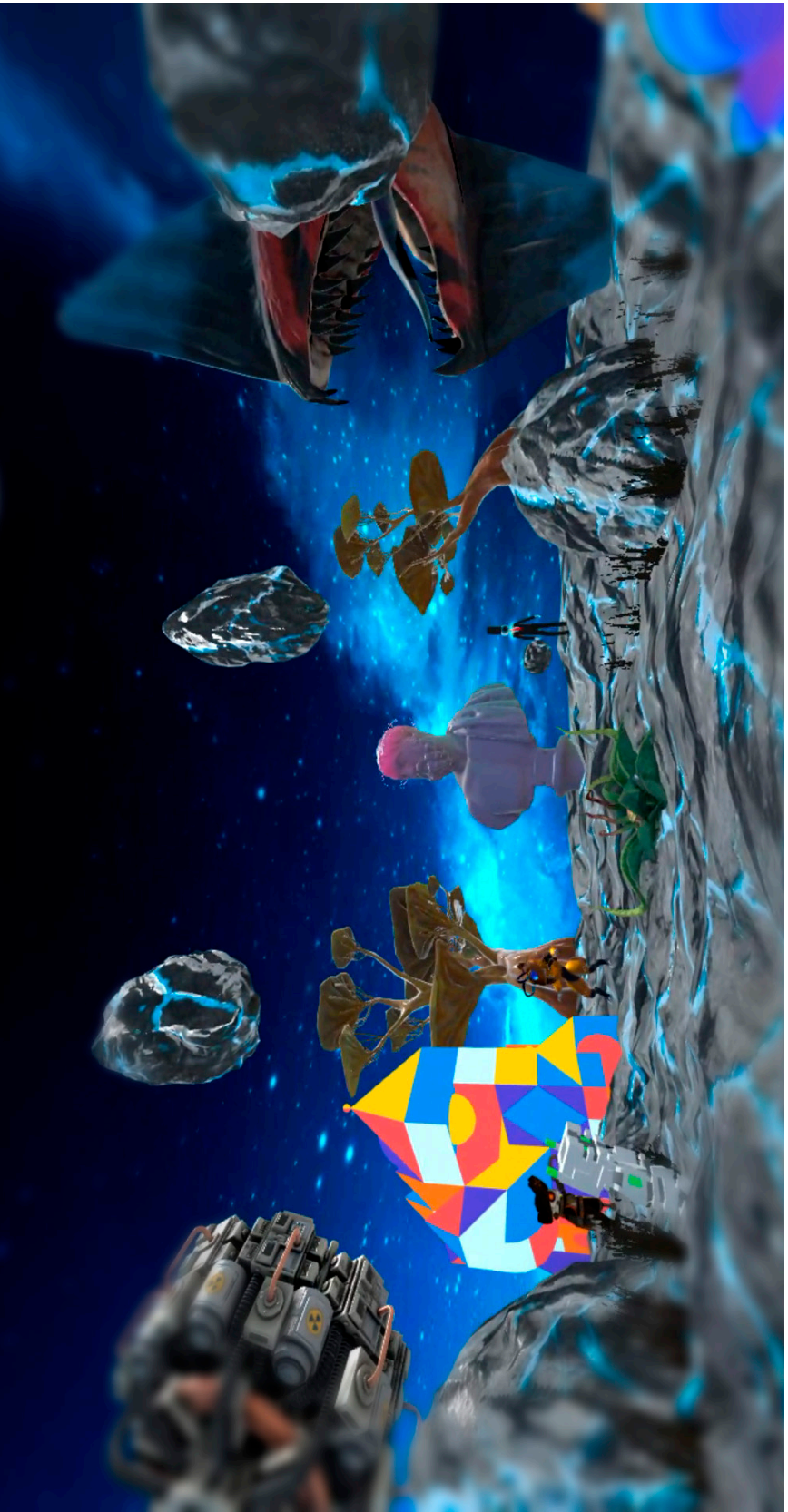


# MOZILLA HUBS 2018



matrix: social  
blockchain-based: NO  
VR: YES





# NFTS

*in the space*

(Chapter)

→ 5

- / Institutions and NFTs
- / Exhibitions in the metaverses
- / Exhibitions in non-metaverse platforms
- / NFT Physical exhibitions

## NFTs and Institutions

Owning an NFT relates straight forward to the will to show it.

Metaverses are the fastest answer to this need. Nevertheless, they are not the only places in which it is possible to do it; in fact, already many institutions and galleries created autonomous virtual spaces that do not respond to the definition of metaverse given in this document either because they don't allow the synchronic presence of users or don't use avatars. Also, many physical institutions, NFT-based or attracted by the NFT phenomenon, have organized IRL exhibitions in their spaces.

To better exemplify the different cases of NFT exhibitions, we might delineate three categories: exhibitions in the metaverses, digital exhibitions in non-metaverse platforms, and physical exhibitions.

The browser-based exhibition is not an invention related to NFTs; the firsts date back to the nineties<sup>1</sup>. Since then, with the development of digital art, a discussion has opened on the best method to show and explain this type of art. During the pandemic, many physical institutions approached virtual exhibitions, doubling their spaces online. The result was the possibility to see galleries and museums in VR or from the computer, similar to Google Streetview. This added little to the experience; indeed, the 2D use was more comfortable and communicative in many cases. Instead, some artist-driven projects have designed experiences that exploited the possibility of the virtual space; these examples mainly appertain to contemporary art institutions.

In any case, NFTs and frenetic evolution of technology generates the problem of conservation and archives. Even if the links to platforms and exhibitions are kept, it is not sure that the domains will remain open and functional forever. Therefore, the transience of technology has put professionals in front of a new nuance of conservation and fruition.

Regarding NFTs, museum regulations still need to be made more explicit due to the promiscuous relationship between acquisition and use. There have been some cases in Italy, even if heatedly debated, in which museums minted an NFT - such as Tondo Doni from the Uffizi Gallery.<sup>2</sup> Rarer are the acquisitions of crypto artworks by museums. The first was made in 2015 by the MAK Museum in Vienna,<sup>3</sup> and the purchased artwork was Event Listeners (2015) by the artist Harm van den Dorpel, realized on the occasion of the *MAK NITE Lab Digital Superposition - The File as an Object and sold in Bitcoin*.<sup>4</sup> Not all countries have the same rules, though; during the event *The New Atlas of Digital Art* that took place in Milan in June 2022, the director of the future National Museum of Digital Art, Ilaria Bonacossa, explained that Italian na-

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1 Brian Droitcour, "From Blockchain to Browser: Exhibiting NFTs, Part One," *Art in America*, August 12, 2021, <https://www.artnews.com/art-in-america/features/nfts-curation-online-exhibitions-crypto-art-1234601534/>.

2 Desirée Maida, "Uffizi Vende Opere in Digitale. E Il Ministero Interviene per Bloccare Tutto," *Artribune*, May 25, 2022, <https://www.artribune.com/professionisti-politica-e-pubblica-amministrazione/2022/05/uffizi-vende-opere-nft-ministero-blocca-tutto/>.

3 Domenico Quaranta, *Surfing with Satoshi. Art, Blockchain and NFTs* (Ljubljana: Aksioma, 2021), p. 221.

4 Judith Anna Schwarz-Jungmann, "Press Release - MAK Purchases Digital Art Work by Harm van Den Dorpel with Bitcoin," April 23, 2015, [chrome-extension://efaidnbmninnkpbpcjpcglclefindmkaj/https://www.mak.at/jart/prj3/mak/data/uploads/downloads/presse/2015/Harm\\_van\\_Dorpel\\_e.pdf](chrome-extension://efaidnbmninnkpbpcjpcglclefindmkaj/https://www.mak.at/jart/prj3/mak/data/uploads/downloads/presse/2015/Harm_van_Dorpel_e.pdf).



tional museums were not yet allowed to own a wallet, which prevented them from the possibility of acquiring this kind of artworks.<sup>5</sup> Still, there is the possibility of exhibiting them, which explains the presence of temporary exhibitions of NFTs also in public institutions.

From the point of view of a museum collection, the impossibility of acquisition so far has been limiting for preservation; though, in the case of NFTs, it is possible to save a file without owning it. The legislative uncertainty on the issue of images in free circulation already created a historical case in 2021: that of the GAM, i.e., the Global Art Museum.

This previously unknown collective minted some artworks belonging to the collections of significant institutions without agreeing with them. The NFTs of the works were sold on OpenSeas with explicit associations to the museums that instead did not know anything about it.<sup>6</sup> The event was first pointed out on Twitter by Tina River Ryans, curator of Modern and contemporary art at the Albright-Knox Art Gallery in Buffalo. The specific situation involved the Rijksmuseum in Amsterdam, which immediately replied, declaring not to have any partnership with the GAM. The collective was then forced to remove the reference to the museum on its marketplace page, but the works remained for sale.

Two days later, on the 15th of March 2021, the GAM published a new post on its platforms saying, “you have been punked,” informing that the whole project was a social experiment to highlight the ease of creating issues related to the digital reproduction of public domain works.<sup>7</sup>

A relevant example of an institution based on the NFT culture is the *NFT Museum in Seattle* (SNFTM), which opened in January 2022. It is the first NFT museum in the world, and it exhibits a broad collection of artworks but does not own any. The collections are, in fact, curated and exhibited with the tag *courtesy of or on loan*.<sup>8</sup> In addition to managing heritage differently from the traditional one, this museum boasts an unconventional community-based approach. Indeed, it represents a physical landmark for the community of artists and collectors in the area<sup>9</sup> and is based on meeting and exchanging.

The basis of its diversity can be found in the background of its founders, Peter Hamilton and Jennifer Wong, both from the business field; on the museum website, they openly declare themselves as non-experts, open to learning on the way.<sup>10</sup>

The approach of the SNFTM is significant for the discussion about contemporary heritage, and it is proof of how the mingling of professions and fields

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5 Ilaria Bonacossa, “Nuovi Modelli Culturali Ed Economici Nell’arte” (The New Atlas of Digital Art, MEET Milano, June 24, 2023), [https://www.youtube.com/watch?v=kk05z4EMreQ&ab\\_channel=MEETDigitalCultureCenter](https://www.youtube.com/watch?v=kk05z4EMreQ&ab_channel=MEETDigitalCultureCenter).

6 Sarah Cascone, “A Collective Made NFTs of Masterpieces Without Telling the Museums That Owned the Originals. Was It a Digital Art Heist or Fair Game?,” *Artnet*, March 21, 2021, <https://news.artnet.com/art-world/global-art-museum-nfts-1953404>.

7 Frances Liddell, “Disrupting the Art Museum Now!: Responding to the NFT Social Experiment,” *Curatorial Practices*, March 16, 2021, <https://www.culturalpractice.org/article/disrupting-the-art-museum-now-responding-to-the-nft-social-experiment>.

8 Peter Hamilton to Lucilla Grossi, “Questions about the SNFTM,” February 19, 2023.

9 Chris Talbot, “New Seattle NFT Museum Aims to Highlight Digital Artists Educate Art Lovers about Billion Dollar Trend,” *The Seattle Times*, January 4, 2022, [new-seattle-nft-museum-aims-to-highlight-digital-artists-educate-art-lovers-about-billion-dollar-trend](https://www.seattletimes.com/entertainment/arts-entertainment/new-seattle-nft-museum-aims-to-highlight-digital-artists-educate-art-lovers-about-billion-dollar-trend/).

10 Taylor Dafoe, “Two Tech Executives Are Opening an NFT Museum in Seattle to Give Decentralized Art a Centralized Home,” *Artnet*, January 14, 2022, <https://news.artnet.com/market/permanent-nft-museum-set-open-seattle-2060360>.

can trigger a change in an established system.

As discussed for visual language, and communication, NFT art could lead to rocking the boat in all the disciplines working with art. The arrival of the barbarians always leads us to question the world as it was seen before and forces us to readapt it to new needs.

Developing the sense of community on which the decentralization of crypto is based could be a game changer for many institutional systems that deal with an audience.

At the basis of the design method, there is, in fact, the openness to the promiscuity of disciplines, which allows processes belonging to other fields to be implemented within different projects.

## Exhibitions in the metaverses

The category of exhibitions in the metaverses covers a consistent number of cases.

Especially certain semi-copy worlds, such as Decentraland and Cryptovoxels, look to be fundamentally designed as NFT exhibition places.<sup>1</sup>

Decentraland is interesting for its urbanistic nature; its map includes both private lands and themed districts that are, as previously mentioned, democratically governed by the owners; for its peculiar politic system, it is a well-known reference to the metaverse community systems. Here resides the digital headquarters of Sotheby's, inaugurated in 2021 - a building in full nineteenth-century style with a doorman with a top hat in front of the central glass sliding door;<sup>2</sup> Decentraland also hosts the MoCDA, the Museum of Contemporary Digital Art, an utterly digital institution that monitors the Italian and worldwide NFT art panorama.

Cryptovoxels boasts a lower ambition to create new stable communities and is based mainly on the sale of buildable lots; it is the scenario of many auctions, and NFTs display areas swarm.

NFT artworks can be exhibited in buildings owned by single users or spaces belonging to cultural institutions, such as museums or art galleries. In the metaverses, no digital building is primarily meant for private use because the purposes of the virtual worlds are public;<sup>3</sup> therefore, houses take more the connotation of public spaces than private nests, even if they look like it: accessing an art exhibition sometimes feels like walking in an open private villa.

Aside from private collections, it is possible to find cultural institutions based on the metaverse, as the previously mentioned MoCDA. The museum was created in 2021 and is directed by the curator Serena Tabacchi - whose curriculum mainly develops in contemporary art.<sup>4</sup>

The building that hosts the exhibitions is a skeuomorphic example of contemporary architecture. It is structured in floors reachable through a lift designed as a teleportation portal: one of the very few elements in the building that exploits the a-geography of the virtual world.

The exhibition develops as if set in an IRL space: the bi-dimensional images cover the walls, and some three-dimensional artworks stand on the floor. Users can pilot their avatars freely around the museum and get as close as they want to the art pieces.

The MoCDA constitutes an emerging attempt to put some order in the NFT world from a curatorial point of view. Its institutional mission is to help research in the digital art field and document and spread the knowledge of this evolving world.

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1 Domenico Quaranta, *Surfing with Satoshi. Art, Blockchain and NFTs* (Ljubljana: Aksioma, 2021).

2 Brian Droitcour, "Brick and Voxel: Exhibiting NFTs, Part Two," *Art in America*, August 19, 2021, <https://www.artnews.com/art-in-america/features/nft-exhibitions-galleries-metaverse-1234602008/>.

3 Andrea Daniele Signorelli, "Who Is Designing the Architectures of the Metaverse?," *Domusweb*, February 9, 2022, <https://www.domusweb.it/en/news/2022/02/09/the-metaverse-real-estate-market-from-investment-to-design.html>.

4 Federica Pogliani, "La Digital Art Storica Di Marjan Moghaddam per Il Nuovo MoCDA Virtuale," July 24, 2021, <https://www.exibart.com/progetti-e-iniziative/la-digital-art-marjan-moghaddam-mocda-decentraland/>.



Although their vision sounds generic and declares to work with renowned and new digital artists, the past exhibitions primarily focused on NFT art.<sup>5</sup>

The MoCDA is not an isolated case of skeuomorphic exhibit design; a significant part of the metaverse exhibitions look like it.

Also, in the case of art galleries, which constitute a very common typology of art spaces, the project line is frequently the same. Analyzing the five art galleries on Spatial highlighted in the official metaverse's blog in an article of the 26th of September 2022,<sup>6</sup> three on five look reproductions of traditional physical galleries (*NeoSutras Metaverse Art and Wellness Center*, *1111 Gallery*, and *Tyrone Webb Spray Paint Artist's Futuristic Landscapes*)

The other two propose a similar exhibit design approach, but in different kinds of spaces; *Hi CeeCee's AI Art Gallery* is an open-air gallery, and *Hajime Tsuruta's Tower Art Gallery* is situated in a speculative virtual building.

In addition to numerous galleries designed as buildings, Spatial hosts some exhibition spaces that go beyond the idea of walls and ceilings and can be considered works of art; it is the case of the *Cave Art Gallery*,<sup>7</sup> which is a plausibly terrestrial landscape in which NFTs are exhibited on rock escarpments or float in the air.

Mozilla Hub is another metaverse that hosts many galleries. As in the previous cases, it is possible to find many skeuomorphic spaces<sup>8</sup> as well as some more speculative ones, but the feeling of safety given by walled spaces, however, seems to be prominently sought after by the creators.

The metaverses put at disposal an easy system to create an exhibition space that, in whole NFT spirit, every user can manage and own. The side effect of the democratization of art spaces is the reduction of the selection of works, the so-called art curation, and a decrease in the quality of the design of the spaces. Some metaverses, such as Spatial, offer a pre-set system of rooms to start creating an art gallery. This facilitation implies a very long list of identical spaces, with the connotations of the traditional white box, which contains different images hanging on the walls. This phenomenon consistently follows the process of democratic accessibility that social networks have established in contemporary society. The concept of "you can do it too" opens the possibility of success to potentially anyone, but since only a tiny percentage of users will succeed - presumably the most gifted and subversive - it leads to the creation of an infinite number of bad copies of contents that crowd the web<sup>9</sup>. In general, the augmentation of the ease of use corresponds to a lowering of the skills required and, consequently, to a lower quality of the system.

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5 "Museum of Contemporary Digital Art," MoCDA, accessed February 1, 2023, mocda.org.

6 "What Is an NFT Gallery? 5 Galleries to Visit in Spatial!," Spatial.io (blog), October 26, 2022, <https://www.spatial.io/blog/what-is-an-nft-gallery-and-5-galleries-to-visit-in-spatial>.

7 "Cave Art Gallery," spatial, accessed February 16, 2023, <https://www.spatial.io/s/Cave-Art-Gallery-63748a10f07ed8000192ca6e?share=9206148654806795207>.

8 "5 Inspiring Galleries Built with Hubs," Mozilla Hubs (blog), January 21, 2022, <https://hubs.mozilla.com/labs/5-incredible-art-galleries/>.

9 Valentina Tanni, *Memestetica* (Roma: Nero Edizioni, 2020).

## Exhibitions in non-metaverse platforms

Many galleries and curators dealing with NFT art have opened independent platforms.

First, this prevents them from being forced into the formal uniformity that characterizes the metaverses.

It is possible to find many projects with a solid cultural basis created by contemporary art professionals and novices directly emerging from the NFT art world.

Not all independent platforms present themselves as speculative, but the need to set up a complex digital system inhibits many amateurs; therefore, it is more frequent to find worthwhile projects than in pre-set systems such as the metaverses.

Some of these exhibitions take the shape of 3D freely navigable environments, whereas some consist of 2D curated collections of images. Some other interesting projects are actual marketplaces in which sales and curation go parallel.

The following is a selection of exhibitions that the author found particularly valuable or found to be widely discussed in the literature, selected to give an overview of the exhibition scene of this category.

Among the most speculative 3D spaces for digital and NFT art, there is New Art City. Founded by Don Hanson, this platform has been active since 2020 and works as a toolkit for artists.<sup>1</sup>

It is structured as a multitude of digital rooms, each hosting an exhibition.

Frequently, New Art City organizes art residences with new names from the contemporary art scene. The quality of the selection of the artists is an added value to a particularly interesting setting from the design point of view.

The artists themselves design the rooms: they are given a space to model and fill with their digital artworks.

The exhibit space is a boundless void in which geometric shapes float and are accessible to the users; there are no avatars, but the visitors fully control their movement in space. Even the sound aspect helps to outline the spatiality: the spatial audio individuates an emission point, and by distancing from it, the volume is lowered until exhausted, as it would happen in real life. The space is not designed for a human body, which allows being free to create the fruition narrative.

New Art City has also been noticed by Rhizome, which partnered in the exhibition NFS NSFW NFT in July 2021. The organizers were the three artists Christopher Clary, Pearlyn Lii, and Mark Ramos, at the time residents at New Inc, the art-and-tech incubator at the New Museum in New York.<sup>2</sup> The entire exhibition was conceived as an NFT, as in other cases, such as in the "Freeport" exhibition by the Epoch Gallery. Minting the NFT of the exhibition instead of the artworks highlighted the value of the curation and led the attention of the potential patrons to the need to support that practice rather than claim the artworks.<sup>3</sup>

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1 Brian Droitcour, "From Blockchain to Browser: Exhibiting NFTs, Part One," *Art in America*, August 12, 2021, <https://www.artnews.com/art-in-america/features/nfts-curation-online-exhibitions-crypto-art-1234601534/>.

2 Zachary Kaplan, "Now Online: NFS NSFW NFT An Art & Code Exhibition," *Rhizome*, July 21, 2021, <https://rhizome.org/editorial/2021/jul/21/now-online-nfs/>.

3 Brian Droitcour, "From Blockchain to Browser: Exhibiting NFTs, Part One," *Art in America*,

*Freeport* opened a month before NFS NSFT NFT in June 2021 and is another example of a 3D exhibition on an independent platform. The platform is the site of the Epoch Gallery, opened by Peter Wu in April 2021. Unlike the previous exhibition, *Freeport* is set in a skeuomorphic space, whose connotations are carefully designed according to its concept. The space is designed as a “storage space for art,”<sup>4</sup> whose ceiling has cracks and weeds invade the floor; it is conceived as the limbo in which the artworks acquired as speculative investments languish and are forgotten. The curatorship is used as a weapon of protest, or at least of reflection, about the same market its works overlook. As in the case of the previous exhibition, the artists come from the world of contemporary art. This was the first opportunity to interface with the minting for several of them.

A similar format to New Art City's is that of SPUR.WORLD. Artistic residencies trigger a dialogue among artists, pushing them to elaborate on the NFT phenomenon. In this case, 125 graduating students of 2020 worked on the platform for six months.<sup>5</sup> The website is structured in rooms, as in the abovementioned cases, each hosting an artist. The freedom of the artists in designing the spaces free their creativity; in fact, the works are varied in aesthetics and concepts and are often speculative.

An earlier institution is *The Digital Museum of Digital Art* (DiMoDA), which is specialized in cutting-edge VR artworks. Conceived by Alfredo Salazar-Caro and William Robertson in early 2013, DiMoDA has set up four digital and physical exhibitions with different professional curators. One of them, *Dis/Location*, was curated by Christiane Paul, Professor of Media Studies at the New School and Adjunct Curator of Digital Art at the Whitney Museum of American Art, one of the most prominent figures in academic research on digital art. Paul's background already suggests a solidity of the institution from a cultural point of view.

The exhibitions took place in physical spaces in many cities worldwide while being digitally at the disposal of everybody.<sup>6</sup>

DiMoDA does not focus its work on NFTs but is a relevant example of a not-metaverse-based exhibition. In *Dis/Location*, the virtual exhibition building was created in collaboration with the architect Ayman Tawfeeq<sup>7</sup> and is a relevant part of the storytelling.

NFT exhibitions curated by professionals in the contemporary art field frequently deal with the redefinition of the meaning of NFT contracts and the unbalancing they provoked in the art world. It is also the case of *Pieces of Me* (May 2021), an exhibition co-curated by Nichole and Wade Wallerstein. The experimental media art gallery TRANSFER and left.gallery collaborated to

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August 12, 2021, <https://www.artnews.com/art-in-america/features/nfts-curation-online-exhibitions-crypto-art-1234601534/>.

4 Brian Droitcour, “From Blockchain to Browser: Exhibiting NFTs, Part One,” *Art in America*, August 12, 2021, <https://www.artnews.com/art-in-america/features/nfts-curation-online-exhibitions-crypto-art-1234601534/>.

5 “SPUR - A Virtual Residency,” curator's website, accessed February 20, 2023, <https://www.chaosmagic.space/spur>.

6 DiMoDA 4.0: *Dis/Location* - Artist and Curator Talk, YouTube video, 2022.

7 “*Dis/Location*,” accessed February 20, 2023, <https://dimoda.art/exhibitions>.

select 50 digital artists whose works would be sold with regular contracts or crypto, optionally as NFTs. The mostly treated themes were identity, resistance, desire, liminality, premonition, mysticism, beauty, hope, and the concept of the curation discussed the intention of the transactions, which was developed primarily in the acquisition system that the exhibition enhanced. The artists would receive 70% of the sale and an extra 50% royalty upon resales; moreover, 30% of every sale would be distributed to all artists and the art workers that contributed, which created a new fair economy for the exhibition. This could be interpreted as an implicit try to treat digital art as a “distributed network,” that has the purpose of equally redistributing resources instead of concentrating them.

Pieces of Me also consists of many rooms, but unlike the previous cases, each collects the works of many artists with the same theme. There is no spatial design; indeed, the exhibition is a 2D collection.

2D digital galleries are the straightforward evolution of museum curations. Their role is as relevant as the 3D ones, even if they lack spatial speculation. Feral File could be considered one of the most renowned; it was co-founded by the artist Casey Reas, and it hosts monthly different contemporary art curators, such as Domenico Quaranta, for the exhibition For Your Eyes Only (December 2021) and Tina Rivers Ryan for Peer to Peer (November 2022). Similarly to Pieces of Me and many other 2D exhibitions, the exhibitions consist of a collection of images - the artwork's preview - accompanied by a text written by the curator covering the narrative function.

Feral File differs from the others for a substantial connotation: it is a marketplace.

Therefore, it is possible to purchase the artworks directly from the exhibitions. In the NFT context, finding a platform interested in educating investors is rare; the works are usually just tagged with a hashtag. As Theodora Walsh wrote, referring to the exhibition Social Codes (March 2021), Feral File highlights the potential of the blockchain “as an archiving tool,” since every presence of an image and every transaction leaves an indelible trace on it.<sup>8</sup>

The JPG platform implements a more emblematic kind of curation, for example, in the exhibition Deep Time (July 2021). We could talk about massive curation since the community has the power of the selection, and no professional nor institutional verification supervises or control the process. It looks more like Pinterest than a museum, as asserted by Brian Droitcour.<sup>9</sup>

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8 Theodora Walsh, “Generating Community,” *Art in America*, April 12, 2021, <https://www.artnews.com/art-in-america/features/social-codes-casey-reas-community-generative-art-1234589396/>.

9 Brian Droitcour, “From Blockchain to Browser: Exhibiting NFTs, Part One,” *Art in America*, August 12, 2021, <https://www.artnews.com/art-in-america/features/nfts-curation-online-exhibitions-crypto-art-1234601534/>.

## Physical exhibitions

Although less frequent than digital exhibitions, many examples of physical exhibitions have already been realized. Especially after the pandemic that enhanced the NFT phenomenon, art institutions and galleries based in physical spaces have developed an interest in NFT art, both for economic interest and for curiosity or belief in this kind of digital development of the art culture.

Physical exhibitions require a more complex regulatory process and a relevant investment; therefore, more aspects are taken care of. All the case studies consulted for this research have a curator in charge of selecting the exhibited works; instead, the exhibit design aspect is frequently lacking and oversimplified.

Let's get digital was the exhibition title in Palazzo Strozzi in Florence (18th May 2022- 31st July 2022) and well exemplified the simplistic and childishly enthusiastic feeling of jumping into a field seen as external and unexplored. Excitement apart, Palazzo Strozzi is not new to digital art; it is a reliable institution that organizes relevant contemporary art exhibitions of many of the main protagonists of the contemporary scene (Ai Wei Wei in 2016, Bill Viola 2017, Marina Abramovic in 2018, Olafur Eliasson in 2022) and also in the digital art field, as in 2019 with the exhibition VISIO Moving Images After Post-Internet. Let's get digital was curated by Serena Tabacchi, the founder of the MoCDA, and Arturo Galansino, general director of the Palazzo Strozzi Foundation, within the project Palazzo Strozzi Future Art. The artists involved were Refik Anadol, Anyma, Daniel Arsham, Beeple, Krista Kim, and Andrés Reisinger, essential names in the NFT art context.<sup>1</sup>

The exhibition took place in the internal cloister of the palace; a great screen positioned upon the internal facade welcomed the visitors with a work by Refik Anadol. The use of the screen provokes in this position a contrast with the renaissance architecture, enhanced by Anadol's piece, Machine Hallucinations - Renaissance Dreams (2022). The artwork consists of a video elaboration of 12.335 renaissance paintings made by artificial intelligence.<sup>2</sup> The rest of the exhibition is inside the palace, and the screens are the only elements used for the installation. The screen in this exhibition is sometimes used as a space modifier. The variation of dimensions and inclinations of the monitors induces specific movements of the users and dynamic perception of the space.

Molding the space with screens is rare, as often they only hang on the wall as traditional picture frames, for example, in the entire exhibition of the Seattle NFT Museum. In the first exhibition at the DART, the Dynamic Art Museum in Milan, DART 2121 Crypto Art is Now (11/2021 - 02/2022),<sup>3</sup> all the pieces were exhibited following the model of screens-as-frames. The monitors were displayed on black stands that held them at eye-height. The stands involved the visitors on a nonlinear path in a neoplastic forest on which the artworks

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1 "Archivio Mostre," Palazzo Strozzi, accessed February 23, 2023, <https://www.palazzo-strozzi.org/archivio-mostre/>.

2 Refik Anadol, Renaissance Dreams – Palazzo Strozzi, 18 May 22 - 31 Jul 22, 18 May 22 - 31 Jul 22, <https://refikanadol.com/works/renaissance-dreams-palazzo-strozzi/>.

3 "DART 2121," Dynamic Art Museum, accessed February 24, 2023, <https://www.dynamiceartmuseum.com/dart-2121-second-edition-nft-art-of-the-future-30-03-2022-24-05-2022/>.

regularly follow one after the other. Even if the repetition of the Mondrian-like black displays had the purpose of shaking the linearity of the fruition, the result was a linear line of screens with many chaotic legs.

In the second edition (03/2022 - 05/2022),<sup>4</sup> there has been a significant change in the interpretation of gallery space through physical staging involving screens. The DART also opened its gallery in many metaverses (Decentraland, Arium, Spatial, Musae, Martix, and the Sand Box) and has even created its platform, DART Dynamic Metaverse. Paradoxically, spatial experimentations have been implemented more in the physical gallery than in the digital ones, which still appeal to a more traditional exhibition style.

The element used for the exhibition did not formally modify the spatiality of the rooms but enhanced the dynamic of the path. The installations were of three kinds: mirror rooms, sectioned rooms, and flooring changes.

The mirror rooms consisted of parallelepipeds opened on one side. The central vertical wall was a screen, and the four other sides were mirrored surfaces. The mirrors gave the impression of the infinite extension of the image on the screen while stepping inside the rooms.

The sectioned room consisted in an upside-down living room, on which floor laid three screens showing the artworks. On the frontal wall was a sofa, and on the two lateral ones, two doors were inserted and flipped according to the room orientation. In this case, there was no ceiling to suggest better the continuity of the sectioned part of the room. The narrative increased its literality in the final installation: the flooring was a green moquette that simulated the grass. On the moquette, six monitors were positioned vertically and adorned with fake flowers emerging from the floor. This display was created specifically for the series of 3D flowers by Luna Ikuta that alternated on the screens in a slideshow.

The use of fake flowers might have been an attempt to highlight the theme of life and death. Still, the skeuomorphic nature of the intervention makes it appear particularly kitsch and unnecessarily decorative.

The exhibit technique of the mirror rooms was also used in the context of the Venice Biennale 2022, in the exhibition organized and curated by the institution of digital culture Aorist.

The title was Venice: CodeX and involved the artists Rafaël Rozendaal, DRIFT, and Jonas Lund in different locations<sup>5</sup>. The work of Rozendaal, in the sale as NFT, was exhibited in a mirror room; in this case, the room was bigger than DART's, and the visitors could walk in it instead of just stepping; the dimension of the room multiplied the feeling of infinity.

Venice Biennale 2022 did not include any NFT in the curation. Still, another independent organization introduced NFTs in Venice and created the Decentral Art Pavilion. The exhibition set at the opening was titled Singularity and included over 200 NFT works by well-known international artists<sup>6</sup>. Also in this case, underlining the concept of democratic equality, the exhibition consists

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4 "DART 2121," Dynamic Art Museum, accessed February 24, 2023, <https://www.dynamcartmuseum.com/dart-2121-second-edition-nft-art-of-the-future-30-03-2022-24-05-2022/>.

5 Julia Kaganskiy, "Venice: CodeX," Aorist.art, accessed February 24, 2023, <https://aorist.art/program/exhibitions/aorist-in-venice>.

6 "Singularity - Decoding NFTs and the Future of Art," Decentral Art Pavilion, accessed February 24, 2023, <https://decentralartpavilion.io/nft-exhibition/>.

of screens of the same size arranged in the space at eye level.

Sotheby's exhibition in its headquarters in New York and London, *Natively Digital* (June 2021), was similar; the monitors varied in dimensions but not significantly and followed one another in line on the wall.<sup>7</sup>

A globally-thought screen installation was in the *Welcome to the Metaverse* exhibition at the Postmasters Gallery in New York from the 30th April to the 28th of May, 2022.<sup>8</sup>

It was a solo exhibition by NFT native artist Olive Allen and, as the title suggests, represented her reasoning about the metaverse. The rooms were painted blue, and the palette of the entire exhibition revolved around the cold tones of blue and purple, which suggest a dark and mysterious atmosphere. In the dedicated rooms, the screens followed a strict central line, and all respected the same size; however, rectangular monitors alternated with round ones creating a dynamic but ordinated visual impact. Only some of the rooms consisted of screen lines; also, 3D printed works were exhibited on thin parallelepipeds, breaking the monotony of the attention on the walls. One of the artworks, a purple bear, laid on the floor because high enough to be seen and had a solid scenographic impact. All the works, especially those hanging on the walls, were integrated with the space thanks to mural drawings and scripts that balanced all the elements without crowding the space.

The exhibition was designed as a game, with the help of the writings on the wall that suggested a narrative interaction of the visitor with the works.

The result was a visual exhibition that skilfully used space to make the viewer identify with its concept. Unpretentiously but with balanced results, the visitor's journey became a physical walk in the metaverse.

Working on the atmosphere creates an involving result; another approach to creating the ambiance was that of Lava Club curating *SUI GENESIS: Digital Shaping* (January 2022) for the gallery Reasoned Art.<sup>9</sup> The artists involved were Hardmetacore, Joe Karava, Waarp, and Paola Pinna, and the concept was reasoning on avatars as an extra-body.

Although the exhibition was made of screen hung on the walls, the difference from the previously discussed examples was light. The small rooms were lit just by the artworks, creating a feeling of artificial space, almost a dreamscape. An emphatic element was an arched door hole separating the two rooms, which looked to belong to the metaverse architectural language.

Being NFT art a new field still to discuss, many events took the advantage to advertise themselves as "firsts". While doing this research, the title "first" recurred many times with small differences in the definition - for example, "the world's first and largest physical crypto art exhibition," and "the world's first physical exhibition space dedicated solely to NFT artwork."<sup>10</sup> Although many "first" and "physical" exhibitions have been realized between 2017 and 2021,

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7 Brian Droitcour, "Brick and Voxel: Exhibiting NFTs, Part Two," *Art in America*, August 19, 2021, <https://www.artnews.com/art-in-america/features/nft-exhibitions-galleries-metaverse-1234602008/>.

8 "Olive Allen - Welcome to the Metaverse," Postmaster Gallery, 2022, [https://www.postmastersart.com/archive/olive22/olive22\\_direct.html](https://www.postmastersart.com/archive/olive22/olive22_direct.html).

9 "SUI GENESIS: Digital Shaping," Reasoned Art Gallery, 2022, <https://www.reasonedart.com/events/2aa8c83d-bd74-484a-8e63-c4ce262a1e96>.

10 Brian Droitcour, "Brick and Voxel: Exhibiting NFTs, Part Two," *Art in America*, August 19, 2021, <https://www.artnews.com/art-in-america/features/nft-exhibitions-galleries-metaverse-1234602008/>.

the following three were designed in a remarkably complete way compared to the other exhibitions analyzed from the point of view of both design and curation.

In March 2021, inaugurated *Virtual Niche: Have You Ever Seen Memes in the Mirror?* at UCCA Lab in Beijing.<sup>11</sup> It included works of the most famous NFT artists, such as Beeple, Hackatao, and Mario Klingemann, shown on regular screens. Still, the general overview of the exhibition looked dynamic and full. As in the second edition of *DART 2121 Crypto Art is Now*, a predominant narrative was suggested through physical installations that did not communicate with the works or did it in a kitsch way.

What added value to the IRL experience by being a physical element dealing with NFTs was a mining installation in one of the rooms as a reminder of how energy power is needed to generate the NFTs.

Almost all the other elements giving dynamic to the space had a decorative purpose that led the visitors into the “mood” of NFTs (which has a coherent consumerist aftertaste).

A few months later, in Austria, opened *Proof of Arts – A brief history of NFTs* (June 2021) at the Francisco Carolinum Museum, curated by Jesse Damiani with the collaboration of Fabian Müller and Markus Reindl.<sup>12</sup> This exhibition showed an analysis of the digital artworks that can be considered predecessors of crypto art and a path through the early experiments with blockchain. Finally, a collection of important artworks of the NFT panorama were exhibited, such as those by Kevin Abosch, Mario Klingemann, Krista Kim, Marjan Moghaddam, Nam June Paik, and Sarah Meyohas.<sup>13</sup>

The curatorial aim was to communicate the story of NFTs and raise questions about the evaluation of art.

*Proof of Arts* was designed using many exhibit techniques, but every installation was aimed at the direct exhibition or emphasis of a work of art. The result was a cleaner space than *Virtual Niche*, less pop, and more didactic than entertaining. The works are also on *Criptovoxels* in a city-like exhibition in the virtual headquarters of the museum.

The name *Proof of Arts* was probably a quote from another exhibition: *Proof of Work*.

*Proof of Work* was curated by Simon Denny and opened in the early September 2017. The location offered a good starting point from the spatial point of view; the Schinkel Pavillon in Berlin consists of irregular rooms with numerous acute and scalene angles, which create an unusual kind of spatiality.

What made the exhibition speculative were, first of all, the artworks. All the artists involved were non-digital contemporary artists who were invited to reason about the NFT phenomenon and produce something about it.

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11 BCA Network, “‘Virtual Niche’ – the World’s First Cryptoart Exhibition to Be Held in China (Press Release),” medium, February 26, 2021, <https://bcanetwork.medium.com/virtual-niche-the-worlds-first-largest-cryptoart-exhibition-to-be-held-in-china-4bb1c3c6b3a7>.

12 “PROOF OF ART Eine Kurze Geschichte Der NFTs, von Den Anfängen Der Digitalen Kunst Bis Zum Metaverse,” Website of Linz’s museums, OÖ Landes-Kultur Web, accessed February 26, 2023, <https://www.oekultur.at/exhibition-detail/proof-of-art-eine-kurze-geschichte-der-nfts-von-den-anfaengen-der-digitalen-kunst-bis-zum-metaverse-21be2?expired>.

13 OÖ LANDES-KULTUR, “Pressmaterial - PROOF OF ART a Brief History of NFTs, from the Beginning of Digital Art to the Metaverse,” 2021, chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/[https://ars.electronica.art/newdigitaldeal/files/2021/09/PROOF\\_OF\\_ART-Press\\_Kit.pdf](https://ars.electronica.art/newdigitaldeal/files/2021/09/PROOF_OF_ART-Press_Kit.pdf).



Only one NFT was exhibited: the CryptoKitty n.127, in the work Celestial Cyber Dimension. The Kitty was exhibited in a display from a Christie's-supported auction and contained as a black and white relic in a blockchain asset storage device: a hardware wallet.<sup>14</sup>

Other works dealt with blockchain contracts, such as Premna Daemon by the digital collective terra0; this work was composed of a virtual element shown on a screen and a physical part, i.e., a 24-year-old bonsai connected to a power system - water and light - which keeps it alive. A blockchain-based tipping system makes it possible to donate Ethereum for maintenance and vote for the care of the tree. Investors decided, therefore, on the bonsai's faith. The screen showed the video footage of the plant IRL and broadcasted donations in real-time.<sup>15</sup>

Works with both 2D and 3D connotations facilitate the work of the designers in creating a movement in the space; this made this exhibition particularly compelling. Also, the quality of the artworks from a curation point of view is particularly high and dense in reasoning.

The example of Proof of Work is important as it is on the verge of NFT art but demonstrates how it is possible to make a speculative work both from a spatial and a curatorial point of view by reasoning on the theme and directly involving some works. NFTs are often conceived as very small images - for example, the crypto punks of 24 pixels- therefore, the homologated use on the big screen does not welcome and correctly communicate the value of all the work. Moreover, these digital works don't need a physical space to be exhibited, unlike painted canvases, so since there is an investment for an IRL viewing, it needs to add something to the experience. The role of exhibit designers could be fundamental for the qualitative communication of NFT works, highlighting a larger context and translating the reasoning of good curatorships spatially.

The format of Ferial Files looks so far to be the most balanced and complete system to enjoy NFTs, as it is possible to watch curated collections of works on any screen while they remain in their original form; the only possible interaction with them is the direct purchase from the marketplace, which is the final sense of minting. It is an appropriate model, which no spatial installation can improve. However, what the set up of the space can do, as in exhibitions of physical objects - also with virtual spaces - is to emphasize the reasoning behind the works. Concerning artworks without reasoning other than the aesthetic one, which was widely argued previously, the role of the creator and promoter of a larger scheme should compete with the designer, reasoning parallelly to the curatorship.

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14 Simon Denny, "PROOF OF WORK - Exhibition Guide," n.d., chrome-extension://efai-dnbmnnnibpcajpcgclcfndmkaj/https://artviewer.org/wp-content/uploads/2018/12/ProofOfWork\_ExhibitionGuide\_EN.pdf.

15 terra0, "Premna Daemon – An Introduction via a History of Autonomy in the Cryptosphere," medium, n.d., <https://terra0.medium.com/premna-daemon-an-introduction-via-a-history-of-autonomy-in-the-cryptosphere-3cee15e92fe2>.

# LIST OF EXHIBITIONS

## *physical displays*

- SR AN SD **September 2017** Proof of Work, Schinkel Pavillon, Berlin
- SD **January 2021** Natively Digital, Sotheby's, New York
- MR **March 2021** Virtual Niche: Have You Ever Seen Memes in the Mirror?, UCCA Lab's, Beijing
- SS SR AN SD **June 2021** Proof of Arts, Francisco Carolinum Museum, Linz and Cryptovoxel
- SS **November 2021** DART 2121 - Crypto Art is Now, DART, Milan
- SS **January 2022** The Seattle NFT Museum, Seattle
- SD **February 2022** SUI GENESIS: Digital Shaping, Milan
- MR AN SD **March 2022** DART 2121 - NFT Art of the Future, DART, Milan
- AN SD **April 2022** Welcome to the Metaverse, Postmasters Gallery, New York
- MR **April 2022** AORIST - Venice: CodeX, Venice
- SS **April 2022** Singularity, Decentral Art Pavilion, Venice
- MR SR SD **May 2022** Let's Get Digital, Palazzo Strozzi, Florence



- SS Screens of the same dimension
- SD Screens of significantly different dimensions or shapes
- SR screens that shape the room
- MB Mirror boxes / spatial effects
- AN Allestimenti narrativi

# LIST OF EXHIBITIONS

## *digital displays*

M

**Decentraland** Sotheby's headquarters  
**Decentraland** MoCDA  
**Spatial** NeoSutras Metaverse Art and Wellness Center,  
**Spatial** 1111 Gallery,  
**Spatial** Tyrone Webb Spray Paint Artist's Futuristic Landscapes  
**Spatial** Hi CeeCee's AI Art Gallery  
**Spatial** Hajime Tsuruta's Tower Art Gallery  
**Spatial** Cave Art Gallery

W

**July 2021** NFS NSFW NFT, NAC (New Art City)  
**June 2021** Freeport, EG (Epoch Gallery)  
**August 2020** SPUR.WORLD  
**February 2022** Dis/Location, DiMoDA  
**May 2021** Pieces of Me, TRANSFER + left.gallery  
**(December 2021)** Notes for a Post-Human Human Vision, Ferial Files  
**November 2022** Peer to Peer, Ferial Files  
**March 2021** Social Codes, Ferial Files  
**July 2021** Deep Time, JPG

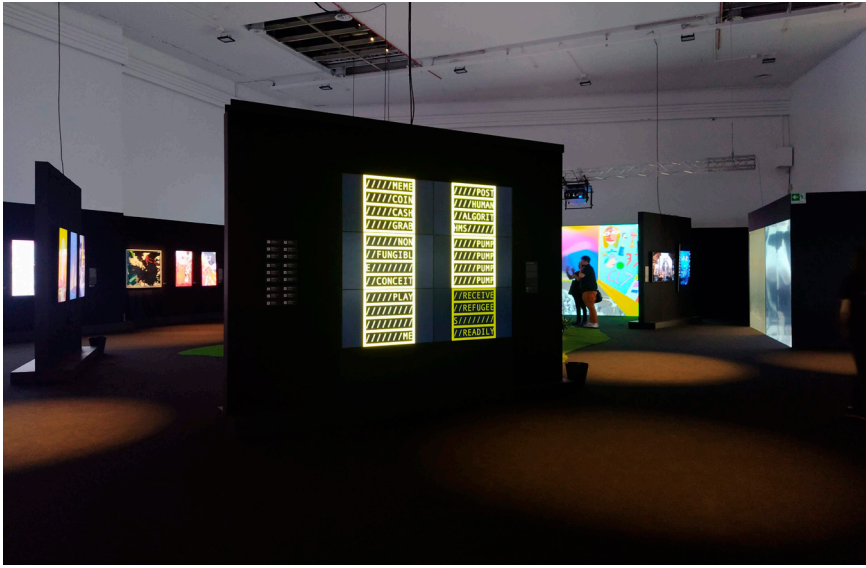


M  
M  
W

in Metaverses  
in other websites



DART 2121 - Crypto Art is Now, 2022



DART 2121 - NFT Art of the Future 2022





Venice: Code X, 2022



Singularity, 2022



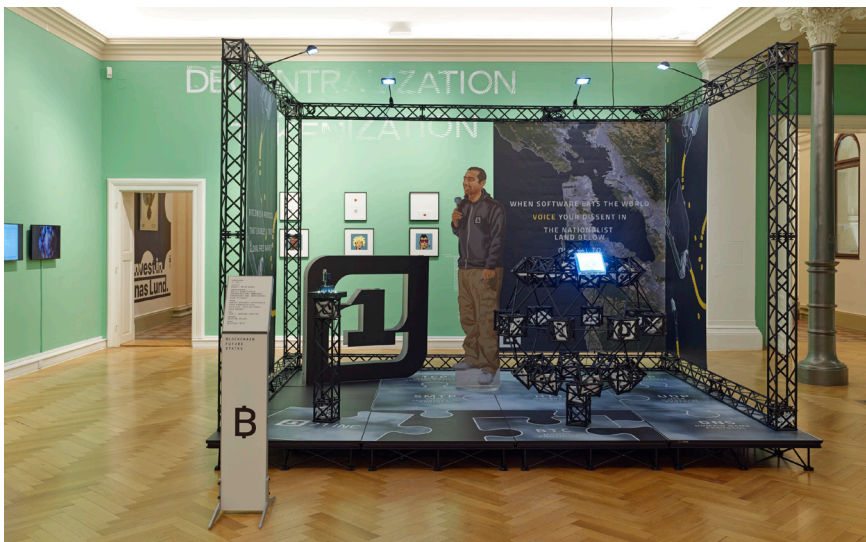
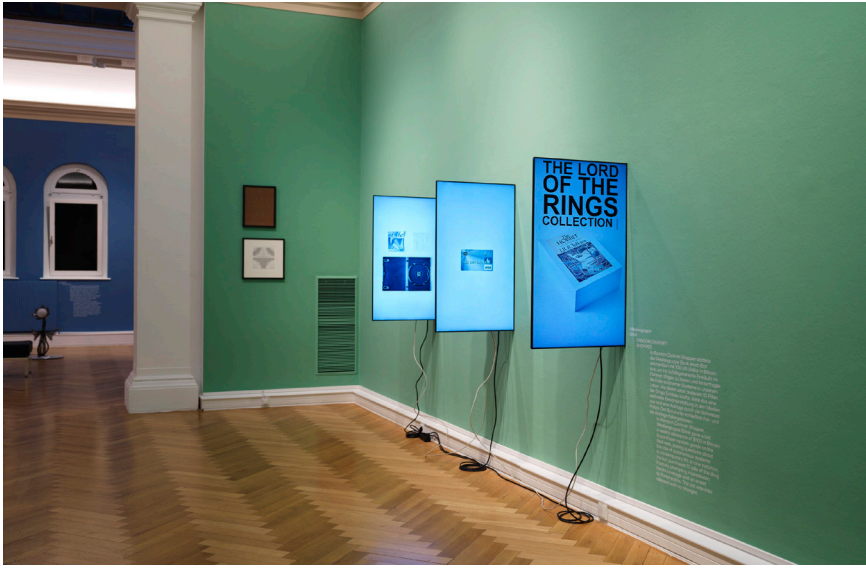
Let's Get Digital, 2022



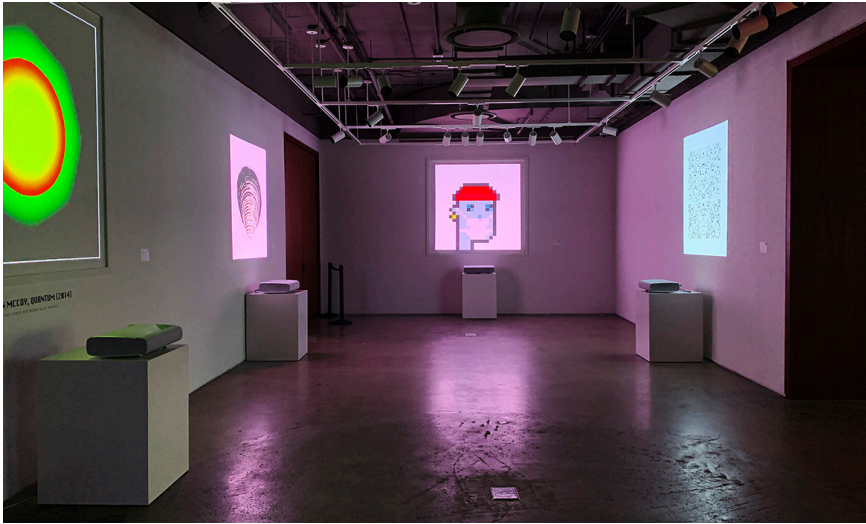


Virtual Niche: Have You Ever Seen Memes in the Mirror?, 2021

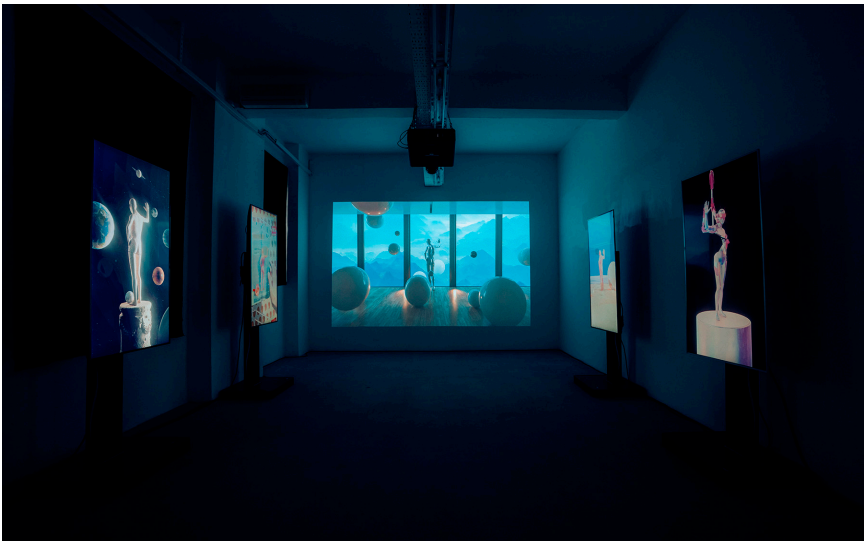
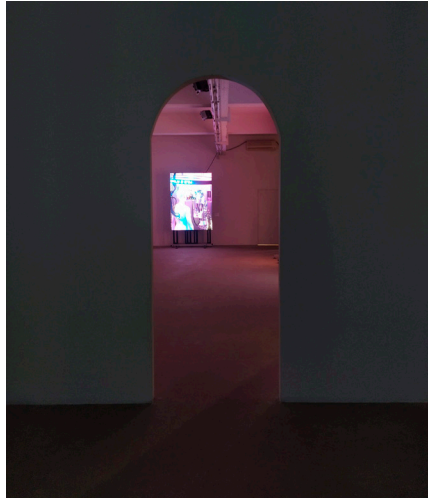
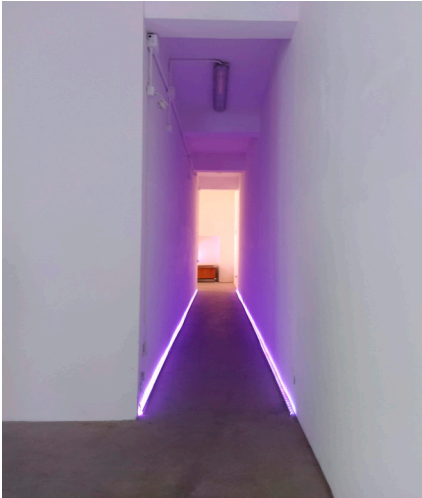




Proof of Arts, 2021

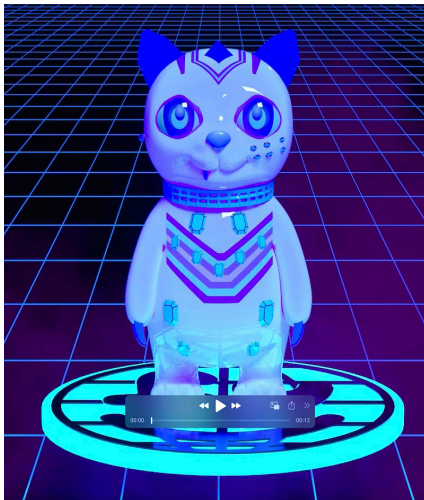
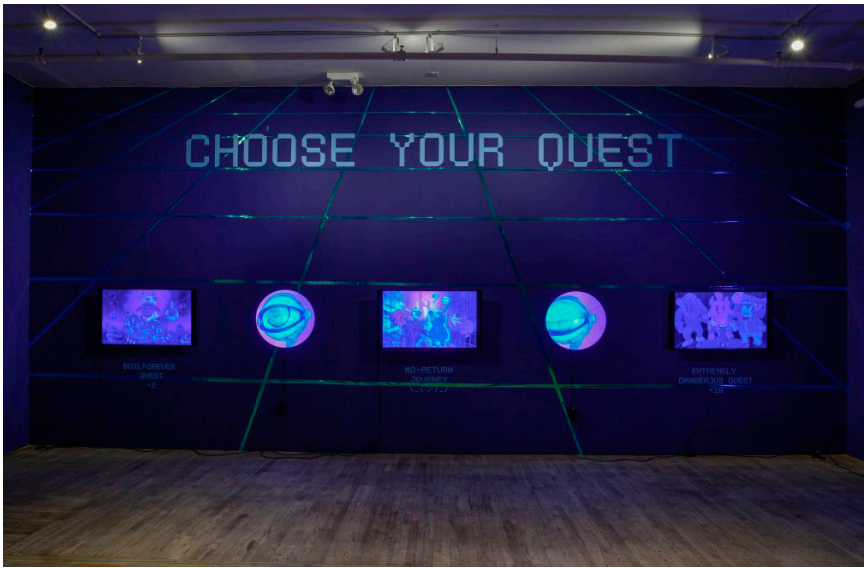


Natively Digital 2021



SUI GENESIS: Digital Shaping, 2022



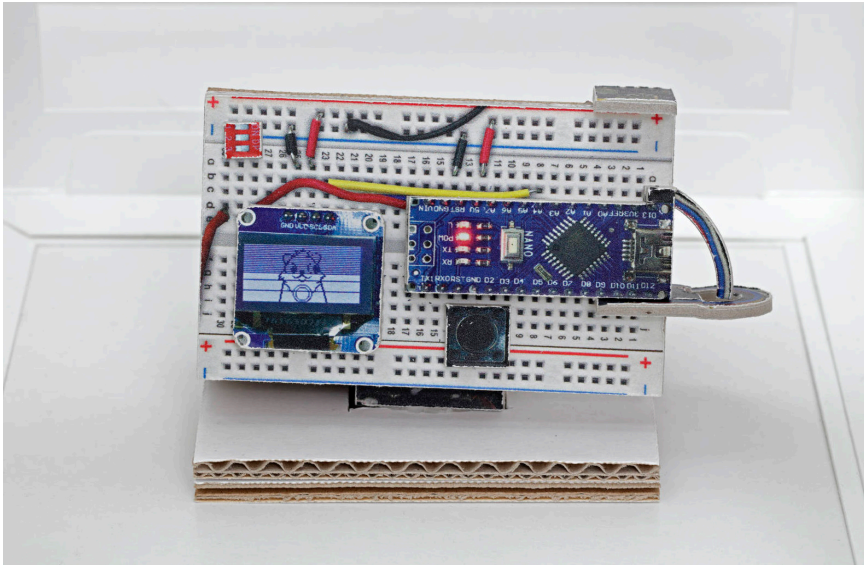


Welcome to the Metaverse, 2022



Proof of Works, 2017





Proof of Works, 2017

CONCLUSION  
*hybridization and  
culture*

(Chapter)  
→ 7

After having drawn the economic line of the evolution of the blockchain, NFTs can be easily framed in a clear initial picture that could be exemplified by the keyword “investment.”

Despite one of the two creators of the technology being a contemporary artist, the spread of NFTs took an economic turn. As NFTs looked to be the perfect fun pretext for investors in crypto-currencies to get into a more tangible asset - or at least visible - the market exploded from within, so with who was already in that field, which also started to produce images to sell. In fact, the aesthetic result of a significant part of NFTs, especially collectibles, is primary and doesn't involve any metaphorical elaboration<sup>1</sup>. The exact keyword could be used to understand metaverses, mostly gaming platforms that include in-game digital payments, therefore, a straightforward market for cryptocurrencies. Aside from the storytelling about digital sociality, metaverses are basically as NFTs: colorful assets.

Simplifying NFTs and metaverses in their nature of economic tools - NFTs as contracts and metaverses as markets - it looks like they both have the intrinsic essence of facilitators, and therefore they function through replicating existing systems that are familiar to people.

The art trade has the precise connotations of the real one, and in the same way, the sale of the lands in the metaverses is a copy of the real estate, not to mention the fashion market, in which the abstraction of the functional product reaches its maximum totality and therefore the importance of the brand is totalitarian of the purchasing interest. As markets have been replicated in a digital version, so have spaces in the metaverses, which frequently have skeuomorphic connotations of the real world.

Although these systems - markets, and spaces - require the essentialization of processes to achieve greater digital functionality, they tend to copy reality precisely, often weighing themselves down with unnecessary elements. The outcome is a depersonalized and sterile seriality.

In light of the investigations and critical analyzes elaborated in this document, a crucial lack emerges: that of what Manzini called “cultura del progetto” (design culture) and described as “meaningful context” in which projects are conceived and developed in order to produce new meanings.<sup>2</sup>

Converging the concepts of culture and enterprise, the economists D. Lavoie and E. Chamlee-Wright framed the “culture” as the “context within which people understand the world around them,” which is fundamental for the proficuous development of any field of work, especially economy.<sup>3</sup>

Both the creation of NFTs and the spatial planning of the metaverse are categorizable as Bariccoan barbaric acts, as they become bearers of a new culture that does not know its own project context.

Without the pretense and the will to eradicate the true essence of the blockchain context, which is decentralized and ethnically multifaceted, we must consider that the integration of the “cultura del progetto” would bring real benefits to the development of both NFT and metaverse systems. The methodological value at the base of art and design is constituted by the questioning, which leads to greater stability, credibility, and articulation of the projects.

Also the world of culture, intended as institutions and private workers that are

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1 “Talk: NTF e Arte, Bolla o Rivoluzione?” (Talk with 4 speakers, Volvo Studio Milano, May 4, 2022).

2 Ezio Manzini, “Design Culture and Dialogic Design,” *DesignIssues* 32, no. 1 (2016).

3 Don Lavoie and Emily Chamlee-Wright, *Culture and Enterprise: The Development, Representation and Morality of Business* (Routledge, 2002).

based on and re-discuss the concept of “cultura del progetto,” could benefit enormously from the exploitation of these new technologies. In addition to being able to feed on the New, constituted by blockchain technologies and dynamics, they could intercept the new web3 audience: cryptocurrency investors, gamers, and visitors of virtual worlds.

Both NFTs and metaverses are, by their essence, characterized by an extreme hybridization of art and design culture and are made dependent on each other by this mixture of background disciplines. As discussed in Chapter 3, creators of NFT art are commonly graphic designers, and conversely, artists are starting to explore virtual spatialities, as seen in experimental worlds. Even from a systemic point of view, the two dimensions are dependent on each other: purchases in the metaverses take place through NFTs, and to wear or expose the latter, virtual worlds are needed, especially as regards skins.

In addition, the hybridization takes place with a third discipline, computer engineering, which seems to have so far obscured the presence of the other two. Web3, therefore, shows a basic tendency towards multidisciplinary and the mixing of methodologies to achieve a common project. This constitutes a huge advantage from the outset, which opens the door to an interlaced dialogue between cultures - both discipline's cultures and those of individual decentralized users.

Not only the advantage of multidisciplinary is that of bringing more points of view into the construction of a project, therefore directing it towards greater concreteness, but the process of creation is enhanced by the connection of disciplines, as we can read in Neri Oxman's description:

*"The role of Science is to explain and predict the world around us; it 'converts' information into knowledge. The role of Engineering is to apply scientific knowledge to the development of solutions for empirical problems; it 'converts' knowledge into utility. The role of Design is to produce embodiments of solutions that maximize function and augment human experience; it 'converts' utility into behavior. The role of Art is to question human behavior and create awareness of the world around us; it 'converts' behavior into new perceptions of information."<sup>4</sup>*

Oxman made clear how the process is based on the enchainment of the disciplines; in fact, the phenomena surveyed within this research look frequently to stop at the level of “utility” or sometimes at “behaviour,” but the step of “new perceptions of information” has rarely been observed. Specifically, in the case of metaverses, i.e. immersive projects not far from the “Gesamtkunstwerk,” the inclusion of all project levels is necessary for the consistency and the value of the outcome.

In conclusion, the achievement of awareness that the design culture and art culture is still not integrated in a balanced way into the web3 must be read as an invitation for artists and designers to enter as soon as possible this dimension that needs to be sculpted, painted, and above all, designed know-ledgeably.

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4 Neri Oxman, “Age of Entanglement,” Journal of Design and Science, 2016, <https://doi.org/10.21428/7e0583ad>.



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