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The Digital Art Paradox - Understanding Its Issues and Dynamics

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Master's in art Markets

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Department of History

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Gratefully,

Beatriz Lopes Nascimento

Resumo

Ao longo dos anos tem havido uma clara separação – a resistência – entre o mundo da arte convencional e a arte digital. O ponto desencadeante desta dissertação é compreender a natureza paradoxal desta relação desde o início, proveniente da literatura basilar e da observação de dados.

A arte digital, apesar de ser um conceito que começou nos anos 50, ainda carece de consenso por parte das grandes instituições de arte, da academia, e do público em geral, até esta data. Este movimento, como pode ser categorizado, tem uma história complexa e em construção, que pode ajudar a compreender os aspetos intrínsecos da arte digital que estão a criar esta lacuna ao longo de todos estes anos.

O aspeto central que explica o paradoxo da arte digital é a relação entre os seus fatores externos - as instituições e organizações de arte - e os internos - a questão da imaterialidade e o problema da autenticidade e dos direitos de autor no mundo digital. A presente dissertação tenta analisar esta relação e traçar algumas considerações para o futuro da arte na crescente e próspera era digital.

Palavras – chave: Arte digital, Mundo da Arte, Mainstream, Rejeição, Imaterialidade, Direitos de Autor, Autenticidade

Abstract

Over the years there has been a clear separation – the *disavowal* - from the mainstream art world and digital art. The main triggering point of this dissertation is to understand the paradoxical nature of this relationship from the start, coming from the basilar literature and data observation.

Digital art, despite being a concept that began in the 1950s, still lacks consensus from the big art institutions, the academia, and the overall audience, to this date. As it can be categorized, this movement has a complex ongoing history that can help to understand the intrinsic aspects of digital art that have been creating this gap for all these years.

The central aspect that explains the digital art paradox is the relationship between its external factors – the art institutions and organizations – and the internal factors – the immateriality issue and the problem of authenticity and copyright in the digital world. The present dissertation attempts to analyze this relationship and to draw some considerations for the future of art in the growing and thriving digital era.

Keywords: Digital Art, Art World, Mainstream, Disavowal, Immateriality, Copyright, Authenticity

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Glossary

Art world - The art world comprises everyone involved in producing, commissioning, presenting, preserving, promoting, chronicling, criticizing, buying, and selling fine art. It is recognized that there are many art worlds, defined either by location or alternative definitions of fine art. Some may use the singular art world to refer only to the elite level of globalized fine art.

Algorithm - mathematical rule that governs computer processes.

Analog - representation of measurable numerical data-standard audio & videotape-old technology.

App/apps - a specialized program downloaded onto a mobile device. Short for application.

Big data - data that contains greater variety, arriving in increasing volumes and with more velocity.

Borrowing – the act of borrowing and/or copying from other artworks, respecting copyright.

Copy/paste - digitally, to select, to copy, & to insert the replica into the same or another document.

Copyright - part of art law. The legal right granted to creator, publisher, or distributor to exclusively publish, produce, sell, or distribute an artistic, literary, theatrical, or musical work. Fair Use and Public Domain are issues that are important in the copyright discussion. © This symbol along with the year declared, and the name of the owner (artist) signify Copyright.

Crypto art - crypto art is digital art that uses blockchain technology to verify ownership. Just as an original Matisse can have its authenticity verified, crypto art uses a non-fungible token (NFT) for verification.

Cryptocurrency - cryptocurrency is a digital currency, which is an alternative form of payment created using encryption algorithms.

Curator - person in charge of art collections, care, research, exhibition, and writing about the art. exhibits are set up by this person.

Data – facts and statistics collected for reference or analysis.

Fair Use - fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means specified by that section, for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright.

Hard-copy - a printed version on paper of data held in a computer. A print of a digital image.

IP – Intelectual Property**.**

Interface- a point where two systems meet and interact.

IT – Information technology.

Jpg/.jpeg – joint photographic experts' group. Graphic file format for compressing digital images.

NFT – Non-fungible token.

Non-representational – artwork with no recognizable subject: non-objective, non-figurative.

PNG - Portable Network Graphic. Bitmapped graphics file format endorsed by WWW Consortium.

software-written computer programs designed to direct a computer to do certain actions: word-process, manipulate images, design websites, and much more. Word and Photoshop are examples.

Virtual reality - interactive computerized simulation experienced by multiple senses.

WWW - World Wide Web-an information system of documents on public sites on the Internet that provide information using a point and click system.

Introduction

"Our contemporary age seems to be different from all the other historically known ages in at least one respect: never before has humanity been so interested in its own contemporaneity"

- "In the Flow", Boris Groys, 2016

The idea for the theme of this dissertation emerged during the latest boom in the art world – The NFTs' Spring of 2021. Non fungible tokens are a technology that emerged in 2015, but it was only in 2020 that it began to gain real relevance, thanks to its popularization. NFTs are units of data stored on a digital network, called blockchain, which consists of a database composed of several interconnected and fully decentralized blocks. All information that is minted and encrypted on the blockchain cannot technically be changed or hidden, and therefore this technology certifies a digital asset – an image or a video – as unique and immutable. NFTs were the open door to the world of digital art, that revealed to be a much more complex topic than one could imagine. To follow the thought process of this dissertation one must assume that there is indeed a specific definable reality that justifies the existence of the notion of "digital art". Digital art exists as the branch of contemporary art practice that reflects on the impact made by the Digital Era.

Since its very beginning, digital art was always on the margin of the so-called mainstream art world. The mainstream art world can be characterized as the domain of big galleries, auction houses, institutions as museums and foundations, biennials, and art fairs. Particularly, it was the relationship between digital art and the art world that encouraged this entire research.

After this starting point, and during preliminary research, it was the lack of academic studies focused on the theme of digital art and its estrangement from the mainstream art world that added to the reasons to direct the research of this dissertation into this path. To understand this estrangement, it was first necessary to explain what it is and what literature says about it, so the first chapter leans on the various notions of what digital art is, exploring the broad concept of terminology and assessing what the paradox of digital art consists of.

Then, attempting to comprehend the present and think about the future, one should focus on the past and on the history of digital art. Preceding the main chapter of this dissertation, the second one is dedicated to the before era and to the moment where digital art now stands.

To grasp this known marginalization, it was crucial to do a reassessment of the biggest issues with digital art. After crossing data with literature, it was time to concentrate on the problem of digital art. Digital art is bound to some internal and external factors that have worked as separation tools from its absorption into the art world. Intrinsic to its nature it is important to focus on the immateriality issue and all the myths and difficulties surrounding it. It is also important to lean on the question of authenticity and copyright, a big issue that comes from a legal perspective, which the art world is famously known to often play a blind eye on. External to its kind, digital art is also extremely dependent on the institutions, organizations and on the market side of the artworld, so it is essential to take a deep look into these complex relationships and reflect on the impact of them in the famous and infamous disavowal.

This dissertation rather explores issues than it is determinate to find definitive answers. Working on the present, the focus was to understand it throughout the past and to raise possibilities for a future that is left unknown. Looking from where humanity stands, it seems that the contemporary age is heavily different from others before. In Human's history, digital revolution seems, so far, the greatest and the more pungent one. Society has witnessed one of the biggest evolutions on earth in the briefest time. The digital revolution has drastically changed the way reality is perceived in every subject; art is no different. The perception of the Digital Age - one of the many ways this contemporary era can be addressed - has irreversibly shaped the world of art. More and more artists are integrating digital technologies into their artwork, which creates a new dimension inside the art world dynamic.

CHAPTER 1
Digital Art Paradox – A Literature Review

1.1. What is Digital Art?

"It seems impossible to pin it down and safely categorize, institutionalize, and commodify it; at times, new media art seems more alive than its practitioners want it to be. "

- "New Media in the White Cube and Beyond: Curatorial Models for Digital Art", Christiane Paul, 2008

Digital Art – as it is going to be addressed in this dissertation further – describes the realm of technological arts, with fluid boundaries that offers many possible interpretations of the terminology. The term has progressed through time and while computer art, multimedia art, and cyber-art were the standard practices during the 1960s until the 1990s, the rise of the World Wide Web added a coating of connectivity that resulted in a language and cultural shift (Chatel, 2020). The term is yet in need to be consensually coined and institutionalized, due to its unconventional history, placement in the artworld and constant reconfiguration (Paul, 2008). Together with the terminology struggle, from a contemporary perspective, it is also quite difficult to find a good description of digital art. Most show an exaggerated focus on the specific techniques and on technologic semantics once artists have appropriated technological terms and transport them to the art lexicon. The constant evolution of the field complicates the observation and analysis of its processes and production (Lorenzo, 2013).

Historically, digital art has been around since the 1950s and its roots are set in conceptual and performance art. The term is generally used to represent the art made within the digital era. In a technical and broad way, it refers to the art that uses digital technology as part of the creative process (Thomson-Jones and Moser, 2021) and, most of the time, also as the medium of the artwork itself. According to Tate's Art Terms, digital art is "a term used to describe art that is made or presented using digital technology".

In her 2016 book, A Compendium to Digital Art, Christiane Paul disagrees with the overall notion of the last definition - not all digital art made in the digital era and using digital technologies can be classified as digital art. Many works use digital technologies as a production tool, but do not necessarily reflect on these technologies, they are made using digital mechanisms but have the same finality as traditional works that were produced using various analog mechanisms decades or even centuries ago. So, besides being made in the digital era and using digital technologies, digital artworks must be "computational; process-oriented, time-based, dynamic, and real-time; participatory, collaborative, and performative; modular, variable, generative, and customizable, among other things." (Paul, 2016, pag.2) Also these artworks can appear in various formats like "installations; software or Internet art without any defined physical manifestation; virtual reality or augmented reality; locative media art distributed via mobile devices, such as smartphones, or using location-based technologies ranging from the global positioning system (GPS) to radio frequency identification" (Paul, 2016, pag.2).

This dissertation leans toward Paul's definition and further tries to understand why this movement is also characterized as being "the art of our times" (Grau, 2007, p.1). Digital art is deeply related to the internet revolution and its progression to the social media era (Paul, 2015), a revolution that would change society in many ways, aesthetically being one of them. Digital art can be seen as a time-dependent movement, it would never happen in another time frame. More than technical it is temporal, it is the art born in the digital era, and it must reflect it, in a discursive and representational way (Gronlund, 2016).

1.1.1. Evolution of Terminology

Undoubtedly, a consensus around terminology reduces ambiguity and increases clarity when discussing puncturing topics. For communication to flow more efficiently it is almost compulsory that terminology for digital art is discussed in this dissertation. This terminology evolution follows digital art growth and settlement in the mainstream art world.

Christiane Paul (2016) states that the terminology for technological art has always been "extremely fluid" and has changed over time. In between the 60s and 90s, it was often referred to as computer art, multimedia art, or cyberart. Names like interactive art, art and technology, media arts, electronic art, new media art and virtual art also appear in the literature and were pinned by artists and academics (Lorenzo, 2013).

Computer art was linked to the period of novelty of computers, describing art made within that period frame, the term has fallen out of use and was and still is associated with bad and

tacky art. (Grau, 2007) It was one of the first tries to name digital art. Net art came along a little later in the picture. Computer art was the art produced with the aid of computers; Net art follows the same logic with the internet, and it is also the name of a 90s collective – *net.art*- that worked in the medium of Internet as a critique of the art world (Gronlund, 2016).

Multimedia art describes artworks made from a range of materials including electronic elements such as audio or video. According to Tate's section on digital art, the term was first used in the 1960s to describe events like those staged by Andy Warhol with the rock group The Velvet Underground, under the title of the *Exploding Plastic Inevitable*, where music, performance, film, and lightwork were combined. The term can be included under the umbrella of digital art but cannot be a substitute. It is still used, referring to specific works of art and not an artistic stream.

Cyberart is a tricky term since it can be seen both as a branch of digital art or one initial term that dissolved into the contemporary used ones. The definition of cyberart is very similar to the one being used for digital art nowadays, "art produced with the help of computer hardware and software" (Jacobson, 1992). Historically, cyberart (Figure 1.1) has always struggled to make its way into the recognized world of art. However it was able to mark an aesthetic period that ultimately developed in subsequent movements, that could overlap, such as media arts, expanded cinema, and mechanical artwork production merging in the ultimate form of digital art (Gronlund, 2016). The aesthetic of cyberart also developed what can be called parallel terms - like systems art. This movement uses systems as a medium and has also a parallel aesthetic theory (Shanken, 2015). Virtual art, electronic art, and technologic art are niche parallel terms that can be set under the larger wing of the overall media arts. They are largely connected to the virtuality of the medium that is being used to support the artworks. They can still be used to specify the aesthetic of a particular work, but they are not strong enough as a separate movement.

Figure 1.1 - Tod Machover of MIT Media Lab unveils the Hyper-Glove and conducts musicians at CyberArts International 1990. Source: wikipedia.org/wiki/File:Machover.jpg

Digital art is also often compared to new media or media art, concepts that emerged at the beginning of the 2000s. The one present problematic qualifier is the "new" in the new media. It always implies its integration, datedness, and obsolescence and, at best, leaves room for accommodating the latest emerging technologies. Some of the concepts explored in "new" media art date back almost a century—and others even several centuries —and have previously been addressed in various other traditional arts. That's why the term digital art can be comprehensive to a more global reality. In general rule, the terms digital art and new media can be used interchangeably with some nuances (Paul, 2016).

Adding to the evident struggle with terminology and category, some literature suggests the separation of digital art and post-digital or post-internet art (Chan, 2012). According to Christiane Paul (2016), the new terms "post-digital" and "post-Internet" are a contemporary attempt to describe a condition of artworks and "objects" that are conceptually and practically shaped by the Internet and digital processes. They reflect the internet culture as the standardized culture, where the digital doesn't have a particular meaning when disconnected from other values like aesthetical, social, or functional (Lorenzo, 2013). This new term aligns with the "New Aesthetic" notion (Figure 1.2) by James Bridle at SXSW1 (Bridle, 2011). Said notion is used to refer to the increasing appearance of the visual language of digital technology and the Internet in the physical world, and the blending of virtual and physical. The "post" condition is important to the author because it represents the post-medium condition of digital art, allowing new forms of materiality to emerge. Melissa Gronlund (2016) also refers to the end of the medium as a defining characteristic of digital art, the medium tends to be flexible and digital artworks migrate within different channels all the time.

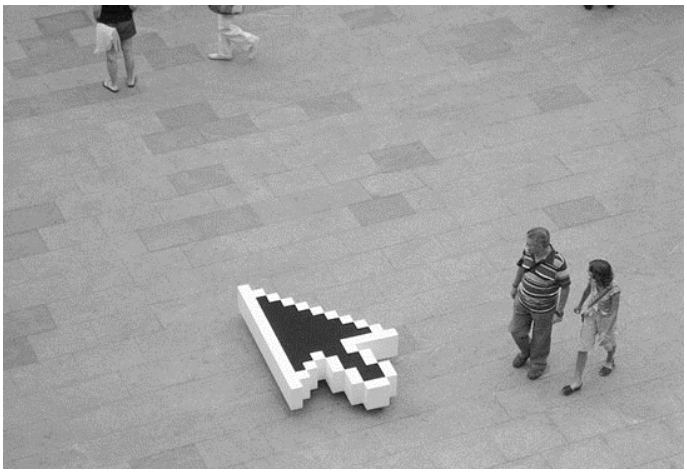

Figure 1.2 - Urban Project, Sebastian Campion 2009. Source: The Urban Cursor

The separation and creation of a new term can be problematic since it evokes a temporal condition, one is not yet outside the Internet age. Likewise, traditional art mediums, the internet, and the digital world are not obsolete. Gene McHugh, the creator of the blog Post Internet: Notes on the Internet, believes that post-internet does not imply a time "after" the Internet but rather a time "about" the Internet (Chan, 2014). This definition is limited for many scholars and artists, once it can only provide the equivalent of what Hito Steyerl, several times, calls "poor vision" or "ghost of an image" of what could be the future of the movement because it is trapped to its conditions (Steyerl, 2009).

It is also important to mention Telematics when discussing digital art, the term has evolved from a cross-disciplinary science, and it is connected to the cybernetic perspective of the world. It integrates computers and telecommunications. The term is largely used by Roy Ascott, who developed the theory of telematics as "computer-mediated communications networking between geographically dispersed individuals and institutions and between the human mind and artificial systems of intelligence and perception" (Ascott, 2007). The term is descriptive of art projects using computer-mediated telecommunications networks as their medium and it challenges the traditional relationship between active viewing subjects and artworks. Ascott's visionary theory and practice aspired to enhance human consciousness and unite minds worldwide in a global telematic embrace. Telematic art nowadays lies under the umbrella of digital art. (Shaken, 1997)

The position of digital art in the mainstream art world and art market is designated by a term. Said term should be recognized and broadly accepted by the academic community and the art world gatekeepers. Having a consensus around terminology is also important in collection systems in institutions and organizations or even for collectors and buyers. At this point, the unanimity of the term digital art would be very significant, but it remains an obstacle and it can be seen as an "elusive goal" (Paul, 2016).

1.2. What is the Digital Art Paradox?

The digital art paradox lies in the self-contradictory historical fact that the mainstream contemporary art world disavows the digital revolution while simultaneously depending on it. The mainstream art world created a digital divide by taking advantage of digital technologies, but not reflecting on the digitalized experience, creating a separation vault towards new media. To understand the paradox, one must understand the mainstream art world that is composed of the big commercial galleries, the Turner Prize, relevant Biennials, curators, and art critics. In 2016, Melissa Gronlund refers to the mainstream art world as a "triangle of power" – gallery, institution, and biennial (Figure 1.3). This trinity has the power to allow certain artists and movements to enter the circulatory movement of exhibitions, publications, and awards. This power battle of gatekeepers is the decisive mechanism to entering the art world sphere. This paradox has been referred to several times in literature over the years but is rarely the center of research concerning digital art. Only a few authors have focused their research on the topic. The most relevant literature is being produced in other disciplines, such as comparative literature, science and technology, film, or performance studies. The written articles that can be found in English were mainly written by artists for a long time.

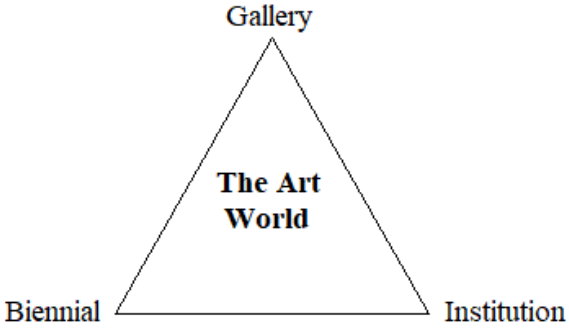

Figure 1.3 - Triangle of Power

In 2012, Claire Bishop wrote the article “The Digital Divide: Contemporary Art and New Media” that would change the turn of digital art research. The article reflects in the historical inaccuracy that happen towards digital art and its absorption by the mainstream art world. Bishop called out this marginalization and coined the disavowal of digital art across time, comparing it with the easy digital transition, experienced in daily mundane lives.

Before the 2012 article, this paradox had been already referred to by Oliver Grau that edited two books that indirectly mentioned the topic. In the article Shanken (2007) wrote for “Media Art Histories” it is underlined the fact that western art’s canon never emphasized the central role of what he calls AST (art, science, and technology) and never truly analyzed the paper of digital evolution in the history of art. Even though, since the Renaissance times, the developments in science and technology were always an essential part of artistic creation. Edward Shanken is one of the names that has researched this detach for many years. He explains the hybrid discourse between digital art and the mainstream.

Although new media art has tried constantly to fall under the traditional umbrella of the theoretical and exhibition context, it has, at the same time, developed its own visual language and aesthetic from marginalization. He addresses this separation, but he also acknowledges the creation of a new media artworld with its characteristics and particularities in constant discourse with the mainstream, in this hybrid discourse where the practices intersect and even blend. (Shaken, 2016)

The lack of regard for technological evolution for artmaking also enlarges the gap between media arts and the mainstream art world. The new media art forms of the 70s suffered the same resistance that digital art still suffers to this day. This separation has been usured by the artworld institutions, and a lot of the reasons for said uneasy relationship are yet to be understood. Digital art indeed poses several challenges to institutions and to the art market in terms of presentation, collection, and preservation (Paul, 2016). However, other formats inquire the same difficulties and were always welcomed into the artworld. Even though institutions and organizations widely use new technologies in their infrastructures to have an online presence and platform, they still predominantly exhibit more traditional art forms that can address the thematic of the digital era. Although they are not necessarily involved in technology as a medium.

Melissa Gronlund (2016) recognizes the long-lasting estrangement, but in her book, she dedicates a whole chapter to “The move into the mainstream”. She writes about the contemporary moment of shifting, where internet and social media became an undeniable part of common life. Since the mid-2000s digital art would be making a move to the mainstream along with other aspects of digital culture. Bishop (2012), years before, also thought it would be the natural path for digital art, but it was proven to be a wrong assumption when looking to the top tier mainstream artworld. There was almost no representation in exhibitions and academic papers, until the last few years.

Apart from this historical baggage, and all the external factors, the reasons for the continuing disconnect between digital art and the mainstream art world lie in the challenges that the medium poses to the public. Digital art’s aesthetics are challenging, as well as its preservation and proof of authenticity. It is based on the juxtaposition of this combination of factors that the digital art paradox is going to be addressed and explored further in this dissertation, aiming to touch the focal points that make the digital movement unique and underrated.

CHAPTER 2
Digital Art Histories

"Renaissance artists were exploring the same thing. The renaissance was a meeting of science and art. Perspective would have seemed like computer CGI graphics now."
- Bill Viola, 1992

2.1. A Timeline

The plural form is used in this context in a non-arbitrary way. The many digital art tales demand a plural, once there is not enough time distance - nor consensus - to write a cohesive and universal history about digital art. It would be also wrong to write about a single digital art history, once the history and academical research on digital art tend to be Euro or US centric, ignoring, most of the times, the fact that many artists all over the world have been exploring technology and digital aspects of artistic creation for decades. Especially artists from South America and Japan who were always in the front row of developments and innovation (Shanken, 2016). Since the so-called digital era is a present concept, the histories are written from within, which is always a difficult and dangerous task. To assemble a collection of digital art histories, more than understanding and interpreting the past, one must work the present and future in an anthropological approach to comprehend the estrangement happening in the mainstream artworld towards digital art.

A timeline is necessary to see the evolution of the digital art paradox that is being analyzed in this dissertation. The time frame is set between the decade of 1950 and the present time, and it is "a timeline", among many, because as history is being written there is always the possibility for several storylines.

Before jumping to the chronological framework, digital art needs to be contextualized in its pre-history. Its origins must be traced further in time, to scholars like Aby Warburg, Walter Benjamin or Michael Fried, the Dada movement and the Fluxus collective (Huhtamo, 2016). It is, especially, impossible to start this archeology of digital art without citing the work of Walter Benjamin. In 'The Work of Art in the Age of Mechanical Reproduction' (1936), Benjamin draws what can be seen as the prehistory of digital art. He defended that technologically reproduced images lacked the "aura" of an individually handcrafted original, but even not being able to predict the future he was capable of recognize the potential of

technological reproduction in the role of democratization. Creating one of the first academic views on the "new technologies" and their influences for art practice, being an unaware prophet for digital art, opening the dialogue to many possibilities.

Other than academics, digital art is deeply rooted in the conceptual and performance art heritage. The issue of performativity was a big one in the relationship between art and digital technologies, especially during the 1950s and '60s when the static paradigms of modernist art were being broken up by situationism and intermedia. There was also the example of mechanized painting performances of artists like George Matthieu and Jackson Pollock (Figure 2.1) (Grau, 2007). Digital art also can be traced to the instruction and rule-based art, that futures prominently in art movements such as Dadaism (1920s-1960s), to the Fluxus movement (organized in 1962) where one can distinguish the conceptual media-oriented artworks and conceptual art (1960s-1970s). In "Global Conceptualism Revisited" (2011), Borys Groys describes the grammar of the 1970's conceptual art as parallel to the grammar of virtual space. He created a correspondence between the art installation space and internet space and their similarities. Both incorporate variations of formal instructions and focus deeply on the concept, event, and audience participation as opposed to art as a unified object (Grau, 2007).

Figure 2.4 - Jackson Pollock performing painting circa 1950s. Source: Ed Harris – *Pollock*

2.1.1. The 50s

Digital art might seem yet a tomorrow topic, but as mentioned, its first few forms date the mid-1950s. As Machiko Kusahara called it her essay “An Overview of Postwar Avant-garde Art”, the 1950s was the “decade of politics” (Kusahara, 2016). This period lays at the end of the Second World War, a new European ground floor, and the start of the long-lasting Cold War. This unfolded chapter was a challenging time for artists but was also an opportunity to explore new aesthetics and mediums.

At this specific moment in the world, there was a major cultural shift towards moving images – Television. Tv has been around since the 1930s, but it is not until then that it reached fully the masses, being the chosen vehicle for news. At the start, it was seen as a menace to the traditional family quality time activities, but it didn’t take long until the living room was reorganized around the television set, instead of the fireplace (Gronlund, 2016). It was also seen as a defined vector for distance transportation of images, show machine, and an omnipresent eye for social control, Tv was also predicted to be a complex device for the transformation of energy into image-sound motions (Khazam, 2021).

Artists took advantage of this shift and started to explore motion rather than stillness. Besides Tv, computers were in their very early starting points, but already being the potential “universal machine” where photography, film and sound would meet. This was an era of great novelty, intensifying the relationship between art and technology, bringing a general expansion, and questioning the notion of art. The beginning of the shift from analog to electronic made some artists choose to move away from traditional mediums and start exploring with new ones. Participatory and technological art was being created by artists such as Ben Laposky, John Whitney Sr., and Max Mathews at Bell Labs; John Cage, Alan Kaprow, the Fluxus movement. Or groups such as the Independent, Le Mouvement; ZERO; GRAV (1960–1968); New Tendencies (1961–1973); The Systems Group (1969) (Paul, 2016). Performances and happenings, led by these artists and groups, denied the concept of artwork as “based on physical objects to be kept” (Grau, 2007). They brought into scene the idea of ephemeral and interactive that digital art still portraits to this date (Figure 2.2).

Figure 2.5 - Alison Knowles, Make a Salad. 1962, Performed at the Institute of Contemporary Arts, London, October 1962. Source: Julia Robinson, "The Sculpture of Indeterminacy: Alison Knowles's Beans and Variations," Art Journal 63, no. 4 (2004)

2.1.2. The 60s

In the early 1960s, the relationship between art and technology was mainly conceptual, due to technical barriers. To work with new technologies artist often required collaborations from engineers or researchers from the tech industry. Access to these machines was very limited as well. Computers were heavy and extremely expensive, solely located at research facilities, such as universities or big corporations that could afford them. The output devices in the 60s were also limited to technology like the plotter, a mechanical device that holds a pen and is controlled by a computer. That's why early digital artworks focused on geometrics and structures in black and white. It was limited by the nature of the circumstances, and it was more about developing a shape than content.

Such as conceptual art, there is a historical lineage that connects digital art to kinetic or op art from the 60s. The employment of motion, light, and optics resembles the aesthetic digital art was first settled upon. Kinetic sculptures had their peak in the 60s and 70s and this idea of motion overlapped with the optical illusions factor in op art. In the 1960s, the Groupe de Recherche d'Art Visuel – GRAV - was created, inspired by the artist Victor Vasarely (Figure 2.3). The artist informally coined the term and the movement of op art and influenced several artists working with kinetic light sculptures and concepts as virtual volumes that can be traced in quite a few digital art installations (Paul, 2016).

Figure 2.6- Portrait of Victor Vasarely, 1960. Source: Willy Maywald, Association Willy Maywald / Adagp, Paris 2019

Between the 1960s and the 1970s, communication networks, as open systems, also formed the foundation of telematics. Artists started using these "new technologies" to experiment with performances and conceptual art that anticipated the interactions that would later take place on the internet (Paul, 2016). There was an emphasis on instruction art that connected to algorithms that inspired the digital algorithms pioneers such as Frieder Nake, who started using mathematical functions to create "digital drawings" (Smith, 2019) on paper in the 1960s. Nake was a mathematician and was interested in the relationship between the vertical and the horizontal elements of Klee's painting. When writing the computer program create his own drawing "Hommage à Klee". Nake outlined the parameters the computer should've follow, and the pen plotter drew some geometric figure. After that he deliberately wrote random variables into the program which allowed the computer to make choices of its own, based on probability theory. In this way, he was able to explore how logic could be used to create visually exciting structures and to explore the relationship between forms. Nake's group EAT (Experiments in Art and Technology), and Allan Kaprow was constantly exploring the relationship of man and machine in the artistic realm. The first two exhibitions of computer art were held in 1965: Computer-Generated Pictures, featuring work by Bela Julesz and A. Michael Noll at the Howard Wise Gallery in New York in April 1965; and Generative Computergrafik, showing work by Georg Nees, at the Technische Hochschule in Stuttgart, Germany, in February 1965 (Paul, 2016).

In 1966, Kenneth C. Knowlton and Leon Harmon, two engineers at Bell Laboratories in Murray Hill, created an image of a reclining nude, called "Young Nude" (Figure 2.4), the first computer-generated print. A scanned photograph, using a special camera converted the analog voltages to binary numbers which were assigned typographic symbols. The Bell Labs wanted to keep this revolutionary work under the radar, because of its research novelty, but the New York Times found it and published it, calling it "the first nude of new media art", becoming a 20th century icon of digital art. Their work was also shown at the Cybernetic Serendipity in London, and Computer and Visual Research 1969's exhibition in Zagreb.

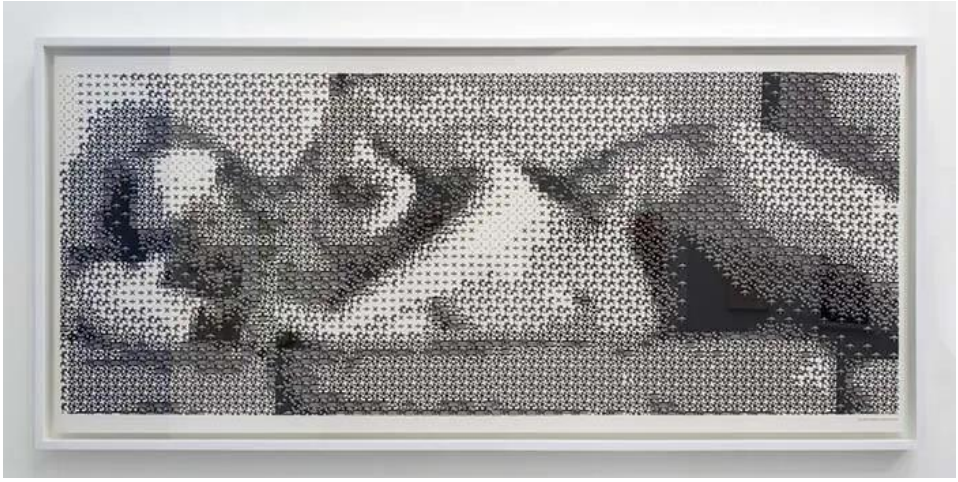

Figure 2.7 - Young Nude, 1966. Source: Collection Buffalo AKG Art Museum

The Zagreb connection is crucial to the history of digital art. In 1961, a group of Yugoslavian artists and art critics organized the Nove Tendencije exhibition in Zagreb, for neo-constructivism art, then becoming an international exhibition of op and kinetic art. The founders of Nove Tendencije included critics Dimitrije Bašičević, Božo Bek and Boris artistic movement (Nuova Tendenza, Nouvelle Tendences, New Tendencies) were reacting to the gesturing and pathos of tachism and abstract expressionism by systematically removing any trace of subjectivity and emotion from the surface of the artwork. Collective identities, such as GRAV, further emphasized the rejection of the artist's ego, demystified via the jargon and methods of scientific research, an important base for the creation and conceptualization of digital art. (Miller 2014, p.57)

2.1.3. The 70s

Going into the 1970s artists started to experiment with live performances with new technology, mainly video, imitating what would later take place on the internet. Digital art has many lineages that can be traced to the 70s practices, just like algorithmic conceptual art and interactive notions borrowed from television and cinema. So, it is not a surprise that the systems theory - as a transdisciplinary domain comprising ideas from fields as diverse as the philosophy of science, biology, and engineering - became crucial in this decade, opening doors to the construction of media arts. (Paul, 2016)

The 1970s witnessed the beginning of significant magazines on digital arts such as Radical Software (1970–1974) by the Raindance Collective and Computer Graphics and Art. The Leonardo journal (1968–) is the only one of the early periodicals that are still published today. It extended its organizational frame beyond a simple printed magazine at a later point, in the 1980s. Leonardo is still to date, a peer-reviewed academic journal, an international channel of communication for artists who use science and develop technology in their work (MIT, 2013).

The 70s were also crucial to understanding what digital art could be and what kind of difficulties it could face. The first signals of displeasure by the traditional art systems were shown because of the link between systems art, cybernetics, computers, and the military-industrial-academic complex and their use in the Vietnam War. The first problems in collecting, conserving, and commodifying these artworks were linked to non-objective art building on post-Duchampian ideas. These issues collided with a massive economic crisis and the dystopian portraits of technologies. At the end of the decade, the same problems from the beginning gained a new strength with video art that was gradually subsumed by the mainstream art world (Levin, 2010).

In need of a shift of tone, during the decade, the major protagonists in the field, such as Frieder Nake, Gustav Metzger, and Jack Burnham at the *New Tendencies 6*, in Zagreb could not find a consensus on how to contextualize and support "computers and visual research". They finally organized only an international conference titled *Tendencies 6 – Art and Society* in 1978. The planned exhibition never happened, it was instead replaced by the New Art Practices exhibition, because the organizers in Zagreb sent more than 100 open calls for works around the word but there were not enough answers. The following movement of video art in the 1970s, as mentioned, can provide context to the gap between socially engaged arts and technologies once the media-oriented conceptual artists in the 70s were mostly using analog media instead of digital technologies. (Fritz, 2016)

Approaching the end of the 1970s, an economic reform started, and several open policies set in. Western modern and contemporary art became more accessible, giving the means to young artists to experiment with new forms of art. In 79, a group of avant garde artists, founded by twelve members including Ai WeiWei and named – Star (Xingxing) – organized a revolutionary outdoor exhibition that was later followed in the 1980s by various experiments by different groups, which were referred to as the "85 Art Movement" or "85 Art New Wave." (Kusahara, 2016).

2.1.4. The 80s

The 70s activist movement towards digital media art seemed to be forgotten until the late 80s, as Darko Fritz asserts, most media oriented conceptual artists, from the time, focused on analog media as it shifted again due to the social engagements with technology and its evolution in nearly 20 years (Fritz, 2016). This return originated many new digital arts' networks such as institutions, magazines, media labs, university departments, online platforms, conferences, and festivals.

In 1982 the International Society for the Arts, Sciences and Technology (ISAST) was founded to promote the goals of Leonardo by offering a venue of communication for artists working in contemporary media (Fritz, 2016). The society also publishes the Leonardo Music Journal, the Leonardo Electronic Almanac, Leonardo Reviews, and the Leonardo Book Series. All publications are created in collaboration with The MIT Press. Leonardo is still the longest lasting journal in the field as of today. From the turning of the decade, the longest lasting festival sprung. Ars Electronica was launched in Linz, Austria, in 1979. Initially it was a biennial event, and has been held annually since 1986, with each edition focusing on a specific theme. In its growth phase, two key factors drove the festival's subsequent development: on one hand, the goal to create a solid regional basis by producing large-scale open-air projects such as the annual multimedia musical event Klangwolke; and, on the other hand, to establish an international profile by collaborating with artists, scientists, and experts—for instance, by hosting the first Sky Art Conference held outside the USA.

During the 80s, the conceptual and text based approached to digital art began to gain a different body in terms of using virtual images that solidified in the 90s. These practices have become so diversified and hard to set under a signpost name that were settled into the umbrella of digital art. A growing number of artists then began to create installations that are crucial for digital art's identity and solidification as a movement, with important gallery exhibitions, underlying the significance of the interactive nature of digital art. A slight notion of "virtual reality" was also evoked in the 80s, as a predictive term for futuristic spaces, although a lot of the art by that time had some feeling of past nostalgia in it.

In her essay, Erkki Huhtamo (2016), also notes that cinema, radio and tv were also affected by the turn of the decade and had to adapt to cable and satellite technology. In the early 1980s the artist Harald Cohen, with a group of engineers, invented a painting program named AARON (Figure 2.5) a robotic machine designed to make large drawings on a sheet of paper placed on the floor. Initially, the machine created abstract drawings, then those turned more representational over time and the machine was able to imitate shapes from nature. The 80s also greatly developed 3D computer graphics and computer networking. These events coincided with the end of the Cold War, which started at the same time as the digital art precedents from the 50s. It could have been the end of the digital art movement, but rather than following the socio-political context, digital art always follows the technological evolution.

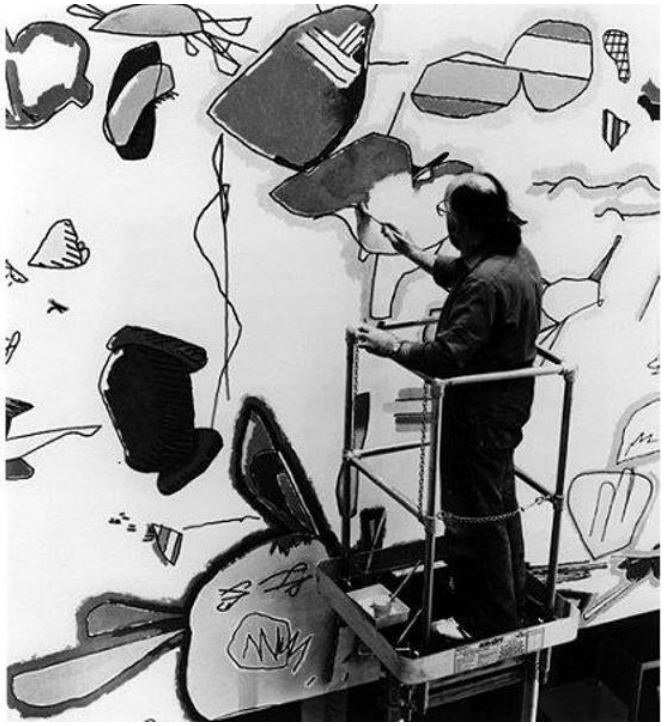

Figure 2.8 - Harold Cohen coloring the forms produced by the AARON drawing “Turtle” at the Computer Museum. Source: Boston, MA, ca. 1982. Collection of the Computer History Museum.

In the late 1980s, the public awareness in computer networking and internet had expanded (Shanken, 2009), influencing artists to participate in new “telematic exchanges”. The mimetic representation of the world is shifting, and the new media allows new realities and new approaches. The conceptual idea of digital art really embodies the interactive dynamic, and as Grau (2007) states it, the intent is no longer to imitate life but to emulate it.

2.1.5. The 90

In the 1990s the normalization of personal computers and the access to the World Wide Web, brought a new outlet for digital art enthusiasts to evolve and produce. Even though internet was slowly entering the worldwide use sphere, this decade was notorious for the world widespread emergence of the internet as a common tool, resulting in a major shift in the way digital art proceed to be produced. Digital art became more accessible, not only for artists, but also for viewers. The Internet was a mean and a medium, and it was a unique explorative opportunity.

In the 90s, AARON also started to implement color to the drawings. Even though Cohen was always very careful not to claim AARON's creativity but rather his own, the machine was just as a tool for his individual expression (Digital Art Movement Overview, n.d.). His program is now considered as a harbinger of what is known today as Artificial Intelligence. Nam June Paik was a member of the Fluxus group, and he is often called the "father of video art". In his installation "Electronic Superhighway: Continental U.S., Alaska, Hawaii" (Figure 2.6), Paik demonstrated the constant evolution of both technology and digital art, something that was pivotal to the movement. This artworks presented a "hybrid vision" of an America connected both by television and the new technological innovations (Digital Art Movement Overview, n.d.).

Figure 2.9- Nam June Paik assembling his work circa 1995. Source: Peter Moore Estate

For some, internet age introduced a new movement that could be considered apart from digital art: internet art or net art. At the time it was addressed to be a branch of the global digital art or media art, which is still in an evolving phase until the present time (Digital Art Movement Overview, n.d.). Edward Shanken, on his essay for Roy Ascot's book "Telematic Embrace" (2007) expands on the 90s innovation for digital art that was the creation of hypertext markup language - HTML - and free distribution graphical user interfaces, such as Microsoft's Internet Explorer. These innovations enabled the capabilities of the World Wide Web for artists, serving for the first time as a venue for digital exhibitions and as an archive, while also being used as a medium itself.

Turning from conceptual, digital generative art boomed in the 90s, Phillip Gallanter in "Generative Art Theory" (Gallanter, 2016), agreeing with Shaken point of view, attributes this surge to the accessibility issues, as the creation of a user-friendly software. Thus, innovation allowed artists to develop their art in a much more efficient way. Even physical computing platforms, as the Arduino[1], gave artists the access to sensors, light displays, sound devices, motors, actuators, robots, and so on for reactive and interactive installations (Gallanter, 2016).

Digital photography and film became "workable, cost-effective and available" (Gronlund, 2016, p.35). Digital cameras' prices came from 995 USD (American dollars) in 1990 to 100 USD in 2003, with increased storage space and pixel resolution. Accessibility and affordability were the big staples for digital art in the 90s. Digital film was also being widely accepted in Hollywood.

Data was a defining term in the 90s, in the way it was being stored and explored, and as Christiane Paul (2016) states, the rise of "big data" and its developments in visualization had a huge influence on artistic practices from that time. Data visualization was becoming a part of the "vernacular visual culture" (Paul, 2016 p.13), especially prominent when artists deviated from using lines and graphics to use images and videos throughout the web as visual media artworks.

[1] single-board microcontroller capable of interacting with sensors and actuators through digital or analog signals.

In this decade, digital art was still a new field within the artworld, leaving no space for consensus and unanimity on interface systems for art production, as they just started to appear, creating an opening for digital art evolution and dissemination. Being a fairly new field, digital art did not have a major role on the art market and artists couldn't, most of the times, enter the gallery and museum system. Many artists took the academic turn, and the proximity to academic research centers and laboratories gave an ideal context for these artists, bringing them closer to cutting edge technology and visions. The 90s were also big on the "hacktivism" campaigns (the blend of hacking and activism) to electronic civil disobedience. In 2002, Cory Arcangel hacked the blockbuster Nintendo video game Super Mario Brother. He removed all sound and visual elements except the blue sky and the iconic Super Mario's white clouds. This method remarked upon the ideas of abstraction in that he removed all familiar elements of the game yet left only a few defining visuals (Figure 2.7) (Digital Art Movement Overview, n.d.).

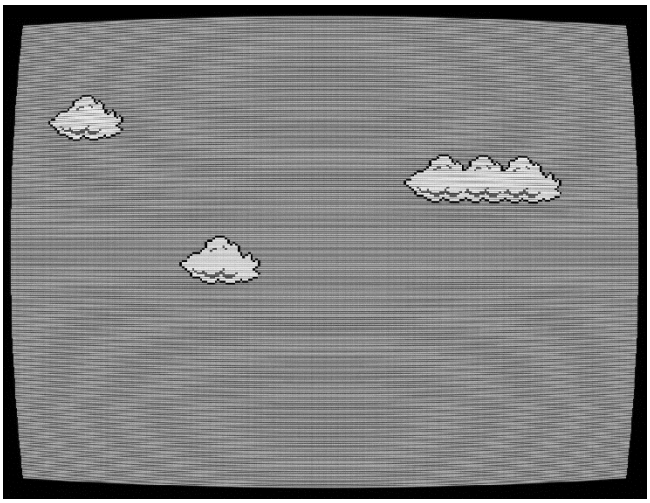

Figure 2.10- Cory Arcangel's 'Super Mario Clouds' online. Sourec: Stavanger Art Museum

These movements raised the importance of intellectual property and the need for protection in the digital domain. Artists realized that free and open-source software was crucial in achieving sustainability and transparency, walking a step further to the main ideologies of the traditional art world and market.

2.1.6. The 2000s

The turn of the century was a focal point to the settlement of digital arts. It is important to acknowledge that the performance and participatory art from the 60s, 70s, all the way through

the 90s and 2000s were inevitable responses to cultural and social developments led by technology. The 2000s got notorious for the concept of an "art platform", the framework of references changed, and media was a part of common life. (Stiles and Shanken, 2002).

The new millennium was a fresh start for digital art, since it took its first real steps into the mainstream art world, It started a debate on whether or not it was valuable showing net art is physical spaces, with the examples of exhibitions like The Walker Art Center's gallery 9, the Tate's online commissions, the Whitney Museum's artport (2001–) and 2002 Whitney Biennial, and the Net_Condition (1999–2000) exhibition at the ZKM. This type of exhibition really started to question the meanings and contexts of digital-based artworks and their public presentations, which opened a lot of new points of views in the academic community. (Cook and Barkley, 2016). Due to these discussions, in the 2000s, the art world also responded to digital art by creating new positions in museums and institutions linked to the movement. In larger institutions there were dedicated positions for new media specialists, Christiane Paul was named Adjunct Curator of New Media Arts at the Whitney and Steve Dietz Curator of New Media at the Walker Art Center. At smaller museums, the positions might have been hybrid, but there was space for innovations and for "going digital" (Rinehart, 2016)

Auction houses were also going digital, with parallel online auctions, easing the process of art purchases and changing permanently the way it was done in art sales. There was also the preliminary idea that art would become more democratic in the new millennium. There were the means of eliminating the middlemen and do direct transactions, but that is only being witnessed 20 years later. Edward Shaken (2015) saw this shift of growing interest as an "ongoing fascination" with the aesthetics of digital art, which was useful to understand the past and model potential futures, making the 2000s decade one of the most defying ones for digital art.

Melissa Gronlund's 2016 "Contemporary Art and the Digital Culture" focus primarily on this decade. The author believes that was only in the 2000s that the true idea of the "masses" came into play. It was the first-time artists started working consciously towards "virality" and a lot of times "anonymity" in the digital space. The pioneers of *net.art* would represent themselves as internet functions like JODI.org, VVORK.com or 0.10010110101.org. There was also the notion of "fake personhood" like the example of the teenager "JT Leroy", whose memoir Sarah (1999) was exposed as having been authored by a forty-something female writer in Brooklyn, there were also fake personalities created to purposely mischief others, but it was a powerful performative tool.

The 2000s were also shaped by the first appearances of social media in daily life. Facebook was founded in 2004, YouTube in 2005, Twitter in 2006, and the iPhone appeared in 2007. A lot of young artists work was developed alongside these novelties has it became part of their lives and not an abstract concept, only understood by few. The "digital culture" (Gronlund, 2016) started to evolve reflecting on performance of identity, the need to be online, the public/private barrier, the artistic appropriation, the notion of lawful borrowing, and on the limits of copyright.

Concerning the artworks themselves, the 2000s brought a big evolution in data visualization, with the rise of Big Data in the second half of the decade. Artists and engineers were in need to invent new techniques and technology to deal with data visualization. Data sets became the new representations of the world in art, like portraits and photography were (Paul, 2016).

2.2. The Present Context

In the late 2000s, moving-image work in the art world was still deeply invested in analogue technologies of 16mm and 35mm celluloid film and in obsolete forms of technology, creating a nostalgic feeling that was fighting the dystopic rapid digital evolution (Bishop, 2012). From 2010s onwards, artworks were being created leaning on new internet and digital vocabulary, such as the borrowing and appropriation concept or the interest in banality (Gronlund, 2016). Today, it is usual to see artworks in the form of video, internet, social media, and multimedia, without a specific alignment with the digital art aesthetic itself. These works might use digital technologies to reach an end, but do not reflect it in their final form. So, the banalization of new technologies in art tends to fade the barriers that would once estrange digital art from the mainstream artworld (Paul, 2016).

For the last twenty years, digital art has been slowly but surely working its way inside the mainstream art curriculum, the number of exhibitions and sales have risen and more and more institutions and museum's departments all over the world are focusing on the topic. After the settlement of the World Wide Web, and once digital technology completely changed the way one perceives the world, pure digital art has been a curiosity to some institutions, curators, and collectors. It is not consensually treated like a movement itself and, by no means, it is exhibited and collected on the same scale it is talked about outside the mainstream art circle.

The present context and its current affairs would be what some academics call the post-Internet stage (Chan, 2012). This dissertation moves away from this definition, acknowledging that society has not moved away from the Internet Age. Since the mid-2000s, internet started to be addressed, gradually, in the mainstream artworld as it was part of the day-to-day life. Digital art started to be perceived by the *Bermuda Triangle of institutions* (Gronlund, 2016)- museums, biennials, and commercial galleries, but at the same time, as technology has become more entrenched in common existence, the novelty of the "digital" in art has worn off.

In the last few years, the evolution of technology has been astronomical, there were several developments that academics before never thought to pair with art creation. The 90s AARON program is now considered as a prelude of today's Artificial Intelligence, that has been used for art production. Nowadays there are extremely respected digital artists by the norms, just like Keith and Mendi Obadike, Sol LeWitt, Rafaël Rozendaal, Hito Steyerl, to name a few.

The present context of digital art approaches the digital art paradox further than its historical view to its conditional state. The estrangement of digital art is an intrinsic condition of its formats. However digital art is slowly being absorbed by the main gatekeepers, especially in the art market, once they realized the profit that would come with it.

2.2.1. Digital Art Awakening - The NFT's Spring

In the Spring of 2021, after the world shut down due to the pandemic, NFTs appear as the big novelty both in the artworld and the financial world. As said, the technology has been around since 2015, but the interest in spiked, and several high-profile sales were made. Famous personalities were selling NFTs, and the big event, that initiated the spring frenzy, was in February when Christie's, centenary auction house, announced the first NFT sale, accepting cryptocurrency for the artwork of the American digital artist Beeple's Everydays: The First 5000 Days for $69.3 Million in Ether (ETH), reaching the top3 most expensive works sold at auction.

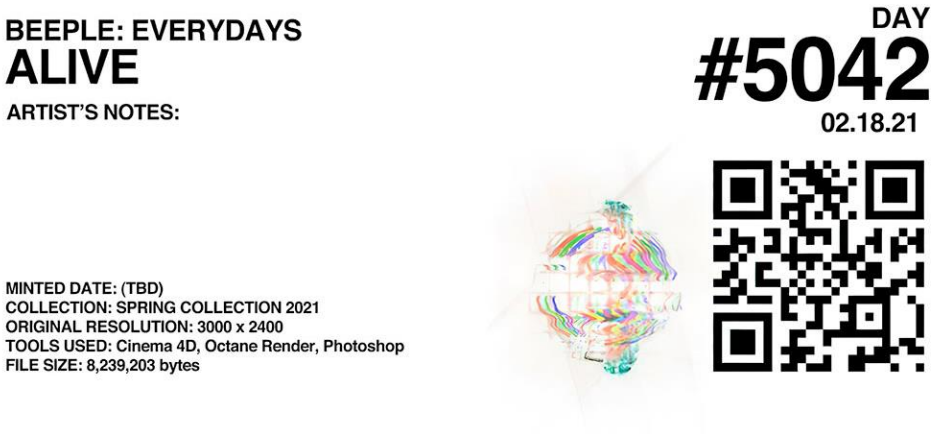

Figure 2.11- Beeple (Mike Winkelmann), ALIVE #2/3, 2021. Video files (NFT). Collection Jehan Chu. Sourece: Courtesy of the artist

The year before, in October, Christie's opened the door for digital and launched the first piece of digital code, a NFT, that tracks the artwork's location. The artwork is titled "Block 21" and it was created by the London-based artist, Ben Gentilli. The artwork was supposed to create a history of bitcoin and its mysterious founder. The piece went for just over $130,000, causing a stir in both the art world and the blockchain world (Ehrenkranz, 2020). Christies was one of the first big players in the mainstream artworld and market to enter the crypto art game and was way ahead of the competitors. For example, the centenary auction house has been organizing *Art+Tech Summit* since 2018. This bold move started a worldwide awakening for digital art. This new acronym opened a new dialogue, especially interesting inside the digital art realm. To fight this norm, and under the pretense of democratic art, NFTs became known for offering freedom on the sale and disclosure of artworks through the web, certifying their authorship and authenticity. Until then, the opportunity range for digital art in the art market space was often characterized as reduced. This introduction into the mainstream started one of the most polemic discussions in the XXI century on contemporary art but opened many doors.

Crypto art fast became part of the vocabulary of digital art, being one of its many branches, and names as Damien Hirst, the Pace Gallery and Sotheby's rapidly followed Christie's example. These big players are now accepting crypto currencies as payment and are dealing with digital art sales and consequently with digital art exhibitions apart from the independent NFT's platforms such as NiftyGateaway, Opensea, Rarible, SuperRare or MakersPlace. A panoply of articles was being released at full speed to understand the phenomenon. Magazines like Art.net were even creating specific spaces for news related to

the topic. Concerning the art fairs and biennials, the theme for *Ars Electronica* 2021 was "A New Digital Deal" and was focused on new possibilities for digital art. NFTs are being showend in the most prestigious venues, this year, there was an exhibition in Palazzo Strozzi, Florence. This year's (2022) Venice Biennale, apart from showing the works that artists intended to create in digital formats had *The Decentral Art Pavilion* (DAP), the first deep dive decentralized art pavilion in the most prestigious international Art Biennale, with the aim of fostering a dialogue between NFTs and mainstream (Decentral Art Pavilion Venice 2022 International NFT Art Exhibition, n.d.).

Figure 2.12 - Palazzo Strozzi & NFTs. Source: Ela Bialkowska, OKNO studio

One cannot predict the end and the dimension of this novelty. The role of NFTs in the art world is still blurry, and it could be more pertinent and less ambiguous to analyze the issue in the context of scientific and technological research, but taking a closer look to this phenomenon one can say that, recently, digital art is being an active part of the art world dynamic.

CHAPTER 3
The Problem with Digital Art

"Art in the digital sphere is processual, contextual, modular, and ephemeral, and its creative process is collaborative. From artists, scholars, technicians, and conservators– to preserve this contemporary art is a transdisciplinary task… Finally, the need for a new appropriate museum and archive infrastructure is shown to preserve the art of our time."
- Digital Art Through the Looking Glass, Grau, Hoth and Wandl-Vogt.

3.1. Assessment of the Problem

The main body of this dissertation will be leaning on what happened to digital art and its current presence in the mainstream and international art world. It is first necessary to take one more in dept look to the isolated aspects of digital art that might be seen as issues. Always assuming digital art as a movement inside contemporary art, it poses many conceptual issues. Digital art lacks ontological and nomination stability, it is difficult to it is difficult to assume what are purely digital art works and, as said, it is difficult to give a consensual name to this movement. Digital art also challenges the traditional notions such as the ownership statues and the relationship between the artists and the collectors. As referred to in previous literature, the paradox is directly linked with external and internal factors intrinsic to digital art.

The external players that constitute the mainstream art world, are related to digital art, and add to the estrangement of this movement from the traditional stream, creating dynamic and complicated power structures. Those powerful external players in the art world are the Institutions, Organizations, and the self-regulated Art Market. Adding to these external factors, the internal characteristics of digital art create another set of problems for the movement to be perceived by a general audience and to be accepted into the structure. Those internal issues are related to the instability of the medium and its problematic with authenticity and copyright law. Digital art mediums, virtually, may seem a little instable due to the idea of immateriality. This idea also challenges the creators, buyers, and curators to deal with works built with software that disappears subsequently due to rapid updating. This materiality and immateriality duality brings a sense of insecurity for buyers and collectors. The question of authenticity and copyright also raises the same problem. Collectors worry

about how to value a work that can be copied multiple times, and artists worry that their works might be stolen, and their properties of authorship are lost in the midst of the internet.

The histories of ever-changing artistic currents of modern and contemporary art cannot be traced by a continuous line, especially not in the field of digital art and art-science-technology field. Due to these key factors, digital art's methodologies and streams of thought were constantly coming in and out of focus for the mainstream artworld. This behavioral pattern surrounding digital art is continuing up to the present date (Paul, 2016).

3.1.1. Immateriality

The genesis of immateriality takes place in the 19th century. Freud and psychoanalysis art gained a path of inward searching, this was traced by artists like Bacon (1909 -92) and by the rawness in the exposure of visceral scenes of bodies and in the organic landscape of the early expressionists. Surrealism clearly takes these notions of introspection in art and creates what is called psychic automatism in the exploration of the unconscious and sleep. Already at the entrance of the previous century, Duchamp (1887 - 1968) and the Dadaists, through the extrapolation of artistic boundaries, anticipated the foundations of what would become conceptual art, "permanently and radically changing the approach to modern and contemporary artwork" (Hargreaves, 2015 p.3). Added to these ideas of contestation of the limits and saturation of the art market that occurred with American Abstract Expressionism and Pop Art, a window of opportunity is created for conceptual art to be born in revolt against the idea of the materiality of the artistic object and its transformation into a tradable luxury commodity, in a period of post WWII art market boom. In this sense of breaking with the commercialization of art, Lawrence Weiner's idea of the experience of the work of art and its inscription in the memory and in the depths of each being, without recourse to the materialization of a piece, was introduced.

Figure 2.13- Lawrence Weiner working on 36" x 36" Removal to the Lathing or Support Wall of Plaster or Wallboard from a Wall, 1968. Source: Fine Art Multiple

The era after the digital novelty marks a new stage in the relationship between digital technologies and materiality. In the late 1960s and early 70s, Lucy Lippard theorized the dematerialization of art objects. She did not talk explicitly about digital art, but the art forms she analyzed, like the Fluxus movement and performances, are today considered part of the lineage of digital art. Those art forms and movements emerged in a cultural climate that was infused by the cybernetics and systems aesthetics (Paul, 2020). It is in the physical and abstract concept of immateriality that the natural and organic precedence of conceptual and performance art to digital art is recognized. The announcement of the death of painting, in the 60s, left a lineage of heirs with it and new media art emerges from this latest branches of contemporary art. Even though digital artists may or may not identify as conceptualists, the ideas of anti-market, social and political critique continue to have a place among digital art production and the way it has been assimilated (Guez, 2019).

The histories of digital art try to understand the complex relationship between the material and immaterial concepts through time. The idea of an immaterial body is intrinsic to the nature of digital art, and it is a big part of the digital art's problem in relation to the mainstream artworld, especially because this internal factor is an issue for the audience perception and fruition. Digital artworks present the challenge of immateriality in the age of the loss of objecthood (Fried, 1998) and present part of the problem of digital art. The lack of body and the difference shape of what should look like, helped, for 50 years, to create the void between digital art and the mainstream art world.

The years after the conceptual art peek of the 60s and 70s had the tendency to restore the materialization in art, and digital art was, yet again, left on the side.

Confronting the state of immateriality of art, Bernard Stiegler, in the belief that there is nothing that is not ultimately in a material state, states that the immaterial condition of an artwork is not real. He then created the concept of "hypermaterialty" – a complex of information where it is no longer possible to distinguish matter from form (Paul, 2020). Exploring the complex concepts of materiality in digital art and the barrier of immateriality as internal issues fully enter the mainstream art world, Christiane Paul (2020) proposes the notion of "neomateriality" to capture "an objecthood that incorporates networked digital technologies and surrounds, processes, and reflects back the data of humans and the environment" (Paul, 2020, p.2.05). Neomateriality reveals digital art's coded materiality in the way it processes and shapes the artworld. It reflects a hidden materiality in the digital spaces, through the objects, images, and structures and the relationship surrounding contemporary culture and the digital age. Nothing is truly immaterial in digital art, there is always the massive backup in hardware to store software.

The factor of immateriality is an undeniable important element of digital art, but at the same time immateriality cannot be separated from material components of the medium. Probably more than any other medium for art, the digital is entrenched in various layers of commercial systems, and the tech industry keeps defying the standards for the materiality and durability of hardware components. This link between the immaterial essence and the material form is the core of digital art and its aesthetics. Therefore, the preservation of the artworks needs to consider this connection to assure an accurate digital materiality. This new digital materiality is characterized by processes of seeing and being seen through digital devices and has profoundly changed the relationship with objecthood and the representation as subjects. In the current day and age, and having direct repercussions in art, there is a mass cultural shift from an object-oriented society to a systems-oriented culture (Burnham, 1968). A concept present not only in art but in the common life, where social media and digital technologies are used constantly for the most basic needs.

One of the biggest challenges surrounding digital art to this day is yet related to its fusion of materiality and immateriality. Preservation and exhibition of digital media is highly connected to its materiality, museums and galleries need to build new structures and need to assign staff to the ongoing maintenance of the technologies (Paul, 2016). According to the art historian and critic Jean Wainwright's famous saying, like preserving digital art, "preserving performance and staged art is like trying to keep smoke in your pocket.". This relation also affects the way digital works are displayed in the physical space. A lot of the times, digital art does not seem like a desirable collectable because, as Christie's contemporary art expert Amy Cappellazzo observed that collectors get confused and concerned about the things that need to be plugged in (Shanken, 2016). Plugging in and turning on/off an artwork is not appealing. On the issues of collecting digital art and transmission of its immaterial and virtual properties, there is little consensus in the art world. Because there are indeed collectors interested in acquiring entirely digital works and collections, allowing new perception on the world, where the barrier between the artist, the artwork, and the audience can be broken.

For now, immateriality linked to digital remains a concept under exploration, mainly in the sense of its ownership. Digital art is only under the pretense of immaterial but can be collected and preserved by material means. The receptor can choose to look away from the material formats in a way to achieve the ideal of ephemerality and immateriality, far from traditional objecthood.

3.1.2. Authenticity and Copyright

There is the underlying current idea that there are no more original ideas in contemporary art production, a lot influenced by the speed and easy access of information through the internet (Alieksieyeva**,** 2019). Adding to that, the digital age is also home to the "borrowing" and the "copy-paste" culture, where images are used for creative purposes without any concern for their provenience. Images on the internet are used and manipulated by artists, challenging the notion of original and the copy. Digital technology allows the mass reproduction of art on a scale never known in human history. Due to these factors, questions related to proving the primary authenticity of digital art assets have arisen. Applying Benjamin's (1935) theory, the digital era would not be the Age of Mechanical Reproduction, but the Age of Mass and Virtual reproduction of all content, not just art.

There is also the side of academics that explores the benefits of a non-regulated art world when it comes to authenticity and copyright. The base of this case is the claimed originality of the instant when one copies and modifies digital images. This originality

benefits from the possibility of reproducing and free circulation on the internet (Davis,1995). Since digital artworks are linked to the virtual space, they circulate much more easily and are more vulnerable to virtual piracy, which forms a tremendous liability for buyers and sellers, creating one of the key internal issues for digital art – the authenticity proof.

Authenticity seems to matter a lot in the artworld. Authentic paintings are sold for incredibly high amounts and authenticity is even questioned to be of any value for the aesthetics or a mere product of the market. On the authenticity of digital art, one must address the concept of "boundless borders", that imply the understanding of the whole process: from the artist to the social context in which he worked. The process passes through the technology used, both hardware and software, to the exhibition, to its later preservation and restoration. The capability to prove authenticity in a digital object is crucial for its own preservation. Even if the concept of authenticity is highly nuanced in the digital age, it is still a starting point for discussion about digital art. Authenticity seems no less than a memory created for a specific artwork. The present context represents a defining moment in which digital technologies can break down barriers to the creation and experience of art (Concas, 2020).

This branch of art possesses a unique set of characteristics, which makes it a distinctive art form. Digital art allows new ways of expressing artistic creativity, as a result, virtually based art stands out among other arts when discussing the topic. Its artworks are to be considered authentic artworks, even considering their disembodied nature, which immediately correlates the two intrinsic issues of digital art. Nevertheless, the authenticity of digital art still appears to be a complex notion, because, as any visual art, it is an autographic one. This reconfirms that the notion of authenticity is closely connected to the process and history of creation of a given artefact which we evaluate as art, especially for institutions and for the market (Mattei, 2021).

It was the need to ensure that they were not being illegally reproduced that technology was created to protect them. The NFT technology seemed perfect to deal with the problem. Through blockchain all information linked to the work of art would be eternally encrypted and available for consultation, information such as the authorship of the work, its date and transaction history as well as a smart contract, that allows the payment of royalties from ongoing sales to the artist to be automated. This system works like the resale right contemplated by Portuguese law (Santos, 2019), but without percentage limits. The smart contract allows the collector to maintain proof of ownership and authenticity of the work, since the code is permanently minted on the blockchain. An NFT is a virtual non-replicable certificate of ownership of a digital creative work (or not) rather than the artwork itself (White

et al., 2021). The features of this technology seem to prevent illegal reproduction of, especially, digital artworks. The blockchain, even not being bullet proof, has proven to be extremely secure and difficult to penetrate through hacking.

Even with NFTs solution to the authenticity of digital art, there is still the problem of copyrights and intellectual property theft, as this technology allows anyone to encrypt on blockchain a link to any piece digital or otherwise. Lately there have been reported cases of artists who had their digital works on other online platforms and were appropriated and reproduced into NFTs by other people, who profit from the smart contract they created for that work, which they are not the original creators but are the authors of that NFT, thus creating what can be considered an "original copy". It is with this issue that the first thoughts about the legislation and control of this technology arise. It stands out for being independent and decentralized from the restricted contemporary art system and a new opportunity for the democratization of ar. But, although the initial idea was harmless and well-intentioned, it is now clear that the hype of NFTs has several parallels with the traditional art world.

Closely connected with authenticity issues, digital art raises big questions about its authorship and copyright. For authorship purposes, this digital art issue can be split in two - the use of systems and technologies such as artificial intelligence and collaborative or distributed authorship between several specialist people who aid the final vision of the artist's work. In cases of "machine learning" technology, in AI systems, completely original digital artworks can be created almost independently by systems, such as the case of the piece "The Next Rembrandt" (2016). This 3D-print of a "self-portrait" of the painter was achieved from empirical features in Rembrandt's 346 known paintings. This type of digital production is disconnected from aesthetic and material issues of art, but the AI instrumentalizes the "hand of the artist" by applying fixed rules rather than creating the works, as this piece is by Bart Korsten, artistic director of an advertising agency in Amsterdam for which the piece was produced. Korsten is the creator and therefore author of the work as he was the one who conceptualized it and the AI was just an artistic material like any other and therefore insignificantly "creative" (Betancourt, 2011).

Figure 3.14 - The Next Rembrandt. Source: Dutch Digital Design

In the second case of collaborative or distributed authorship, like productions with several actors in performance, the authorship is done through sharing copyrights (right of sound, light, text). In the case where an artist idealizes the artwork, the artist remains the creator and works in collaboration with others, in the case of digital, with engineers, software designers and computer programmers who solve technical issues of the original idea.

The question of authorship and copyright behind law is also philosophical and, sometimes, performative, in digital art. According to Foucault (1982) identity is created through language, out of the available identity discourses in a certain time and space. The identity is also created in duality, by creating contrast and distance to the other. There is the opinion that art is a collective process as Becker (1982) aimed to demonstrate in his interpretation of the art worlds (Tanner 2003). This characteristic does not diminish the importance of artist identity. Even in predominantly collaborative art contexts like film, an individual artist's identity is important to give the art legitimacy (Baumann 2007). A functional art market depends on the impossibility of inflation in the art, that it is an original item that unlike mechanically reproduced items won't be copied so easily (Thompson 2008). Authorship functions as an art works trademark loaded with authenticity (Hansson, 2018).

Authorship seems more vital than ever in the virtual space and in the digital era. Digitalization is redefining the artworld as it did for mundane life, artists have new paths for their creative work to reach more people every day. Directly linked to IP law, in the last few

years the Berne Convention[2] started to become insufficient, so new conventions and treaties were necessary to contemplate the digitalization of content. While the creative economy has grown exponentially, copyright hasn't evolved fast enough (Iruzun, 2021). Laws and regulations — especially at an international level — are old and outdated. Copyright laws and customary norms protect the author's rights in his creation, to provide the incentive to create and allow him to appropriate the social value generated by his creativity as recognition of his contribution towards society (Petruzzelli, 1995). By initially protecting the rights of authors in artistic works as a property right, copyright laws facilitated market transfers of private rights and directed use of these works towards the most socially beneficial uses.

Analyzing the demographic sample of Smita Kheria (2015) in the article *Copyright and Digital Art: Through the Looking Glass*, a lot of digital artists are copyright sceptics. Most think laws such as the right of copying and distribution, to be neither personally important to them nor crucial to funding and sustaining their creative practices (Kheria, 2015). This artists in the study did not feel strong or strict enforcement of the right to copy in the digital domain to be crucial to their practice. Having alternative and independent practices, most portraited a lack of faith in adopting traditional routes for exploiting the exclusive rights provided under copyright law in their digital artworks. They saw the economic value in their works, for purposes of exploitation, to lie not in the digital work but in either a physical object, the idea and experience itself, or in their reputation as artists. The interviewees believed attribution to be extremely valuable to them personally but also as a basis of building artistic reputation (Kheria, 2015).

This study demonstrates that creators' relationship with copyright is a lot of times complex and cannot simply be understood in economic terms alone. The creators' perception of the law that they internalize in their creative practice illustrates that copyright law may imply little for them. While copyright has been fighting a battle to reinforce its legitimacy, there is also the necessity to convince digital creators of its legitimacy and relevance to (Kheria, 2015). The field of digital art provides a diverse body of new and experimental works, which embrace not just some but all the features of the 'digital' like appropriation, interactivity, remixing, and hybridization all of which fundamentally challenge the copyright framework. Digital art is on its way to be fully accepted in the mainstream art world. The field has been undertaken by independent creators, who haven't been organized professionally

[2] The Berne Convention, adopted in 1886, deals with the protection of works and the rights of their authors. It provides creators such as authors, musicians, poets, painters etc. with the means to control how their works are used, by whom, and on what terms.

for many years, and mostly remained below the radar of other institutions and organizations which have assisted artists in exploiting intellectual property rights in their practices. This marginalized group was a lot of times absent from the process of policy making and the relationship with IP law and copyright as left neglected.

These findings are important for both intellectual property theory and policy in digital art. Although NFTs brought some ideal solutions to the table copyright is still a complex topic in the digital world. Concerning the lack of international laws and powerful enforcement, and the lack of belief of some artists, a more nuanced approach may be necessary. Scholars have argued various types of rhetoric to convince creator that copyright benefits the authors and it exists to incentivize creativity. There is also the prominent romantic view of authorial creation connected to these questions of authenticity that matter for the market (Kheria, 2015). This rhetoric can be quite powerful, and it is often used by stakeholders, other than creators, to gain support for strengthening and extending intellectual property rights and laws. A lot of times, these questions benefit more the side of the buyers and the intermediary sellers, like dealers. That said, a challenge for copyright policy making is not just to increase awareness of the law and access to works for the users of the system, but to ensure protection to those whom it primarily claims to benefit: the creators.

3.1.3. Institutions and Organizations

In the artworld, gatekeepers perform critical institutional functions regarding the recognition, interpretation, preservation, and the passing-on of knowledge and practices to be part of the canon. Art institutions and organizations are the holders of the crucial opinions, and they can appear in the form of scholars, curators, museums, collectors, critics, and galleries.

This rigid format works since the definition of Danto's artworld (1964), and for digital art to transition from counterculture to this mainstream artworld it must follow the ritual. Years later, Becker's notion of the multiple artworlds - "network of people whose cooperative activity, organized via their joint knowledge of conventional means of doing things, produces the kind of art works that [particular] art world is noted for" (Becker, 1982) – had the tendency to be less strict, but still relied on a power structure that dictates the rules. Even with a certain amount of pluralism involved, there is, with no doubt, a network in contemporary art that dominates the most prestigious and powerful institutions.

Although this rigid regime has been in function for centuries, the art world has changed dramatically in the last half century. It has grown tremendously in terms of participants, money, and profile; It has then bifurcated into two separated unions, the commercial – the art

market – and the discursive – the art world. In terms of valuable players, the role of curator has eclipsed the critic as holder of intellectual value and ultimate trendsetter. Art has also grown as an asset and an investment and most museums and biennials relies on private donors, but even if some aspects are affected or intensified by the internet, the internet itself cannot be said to answer for them (Gronlund, 2016). Regarding digital art, as Groys (2011) meditates on the aspects of the migration of art from the conventional institutional spaces to the Internet, he considers topics such as the change in the artworks space that becomes de-institutionalized and de-fictionalized. Even with the turbulent relationship between digital and the institution, in the last few decades there was an increase of art documentation. Cultural institutions also placed a focus on the use of Internet to mark their presence online, through websites and social media. Thanks to the Internet artists became global phenomenons with online following count and museums started to integrate this migration into their plans in the turn of the millennium (Groys, 2011). Richard Rinehart (2016) explores the coupling of new media art and art institutions. He provides a close analysis of the turning point for new media art exhibitions in the United States in major museums in the early 2000s. It is also important to raise the question related to digital art estrangement from institutions – even today, digital art is not exhibited and collected on the scale that it is talked about.

For institutions, digital art poses several challenges in terms of its presentation, collection, and preservation. The artworld and its institutions have always had a way to absorb the counterculture into the mainstream and profit from it, until a few years ago. Digital art seemed to be the big exception from the rule and the barrier created outside the institutions is one of the focal points of the external factors for digital art estrangement. In the turn of the century, contemporary art has been constructed by the concepts of participation, collaboration, and performativity, as can be seen in the works of Tino Seghal or Carsten Höller (Paul, 2016). These concepts are also the key to most digital art through the age of WWW. The participatory art of the 21st century, which is shaped by digital technologies and social media, got a considerable attention from art institutions, but art that uses these technologies as a medium remains largely absent from major exhibitions in the mainstream artworld, because it is often seen as “DIY” and amateur art (Bishop, 2012) and because of the challenges of preservation, exhibition, and curating. This phenomenon of rejecting digital medium oriented art and preferring more traditional artworks that reflect on technology, collides with the fact that institutions and organizations commonly use digital technologies in their infrastructure, through their web sites, Facebook, Instagram, or YouTube (Paul, 2016). Digital art still defies the concepts of exhibitions on museums and institutions nowadays.

These organizations are now producing and store large amounts of digital material and have gone through many digitalization processes to convert analogic materials, produce original materials in digital format and distribute materials by means of different devices, as the 2015 example of the Smithsonian Institution plan titled Digitization Strategic Plan, or the Tate Gallery "Digital as a Dimension of Everything" document with guidelines to identify and dispose obsolete material. There is growing awareness inside the institutions towards the field of digital art that reflect on exhibition, fruition, curation, preservation, and the actual conceptualization. The digital era is still a time of hybrid culture where the speed with which some of these subjects are responding to the changes brought about by digital technology is impressive and hard to gasp to the institutions, especially considering that they are generally considered as gazing towards the past and strongly anchored to the conventional and traditional well-established systems for art display, documentation, and preservation. (Lughi, 2014)

One of the biggest challenges of integrating digital art into the mainstream artworld is the preservation of the art forms, which forms a big and costly responsibility for organizations. Being stuck between the past and the future (Lughi, 2014), digital art struggles with accelerating technological obsolescence created by the tech industry. The practice of preserving digital art is still an ongoing process, especially regarding the fact that digital has been around, in the digital medium form, since the 60s. Ben Fino-Radin's (2016) surveys the process of "learning the work" through the initial conservation assessment and artist interviews, the capture and storage of the piece, and the role of emulation, virtualization, as well as recreation, reinterpretation, and replacement as preservation strategies (Fino-Radin, 2016). Since this process of preservation can be difficult to navigate inside the institution and can also be used as an excuse to disregard digital art purchases. Jon Ippolito's "Trusting Amateurs with Our Future" (2016) essay shifts the focus of preservation to practices outside of the institution. Since, as Shanken argues several times, digital art isolated from the institution formed an autonomous movement and created a critical discourse between the two worlds – the inside and outside of the institution. Ippolito showcases the "unofficial" preservation practices that can, sometimes, in this context, be more effective that traditional ones. Only a small portion of digital art works since the 80s has been preserved in their original forms, most of them were only documented in the few public displays they had at the time. The relationship between preservation and documentation is other difficult one, but both should be aligned as a strategy for achieving an eternal life for artworks. Preservation should create a guideline for an eternal existence of art conceived by ongoing documentation. (Paul,

2016). Since the 80s, the works that got preserved were a lot of the time through “amateur” techniques, what can be problematic due to the loss of artistic integrity that can result from the loss of original mediums and context. If the institution had been more present during the initial decades of digital art, its preservation should be more commonly studied and perceived (Paul, 2016). Digital art preservation requires a common ground between the institutional view that sees unique and original materiality as essential and the technological view that all computational activity is enacted at many layers that function as abstractions from physical materiality, making the latter replaceable.

Another theory for the estrangement is that the system of contemporary art and its organizations do not need new media art to justify their authority. Despite the distinguished outcomes generated by the entwinement of art, science, and technology since the 50s, the main institutions and organizations struggle to recognize digital art as valid and valuable contribution to art history and to the art market. In the institutional eyes, digital art does not resemble the way art should look like “based on hundreds of years of painting and sculpture” (Thornton 2008, p.21). As tackled, digital art deals with the form and perception issue, the myth of immateriality and the copyright factors scare collectors and buyers. New technologies were difficult to adjust to traditional curating aesthetics and it was easy to address the movement as a thing of its own, to later absorb it into the mainstream art culture. The curating of digital art in a gallery or museum environment requires a process of interfacing the digital space. This process works in exchanges between the curator, the artwork, and the audience. The artwork must be taken from its original digital-planted context to be exhibited and the curator must adapt the space of the white cube to this particularity. Most new media art is inherently performative and interactive, and the institutions must accommodate the specific requirements of the several forms of art, whether it is software art, virtual reality and augmented reality, net art and media art distributed via smartphones, tablets, and other mechanisms (Paul, 2016). The big challenge for institutions is to adapt their traditional approaches, especially in the online space. Curatorial practice ranges from traditional display mechanisms to others that can take multiple technologies in the process – including the virtual institutional spaces such as the Walker Art Center’s, “Gallery 9,” SF MOMA’s “e-space” and the Whitney Museum’s “art port”. Digital art is deeply connected with information, so the new forms of art production always transcended the boundaries of the museum and gallery, and created new spaces for art. The process of curating new media both addresses and shapes the cultural implications of new media practice itself and its creation of spaces for production, dissemination, and reception.

3.1.4 The Art Market

The traditional art market, inside the realm of big galleries, art fairs and auction houses has presented a clear resistance from digital art over the years. That said, digital art needs a new approach to the art paradigm in the age of mass reproduction and distribution. In the century after Benjamin's analysis, reproduction technologies—both digital and mechanical— have not yet found their appropriate steady place in the art marketplace. (Grau, 2009).

During the last years, auction houses, especially Christie's, attempted to bring digital art to mainstream attention. In October 2018, Portrait of Edmond de Bellamy (2018) by the artist's collective Obvious sold for over 430,000$ (USD) with the claim of being an artwork entirely created by an artificial intelligence. It made headlines internationally and brought unprecedented attention to AI. In 2019, Mario Klingemann's AI piece Memories of Passersby I (2019) sold for a decent but less spectacular 51,00$ (USD). The AI craze seemed to cool down quickly, followed by criticism and doubt.

Figure 3.15 - Mario Klingemann *MEMORIES OF PASSERSBY I.* Source: ArtDip

Many people – even the professionals in the art world – still seem skeptical about the possibility of acquiring and collecting works of art that consist of digital files or online-located art. So, the market, together with the institution, formed a resistance to accept digital art, always addressing the same issues with copyright, authenticity, immateriality, and preservation, perpetuating the paradox surrounding this movement.

Performance and conceptual art practices have all emerged within the contemporary art world, by artists who mostly had a background in visual arts and developed their work in art galleries and other venues integrated in the art scenes of influential hubs such as New York, or Paris. These artists and movements were supported by institutions and collectors. Their ideas and actions, naturally, have been adapted to the conditions of the art market.

In contrast, digital art has evolved in a different context. It was developed in the midst of art, science, and technology festivals, in science museums and research labs. And while it has also been present in art museums, some commercial galleries, and art fairs, the fact that digital art has been born and nurtured in spaces that are considered non-artistic, and linked to narratives that do not align with the predominant discourses in the art world have made it difficult for these artistic practices to be accepted in the mainstream contemporary art scene (Waelder, 2021).

Turning on the resistance from the traditional art market, artists tended to be focused on disseminating their art among internet. Art created on the Internet was usually considered a "more marginal and oppositional form" (Greene, 2004, p.11), the artworks being freely available online and, in most cases, not intended for sale, making hard for artists to provide their livelihood. Some artist developed strategies to sell their work online without a middleman, a lot of time through Instagram, since it became the "universal" social media for digital content, but usually these artists were not being included in the mainstream art circle of exhibitions. Although Instagram and social media are powerful tools, they are not a significant enough phenomenon to change the established primary and secondary market means of buying art. If anything, the fact that there are enough collectors with the money to make such a big purchase on the digital market, shows, not the reach of the internet, but the vast amount of capital looming within the hyper-rich and the popularity of art as an ultra-high-end consumer good among them,

Online auction houses that have been established since the mid-2000s (Gronlund, 2016) The dream that the internet would eclipse the authority of gallerist and curator suggested that the art field would become more democratic. It was a mean of eliminating the middlemen and make a more direct relationship between the artist and the collector. However, while the gallerist and the curator remain as important as always, the internet has effected changes on how one perceives art and interacts with it outside the authority of the institutional space.

Analyzing the digital sales trends of 2021 in the Art Basel Market Report, one can see a growth in Millennial and Gen Z buyers collecting digital art – 56% - due to crypto trading, younger collectors have now a robust stake in the digital art collector market. Millennials are currently the fastest growing segment of art collectors purchasing art using sales platforms and social networks like Instagram. NFT technology was a big fractional of ownership inside the digital art realm. Collectors are especially interested in acquiring digital works, but online sales (even inside the mainstream art market) saw healthy development. Online sales accounted for 20% of total sale, down 5% from 2020, but more than double the share in 2019. Traditional, in person, viewing and buying is still favored in the step of making a last decision, there is a trend of confidence in buying online, as the examples of other trades outside art, like luxury fashion or the house market (McAndrew, 2021, pp. 8-44).

Ultimately, digital artworks and NFTs are increasingly diversifying the art market with hungry collectors searching out opportunities in this budding field (McAndrew, 2021, pp. 8-44).The art market is in a transitional phase, where it leans towards the digital more often and became extremely flexible through online channels and social media.

3.2. The Paradox Analysis

Digital art always seemed to be a stream of its own inside the art world. Not because it intended to be on the margin of tradition or to evoke a more democratic artworld. These features were also a response to the resistance coming from the art world.

As most of the movements from the second part of the 20th century, digital art (or what was its precedent) was trying to break the norms and the way art was perceived. The idea that internet and technology would drastically change the world must be reflected on art, since art tends to reflect on society issues. But, until very recently, it never happened, and the paradox surrounding digital art was created. How could an artworld that is extremely connected to society and technology evolution be so aloof of a movement that always intended to reflect that?

The years passed by, and the vault kept growing never fully breaking the paradox circular philosophy. Artists working in new media have never been so widely admired and are now shown internationally, yet, a quarter of a century after the emergence of digital art, it continues to raise challenges for those involved in the dynamics of the movement. One could only wonder why.

After a process of understanding the digital art paradox, through history and its intrinsic factors, its analysis is made using the reasoning of the General Systems Theory (GST). This

theory is an interdisciplinary study of various systems in general, with the aim of discovering patterns and identifying rules that can be applied in various fields of knowledge. The theory adopts that a system is any organism formed by interconnected and interdependent parts. The purpose of the GST is to investigate commonalities between different fields of knowledge and discover their dynamics, issues, and principles. In this case, this analysis likes all the factors that have perpetuated said estrangement and understands why they are connected (Skyttner, 2006). This reflective exercise also aims to ultimately correlate these issues and dynamics in the relationship between the art world and digital art. The digital art system is an organism composed of independent yet interconnected parts. The same thing happens with the art world, that also works as a system.

As a symptomatic characteristic of the art world, it always had the power to absorb all the countercultures into the mainstream culture after a brief period of disavowal. Past revolutionary movements like the Dada and overall conceptual art had gone through this path of first denial and then acceptance. This destiny never seemed to be the same for digital art. The reasons behind this could never be just the said tacky aspect of some digital artworks neither the excuse that they look different than art is expected to.

Conceptual and performance art surpassed the immateriality question and were eventually acclaimed by the critique and the market. The exhibitions dedicated to these movements are countless and worldwide There are avid collectors of these movements. So, these would be the first argument against the factor of said immateriality of digital art, that is restraining it from the collection perspective. Immateriality alone could never cause such disavowal.

The big argument one can oppose to the virtual or digital medium is its obsolescence once technology evolves. Hardware that was top tier in the 2000s in now completely obsolete and difficult to preserve and restore. Software, even the latest as the NFTs minting, also present the same problems of extinction due to rapid updating, creating the fear that some works would possibly disappear. This question is directly correlated to the resistance shown by art institutions along the years. Institutions and organizations in art have perpetually presented this resistance in accepting these movement into their environs, because it presents several challenges to the exhibitions, preservation, and dissemination of these artworks. Digital curators had to build their own networks with the tech world and universities to find the help they needed, and to understand how to work with the hardware and software of some digital artworks. Later, and more recently, the solution that was found was the creation of specific institutions to present digital art to the public, following the example of V2 lab (Paul, 2015). This estrangement could be explained by mentioning this situation, because these institutions are the art world gatekeepers. However, this alone could never explain the paradox of the mainstream art world disavowing digital art but depending on its aesthetics and ideology.

For the complete logic, one must also consider the art market as the other external factor and the issue of authenticity and copyright as the other internal one. There could be more issues, but these four macros are the most prevalent in literature and are the immediate factors to be noticed. Both these questions are intimately related to each other and to the other two. The art market had also resisted to digital art many times before the last five to two years. Said resistance is due to the immateriality aspect of digital artworks or due to the fear related to authorship and copyright these works appose. The art market is a known self-regulatory one, so dealing with questions as proof of authenticity and copyright was extremely difficult. Even in the traditional art world, with physical artworks, authenticity certificates were often dubious and weak to the eye of the law. Concerning copyright, the digital space is a challenging one for the law itself, even more so in dealing with international law, in an international art market. It was the possibility to assure these issues using the blockchain technology that opened a breach in the paradox and brought again, after many years, a dialogue about digital art.

As the GST anticipates, in the digital art system, these factors are interlinked and codependent. The estrangement couldn't be explained fully using only one of them. Also, it was by this logical process that the breach in the paradox was possible. From the moment one of the variables cracked, the others followed. The technology evolved to the point of sorting a better solution for authenticity proof and copyright protection in digital art, that could potentially revolutionize art in general. The art market saw a valuable business opportunity and joined forces with the parallel amateur online market. The immateriality issue stopped being a problem for the new mass of collectors of digital art, that look at art as an investment. For more traditional collectors, it was also fixed by many conceptual digital artists that created a physical collectible deposit of the virtual artwork. Institutions and organizations also followed the stream and decided to incorporate more digital art and NFTs to their exhibitions and collections. Following this flow, mother institutions created new ones completely focused on the matter, a lot of times with the support of technology firms and invested on equipment to deal with the obsolete materiality of technology.

For the last 20 years one could witness a slow inclusion of digital art, mostly because technologic tools were being used by the called traditional artists in traditional fields like painting. There was never an absorption like it is being witnessed now. It is yet too soon to conclude if this is going to last, but one can already conclude that this was the biggest acceptance of digital art by the mainstream art world in the last 50 years. The paradox is not fully broken, but the breach is big enough to see the other side.

3.3. Considerations for the future

In his 1965 article for The New York Times, Stuart Prestone, states, from a dystopic point of view, that with the technological advance in the future there will be no space for artists in the production of artworks. But, even if this future is fulfilled, the role of the artist will always be of the creator who idealizes the concept of the work, because in post-conceptual art, due to its corporeal immateriality, the original idea and thought are the true essence of the artistic object.

> Exhibitions have also moved beyond specialist events and fairs such as ZKM in Karlsruhe, V2 in Rotterdam, YCam in Japan, or even the iconic Arts Electronica in Austria (Paul, 2013). Digital art was the subject of a major show, Electronic Superhighway, at the Whitechapel Gallery in London, and the focus of 2021's summer's Berlin Biennale. In the meantime, the New

> Museum in New York, which has the digital art specialists Rhizome in residence, is working with the Hong Kong-based K11 Art Foundation on an exhibition on art and technology (Morris, 2016). The Museum of Contemporary Digital Art, a museum that exhibits digital artworks for the purpose of documenting, collecting, and advancing the position of digital art, opened in London in 2020 just for this purpose, like The Seattle NFT Museum. This museum seeks to provide an outlet for artists, creators, IP owners, and collectors to display their NFTs for visitors in a highly contextual, physical setting. In Portugal, MAAT – Museum of Art, Architecture and Technology was founded in October 2016, and it is already a cult reference institution in Europe. The other two reference points in media art in Portugal are in opposite extremes. In the north, gnration, a result of Braga 2012 – European Youth Capital, is a space for creation, performance, and exhibition within the domain of contemporary music and the relationship between art and technology. In the south of the country, the recent project of Museum 0 is already giving a spot to digital art embracing new media artists and working in collaboration with the historic V2. A whole new scene for digital art seems to be growing worldwide, with interesting connections and relationships. These new institutions and projects need the complete support of the engine wheel of the art world to continue to thrive and to pass the expect bubble burst of the values in digital art and NFTs right. One hopes the sales keep going, but there is not much more roof left for prices to increase.

Following the market predictions for digital art and NFTs, the future looks bright. Various experts who offered insights into NFT crypto art market for the upcoming year with predict a dominant idea of optimism (McAndrew, 2022). Christie's expert Guillaume Cerutti expects the NFT community and the conventional art world to continue growing together into art the market. Art Basel director Marc Spiegler's perspective follows the same idea. Yuki Terase, the Co-founder of Art Intelligence Global, say that NFTs will revolutionize the way art is experienced and consumed. The international characteristic of the art market plays a big role on digital art sales, but the U.S market is still on the lead with over half of the top auction house sales in 2021, due to questions as taxes and geographical location. This tendency will probably carry on through, especially with the rise of NFT marketplace artists (ORIGYN Foundation, 2022).

According to collecting psychology, nothing seems closer to replacing the habit of collecting objects. Following this mindset and for the purpose of satisfying collectivism as a practice of passion (Afonso and Fernandes, 2019), many digital art artists, such as Beeple, also create collectible physical media. This solution configures the materiality of these virtual works, and can take the form of authenticity kits, which through links, QR codes, or coordinates (How Blockchain Technology Reached Christie's and Changed the Art World along the Way, 2020), direct collectors to the original work in virtual space. These kits or material objects serve only to fulfil issues linked to the taste of collecting material objects but have no validity as documentation or certification.

NFTs are being analyzed, a lot of times, for their properties outside digital art. Even representing an amazing opportunity for documentation and certification, NFTs are more of a sales mechanism, that can bring many benefits for artists inside the scope of digital art, but ultimately, they are not a medium. NFTs could be of better use if studied as financial assets, and for that they are undeniable profitable and interesting. One the contemporary art frame, they seem yet complex and dubious. Blockchain art is not like video or performance art, the blockchain isn't often the medium for the artworks itself, but actually the mechanism for transactions and protected smart contracts. So, although NFTs brought digital art to the spotlight in the mainstream, they do not represent the whole image of digital art. Christiane Paul (2022) for an article in The Art Newspaper, reports this issue clearly, NFTs are a great opportunity for digital certification of authenticity that can be used in several art branches, but, as a victim of an over speculating market, it is being used more commonly by digital artists as a sale mechanism than an artwork conceptual medium. The original intent of the technology behind NFTs was always to support the creative practice. So, to be completely aligned with the philosophy at the back of digital art, in the future, NFTs should probably go back to that original intent and follow a more sophisticated route. Using the blockchain as a complete medium and authenticity tool looks much more interesting for the art world than the crypto speculation and flipping. The 2017 Furtherfield book - *Artists Rethinking the Blockchain* - edited by Ruth Catlow, Marc Garrett, explores several artworks that work on these possibilities, like the artist Eve Sussman that played with ownership in her work 89 seconds Atomized (2018), shattering the artist's proof of her video 89 seconds at Alcázar into 2,304 unique collectible tokens that can be shared by a collective community of collectors. The NFT fever, even if positive for the reborn of digital art, has been investment-driven. In the future, to avoid the same destiny that digital art had the last decades, the mainstream

artworld must acknowledge the art form's age-old history and its potential for creatively exploring the crypto and virtual space and decentralized sales and distribution (Paul, 2022).

This new period of art responds to the desires of Man in the digitized and automated world (James, 2019). This technological world characterized by connectivity, mathematical chaos, and artificiality's issue, offers the artist resources that increase their ability to express themselves, transporting the viewer to virtual environments. Thus, new ways of observing and reflecting on issues are activated every day, emotional and philosophical, through a work of art (Thomson-Jones, 2015).

CHAPTER 4
Conclusions

For once in history, humanity seems, indeed, to be interested in its own contemporaneity. To understand the present one can only revisit the past. Possessing knowledge of art history is highly relevant for understanding contemporary artistic production It is in this interest that technology emerges and that these questions are raised to the art world from a present-day perspective. This perspective would not be possible without art history and without mapping the points that have brought the paradigm of contemporary art to this point. To transact artworks, it is necessary to know them and to study them. Digital art is still in the process of exploring its limits. The topic still lacks academic studies and focus research to achieve a wider understanding of their characteristics and potentialities, in a moment of apparent growth of the digital paradigm in the art world. That is why, different points of view should be regarded when exploring this subject and different focus points should be tackled.

Although the art world now tries to deny it, the digital art paradox is real. It can be found in history, several times since the 50s. Every time digital art would make a step further into the mainstream it would be pushed two steps back. The artworld always disavowed media arts in general, with the pretense they looked tacky, DYI, or simply did not look like art was supposed to. The digital art paradox can be abstract to some, but the truth is that the art world always needed to follow the evolution of digital technologies to evolve, and for that it makes no sense that it was restraining a movement that reflects, using several tools and mediums, such evolution.

Even proven to be real, the paradox can be broken, and digital art could be set free from the vicious cycle it has been on for decades. The analysis to the presented problem of digital art ultimately concludes that the four factors, that were chosen to explain the persistent estrangement from digital art to the mainstream art world, can only be used when interconnected. The arguments all depend on each other, and they have been useful to the creation of the breach, because digital art always seemed to pose difficulties in the selling and exhibition of related artworks. One cannot assume digital art is a seamless movement, it had indeed presented several challenges, but, when compared to other difficult and rule-breaking movements, took long enough to be absorbed into the norm. The cheering point of this research was that the cycle can be indeed broken, and it is apparently happening rather sooner

than later. The art world has been slowly accepting digital art, following the steps of pioneers like Christies and the NFT market. And once one of the four issues was being resolved by more recent approaches, the others would follow. The impact on one issue reflects on the other and the course of things change.

Now more than ever, the art world should fully accept this not-so-new branch of contemporary art. With some refinements and adjustments, digital art seems capable to fully integrate the mainstream like other revolutionary movements did. The future looks promising, but it holds the mystery of the unknown. The predictions of the market are positive and growing. Some important gatekeepers, that ultimately work as trendsetters, are slowly shifting mentalities and influencing tastes inside the digital scope. Digital art is finally growing a stable place inside the artworld and contemporary art, after 50 years of resistance, it's lastly focused on reflecting the collective experience of the digital age and its undeniable mass impact on society frames.

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