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THE INTERSECTION BETWEEN COPYRIGHT PROTECTION AND BLOCKCHAIN TECHNOLOGY:

THE CASE OF CRYPTOART.

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Introduction

This dissertation aims to outline the opportunities that blockchain technology can provide to the copyright system's problems originating from technological development. With this purpose, there will be provided, firstly, an overview of the functioning of blockchain technology and, secondly, the copyright system and the issues originating from the digitalization will be examined, highlighting their impact on the exclusive rights of authors. Lastly, the main benefits and hardships presented by the application of blockchain technology to copyright discipline will be researched.

Copyright is the fuel of innovation, the key to cultural progress. It encourages authors to create new intellectual works by granting them exclusive economic and moral rights and, at the same time, it pursues the social function of fostering cultural development thanks to the dissemination of knowledge. Intellectual works are subject to protection once the underlying ideas are externalized or, in some jurisdictions, fixated on a physical support, and if the element of creativity is detected. The advent of technology and digitalization have brought new challenges to copyright protection: the exclusive rights of the authors of making available, reproduction and distribution have been challenged due to a process of dematerialization and production of digital copies. In recent years, it has been demonstrated how fast technological changes take place and how rapidly society adapts to these modifications. The possibility of creating digital copies, identical to the original works and in unlimited number, is extended to anybody due to the simplicity of the actions required. This situation has posed threats to authors' exclusive rights: they lack any control on the diffusion of their works and cannot exercise their economic rights, the authors of an intellectual work are not easily identifiable and it prevents third parties to compensate them or ask for an authorization for the use of intellectual works. To prevent these situations, there have been introduced several instruments: new exceptions and limitations, more burdens and a stricter liability regime for Internet Service Providers together with technological measures of protection. Nonetheless, these tools have resulted inadequate to contain the phenomenon and to balance the different parties' interests. In this dissertation we will illustrate how the implementation of blockchain-based systems can help authors effectively regain control on intellectual works while providing the tools to receive a fairer remuneration. In particular, we are going to analyse the processes of registration on blockchain-based registries, licensing through smart contracts and the use of non-fungible tokens in the digital art market, that resulted in the creation of an artistic movement: CryptoArt.

In recent years lots of attention has been drawn to blockchain technology. It is usually surrounded by an aura of mystery, as something that only insiders really have knowledge of. The general public, as with any

newly launched technology, still looks at this technological tool with suspicion, hesitant to try to understand its functioning due to its supposed overly technicism. This feeling has been magnified by the media, often associating the technology with illegal transactions or confusing it with cryptocurrencies, to the point of almost becoming synonyms, probably for sensationalistic purposes. Blockchain has become a true "*buzzword*": it is all over the media, has mostly a bad reputation due to misinformation and it seems unapproachable, an exclusive matter of small groups of technicians.

Therefore, in the first chapter, we are making an attempt to dismantle these preconceptions. After an initial overview of the history of blockchain, we will provide a definition of Decentralized Ledger Technology, to which blockchain belongs. In fact, DLT refers to a type of database that is shared, synchronized and managed by multiple users, while blockchains are a *species* of DLT, equipped with the additional feature of recording transactions grouped in blocks and chained with a cryptographic signature, the hash.

We will then explain blockchain's functioning, examine the different types of blockchains and the main features that grant her success: immutability, transparency, decentralization and anonymity. After this section, we will analyse smart contracts and tokens: two fundamental applications built on blockchain. Once again, we will focus on the different types, their functioning and also the legal issues arisen from these applications. Since blockchain is a cross-border phenomenon, it is important to understand how it has been disciplined in different Countries. Therefore, there will be a section dedicated to the regulation of Distributed Ledger Technology and blockchain in selected Countries. The Countries picked were not casual: the selection is based on the importance and influence they had for the legal definition of the technology, its widespread use or historical reasons. In this chapter not only blockchain's opportunities will be highlighted, but also its technical limits and open legal issues, since these are still divisive topics. In particular, its compatibility with Italian contract law and the relationship with the General Data Protection Regulation (GDPR) will be analysed; moreover, we will see the misconceptions of the technology in the public and the technical obstacles that will need to be overcome in the future. The chapter ends with an overview of the all the different sectors in which blockchain technology is applied, highlighting the opportunities that this technology provides in very different markets.

Besides the implementation of blockchain, we are currently experiencing a technological revolution. Internet is vital for our society: it allows constant information and data exchange with any user all over the world and it has deeply influenced copyright's discipline.

With reference to the second chapter, its purpose is to expose the evolution of copyright's discipline and how it has been influenced by European Institutions. Throughout the chapter, an analysis of the main elements of copyright will be provided: its aim, the figure of the author and the different types of protected

works. Subsequently, we will focus on the author's rights distinguishing moral and economic rights. Towards the end of the chapter, the impact of digital innovations on copyright's discipline will be analysed and how the definitions on some of the most important economic rights had to be adapted. Particular attention will be given to the purpose of the InfoSoc Directive: the recent formulations of author's rights and exceptions and limitations established in order to better adapt to a new type of society. Furthermore, we are going to analyse the latest developments of the discipline: the evolution of the liability of Internet Service Providers, the introduction of technological measures of protection and the new principles introduced by the Copyright Directive. All these innovations contribute to the realization of the common purpose of increasing the author's control on intellectual works in a technology-driven society. In fact, copyright discipline is strictly linked to innovation and, since technology is ever-changing, it requires constant implementations and research of more effective solutions to emerging issues of our digitalised society. To assist the legislator in this duty, the role of jurisprudence is crucial, hence, reference will be made to the elements of some important decisions.

The last and third chapter proposes a viable solution to the existing copyright issues in the digital environment and how the blockchain technology can effectively fix them. Blockchain can be a valid ally in combating the issues originating from the online diffusion of digital copies of intellectual works and it may grant a fairer remuneration to authors. In this chapter, we will gather all the elements of copyright and of the blockchain technology analysed in the previous chapters and observe the opportunities available originating from their interaction. Taking into account blockchain's features, we will demonstrate how blockchain-based registries can effectively control and track the online diffusion of the works, granting proof-of-provenance and security. Furthermore, in reference to the principle of appropriate and proportionate remuneration, we will see how the use of smart contracts on blockchains will facilitate the compensation of authors. A reference is also made to orphan works and how a blockchain-based registry can facilitate the required diligent search, decreasing transaction costs. Finally, we will delve into one of the most interesting and currently implemented cases of the use of blockchain in copyright: the adoption of Non-Fungible Tokens (NFTs). This particular type of tokens has finally realized an important objective: it introduces scarcity in the digital world. We are going to focus on one of the most intriguing and growing sectors connected to the use of NFTs, the CryptoArt, exploring its characteristics and providing an overview of the most successful cases. This case-study proves how beneficial the use of the blockchain can be in the digital art sector and for copyright protection in general. Throughout the chapter, the challenges and obstacles that the technology needs to overcome for its widespread use will not be underestimated. Incorrect data input on the registry, irreversibility of smart contracts and the current technical insufficiency are substantial obstructions preventing the extensive implementation of the technology. The early stage of

development of the technology gives hope that new solutions will be applied in the future, while currently some questions remain unanswered.

Chapter 1

Breaking down the Blockchain Technology

Blockchain technology, as many innovations in the digital world, has acquired vast popularity in a relatively short period of time. The number of scholars, together with technology experts and regulators, that have been interested in this new phenomenon and that have analyzed the future implications and current applications has been increasing during the last few years. Nonetheless, it has been a very divisive topic. From some highlighting how this can be a disruptive technology, understanding the different applications in several sectors and how this technology can even change how society works, at the same time, this technology has received many critics and, to this day it still has not quite acquired an appropriate reputation on the general public, mostly due to a lack of understanding of the high technological knowledge underneath its functioning and a focus of the media on its fraudulent uses. This chapter primarily provides a technological analysis of the technology, focusing on its main features and technical aspects. Two of the applications implemented on the technology that are becoming more and more the reason for blockchain's success are also investigated: Smart Contracts and Tokens. After delving into the opportunities and problems of these applications, this dissertation offers a comparative perspective of the different Distributed Ledger Technology regulations, focusing on current initiatives. Completing this research, we also are going to examine the benefits but also the limits of the technology and, finally, give an overview of its applications in different industries.

1.1) Historical introduction of Blockchain

Before understanding the functioning of the blockchain technology, in this paragraph we will investigate the development of blockchain technology and its history[1]. We can trace back the invention of blockchain to Stuart Haber and W. Scott Stornetta that, in 1991, published a study envisioning a cryptographically secure chain of blocks, involving timestamping to prevent the tampering of information by malicious parties[2]. A few years later, in 2008, Satoshi Nakamoto in his whitepaper[3] ideated the first application of the distributed ledger technology: the Bitcoin. From this moment, blockchain really started to gain relevance,

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[1] Source: Iredale G., History of Blockchain Technology: A Detailed Guide, available on https://101blockchains.com/history-of-blockchain-timeline/

[2] Haber, Stuart; Stornetta, W. Scott (January 1991). "How to time-stamp a digital document". Journal of Cryptology. 3 (2): 99–111

[3] Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system

and its success is also due to other possible uses that go beyond cryptocurrencies[4]. Blockchain evolution is commonly divided into phases. The first phase[5] is usually referred to as "Blockchain 1.0" and is interconnected with the first application of blockchain technology, the Bitcoin[6]. Many applications originated thanks to the underlined infrastructure of this cryptocurrency (*id est* the blockchain) and the years 2013-2015 are usually seen as the second phase of blockchain evolution. Many developers began to understand Bitcoin's limitations and started to study new functions to implement. In 2013 a new public blockchain was born: Ethereum. The birth of this new blockchain and its added functionalities has been crucial for the evolution of blockchain history[7]. Its developer, Vitalik Buterin, introduced the possibility to record not only transactions, but also contracts via automated tools: the so called "smart contracts". Being this an everchanging technology, there are always new projects developing on the blockchain infrastructure, trying to address the limits of the existing platforms. These new second-generation platforms have the purpose to optimize the Internet of Things addressing the problems of previous applications such as scalability or the issue of transaction fees. Furthermore, many large commercial enterprises have started to be interested in the technology creating blockchains that are not accessible to the general public: the so-called private, hybrid and federated blockchains. These are the features of the "Phase 3", the current phase of the technology[8]. In the last yearly survey on blockchain[9], it has been reported a progress in the adoption of blockchain based solutions for real-world problems, by businesses operating in various sectors. Companies have developed an interest in the technology and have also started to invest in it more and more, understanding the opportunities that this technology may provide and considering it as a strategic priority[10]. The survey has analysed how the planning of previous years, for companies, has developed into concrete actions and investments and it is predicting even greater development[11]. Thus, the future of blockchain technology is looking bright, in this dissertation, and also towards the end of the current chapter, we will see some of the current opportunities, limits and open issues that the technology is facing, after understanding its functioning[12].

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[4] Iredale G., History of Blockchain Technology: A Detailed Guide, art.cit., "1991-2008: Early Years of Blockchain Technology"
[5] Iredale G., History of Blockchain Technology: A Detailed Guide, art.cit., "Evolution of Blockchain: Phase 1-Transactions. 2008-2013: Blockchain 1.0:Bitcoin Emergence"
[6] Ibidem
[7] Iredale G., History of Blockchain Technology: A Detailed Guide, art.cit., "Evolution of Blockchain: Phase 2- Contracts. 2013-2015: Blockchain 2.0: Ethereum Development"
[8] Iredale G., History of Blockchain Technology: A Detailed Guide, art.cit., "Evolution of Blockchain: Phase 3- Applications 2018: Blockchain 3.0: the Future"
[9] Deloitte's 2020 Global Blockchain Survey From promise to reality, available on https://www2.deloitte.com/content/dam/insights/us/articles/6608_2020-global-blockchain-survey/DI_CIR%202020%20global%20blockchain%20survey.pdf pp. 1-44
[10] Ivi, p. 24
[11] Ibidem
[12] Iredale G., History of Blockchain Technology: A Detailed Guide, art.cit., "2020: Blockchain History & the future"

1.2)   Blockchain Terminology and DLT technology

Most of the fame of the blockchain technology is, at least initially, due to its first application: *Bitcoin*. In 2008 Satoshi Nakamoto[13] published *"Bitcoin: A Peer-to-Peer Electronic Cash System"*. In this paper he explained the functioning of the Bitcoin and its aim: "*A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution*"[14]. The idea of Satoshi Nakamoto was to remove the intermediaries and by cutting out the presence of a third party the whole system would have to rely on a peer-to-peer network[15]. The blockchain technology, the base of Bitcoin, is in fact a public distributed ledger. Instead of having a central institution keeping the data in archives in protected locations, managed by qualified personnel, requiring third parties to gain authorization for the access to this data and thus, the institution (for example a bank) having to bear the responsibility for the management of these archives, blockchain removes the figure of this intermediary[16].

To better understand how blockchains work it is crucial to delve into the definition of some of the technical and technological terms. Blockchain is a form of a Distributed Ledger Technology (DLT[17]). The authors of "Distributed ledger technology: Beyond blockchain", a report by the UK Government Chief Scientific Adviser[18], introduced the term DLT: "*The distributed ledgers are a type of database that is spread across multiple sites, countries or institutions, and is typically public. Records are stored one after the other in a continuous ledger, rather than sorted into blocks but they can only be added when the participants reach a quorum. A distributed ledger requires greater trust in the validators or operators of the ledger*"[19]. These distributed ledgers are managed on a distributed network[20], which does not need any central organization or authority[21]. As regards the blockchain, there are many definitions of this technology but understanding its functioning can start by analyzing the name itself: it is a "chain of blocks". Every block stores information and is linked to the next block thanks to an "hash", which can be imagined as a cryptographic

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[13] There is a lot of speculation around the real identity of Satoshi Nakamoto, whether he is an individual or if there is a group of people behind him. The mystery around his identity is still well alive on blogs online, researching for the earliest possible messages published online by Satoshi Nakamoto back until 1999, talking for the first time about an "e-cash", the first time a virtual currency is mentioned online. Aside from the Netflix documentary "*Banking on Bitcoin",* Wired has published two artcles on this topic: https://www.wired.it/economia/finanza/2020/04/29/bitcoin-messaggio-satoshi-nakamoto/ (the most recent, dated April 2020) and https://www.wired.it/economia/finanza/2018/01/12/satoshi-nakamoto-bitcoin/ (dated January 2018).

[14] See *"Bitcoin: A Peer-to-Peer Electronic Cash System"* by Satoshi Nakamoto, op.cit., p. 1.

[15] Ibidem

[16] Ibidem

[17] In the course of this dissertation both "DLT" and "Distributed Ledger Technology" will be used.

[18] Szostek D. in his "Blockchain and the Law" (p 36) affirms that in 2015 this Report, the term DLT was introduced. The full text is available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/492972/gs-16-1-distributed-ledger-technology.pdf

[19] Walport, M. G. C. S. A. (2016). Distributed ledger technology: Beyond blockchain. UK Government Office for Science, 1, pp. 17-18.

[20] Baran, P. (1964). On distributed communications networks. IEEE transactions on Communications Systems, 12(1), pp. 8-9

[21] Szostek D., Blockchain and the Law, op.cit., p. 35

signature[22]. Everyone with the appropriate permissions (depending on the type of blockchain) can update and share new data on the blockchain. Identical copies of the ledger are maintained and verified by network members. Once the information is accepted by the network members, it is put into a "box" and chronologically added into the "chain", constituted by already existing and approved blocks, cryptographically signed. Summing up blockchain's technology features we can say that they are: the presence of a distributed ledger in which the records are stored and verified in a sequence of blocks (chronologically sorted), secured by a cryptographic signature process.

Before delving into the functioning of blockchains, it is important to highlight the difference with DLTs. Blockchains are a *species* of the DLT *genus[23]*. On one hand, DLTs only refer to the type of databases that are shared, replicated and synchronized between a network of users. On the other hand, blocks are a prerogative of blockchains and they are not required on distributed ledgers. All blockchains are distributed ledgers but, unless further features (such as the use of blocks) are added to the process, not all distributed ledgers can be regarded as blockchains. To better understand how blockchain works, a preliminary clarification of the meaning of some of the terms used in the technology is due.

A node is any device (for example a computer or a smartphone) connected to the blockchain network[24]. The peer-to-peer network, fundamental for the verification of the blocks, is made up by many different nodes located in different geographical areas of the world[25]. Transactions are another one of the main elements of blockchain. By transaction we refer to any operation requiring the verification, approval and subsequent archiving of data on the blockchain[26]: any data shared on the blockchain. In the blockchain, data is stored into blocks, which are the basic unit of the "chain"[27]. Every block is made up of three elements: the data, a hash and the hash of a previous block[28]. The hash is a string of characters resulting from the use of a hash function. It has a fixed length and its scope is to identify the block and its contents. In order to do so, we have to look at the hash value[29]: once a block is created, its hash is being calculated using a hash function[30]. The main features of hashes are their unidirectionality and the impossibility of double generation. By unidirectionality we mean that it cannot be possible to decrypt the mathematical function simply by reversing said function and thus having access to the content of the block: the hashing

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[22] Ivi, p. 41

[23] Faini, F. (2020) Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione. Federalismi.it Anno XVIII-Fascicolo nr. 16/2020, p. 93

[24] Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system, op.cit., p. 5; Bacon, Jean and Michels, Johan David and Millard, Christopher and Singh, Jatinder, Blockchain Demystified (December 20, 2017). Queen Mary School of Law Legal Studies Research Paper No. 268/2017 pp. 11-12

[25] Bacon, J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017), op.cit., pp 11-12

[26] Nakamoto, S. (2019). Bitcoin: A peer-to-peer electronic cash system, op.cit., p. 2

[27] Bacon J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017), op.cit., p. 8

[28] Szostek D., Blockchain and the Law, op. cit., pp.45-46

[29] Or digital footprint is the string of letters and numbers resulting from the hash function. It is useful to imagine the hash as a digital fingerprint.

[30] Bacon J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017), op.cit., pp. 6-7

process creates a one-way function[31]. Additionally, the function works in a way that prevents the double generation: it is impossible to have the same hash as a result of two different datasets[32]. Therefore, changing the data inside the block will cause the hash to drastically change as well, making it easy to detect changes in the block[33]. The third element of the block, the heading or hash of the previous block, is also very important, making the blockchain very secure: it links each block to the following, in a chronological order, guaranteeing that the new block is valid and that it should be confirmed by the network (see Figure 1)[34]. The time stamping feature, shows exactly when the transaction has been added to the block, making the distributed ledger as valid as a centralized ledger[35].
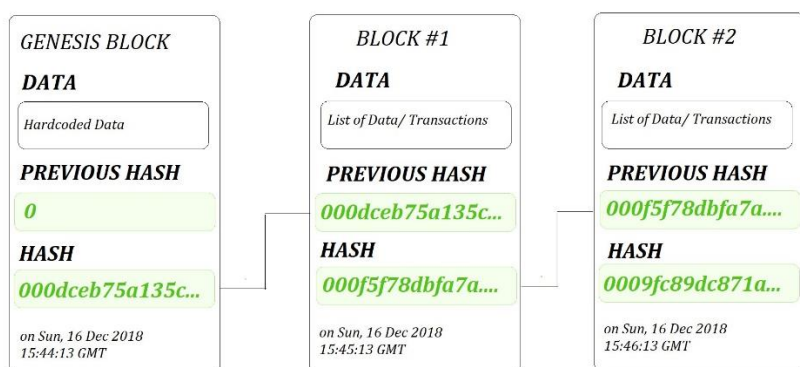
Figure 1[36]

This technology works thanks to a "consensus" mechanism: the process through which all the peers part of the network (nodes) confirm the validity of the block, in accordance to the block's hash[37]. If a block has been tampered with, it will be rejected by the rest of the network, because the hashes do not match according to the nodes[38]. After the creation of the block, each node will validate the new block (if it is deemed compliant) and add it to the ledger so that all the nodes will possess an identical copy of the ledger with the new added block[39].

Crucial is the role of the *miners* which, are nodes with great computational power that they use in order to validate new transactions and record them on a new block[40]. When a new transaction is added, miners around the globe compete to solve a difficult mathematical function, based on a cryptographic algorithm,

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[31] Pedro Matias de Araújo, An overview about hash functions: Theory and Security, 2018 available on https://medium.com/@pemtajo/an-overview-about-hash-functions-theory-and-security-21e52ddc9993
[32] Szostek D., Blockchain and the Law, op.cit., p. 46
[33] Bacon J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017) op.cit., p. 8
[34] Szostek D., Blockchain and the Law, op.cit., p. 41 and 45
[35] Nakamoto S., Bitcoin: A peer-to-peer electronic cash system, op.cit., p. 2
[36] Source: https://blogs.sap.com/2019/01/14/what-is-a-block-in-blockchain/
[37] Bacon J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017), op.cit., pp 13; Szostek D. Blockchain and the Law, op.cit., pp. 47-48
[38] Ibidem
[39] Ibidem
[40] Ivi p.12; https://dev.to/damcosset/blockchain-what-is-mining-2eod

to create a new block. There are different mechanisms ensuring security on blockchains[41], the most used ones are Proof of Work (Pow) and Proof of Stake (PoS)[42]. Proof of work[43] is a mathematical operation that is easily verifiable by the service provider, while the generation of the result is quite hard, imposing a very complex process of dealing with difficult mathematical calculations for the applicant[44]. Since the solution is searched for by trial and error and the calculations are made by multiple miners simultaneously, it is impossible to trace which of the miners calculated the PoW correctly, and thus signed the block[45]. In blockchains, the power required for hash calculation is enormous[46], resulting in the determination of signed blocks as cybernetically secure. Basically, miners solve a very complex cryptographic equation by trial and error in order to mine a block, using a lot of computational power. Miners receive remuneration for this process via transaction fees or via new cryptocurrency[47]. Miners compete to be first ones to solve the puzzles in order to receive the remuneration and often they come together in groups, called "*mining pools*", to share remuneration easily. The second most used method is Proof of Stake[48] (PoS)[49]: the nodes are not competing for the remuneration but one of them is selected to validate the next hash based on the node's stake on the network. This is a very efficient way because the energy consumed is much lower compared to PoW, since only one node will solve the mathematical function. These nodes are not called miners but forgers or validators; they receive a transaction fee and cannot receive new coins. There are also other

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[41] Ismail, L.; Materwala, H. A Review of Blockchain Architecture and Consensus Protocols: Use Cases, Challenges, and Solutions. *Symmetry* 2019, *11*, 1198; Szostek D., Blockchain and the Law, op.cit., (pp 47-48)

[42] More information on blockchain consensus, PoW and PoS can be found on the following link https://blockgeeks.com/guides/blockchain-consensus/

[43] PoW and PoS are two of the most used consensus mechanisms in blockchain that propose a solution to the "Byzantine generals problem": this is a metaphor to help understand how consensus can be reached without a central authority. We have to imagine a war-like situation in which the army will successfully conquer a city only if the army is attacking the said city from different angles at the same time. How can the generals be sure to communicate with the other half of the army and plan the attack at the same time, knowing that the soldier delivering the message can be killed or replaced by another soldier by the city to tamper information and prevent the simultaneous attack? Further information on this topic is analyzed by Lamport, L., Shostak, R., & Pease, M. (2019). The Byzantine generals problem. In Concurrency: the Works of Leslie Lamport (pp. 203-226) readable at the following link http://people.cs.uchicago.edu/~shanlu/teaching/33100_wi15/papers/byz.pdf

[44] Ismail, L.; Materwala, H. A Review of Blockchain Architecture and Consensus Protocols: Use Cases, Challenges, and Solutions. Op. cit., pp. 17-18; Bacon, Jean and Michels, Johan David and Millard, Christopher and Singh, Jatinder, Blockchain Demystified (December 20, 2017), op.cit., p. 14

[45] Helliar, C. V., Crawford, L., Rocca, L., Teodori, C., & Veneziani, M. (2020). Permissionless and permissioned blockchain diffusion. International Journal of Information Management, 54, 102136 p. 3; Bacon J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017), op.cit., p. 14

[46] Bacon J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017), op.cit., p. 14-15

[47] Nakamoto S., supra p.4; https://dev.to/damcosset/blockchain-what-is-mining-2eod

[48] While Bitcoin use PoW, Ethereum is set to esclusively use PoS in the future, in the meantime it is still using PoW.

[49] Ismail, L.; Materwala, H. A Review of Blockchain Architecture and Consensus Protocols: Use Cases, Challenges, and Solutions. Op. cit., pp. 20-21; more information on PoS can also be found on: https://www.ico.li/blockchain-validate-data/

methods to validate new data, for example Proof of Authority[50], Proof of Burn[51], Proof of Capacity[52] and Proof of Elapsed Time[53]. Once the puzzle is solved, the miner signs the block and shares it with other nodes on the network that will check if the calculations are correct: this verification process is much simpler[54]. At the end of this process, by verification of the recently closed block, new transactions are recorded on the chain. In other words, the activity of mining ensures the correct running of the blockchain, by closing and creating new blocks with data about performed operations.

Blockchain and the cryptocurrencies built on blockchains use the public-private key cryptography mechanism to sign and verify transactions[55]. Public-key is a cryptographic system that uses a pair of keys: public keys, available to anyone interested and essential for identification and private keys which must be kept secret and are used for encryption and authentication[56]. This method is widely employed because, by using someone's public key, it is possible to encrypt a message in such a way that only the person holding the private key paired with the public one, can decrypt it and, thus, read it[57]. Using a private key, on the other hand, creates a digital signature so that anyone that has access to the paired public key can verify that the message was signed by the owner of the private key[58]. The aim of this cryptography is to enable secure, private communication via the use of public-private keys. This cryptography system is also used in blockchains, and particularly in cryptocurrencies: public keys are used to create the public address that users use to send and receive funds and private keys are used to sign transaction to prove the origin of the transaction. In fact, if a transaction is signed with a private key, only the person owning this private key could have signed it, and thus approved it. Owning the private key equals to having access to someone's

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[50] " https://www.ico.li/glossary/proof-of-authority/ :"*A consensus mechanism in a private blockchain with the aim to decide who has the right to validate a block. PoA is based on identity as a stake and grants a single private key to the authority to create all of the blocks* ; Ismail, L.; Materwala, H. A Review of Blockchain Architecture and Consensus Protocols: Use Cases, Challenges, and Solutions. Op.cit., p. 25

[51] https://www.ico.li/glossary/proof-of-burn/ :"*A consensus mechanism in a private blockchain with the aim to decide who has the right to validate a block. To be able to validate a block, miners have to show proof that they burned coins. Burning coins means sending them to a verifiably address*" ; Ismail, L.; Materwala, H. A Review of Blockchain Architecture and Consensus Protocols: Use Cases, Challenges, and Solutions. Op.cit., p. 22

[52] https://www.ico.li/glossary/proof-of-capacity/ :"*A consensus mechanism in a private blockchain with the aim to decide who has the right to validate a block. Miners will "plot" their hard drives in order to take part in the transaction verification process. Those miners who can achieve solutions faster than others will be awarded the block and hence the coins applicable to that*"; Ismail, L.; Materwala, H. A Review of Blockchain Architecture and Consensus Protocols: Use Cases, Challenges, and Solutions. Op.cit., pp- 22-23

[53] " https://www.ico.li/glossary/proof-of-elapsed-time/ :"*A consensus mechanism in a private blockchain with the aim to decide who has the right to validate a block. Proof of elapsed time (POET) follows a fair lottery system. Each participating node in the network is required to wait for a randomly chosen period of time, and the first one to complete the designated waiting time wins the new block*; Ismail, L.; Materwala, H. A Review of Blockchain Architecture and Consensus Protocols: Use Cases, Challenges, and Solutions. Op. cit., pp. 25-26

[54] Steps #6 and #7 https://yourstory.com/mystory/how-does-the-blockchain-mining-process-work-a-step-rrmrtg4z9e

[55] Bacon J. and Michels, J.D. and Millard C. and Singh J., Blockchain Demystified (December 20, 2017), op.cit., p. 9-10; Nakamoto S., Bitcoin: A peer-to-peer electronic cash system, op.cit. supra p. 1

[56] Bacon J. and Michels, J.D. and Millard C. and Singh J. Blockchain Demystified (December 20, 2017), op.cit., ibidem; https://support.blockchain.com/hc/en-us/articles/360000951966-Public-and-private-keys

[57] Ibidem

[58] Ibidem; https://medium.com/coinmonks/blockchain-public-private-key-cryptography-in-a-nutshell-b7776e475e7c

cryptocurrency, so it should be kept secret at all times. The goal for public-key in cryptocurrencies is to prove that a spent transaction was without a doubt signed by the owner of the funds and was not forged[59].

The first blockchain to solve the double-spending problem was Bitcoin[60]. In physical transactions, in order to gain property of a product or have access to a service, an amount of currency is exchanged. The buyer gives up a certain amount of currency to the seller, so there is no risk of the buyer spending that same currency a second time. In digital transactions, though, there is no physical relinquishing of currency and this can create the double-spending problem: spending the same currency for two or more transactions. In his whitepaper, Satoshi Nakamoto solves the problem of double spending with blockchain[61]. Using this technology, there is no need for an intermediary that can grant that a currency has not been spent twice. When a new transaction is made, a new block is created and nodes have to validate the new transaction. If someone were to make two different transactions using the same Bitcoin input, these would never be validated by the network[62]. Furthermore, the transparency of the transactions and the fact that they are public, with thousands of nodes constantly verifying them, adds to the prevention of double spending[63]. It is close to impossible that Bitcoin, or any other cryptocurrency, can successfully be hacked and thus have their double spending measure tampered with, because they are constantly monitored. The computational power that would be required to hack these platforms is simply enormous, and since the technology is always evolving, the power required is always greater[64]. Even though cryptocurrency cannot be double spent, it can still be stolen by hackers, as many thefts have occurred and have hit the news. This should not discourage the use of these cryptocurrencies, though, because this possibility makes them as vulnerable to theft as precious belongings or cash are. A way for hackers to double spend their Bitcoins, for example, is a 51% attack[65]. When a group of miners controls over 50% of a network mining power, they can block new transactions from taking place or being confirmed[66]. For example, one of the possibilities may be to reverse transactions that have already taken place and thus making sure that the Bitcoin spent on a transaction will be refunded to the attacker. This process would nullify the solution to double spending, but the chances of an attack actually taking place are extremely low[67]. A single (or a group of malicious nodes) would need to have a computational power greater than all the rest of the nodes[68]. Besides, the cost of electricity required

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[59] More information on the use of Private key cryptography in cryptocurrencies can be found at: https://www.ledger.com/academy/blockchain/what-are-public-keys-and-private-keys

[60] https://www.worldcryptoindex.com/how-bitcoin-solved-double-spending-problem/

[61] Nakamoto S., Bitcoin: A peer-to-peer electronic cash system, op.cit., pp. 1-2

[62] Ivi, p. 8

[63] Ibidem

[64] Bitcoin mining difficulty increases every 2016 new blocks (circa every two weeks).

[65] Bacon J. and Michels, J.D. and Millard C. and Singh J. Blockchain Demystified (December 20, 2017) op.cit., pp. 17-20; https://www.fxempire.com/education/article/51-attack-explained-the-attack-on-a-blockchain-513887

[66] Ibidem

[67] Ibidem

[68] Ibidem

for such of an operation would be immense. Bitcoin blockchain, thanks to his active and always developing hashing power, has never suffered a 51% attack[69].

Blockchains are classified into four different types: public, private, hybrid and consortiums[70]. Given the diversity of features, belonging to one or the other, results in different legal consequences[71]. In public blockchains, any user with an internet connection can create new transactions and have access to previous ones. These blockchains are censorship resistant: as long as the transaction is valid, it will be included in the blockchain. Consent from the blockchain operators is not necessary to conclude transactions[72], hence they are usually referred to as permissionless blockchains[73]. The advantages that this type of blockchain ensures are that anyone can join them, and the more users on the blockchain the more secure it becomes, bringing trust to the community of users, also due to its inherent transparency[74]. The problem of public blockchains is that they did not meet the needs of most businesses: due to the transparency, in fact, businesses had to make every transaction public and, in order to protect valuable information from competitors, there was a need to create a more private environment. This is the case of permissioned or private blockchains: only a predefined list of operators can access the network, the use of these types of blockchains is restricted to a fixed number of trusted users that were granted access to the network by a blockchain operator[75]. The features[76] offered by the private blockchain are the same offered by the public one, the difference regards the access to information to the data and the decentralization is restricted only to reliable nodes: even though the decentralization is compromised and restricted only to the permissioned users, the other core characteristics of blockchain remain. This type of blockchain is mostly used by companies and organizations and stands out for its speed of processing information. The third type are consortium (or federated) blockchains[77] : they solve the problem of keeping some features private and some others public[78]. Consortium blockchains offer the same functionalities of private blockchains without having only one party with the power of validating transactions: they are managed by a group, rather than

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[69] Source: https://www.fxempire.com/education/article/51-attack-explained-the-attack-on-a-blockchain-513887
[70] A complete guide of the differences between the types of blockchains can be found at the following link https://101blockchains.com/types-of-blockchain/
[71] Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges. Computer law & security review, 34(3) p. 551
[72] An example of public blockchain is Bitcoin: as Savelyev mentions in his article (supra) in Bitcoin, anyone can create a wallet and perform transactions or even become a miner.
[73] Neudecker T. and Hartenstein H., "Network Layer Aspects of Permissionless Blockchains" pp. 839-840; Helliar, C. V., Crawford, L., Rocca, L., Teodori, C., & Veneziani, M. (2020). Permissionless and permissioned blockchain diffusion. International Journal of Information Management, 54, p. 3
[74] Ibidem
[75] Helliar, C. V., Crawford, L., Rocca, L., Teodori, C., & Veneziani, M. (2020). Permissionless and permissioned blockchain diffusion, op.cit, p.4
[76] See 1.1.1) The main features of blockchain technology
[77] This type of blockchains is usually considered a sub-category of private blockchains instead of a whole separate type of blockchain https://dragonchain.com/blog/differences-between-public-private-blockchains
[78] Sources: https://academy.binance.com/en/articles/private-public-and-consortium-blockchains-whats-the-difference ; https://101blockchains.com/types-of-blockchain/

just one organization[79]. It is a more efficient type of blockchain compared to public ones because it offers customizability on access control[80]. Finally, the last type in this classification are hybrid blockchains[81]. They are very similar to federated blockchains in the way that they are a combination between public and private blockchains. They have the privacy benefits of permissioned blockchains (businesses can choose which data can be public and which data should stay private) while maintaining the decentralization and transparency of public blockchains.

1.2.1)   The main features of blockchain technology

The use of Blockchain has become quite widespread thanks to its core features[82]. As we have already analyzed, blockchains lack a central figure and, thus, one of its main features is the disintermediation or decentralization[83]. Decentralization refers to the fact that the decision-making process is transferred from a centralized entity to a distributed network. In public blockchains, there is no single party responsible for the management and verification of the blockchain, so users do not need to trust a central authority and neither one another[84]. Apart from the creation of a trustless environment, the decentralized storage of data allows any entity to access real-time data in any moment and place. Anyone with an internet connection can download a free software and become part of the network; by doing this, the connected nodes may be located in different parts of the world making the blockchain a transnational network[85].

Another important feature is the transparency[86]: thanks to the hashing function and consensus protocol it is easy to verify if the data have been altered[87]. Additionally, the very distributed nature of the blockchain means that every blockchain user holds a copy of the data. In the case of network problems on one region of the world, the rest of the network will still be able to verify or add new information to the blockchain until the connectivity is restored in that particular area[88]. Thanks to the transparency feature, data on blockchain, is protected in such way that any change implemented will always be recorded and be visible to the other users[89]. Moreover, thanks to the functioning of blockchain, data is resilient and tamper-resistant,

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[79] Ibidem
[80] Ibidem
[81] Sources: https://www.blockchain-council.org/blockchain/what-is-hybrid-blockchain-how-can-it-help-to-solve-everyday-problems/ ; https://101blockchains.com/types-of-blockchain/
[82] In *Blockchain and the Law*. Harvard University Press. Print., De Filippi P. mentions the seven core characteristics of the blockchain in the Chapter 2 "Characteristics of Blockchains".
[83] De Filippi P., Blockchain and the Law, Chapter 2, op.cit., "Disintermediation and Transnational Networks"
[84] Savelyev, A.I., Copyright in the Blockchain Era: Promises and Challenges (November 21, 2017), op.cit., p. 551
[85] De Filippi P., Blockchain and the Law, Chapter 2, op.cit., "Disintermediation and Transnational Networks"
[86] Savelyev, A., Copyright in the Blockchain Era: Promises and Challenges (November 21, 2017) op.cit, p. 551; Primavera De Filippi, Blockchain and the Law, Chapter 2, "Transparent and Nonrepudiable Data", op.cit.
[87] De Filippi P., Blockchain and the Law, Chapter 2, "Transparent and Nonrepudiable Data", op.cit.
[88] Ivi, Chapter 2, "Resiliency and Tamper Resistance"
[89] Ibidem

so users are sure that data recorded on the platform has not been changed opportunistically. The transactions are fully auditable and indelible[90].

This brings us to the next feature of blockchains: immutability[91]. Given its technical and distributed nature, as we have just seen, once the data is stored, it cannot be changed unless it is compromised by malicious intents. These operations are incredibly difficult to implement, though. On the blockchain, data is immutable so that if a transaction was to be changed, all the following blocks would need to be amended as well[92]. This mechanism makes the whole process of changing data pertaining to transactions impossible to not leave trace[93].

Data on blockchain is shared to a peer-to-peer network and, once the block is verified, it is signed by a digital signature[94]. Public-key cryptography makes the traceability of transactions easily verifiable, even when the contents of the blocks are encrypted. This feature grants the possibility for any blockchain user to trace all the history of transactions on the network[95]. The content of these transactions is protected, but on most blockchains it is possible to detect the interaction between accounts. Once the transaction enters the blockchain, it is also authenticated and thus non repudiable by the user[96]. All the transactions are, in fact, signed with a private key, which only the user has access to. By digitally signing a transaction with a private key, there is evidence of the involvement of the user in the transaction[97]. Unless the user is able to prove that his private key has been used by someone else, he is responsible for the transactions and has to abide to its terms. By giving access to the transaction's information and thanks to the tamper-resistant and resilient essence of blockchain, users are confident that the information they are seeing on the blockchain has not been modified in the past and cannot be modified in the future[98].

In blockchains, all the transactions can be carried out without revealing one's identity[99]. In fact, in order to engage in a transaction on blockchain, the disclosure of the real identity of the other party is not necessary. Users trust the blockchain system and the trust towards the other party is unnecessary[100]. In blockchain

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[90] Ibidem
[91] Savelyev, A. I., Copyright in the Blockchain Era: Promises and Challenges (November 21, 2017), op.cit., p. 554
[92] Ibidem
[93] Savelyev, A. I., Copyright in the Blockchain Era: Promises and Challenges (November 21, 2017), op.cit., p. 561
[94] De Filippi P., Blockchain and the Law, Chapter 2, op.cit., "Transparent and Nonrepudiable Data"
[95] Ibidem
[96] Ibidem
[97] Ibidem
[98] De Filippi P., Blockchain and the Law, op.cit., notes that this system can be used to prove the truthfulness of the information shared. In this case any user providing information can reveal their public address in order to prove that they are the source of information. This method was used by the founder of WikiLeaks to deny the allegations surrounding his death, by executing transactions with a profile knowingly linked to WikiLeaks.
[99] Ivi, Chapter 2, "Pseudonimity", op.cit.,
[100] In this regard, De Filippi P., Blockchain and the Law, op.cit., highlights how the pseudonymity is often seen as a very useful tool to illegal social and economic activity. Quite frequently blockchain is associated with illegal activity by the general public that instantly connects blockchain to drugs and weapons trade.

every party is identified by a pseudonym and relies on public-private key and digital signatures for identification of the other party.

The way the blockchain is designed gives reward to parties that make the blockchain work[101]. We have seen how the role of miners, that validate and close the blocks through the solution of complex equations in PoW, is fundamental for the blockchain[102]. These operations require a lot of energy consumption, and since the networks have become very widespread, the generation of a hash has become even more difficult and energy consuming[103]. This is the reason why miners have organized themselves in groups: the mining pools[104]. Furthermore, transactions on the blockchain require the payment of a fee to miners in order to add the transaction into a new block: the higher the fee a user is willing to pay to miners, the faster the transaction underneath will be processed[105].

Another feature of blockchain is consensus[106]. The consensus is a mechanism that is designed to achieve an agreement between parties[107]. Since there is no central institution in blockchain that can take decisions for the group, consensus algorithms are a very useful tool for the democratic decision-making process in blockchain. Thanks to these algorithms (PoW, PoS are the most common) data is recorded on the blockchain without the intervention of an intermediary: data is registered chronologically and people not trusting each other can continue to engage in transactions, thanks to the trust they have for the infrastructure[108].

The blockchain technology is also "unstoppable". Because of the absence of a central figure, even if a user abandons the network, the system will continue to operate seamlessly[109]. The only way for the blockchain to stop working is if all the servers (spread worldwide) connected to the network will cease to work simultaneously. Given the high numbers of the nodes (over 100000 on Bitcoin blockchain[110]), this scenario is highly improbable.

The autonomy[111] of the blockchain is such that once a software is being introduced in the network, the execution of this software becomes independent from any of the parties[112]. None of the parties can

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[101] Nakamoto S., Bitcoin: A Peer-to-Peer Electronic Cash System op.cit, p. 4; De Filippi P., Blockchain and the Law, op.cit., Chapter 2, "Incentivization and Cost Structures"
[102] Ibidem
[103] Ibidem
[104] De Filippi P., Blockchain and the Law, op.cit., has highlighted how much control these mining pools hold. In December 2017, four mining pools controlled over 50% of Bitcoin and only two mining pools controlled over 50% of Ethereum.
[105] Ibidem
[106] De Filippi P., Blockchain and the Law, op.cit., Chapter 2, "Consensus"
[107] Ibidem
[108] Ibidem
[109] Ivi, Chapter 2, "Resiliency and Tamper Resistance"
[110] Source: https://thenextweb.com/hardfork/2019/05/06/bitcoin-100000-nodes-vulnerable-cryptocurrency/
[111] De Filippi P., Blockchain and the Law, op.cit., Chapter 2, "Autonomy"
[112] De Filippi P., Blockchain and the Law, op.cit., talks about how the Bitcoin transaction are executed autonomously on the network, if the parties comply with the protocol, and these transactions cannot be reversed once they enter the network.

unilaterally affect the execution of the code because they start to run on the decentralized network[113]. Thanks to this autonomy, many transactions can be executed without the need of a human intermediary, thus lowering the costs and completing the transactions faster[114]. On the other hand, codes executing transactions automatically can be designed to bypass the law and thus they can be used as a very valid tool by criminals, trading with each other[115]. Smart Contracts and Tokens will be the focus of the next section.

The sum of all of these characteristics of the blockchain helped cement the trust in this technology by its users and its worldwide adoption in many different sectors and applications[116].

1.3) Smart Contracts and Tokenization

In this section we are going to discuss two of the applications running on blockchain that are considered to be the root of its success, given their current and future possible applications. After a definition and a classification of smart contracts we are going to analyze the problems that can arise from these technological tools, incredibly convenient for digital transactions. Afterwards, we will conclude with a focus on the different types of tokens, the legal consequences and issues connected to their prevalent component.

1.3.1) Smart contracts and their benefits

Many definitions have been given to smart contracts but Dariusz Szostek, in his "Blockchain and the Law"[117] traces the first time a definition of smart contract has been given. In 1997, Nick Szabo[118] described the idea behind smart contracts as the fact that "*many kinds of contractual clauses (such as collateral, bonding, delineation of property rights, etc.) can be embedded in the hardware and software we deal with, in such a way as to make breach of contract expensive (if desired, sometimes prohibitively so) for the breacher*"[119]. A smart contract is a technological tool enforcing a contract, it does not need human intervention to be enforced, nor negotiated or performed; it is a computer protocol that has the ability to self-execute the terms of a contract, thanks to the fact that these terms are written in a "computer language": the computer code[120]. Szabo provides a real-life example of a smart contract that anyone is familiar with:

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[113] Ibidem
[114] This is the case of Smart Contracts, see 1.2) Smart Contracts and Tokenization.
[115] De Filippi P., Blockchain and the Law, op.cit., Chapter 2, "Autonomy"
[116] See 1.6) An overview of the different Blockchain applications
[117] Szostek D., Blockchain and the Law, op.cit., p. 110
[118] In his publication "Formalizing and Securing Relationships on Public Networks"
[119] Szabo N., Formalizing and Securing Relationships on Public Networks, paragraph "Contracts Embedded in the World"
[120] Christidis, K., & Devetsikiotis, M. (2016). Blockchains and smart contracts for the internet of things. Ieee Access, 4, pp. 2295-2296; Raskin, M., The Law and Legality of Smart Contracts (September 22, 2016). 1 Georgetown Law Technology Review

the vending machine[121]. The fact that smart contracts can be (and very often they are) recorded on blockchains, gives them even greater potential, thanks to the trust in the data recorded on blockchains. Smart contracts only reflect the agreement that the parties have previously reached, while executing the terms of said agreement with no further human interaction[122]. It is a tool that facilitates transactions and with the additional features of certainty of performance, non-repudiation, transparency and immutability when they are registered on the blockchain[123]. The goal for smart contracts on blockchain is to formalize and secure relationships in computer networks: some contract clauses can be performed by computer software autonomously, making the breach of these terms very complex and expensive for the violator[124]. For Szabo, the "*realm*" of these smart contracts is not only limited to the autonomous performance, but it involves the "*search, negotiation, commitment [...] and adjudication*"[125] of contracts. Relying on a computer software for the performance of contracts surely helps to lower the costs and time of contracting and enforcement, but it is not a mechanism that does not carry any risk[126]. The use of smart contracts in blockchain has strong potential: it can decrease the risks related to human involvement, lowering the cost for negotiation, enforcement and possible arbitration[127] while providing and guaranteeing the performance of the obligations; in addition to this, it provides certainty to the parties that can verify the history of transactions at any moment[128]. Smart contracts are still viewed as in their early stages of progress, but some States have already started to implement regulation regarding this new phenomenon[129].

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304 (2017), Available at SSRN: https://ssrn.com/abstract=2959166 or http://dx.doi.org/10.2139/ssrn.2842258 pp. 309-315; https://www.coindesk.com/making-sense-smart-contracts, Goldenfein J. and Leiter A., 'Legal Engineering on the Blockchain: "Smart Contracts" as Legal Conduct' (2018) Law and Critique (Forthcoming)., Available at SSRN: https://ssrn.com/abstract=3176363 ; Sherborne, A. (2017). Blockchain, smart contracts and lawyers. Pobrano z lokalizacji.

[121] Szabo N., Formalizing and Securing Relationships on Public Networks, paragraph "Contracts Embedded in the World"

[122] Goldenfein, J. and Leiter A., Legal Engineering on the Blockchain: 'Smart Contracts' as Legal Conduct, p. 2, Sherborne, A. (2017). Blockchain, smart contracts and lawyers. Pobrano z lokalizacji pp. 3-4

[123] Szostek D., Blockchain and the Law, op.cit., p. 113

[124] Raskin, M., The Law and Legality of Smart Contracts (September 22, 2016) p. 310

[125] Szabo N., Formalizing and Securing Relationships on Public Networks, paragraph "Introduction"

[126] As the "Distributed Ledger Technology: beyond block chain A report by the UK Government Chief Scientific Adviser" (supra) states, smart contracts are the technology that makes the blockchain technology a reality, given its practical application. In this report smart contracts are defined as "*contracts whose terms are recorded in a computer language instead of legal language. Smart contracts can be automatically executed by a computing system, such as a suitable distributed ledger system*". The report, when talking about the risks of smart contracts has doubts regarding a complete reliance on a computing system for the execution of contracts.

[127] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), p. 322-324, proposes the Ricketts v. Scothorn case under a smart contract light. Under common law, contracts are not considered binding unless compensation (a sum of money, albeit symbolic) is given to the party. In this case, a young woman decides to quit her job, thanks to the promise of her grandfather of a large amount of money after his death. When the executor refrained from handing her the money, she brought the matter before a court seeking damages because she relied on the sum promised to her grandfather. In this case, says Raskin, if the grandfather's intentions were embedded in a smart contract, shared on a distributed ledger, the bank would have simply transferred the money to the woman. This enforcement mechanism is surely cheaper than a time and money consuming court judgement. The executor would have been bound to the will of the testator, since the will of the testator would have been recorded on a distributed ledger.

[128] Sherborne, A. (2017). Blockchain, smart contracts and lawyers. Pobrano z lokalizacji pp. 3-4

[129] Szostek D., Blockchain and the Law, op.cit., mentions the amendment to statute 44 of chapter 26 of the Arizona States that added art.5 concerning electronic transactions, the Decree of the President of the Republic of Belarus No. 8 of December 21,2017, annex No.1 on Development of Digital Economy and lastly the Malta Digital Innovation Authority Act C901 and Virtual Financial asset Act C778 which introduced the following definition of smart contract: "*form of innovative technology*

1.3.1.1) Types of smart contracts

Depending on the criterion, smart contracts can be classified in different categories[130]. If we take in consideration the way the agreement is concluded using smart contracts we will have: those that have been concluded autonomously by the code embedded in the smart contract, those concluded in a traditional way and hybrids where the agreement is concluded in a traditional way but the details are concluded using the programming code[131]. The relevance of this classification emerges when challenging the contracts before a court in evidentiary proceedings[132]. In case of programming problems and smart contracts operating on the blockchain, due to the irreversible nature of the technology itself, it is quite complex to trace down and amend these issues[133]. The errors in the code can result in contracts that are in contrast with the agreement previously reached by the parties. Moreover, if we look at the structure of smart contracts, we have the "*declared smart contracts*", used in simple agreements in which the party can only accept all the terms or the contract cannot be concluded; on the other hand, "*module smart contracts*" give the possibility to the party to choose between alternatives, that have been already programmed in the code. The party cannot change the content of the alternatives but can choose between the options given by the contract[134]. Another distinction can be made when analyzing imperative contracts (in which the code specifies the actions that the contract will self-execute to comply with the agreement) or declarative contracts (in which the programmer sets the code with the aim of reaching a result, without programming the actions that will be taken to reach said result)[135]. Noticeably, smart contracts can be recorded on DLT or on blockchains. Another distinction can be made in reference to the degree of self-execution of the contract: completely self-executing or partly self-executing if new activities or the human intervention is required for the execution of the contract[136]. Smart contracts can be open, when they are available to an unlimited group of people, partly open, or closed (if they are available to a specified group of people). The number of parties can vary, thus creating bilateral or multilateral contracts[137]. When smart contracts are international (instead of domestic) parties can decide the applicable law or apply the law in accordance with the general principles

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arrangement consisting of: (a) a computer protocol; and, or (b) an agreement concluded wholly or partly in an electronic form which is automatable and enforceable by execution of computer code, although some parts may require human input and control and which may be also enforceable by ordinary legal methods or by a mixture of both".

[130] The following classification of smart contracts was made by Szostek D., Blockchain and the Law, op.cit., p.119-123

[131] Szostek D., Blockchain and the Law, op.cit., p.119

[132] For example, many contracts have been concluded with active or passive actions (ex. By downloading and running a software). Expressing their declaration of intent is not an issue only because it is expressed through the use of a program instead of a more traditional way.

[133] Sherborne, A. (2017). Blockchain, smart contracts and lawyers. Pobrano z lokalizacji p. 6

[134] Szostek D., Blockchain and the Law, op.cit., p.121

[135] Ibidem

[136] Ivi, p.122

[137] Ivi, p.123

of law[138]. This is a non-exhaustive classification of smart contracts, due to their multi-faceted nature and because many other criteria can be taken into consideration.

In his article, Raskin proposes another classification, dividing smart contracts in weak and strong, depending on the costs of revocation or modification of the terms[139]. If these costs are significantly high, thus making it difficult for a party to choose to breach the contract, we will be faced with a strong smart contract[140]. The difference is better understood when the contract is being taken before a court: if it is relatively easy for the judge to alter the contract after it has been executed, we are faced with a weak smart contract, meanwhile if the costs are prohibitive, we are faced with a strong smart contract[141]. Raskin also identifies two features of smart contracts: the "*contractware*"[142] and the distributed ledger. The contractware is defined as "*physical instantiation of a computer-decipherable contract"[143]* and it refers to the code used by the computer to interpret and execute the terms of the contract without human intervention. The distributed ledger, on the other hand, is still crucial for smart contracts, because it creates trust thanks to the consensus mechanism and the network verification of the data, without the need of a central entity[144]. One of the advantages highlighted by Raskin, together with the lower costs of transaction, is the fact that, since there is no space for ambiguity in computer code: the disputes regarding the misunderstanding of the conditions of a contract will be just a memory of the past[145].

1.3.1.2) Smart contract problems

A problem that can be presented for smart contracts is when modification of the contract is required: the output produced may not have been foreseeable by the code[146]. The smart contracts, contrary to lawyers, will not be able to deal with the unexpected. One way of addressing this issue is the creation of a database

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[138] Ibidem

[139] Raskin, M., The Law and Legality of Smart Contracts (September 22, 2016). 1 Georgetown Law Technology Review 304 (2017), Available at SSRN: https://ssrn.com/abstract=2959166 or http://dx.doi.org/10.2139/ssrn.2842258 p. 310

[140] Ibidem

[141] Ibidem

[142] Ivi,., p. 311

[143] Ivi, p. 312

[144] Ivi, p. 316-320

[145] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), op.cit., notes that ambiguity can still exist in programming code, but, in his opinion "*these ambiguities are less than in the real world because of the fact that there are simply fewer terms that a computer can recognize than a human can recognize*" (p. 324). He then continues highlighting that programming the code is subject to human error as much as language, but two computers will always interpret the code the same way. On the other hand, two humans reading the same page might understand it differently. In computer code the ambiguity of the words (typical of human language) is non-existent. Once again, the advantages given by smart contracts can relieve typical contractual problems.

[146] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), op.cit., p. 326-327, refers to modification of a contract in case of impracticability or impossibility, for example when a contract becomes illegal, parties are excused from their performance. Another example is a change in the legislation regarding a period of time required before taking an action against a fraudulent debtor (from 30 to 90 days). Also Sherborne, A. (2017). Blockchain, smart contracts and lawyers. Pobrano z lokalizacji pp. 5-6 ;

run by the government, to which smart contracts can have access to, that stores codes that can modify the smart contracts to make them compliant with the current legislation[147]. Another way might be to impose the updating of the provisions directly to the parties[148].

Another question arises around the consequences of illegal objects or outcomes of smart contracts[149]. Governments can only persecute these actions *ex ante* or *ex post,* before or after the action will take place, by a regulating or policing activity and with criminal or civil proceedings[150]. Smart contracts, because of their self-executing nature, are considered as a self-help tool[151] under American regulation, and when the contract regards illegal activity, a solution would be for governments to give a second remedy to balance and outweigh what the self-help remedy could not[152]. Smart contracts need regulation to reach their full potential, but scholars believe that a liberal approach must be taken by governments[153]. Although the contents of a smart contract may be fully legal, its outcome might not[154]. In this sense governments should regulate *ex ante*, excluding *a priori* certain contractware that are linked to unconstitutional provisions (making the contract null and void) or regulate more heavily sectors with greater public interest[155], or also act on a case-by-case basis when these contractwares are brought before a Court, analyzing the particular situation and reaching a decision, *ex post*, based on the peculiar events[156]. Regulators and judges will have

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[147] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), op.cit., p. 327

[148] To prevent parties to modify the contracts unilaterally and maliciously only in their favor, some terms should be left unmodifiable while others can be updated. (Raskin M, The Law and Legality of Smart Contracts (September 22, 2016), op.cit., p.327)

[149] For example, drug trafficking online is often associated with blockchain, thanks to the anonymity granted by the technology to both the trader and the consumer.

[150] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), op.cit., p. 325

[151] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), op.cit., p. 333: "*legally permissible conduct that individuals undertake absent the compulsion of law and without the assistance of a government official in efforts to prevent or remedy a civil wrong*"

[152] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), op.cit., p. 339

[153] Ivi, pp. 334-336

[154] Raskin M., The Law and Legality of Smart Contracts (September 22, 2016), op.cit., pp. 329-333, talks about the "starter interrupter", a mechanic device that stops the engine from starting and that is controlled by a remote third party. It is particularly useful when a debtor is not paying the installments for the payment of his car and it can fall within the range of self-help, mentioned above. Whilst it is not an illegal instrument, its inappropriate uses might violate citizens' rights and will need to be prohibited or, after these have been executed, remedies to the party will need to be issued. For example, the device might be activated as the car is already running, thus endangering the people in the car or, in a less extreme event, when bankruptcy has been filed and the car is essential for health or business events.

[155] von Haller Gronbaek, M. (2016). Blockchain 2.0, smart contracts and challenges. Bird&Bird, Artikel vom, 16 (https://www.twobirds.com/~/media/pdfs/in-focus/fintech/blockchain2_0_martinvonhallergroenbaek_08_06_16.pdf) understands that one of these sectors needing heavier regulation is the consumer rights regulation. Since these contracts will be unilaterally drafted by the businesses, prohibitions will need to be set and minimum rights criteria will need to be met.

[156] Raskin M. (The Law and Legality of Smart Contracts, op.cit., pp. 338-340), conceptualized a spectrum with three different degrees of tolerability: on one hand he put the uses that governments should allow (ex. The use of smart contracts to repossess cars from fraudulent debtors), and on the other hand, the uses that should always be prohibited (ex. Because they interfere with human rights). The less extreme degree is when the uses are allowed as long as they do not go against state policy, thus being brought before a Court for judgement. This way, Courts will have to decide based on the evidence (ex. By providing a remedy for one of the parties).

to respect the parties' freedom of contract, intervening *ex post* after an evaluation of the rights implicated, while regulating *ex ante* only those contractware that are deemed illegal or against State policy[157].

Reasons for Courts to deem a smart contract invalid are the same as to what would happen in case of a traditional contract. They can be concerned with the legal capacity of one of the parties, fraud, duress, forgery[158] choice of jurisdiction or liability (in particular, programmers' liability in case of code errors): these are the typical issues of civil law and, for this reason, are beyond the scope of this dissertation.

1.3.2) Tokens in the blockchain

In order to understand the potentials of tokens, it's crucial to understand how they are linked to the blockchain. Blockchains (such as Bitcoin, Ethereum, Ripple etc..) are the platforms on which tokens are being created and traded. Tokens are built on blockchains and thus require them in order to run: the association with a blockchain is essential and indispensable since tokens can only operate on these platforms[159]. Tokens are a tool used in smart contracts; they are not necessary for smart contracts to function[160] but, as it will be shown later, they facilitate the transaction process and are more and more widely used. The process of using tokens in smart contracts is called tokenization[161]. Tokens may have several different functions and they depend on what the parties have agreed: they may can give the right to access services, to participate in a discussion, but also to share profits or interests[162]. Tokens are often used in ICO (Initial Coin Offering)[163]: by selling tokens to the public in exchange of cryptocurrencies, start-ups, usually with blockchain linked business models, have found a new way to collect funds[164]. This new

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[157] This is the same conclusion that Raskin M. (The Law and Legality of Smart Contracts, op.cit., pp. 340-341) reaches in his article, whilst hoping for a broader use of this technology thanks to its several benefits. The main obstacles for the adoption of this new technology are, in his opinion, the switching costs from paper to smart contracts and the uncertainty related with the use of new technologies.

[158] As it is pointed out by von Haller Gronbaek M., Blockchain 2.0, smart contracts and challenges. Bird&Bird, Artikel vom, 16 p. 5

[159] For example Augur, Omisego and Golem are tokens built on Ethereum.

[160] Szostek D., Blockchain and the Law, op.cit., p 123

[161] Burilov, V. (2019). Regulation of Crypto Tokens and Initial Coin Offerings in the EU: de lege lata and de lege ferenda. European Journal of Comparative Law and Governance, 6(2), p. 147 *"Tokenisation is a method that converts rights to an asset into a crypto token which becomes a representation of such right"*

[162] Szostek D., Blockchain and the Law, op.cit., p 124

[163] A very interesting ICO is the DAO. In 2016 a network of smart contracts gave the opportunity to the parties interested to send ether (the currency used on Ethereum) in exchange of DAO tokens, thanks to which they were entitled of voting rights regarding further blockchain investments proposed by the same token holders and a share of the profits. DAO was extremely successful and amounted 150$ million worth of ether. A hacker subsequently managed to hack the system and collect part of the funds, but thankfully the investors were refunded by a very complex operation in which the blockchain history was rewritten. The Security and Exchange Commission (SEC, an independent USA agency) investigated the DAO token offering and concluded that DAO tokens were security under US law. (Hacker P. and Thomale C., infra, p. 11)

[164] Szostek D., Blockchain and the Law, op.cit., p.123

application of crowdfunding gives the rights to the initial token owners to dispose of them on the market facilitating new buyers to enter the transaction[165].

If we were to give a definition of tokens[166], they represent an asset or provide the owner of the token with a specific right. They reside on blockchains and are often issued after an ICO, as a form of fund-raising[167]. As the word suggests, they are a digital representation of a unit of value[168] and they are hardly ever mined by their holders. Tokens can also be regarded as a "record in a blockchain"[169], functioning within a smart contract and thus considered as a "*technological tool in which the given entitlement of its holder is recorded under an agreement*"[170].

Creating a token on the blockchain implies the formation of a smart contract featuring the qualities and rights that the owner of the token will have access to and, once the agreed conditions are met, the contract will be automatically executed (for example, the actions that trigger ownership of a token or the number of tokens issued)[171]. Once the tokens are created, they are shared on the blockchain[172], in which, thanks to its intrinsic transparency that has been discussed in the previous section, everyone can verify the regularity of the token's creation process. Tokens are used because they speed up the process for transactions and require less computational power: the reason for these advantages is the fact that tokens are built on blockchain and the mining and verification process are required only to new blocks, not to tokens alone. In fact, since they are built on blockchains and they are not new blocks but they simply indicate a unit of value, the mining and verification are superfluous, given the fact that these operations have already been done on the blockchain (acting as the infrastructure). It is also worth mentioning that no intermediaries are required for the tokens, thanks to the decentralized nature of the blockchain.

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[165] Ivi, p. 124

[166] Since there is no current legal definition, the one provided by this author is inspired by the definition provided by the following sources Investopedia (please see https://www.investopedia.com/terms/c/crypto-token.asp),BitcoinWiki (please see https://en.bitcoinwiki.org/wiki/Token), Szostek D. p 125 (supra), Burilov, V. (2019). Regulation of Crypto Tokens and Initial Coin Offerings in the EU: de lege lata and de lege ferenda. European Journal of Comparative Law and Governance, 6(2), pp. 146-147, Sater, S. (2019). Tokenize the musician. Tul. J. Tech. & Intell. Prop., 21, 118-119, Fisher, K. (2019). Once upon a Time in NFT: Blockchain, Copyright, and the Right of First Sale Doctrine. Cardozo Arts & Ent. LJ, 37, p. 631; Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view p. 5

[167] Source: https://www.investopedia.com/terms/c/crypto-token.asp

[168] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view, op.cit., p. 5

[169] Ibidem

[170] Szostek D., Blockchain ans the Law, op.cit., p. 126-127

[171] Burilov, V. (2019). Regulation of Crypto Tokens and Initial Coin Offerings in the EU: de lege lata and de lege ferenda. European Journal of Comparative Law and Governance, 6(2), pp. 152-153

[172] Ibidem

1.3.2.1) Types of tokens

Hacker and Thomale[173] have conceived three archetypes of tokens: currency, utility and investments tokens. Currency tokens[174], as the word suggests, are meant to be used to acquire and pay for goods or services, even external to the platform[175]. They are used in ICOs, when creating a new cryptocurrency. For example, in Ethereum ICO, users offered Bitcoins in exchange of Ether[176]. Since these currencies are issued on blockchains, they lack a central authority but are still valid and reliable thanks to the blockchain's characteristics (transparency, traceability, immutability etc..).

Secondly, utility tokens provide investors with additional advantages other than the payment for external goods or services. They provide the right to token holders to have access to a product that is being developed or that has just been created[177]. The difference with currency tokens is this additional utility provided to investors directly by the token issuer[178].

The third archetype of tokens is investments tokens: this further component considers tokens as assets promising investors positive future (crypto) cash flows[179]. They have similarities with traditional stocks: they are a bet on a market process and also may grant economic and administrative rights, such as profits or voting rights in companies' assemblies[180]. As security assets, security tokens do not grant ownership on the underlying company but are usually bought as an investment with the purpose to resell them on the market once the stock price has risen[181]. The difference with traditional stocks is the registration process: instead of using paperwork, they are registered on the blockchain[182].

Beside these three archetypes that define the so-called *pure tokens*[183] (which show only one main component: strictly investment, utility or currency) we can also find "*hybrid tokens*": tokens that combine together two or more of the previous components[184]. This type of tokens arises legal questions as to which they should be regarded as securities or not; these issues will be discussed in the following paragraphs.

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[173] Hacker P. and Thomale C., Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law (November 22, 2017). 15 European Company and Financial Law Review 645-696 (2018), Available at SSRN: https://ssrn.com/abstract=3075820 or http://dx.doi.org/10.2139/ssrn.3075820 pp 12-13.
[174] Ivi, pp. 30-33
[175] Ivi, p. 12
[176] Ibidem
[177] Ibidem
[178] An example of a utility token created with the ERC20 standard tokenization smart contract is filecoin. It collected more than 250$ million and the utility component provided to investors was the possibility to store data on a decentralized ledger when spending tokens and miners would earn tokens when storing and serving data. Even Ethereum itself, other than a currency, provides its users with the possibility to spend tokens on its smart contract platform (and by extension on other tokens).
[179] Hacker P. and Thomale C., Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law (November 22, 2017), op.cit, p 13
[180] Ivi p 26
[181] Ibidem
[182] Ivi, p 27
[183] Ivi, p 25
[184] Ivi, p 33

Firstly, we examine the *"Hybrid Utility/Investment Tokens[185]"*: it can be expected that the investors that chose to purchase tokens primarily for their utility, can also hope for profit when reselling them[186]. The causes for this eventual profit are not only market forces, but how much development and resources are brought into by the token issuer[187]. We can detect here an information asymmetry[188] between seller and buyer, and we will later see if this asymmetry will make this type of token fall under securities (and their relative regulation)[189].

Secondly, we have those tokens that are primarily used as currency, but they also present the investment component: the "*hybrid currency/investment token[190]*". Similar issues as the previous hybrid token regard the investment component: notwithstanding the use of these tokens as a means of payment, token holders cannot ignore the fact that they can be easily converted into other currencies[191]. This is the case of Bitcoins: most of the transactions take place between investors looking for profit.

Lastly, the hybrid currency/investment/utility tokens[192] (such as Ether). Ether is suitable for payments outside of the Ethereum platform, has a strong speculation component since it is traded by investors when its value rises, in order to gain profit, and finally has a strong utility component due to its several uses available on the Ethereum platform (for example the computational power of Ethereum Virtual Machine used in smart contracts)[193].

1.3.2.2) Fungible and non-fungible tokens (NFT)

Tokens are often also divided into fungible and non-fungible tokens. Fungible tokens (such as ERC20 token) are the type of tokens that can be replaced by tokens with identical features[194]. To better understand this type of tokens we can make a comparison with cash. When we lend someone some money (let us say 100€), we do not expect them to give us back the precise banknote we have previously lent them. As long as we have a banknote of the same value, or even different banknotes amounting to the same sum, we can be satisfied by the exchange[195]. Fungible tokens have the same features of a digital currency and are often

[185] Ivi, p 33
[186] Ibidem
[187] Ibidem
[188] Ibidem
[189] Please see 1.2.2.3) Tokens legal issues
[190] Hacker P. and Thomale C., Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law (November 22, 2017) , op.cit., p. 36-37
[191] Ibidem
[192] Ivi, p. 37
[193] Ibidem
[194] Source: https://opensea.io/blog/guides/non-fungible-tokens/#History_of_non-fungible_tokens_2017_2020
[195] Source: https://blockgeeks.com/guides/fungible-vs-non-fungible-tokens-what-is-the-difference/

used as such[196]. They can be divisible, so that a single token can be split into smaller tokens and transferred to multiple parties[197]. This often happens with stocks that are bought by several parties.

On the other hand, non-fungible tokens (such as ERC721 token) are the type of tokens that have some specific attributes that make them unique. Non-fungible tokens can represent any asset with specific characteristics, they are not "*mutually interchangeable*[198]" and they are not divisible. They contain identifying information recorded in their smart contracts[199] and are linked to a specific asset. To understand the non-fungibility, we can picture two 200 square meters houses: it is obvious that the position and the condition of the houses (unique attributes) will result in a different value on the market. The house in a very elegant neighborhood in the center of one of the major cities in the world will probably have a very different monetary value than a house in the middle of the countryside, far away from any service. Other examples of NFTs are used with collectibles, digital art (the so called "*Cryptoart*"), tickets for events and videogames[200].

Thanks to the use of NFT tokens, it has been possible to introduce the concepts of scarcity[201], authenticity and actual digital ownership on the blockchain. For collectibles in general, and in particular in the art industry, relying on NFT tokens on a blockchain provides proof of ownership of an artwork and its authenticity, other than proving scarcity: trusting the recorded data without the need of hiring experts is a crucial feature in the art world[202].

After some experiments with *colored coins*[203] and the well-known *Rare Pepe* on the Bitcoin Platform[204] the first application of NFT on Ethereum, the platform where NFT flourished, were Cryptopunks. These

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[196] Source: https://www.blockpass.org/2020/02/21/what-are-fungible-and-non-fungible-tokens/ "What is a Fungible Token?"

[197] Ibidem "What are the Benefits of Fungible and Non-Fungible Tokens?"

[198] Source: https://en.wikipedia.org/wiki/Non-fungible_token

[199] Source: https://decrypt.co/resources/non-fungible-tokens-nfts-explained-guide-learn-blockchain

[200] At the following link https://opensea.io/blog/guides/non-fungible-tokens/ the whole NFT discipline is analyzed in depth. A very concise but also complete definition of NFT is given at the top of the page: "*Non-fungible tokens (NFTs) are unique, digital items with blockchain-managed ownership* […]".

[201] https://opensea.io/blog/guides/non-fungible-tokens/ describes scarcity as*: "Smart contracts allow developers to place hard caps on the supply of non-fungible tokens and enforce persistent properties that cannot be modified after the NFTs are issued. For example, a developer can enforce programmatically that only a specific number of a specific rare item can be created, while keeping the supply of more common items infinite. Developers can also enforce that specific properties do not change over time by encoding them on-chain. This is particularly interesting for art, which relies heavily on the provable scarcity of an original piece.*"

[202] Ibidem

[203] *https://www.coindesk.com/colored-coins-paint-sophisticated-future-for-bitcoin describes Colored coins as:"Colored coins is a concept designed to be layered on top of Bitcoin, creating a new set of information about coins being exchanged. Using colored coins, bitcoins could be "colored" with specific attributes. This effectively turns them into tokens, which can be used to represent anything".*

[204] Pepe is a frog-like character created by Matt Furie in 2005, heavily used in memes and drawn in situation far form the artist's purpose. Its association with far-right movements and white supremacism has not stopped the hype around this character. In 2018, artists developed an interest In Pepe and coupled it with blockchain, as a secure platform for trading Pepe's art. Even though these drawings can be shared online by any individual for free, buying "Pepe art" using the Bitcoin platform grants ownership of the works and it has also been use with the purpose of gaining profit with the reselling of tokens associated with these artworks ownership rights. As Steffen Cope, a Web developer who creates and trades Rare Pepes, said "We're using the most secure financial computer application ever known to man to swap cartoon frog pics". For a more in-depth social and market

ten thousand digital, pixelated and two-dimensional collectible punk characters with unique attributes, created by Larva Labs using an algorithm, have revolutionized the market of NFT and inspired the entire CryptoArt movement[205]. CryptoPunks initially could be claimed for free by anyone with an Ethereum wallet; after all of them were claimed, sales and trading have begun amounting to a total Value of All Sales of 15.98KΞ (amounting to $7.47 Million dollars[206]). Thanks to the history that CryptoPunks carry, their limited supply and the reputation they have gained in the community, they are considered[207] "*digital antiques*", hence their economic value.

What has really made the adoption of NFT mainstream were the CryptoKitties: they are "*breedable, collectible oh-so-adorable creatures [...] Each cat is one-of-a-kind and 100% owned by you; it cannot be replicated, taken away, or destroyed*[208]". According to flipside Crypto, this game made on its first year $27 Million dollars and 75% of the revenue (around $20 Million dollars) was given directly to players through auctions of the breeded cats, making this game very appealing to future interested gamers[209]. Cryptokitties have been very important for the diffusion of blockchain: with this online game, people were finally starting to break the assumption of blockchain as a means for illegal activity. Many beginners have also had their first "in-person" contact with this technology, by creating their wallet and learn more about the functioning of these platforms. The success of this game has been attributed to the cuteness of these collectible kitties but also to the extensive media coverage. It was probably thought absurd and has probably intrigued (and offended) many people when they heard that a digital cartoon cat was being sold for $170.000 USD dollars[210] or that the Ethereum blockchain was clogged because of the computational capacity of the blockchain could not keep up with the number of transactions involving Criptokitties[211].

After the hype around Cryptokitties died, investments in NFTs were far from over: from digital art, to gaming platforms to the birth of online trading cards marketplaces, to the selling of tickets for events, many were the industries and sectors interested by the development of this technology[212]. Later in this dissertation we will focus on the interest of digital art and artists to the platform and the correlation and legal questions regarding copyright protection and ownership of these digital, but unique, artworks.

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analysis of Pepe, please see the following link https://fivethirtyeight.com/features/pepe-the-frog-symbolism-cryptoart-blockchain/

[205] According to https://www.larvalabs.com/cryptopunks

[206] Source: https://www.larvalabs.com/cryptopunks lastly viewed on 19/11/2020

[207] By Opensea, a marketplace specializing in the trading of unique assets on blockchain https://opensea.io/blog/guides/non-fungible-tokens/#History_of_non_fungible_tokens_2017_2020

[208] Source: https://www.cryptokitties.co/

[209] Source: https://blog.flipsidecrypto.com/these-top-crypto-games-made-millions-their-first-year/

[210] Source: https://thenextweb.com/hardfork/2018/09/05/most-expensive-cryptokitty/

[211] Source: https://www.coindesk.com/loveable-digital-kittens-clogging-ethereums-blockchain

[212] For instance, OpenSea is a platform providing all these services.

1.3.2.3) Tokens legal issues

Since their adoption has become so widespread, legal issues have arisen regarding the nature of tokens. Because of their investment component, it has been discussed whether tokens need to be regulated as securities, with all the further requirements that better protect investors, or if these transactions should be covered only by Consumer Law provision. The key to understand how tokens should be regarded is the investment component itself. As Thomale and Hacker suggested[213], it is appropriate to start analyzing what is the purpose of securities regulation: one should abide securities regulation when there are information asymmetries and financial risks on investors. These asymmetries can be amended thanks to the adoption of a prospectus[214]. In the case of hybrid utility/investment tokens, they might be considered securities if, when they were promoted to the public, the profit possibility when reselling them was highlighted by the promoters[215]. Nonetheless these conditions, pure utility tokens should not be considered securities: token holders do not have any right on the company and thus will not have access to the profits of the company launching an ICO[216]. Therefore, in case of profit for the company, token holders will have no equity claim (for example access to a dividend), but their only profit would be gained thanks to a rise of the value of the tokens and the subsequent resale[217]. So, even if the profit potential is highlighted by promoters, there is still a main difference between utility tokens and stocks and shares. Secondly, if tokens were to be part of a prospectus, we could incur in a clash between securities and Consumer Law[218]: product defects (even when these are digital) impacting negatively the resale prices is an area of competence typical of consumer law. Therefore, consumer laws should be applied and adjusted to the sale of digital assets, while securities regulation and prospectus rules are less likely to address these token issues[219]. Utility tokens or hybrid utility/investment tokens too, cannot be deemed as securities thanks to their different nature: they do not grant any access to future profits (such as dividends or rights that shareholders hold in the case of liquidation or sale of a company), and since there is no direct involvement with the profits, there is no need for the disclosure of the financial situation of the company (typical of securities law). The only case in which hybrid utility/investment tokens can be considered securities is when the speculative aspect is objectively predominant on the consumptive aspect: if tokens mainly offer access to future cash flows, together with

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[213] Hacker P. and Thomale C., Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law (November 22, 2017),op.cit., p. 34

[214] Ibidem

[215] This has been the case adopted by the SEC in its landmark decision "*Munchee*" (Ibidem)

[216] Hacker P. and Thomale C., Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law (November 22, 2017), op.cit., p. 35

[217] Ibidem

[218] In fact, consumer law is involved with the depreciation of value of a product caused by the lack of utility of said product, for example for lack of conformity between of the sold product. As Hacker P. and Thomale C. mention (op.cit. pp 34-35): "*The European Commission has proposed a directive on the supply of digital content which provides remedies taken from consumer sales law precisely for deficits in digital conten*t".

[219] Ibidem

the utility aspect of the asset, there is an investment risk and they need to be regarded as security[220]. The same issues incur when analyzing currency tokens: the pure form of these tokens (used as a form of payment) excludes them from securities[221], while if hybrid currency/investment tokens offer participation in future cash flows, they should be regarded as securities[222]. In conclusion, only pure investment tokens and hybrid tokens giving access to future cash flows can be deemed securities and should be subject to securities law; the appreciation in value when reselling tokens is not an adequate element to deem them as securities.

Many case-studies around the nature of tokens have emerged in different parts of the world, sometimes with different outcomes[223]. As we have previously mentioned, the DAO ICO was a very successful business operation. On a report, SEC stated that the tokens offered were to be considered as securities and, as such, registration of offers and sale of these securities was mandatory[224]. The aim for this registration was to protect investors so that regulatory entities obtained all the information required for them to intervene in case of illegal behavior[225]. Similar conclusion was reached in Singapore by the Monetary Authority (MAS): if tokens were to meet the criteria of securities, they would need to be registered before being issued, and registration with the required permits would be compulsory also for issuers, intermediaries and platforms[226]. Under EU regulation, as we have seen in this paragraph, tokens will only be considered securities, and thus regulated as such, when the investment component is predominant on the others or in case of pure investment tokens[227].

1.4) Comparative perspective on Distributed Ledger Technologies regulation and current initiatives

In this paragraph we are going to give a non-exhaustive overview on the current DLTs, blockchain and smart contracts regulation. The aim of this overview is to provide an analysis of the different approaches to the regulation of this technology. Thanks to its transnational nature, it is important to highlight the differences and similarities in the regulation of this phenomenon in Countries that, even geographically far from each other, are more and more interconnected in our globalized society, also by the use of blockchain technology by their citizens. Starting with the EU approach and Institutions involved in the definition and

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[220] Hacker P. and Thomale C., Crypto-Securities Regulation: ICOs, Token Sales and Cryptocurrencies under EU Financial Law (November 22, 2017), op.cit., p. 35
[221] Ivi,, pp. 30-33
[222] Ivi, p. 36-37
[223] Szostek D., Blockchain and the Law, op.cit., pp. 127-131
[224] Ivi, pp. 127
[225] Ivi, pp. 128
[226] Ibidem
[227] Ivi, pp. 128-129

regulation of DLTs, we are going to focus on the regulation from various parts of the world (Malta, Belarus, Japan and USA) and examine how these technologies have been regulated, highlighting the common features identified by legislators. Lastly, we are going to focus on the Italian regulation, the interpretative issues arisen with the European Regulation and the possible solutions, while giving an overview of the current initiatives to develop a more widespread use of this technology. Italian blockchain regulation will be taken into account through the course of this chapter and also in the following ones. Firstly, we will be analyzing the relation and difficult compatibility between smart contracts and Italian contract law and also analyzing another challenging open issue: the relation of blockchain technology and the data protection rights protected by the GDPR. In the second chapter we will be focusing on Italian copyright regulation and, in the third chapter, we will be analyzing the application of blockchain technology for copyright protection and its relationship with the Italian Regulation.

1.4.1) The European approach

The blockchain technology has been gaining more and more attention during these years and, since its widespread adoption, a need for regulation arose with it[228]. In this paragraph, we are going to analyze how different legislators have regulated this technology[229]. Noticeably, the regulation is mostly concerned with the definition of the Distributed Ledger Technology; in fact, since blockchain is an application (or even better a *species*) of this technology, legislators have chosen to define the broader class of which blockchain is part to. The problem with this line of reasoning is that, by regulating in a wider sense, the uncertainty related to the definition increases. In fact, with the Distributed Ledger Technology, we refer to a heterogeneous variety of applications: we have already mentioned public, private and hybrid blockchains and their different features that deserve to be regulated by the law as well.

Initially, European Institutions understood the potential of blockchain, but since it was on the earliest stages of development, they thought that regulating the technology too early would stop its development and, more importantly, it would not be able to regulate further problems and circumstances that would only arise with the advancement of this technology[230]. On top of that, EU Institutions wanted to understand if this was a

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[228] Miseviciute, J. (2018), "Blockchain and virtual currency regulation in the EU", Journal of Investment Compliance, Vol. 19 No. 3, pp. 33

[229] It is worth mentioning that the following Countries are not the only ones having adopted a regulation on blockchain and cryptocurrencies. To have a broader understanding of the worldwide regulation please see Goitom, H. (2018, June). Regulation of cryptocurrency in selected jurisdictions. In *The Law Library of Congress, Global Legal Research Center, Washington, DC, ReportJune,* (at the following link: http://www.marinacastellaneta.it/blog/wp-content/uploads/2018/07/regulation-of-cryptocurrency.pdf) that analyzes Countries like Argentina, Australia, France, Gibraltar and Switzerland that have implemented regulation on digital currencies.

[230] Miseviciute, J. (2018), Blockchain and virtual currency regulation in the EU, op.cit., pp. 33

phenomenon destined to stay, or if it was just hype[231]. A different approach was taken regarding cryptocurrencies and Bitcoin. As Misevicute mentions[232], EU Institutions have paid close attention to the relation between the financial world and the development of technologies compatible with it, in particular blockchain, because of the relation with the financial stability. It is worth mentioning the European Commission Fintech task force, set up in 2016, which has three main objectives: "*first to make sure that all policy work across the board is informed by and takes account of technological innovation; second, to assess whether existing rules and policies are fit for purpose in the digital age; and thirdly, to identify actions and proposals that could harness the potential opportunities FinTech offers while also addressing the possible risks. In practice, the task force has been looking at the existing frameworks within EU Member States, talking to relevant stakeholders and considering the case for a coordinated European response*"[233]. The task force has worked very closely with the Blockchain Observatory and Forum[234], set up by the European Commission, which is predominantly used as a communication tool to share knowledge and EU's vision for DLTs[235].

In order to *"cement Europe's position as a global leader in this transformative new technology[236]"* it was also instituted the European Blockchain Partnership, to grant a uniform approach and the sharing of expertise between countries, benefitting European citizens with the creation of the European Blockchain Services Infrastructure (EBSI): *a network of distributed nodes across Europe that will deliver cross-border public services[237].*

It has been reported[238] that by 2024 *"The EU executive will present a draft law to clarify how existing rules apply to crypto assets and set out new rules where there are gaps"*. The European Commission also seeks to encourage the use of digital payment since the 78% of transactions still relies on cash while, due to the current circumstances (the advancement of the digitalization of payments due to COVID19), citizens would benefit from a shift to faster digital payments: the so-called "instant payments" that are sought to replace

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[231] Ibidem

[232] Miseviciute J., Blockchain and virtual currency regulation in the EU, op.cit., pp. 33, pp. 34-35.

[233] Available at : https://ec.europa.eu/newsroom/fisma/item-detail.cfm?item_id=56443&utm_source=fisma_newsroom&utm_medium=Website&utm_campaign=fisma&utm_content=Task&hx0025;20Force&hx0025;20on&hx0025;20Financial&hx0025;20Technology&lang=en

[234] The EU Observatory and Forum Reports and themed events (for example on the use of the blockchain in healthcare or agri-food sector) are organized and published on a regular basis, and are very useful for those trying to be up to date with the developments and recent legal issues of this technology. They are available at the following link: https://www.eublockchainforum.eu/

[235] The EU Blockchain Observatory and Forum is split into two work-groups: the Blockchain Policy and Framework Conditions Working Group whose aim is to define the legal and political conditions for the mainstream adoption of blockchain and, also, to face questions regarding the application of blockchain such as smart contracts and privacy issues, and then we have the Use Cases and Transition Scenarios Working Group whose purpose is to understand and work on the up-and-coming applications of the blockchain.

[236] On the official website (See https://www.eublockchainforum.eu/) it is highlighted the aim of the forum

[237] See https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/EBSI under "What is EBSI?

[238] See https://www.reuters.com/article/us-eu-cryptoassets-idUSKBN2692CP?taid=5f650e4b1266d20001848e70&utm_campaign=trueAnthem:+Trending+Content&utm_medium=trueAnthem&utm_source=twitter

card payment schemes for physical and online purchases[239]. Furthermore, the documents also mentioned that "*by 2024, the principle of passporting and a one-stop shop licensing should apply in all areas which hold strong potential for digital finance*"[240].

1.4.2) The first European Member State regulating DLTs: Malta

Starting in a chronological order, the first European Member State adopting a regulation regarding blockchain was Malta. The EU's smallest State by population has been the chosen jurisdiction for operators in this field[241] and the reason behind this is that the Maltese Virtual Financial Assets Act[242] (VFAA) has managed to achieve the objectives set by international standards for financial regulation[243]. The Maltese regulation sets a framework that supports the development of the technology and its innovation while still respecting these international standards[244]. The VFAA was issued in 2018 together with the Innovative Technology Arrangement and Services Act[245] and the Malta Digital Innovation Authority Act[246]. Maltese government has gathered the experts in this field under the Malta Digital Innovation Authority[247] in order to make Malta one of the centers of excellence for innovation. The Innovative Technology Arrangement and Services Act incorporates DLT technology under the broader term of "*Innovative Technology Arrangements*" which are described as: "*1. software and architectures which are used in designing and delivering DLT which ordinarily, but not necessarily: (a) uses a distributed, decentralized, shared and, or replicated ledger; (b) may be public or private or hybrids thereof; (c) is permissioned or permissionless or hybrids thereof; (d) is immutable; (e) is protected with cryptography; and (f) is auditable; 2. smart contracts and related applications, including decentralized autonomous organisations, as well as other similar arrangements; 3. any other innovative technology arrangement which may be designated by the Minister, on the recommendation of the Authority, by notice from time to time*[248]*".

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[239] Ibidem

[240] Further elements on the EU strategy on blockchain can be found at the following link: https://ec.europa.eu/digital-single-market/en/blockchain-technologies

[241] Buttigieg C.P. & Efthymiopoulos C. (2019) The regulation of crypto assets in Malta: The Virtual Financial Assets Act and beyond, Law and Financial Markets Review, 13:1, p. 30

[242] Available at: http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29079&l=1

[243] Buttigieg C.P. and Efthymiopoulos C., supra, p. 30: "*such as International Organisation of Securities Commissions (IOSCO), being: [i] investor protection, [ii] market integrity and [iii]financial stability*"

[244] Ivi, p. 30

[245] Available at: http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lp&itemid=29078&l=1

[246] Available at: http://www.justiceservices.gov.mt/DownloadDocument.aspx?app=lom&itemid=12873&l=1

[247] See https://mdia.gov.mt/about/

[248] Innovative Technology Arrangement and Services Act, First Schedule

1.4.3) Belarusian Regulation and definitions

Belarus[249], on the other hand, with the Decree On the Development of Digital Economy[250], signed on 21 December 2017 and that became effective in 28 March 2018, was the first Eastern European country to adopt comprehensive legislation on cryptocurrencies and was the first country in the world to legalize smart contracts[251]. The Decree also created the HTP (High Technologies Park) a governmental unit with the purpose of regulating entities, both resident and non-residents, undertaking development operations for blockchain or for cryptocurrencies innovation[252]. This entity in 2018 also issued five more regulations to better govern cryptocurrencies and token activities[253]. The Decree describes "cryptocurrency" as Bitcoins or other digital signs (tokens) that is used in international circulation as a universal means of exchange. A "digital sign" (token) is defined as an entry in the transaction block registry (blockchain) or other distributed information system, which certifies that the owner of the digital sign (token) is entitled to civil law protections and/or is a cryptocurrency[254]. Smart contracts are defined as a program code intended for functioning in the transaction block ledger (blockchain), another distributed-information system for purposes of automated performance and/or execution of transactions or performance of other legally significant actions[255]. The Belarusian regulation also regulates taxation, anti-money laundering, licensing requirements and foreign exchange controls[256].

1.4.4) USA Regulation

Similar approach was taken by the United States of America with the Senate Bill n.1662[257] which defines DLT as "*any distributed ledger protocol and supporting infrastructure, including blockchain, that uses a distributed, decentralized, shared, and replicated ledger, whether it be public or private, permissioned or permissionless, and which may include the use of electronic currencies or electronic tokens as a medium*

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[249] For a deeper understanding of the Belarusian regulation on blockchain and cryptocurrencies please read Goitom, H. (2018, June). Regulation of cryptocurrency in selected jurisdictions. In *The Law Library of Congress, Global Legal Research Center, Washington, DC, ReportJune*. pp. 20-23

[250] For the full text in English, please see http://law.by/ document/?guid=3871&p0=Pd1700008e

[251] Source: https://en.wikipedia.org/wiki/Decree_on_Development_of_Digital_Economy

[252] Goitom, H. (2018, June). Regulation of cryptocurrency in selected jurisdictions. In *The Law Library of Congress, Global Legal Research Center, Washington, DC, ReportJune*. p. 20

[253] The five Regulations are the following: 1) Regulations on the Requirements to be Met by Certain Applicants for Their Registration as Residents of the High Technologies Park, 2) Regulations on the Activity of a Cryptoplatform Operator, 3) Regulations on the Activity of a Cryptocurrency Exchange Office Operator, 4) Regulations on Provision of Services Related to the Creation and Placement of Digital Tokens (Tokens) and Carrying Out of Operations on the Creation and Placement of Own Digital Tokens (Tokens) (ICO Regulations), 5) Regulations on the Requirements for the Internal Control Rules of Residents of the High Technologies Park (Internal Control Regulations. Please see https://www.loc.gov/law/help/cryptoassets/belarus.php

[254] Decree of the President of the Republic of Belarus No. 8 of December 21, 2017, annex no. 1 on Development of Digital Economy

[255] Ibidem

[256] Goitom, H. (2018, June). Regulation of cryptocurrency in selected jurisdictions, op.cit., p. 23

[257] Available on https://legiscan.com/TN/text/SB1662/2017

of electronic exchange" and smart contracts as "*an event-driven computer program, that executes on an electronic, distributed, decentralized, shared, and replicated ledger that is used to automate transactions, including, but not limited to, transactions that: (A) Take custody over and instruct transfer of assets on that ledger; (B) Create and distribute electronic assets; (C) Synchronize information; or (D) Manage identity and user access to software applications*". As noted by Szostek[258] , the state of Arizona[259] and Vermont[260] have also issued laws regarding blockchain and distributed ledgers.

1.4.5) Japanese Regulation

The Japanese government started to develop regulation on cryptocurrency after Mt. Gox, one of the biggest Bitcoin thefts in history[261]. The Payment Services Act[262] defines "cryptocurrency" as "*1) property value that can be used as payment for the purchase or rental of goods or provision of services by unspecified persons, that can be purchased from or sold to unspecified persons, and that is transferable via an electronic data processing system; or 2) property value that can be mutually exchangeable for the above property value with unspecified persons and is transferable via an electronic data processing system. The Act also states that cryptocurrency is limited to property values that are stored electronically on electronic devices; currency and currency-denominated assets are excluded[263]*".

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[258] Szostek D., Blockchain and the Law, op.cit., pp 42-44

[259] Act Hb2417, available on https://www.azleg.gov/legtext/53leg/1r/bills/hb2417p.pdf , defining blockchain technology as "*distributed ledger technology that 4 uses a distributed, decentralized, shared and replicated ledger, which may 5 be public or private, permissioned or permissionless, or driven by tokenized crypto economics or tokenless. the data on the ledger is protected with cryptography, is immutable and auditable and provides an uncensored truth*" and smart contracts as "*an event-driven program, with state, that runs on a distributed, decentralized, shared and replicated ledger and that can take custody over and instruct transfer of assets on that ledger*".

[260] Szostek D, Blokchain and the Law, op.cit., p. 43: "*The state changed the 12th title of the statute of Vermont- judicial procedure (chapter 81) entering [...] the definition and presumptions related to blockchain technology. [...] "Blockchain" means a cryptographically secured, chronological, and decentralized consensus ledger or consensus database, maintained via Internet interaction, peer-to-peer- network, or other interaction*". The information recorded on the blockchain in a digital form can be regarded as authentic if there is also the date and time of when the data has been recorded on the blockchain, the fat that the data was recorded by an entity that does this type of operations frequently and that said data has been confirmed by the nodes.

[261] Back in 2014, on the Mt. Gox a cryptocurrency exchange platform there were 850.000 bitcoins missing, that at the time valued around $480 Million dollars. The system was hacked but the platform promised to recover any loss any of their clients had suffered. There is a lot of speculation on this case and the identity of the hacker and his detention and subsequent release. Please see https://www.japantimes.co.jp/news/2019/04/06/national/media-national/solving-worlds-largest-bitcoin-heist/

[262] For further information on Japanese cryptocurrency regulation please see Goitom, H. (2018, June). Regulation of cryptocurrency in selected jurisdictions. In The Law Library of Congress, Global Legal Research Center, Washington, DC, ReportJune pp 53-58.

[263] Please see Payment Services Act art. 2, para. 5

1.4.6) Italian Regulation: interpretative problems, current initiatives and recent developments

Lastly on this non-exhaustive comparative perspective we are going to focus on the Italian regulation. Italy has introduced the regulation and the definition of distributed ledger technologies and smart contracts with the dl. 135/2018 art.8-ter, later converted into l. 12/2019[264], whilst assigning the individuation of a standard with the technical specific regulation to the AgID (Agenzia per l'Italia Digitale, a public Italian agency). We will later see, towards the end of this paragraph how this Act has arisen interpretative issues.

Article 8 ter describes distributed ledger technologies as IT technologies and protocols that use a shared, distributed, replicable, simultaneously accessible, architecturally decentralized on a cryptographic basis, such as to allow the recording, validation, updating and archiving of data both in clear and further protected by cryptography verifiable by each participant, which cannot be altered or modified[265]. Similarly to other countries, Italy has waived the possibility to define blockchain and chose to join the worldwide trend of regulating DLTs instead. As Faini[266] noted, this definition can cause confusion between the concept of DLT and blockchain. As we have previously mentioned, blockchain is a *species* of the DLT *genus*[267], carrying its own typical features: worldwide transparency and verifiability of data by any user are specific features of permissionless blockchains. Furthermore, the third and fourth commas[268] of the Act declare that using DLTs to record data has the same legal effect as the electronic time stamping regulation ex art. 41 of the EU Regulation n. 910/2014 (eIDAS)[269] and that it will be the AgID's duty to set the technical standards that these technologies need to comply with, in order to produce the same legal effects. Interpretative issues have arisen since there are two different types of time stamping[270]: in fact, art. 41 EU Reg. 910/2014 refers

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[264] Full text of LEGGE 11 febbraio 2019, n. 12 Conversione in legge, con modificazioni, del decreto-legge 14 dicembre 2018, n. 135, recante disposizioni urgenti in materia di sostegno e semplificazione per le imprese e per la pubblica amministrazione. (19G00017) available on https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2019;12

[265] Art. 8 ter, co 1 DECRETO-LEGGE 14 dicembre 2018, n. 135 Disposizioni urgenti in materia di sostegno e semplificazione per le imprese e per la pubblica amministrazione: *"[...] le tecnologie e i protocolli informatici che usano un registro condiviso, distribuito, replicabile, accessibile simultaneamente, architetturalmente decentralizzato su basi crittografiche, tali da consentire la registrazione, la convalida, l'aggiornamento e l'archiviazione di dati sia in chiaro che ulteriormente protetti da crittografia verificabili da ciascun partecipante, non alterabili e non modificabili"*

[266] Faini, F. (2020) Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione, op.cit.,p. 97

[267] Faini, F. (2020) Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione, op.cit., p. 93

[268] Art. 8 ter l.12/2019 *"3. La memorizzazione di un documento informatico attraverso l'uso di tecnologie basate su registri distribuiti produce gli effetti giuridici della validazione temporale elettronica di cui all'articolo 41 del regolamento (UE) n. 910/2014 del Parlamento europeo e del Consiglio, del 23 luglio 2014.*
4. Entro novanta giorni dalla data di entrata in vigore della legge di conversione del presente decreto, l'Agenzia per l'Italia digitale individua gli standard tecnici che le tecnologie basate su registri distribuiti debbono possedere ai fini della produzione degli effetti di cui al comma 3".

[269] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC

[270] Faini, F. (2020) Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione, op.cit., pp. 96-98

to *qualified* time stamping[271], while the Italian legislator has not specified whether it is required the qualified or the *simple* time stamping. Since the AgID will set these standards, Faini[272] believes that, for what concerns the time stamping, the choice will fall on the qualified time stamping because, if not, the reference to the simple time stamping would limit the provisions set at European level, due to the principle of non-discrimination[273]. Additionally, the standards identified by the AgID for the qualified time stamp, will have to comply with the standards set by article 42[274] and cannot substitute them: in fact, the standards set by the EU Regulation, due to the hierarchy of the norms, will prevail on national provisions and if the AgID standards are in contrast with the ones set in the eIDAS Regulation, they will be disapplied. The text of the norm has also raised some doubts and criticism[275].

To conclude the comparative overview of DLTs regulation, the definition of smart contracts presented by the Italian legislator on art. 8-ter of the l. 12/2019[276] describes them as softwares operating on DLTs, whose execution binds the parties, based on what they have previously agreed. Smart contracts can also fulfill the requirement for a written form, thanks to a digital identification, a process whose functioning will be set by the AgID. Under Italian law, in fact, some contracts require the written form[277]; as for the smart contracts,

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[271] The difference between the two types of time stamping is that the time stamping required in order to have the presumption of the accuracy for the time and date, and the integrity of data associated with said data and time, is the qualified one. On the other hand, simple time stamping is not sufficient to gain the same legal effect.

[272] Faini, F. (2020) Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione, op.cit., p. 98

[273] Art 41 eIDAS Regulation, comma 1: "*An electronic time stamp shall not be denied legal effect and admissibility as evidence in legal proceedings solely on the grounds that it is in an electronic form or that it does not meet the requirements of the qualified electronic time stamp*".

[274] "*A qualified electronic time stamp shall meet the following requirements:*
(a)it binds the date and time to data in such a manner as to reasonably preclude the possibility of the data being changed undetectably;
(b)it is based on an accurate time source linked to Coordinated Universal Time; and
(c)it is signed using an advanced electronic signature or sealed with an advanced electronic seal of the qualified trust service provider, or by some equivalent method"

[275] Further analysis on the issue can be found in the following article https://en.cryptonomist.ch/2019/02/02/italian-legislation-on-smart-contracts-and-blockchains/

[276] "*Un programma per elaboratore che opera su tecnologie basate su registri distribuiti e la cui esecuzione vincola automaticamente due o più parti sulla base di effetti predefiniti dalle stesse. Gli smart contract soddisfano il requisito della forma scritta previa identificazione informatica delle parti interessate, attraverso un processo avente i requisiti fissati dall'Agenzia per l'Italia digitale con linee guida da adottare entro novanta giorni dalla data di entrata in vigore della legge di conversione del presente decreto*".

[277] Article 1350 of the Italian Civil Code lists the cases in which the written form is required for acts: "*Devono farsi per atto pubblico o per scrittura privata, sotto pena di nullità:*
1) i contratti che trasferiscono la proprietà di beni immobili;
2) i contratti che costituiscono, modificano o trasferiscono il diritto di usufrutto su beni immobili, il diritto di superficie, il diritto del concedente e dell'enfiteuta;
3) i contratti che costituiscono la comunione di diritti indicati dai numeri precedenti;
4) i contratti che costituiscono o modificano le servitù prediali, il diritto di uso su beni immobili e il diritto di abitazione;
5) gli atti di rinunzia ai diritti indicati dai numeri precedenti;
6) i contratti di affrancazione del fondo enfiteutico;
7) i contratti di anticresi;
8) i contratti di locazione di beni immobili per una durata superiore a nove anni;
9) i contratti di società o di associazione con i quali si conferisce il godimento di beni immobili o di altri diritti reali immobiliari per un tempo eccedente i nove anni o per un tempo indeterminato;
10) gli atti che costituiscono rendite perpetue o vitalizie, salve le disposizioni relative alle rendite dello Stato;
11) gli atti di divisione di beni immobili e di altri diritti reali immobiliari;

their use for these specific contracts will be allowed only after identification of the user and thus, probably not allowed on public blockchain[278].

Very recently much attention has been drawn to Bitcoin in Italy thanks to a *Suprema Corte di Cassazione* judgement, the Italian highest Court of Appeal. The judgement no. 26807 (dated 25 September 2020), concerns the nature of Bitcoin and whether or not they are a financial product. The Supreme Court has not ruled on the nature of Bitcoins but has deemed them as a financial product only when they are sold as such, for example if, when selling them, they are advertised with an investment proposition making reference to the possible future return and investment risk[279]. As the Court highlights in the maxim, if the activity is deemed as a financial investment it is subject to articles 91 (and following) of TUF[280], integrating the crime regulated by art. 166, comma 1, lett. c) TUF[281]. It is also worth mentioning the requirements that define a financial investment according to CONSOB[282] which are[283]: use of capital, a financial return expectation and the assumption of a risk directly connected and related to the use of capital[284].

Noticeably, in the near future the combined effort of the AgID and the judges will hopefully remove interpretative problems by setting adequate standards for both smart contracts and DLTs and/or by creating relevant precedents, therefore favoring the development and use of DLTs in Italy. The Italian Ministry of Economic Development has also reunited a group of experts in the blockchain field in order to develop a national strategy for the development of this sector and, thus, stimulating innovation[285]. This workgroup has launched a project that seeks to use blockchain as a tool to defend "Made in Italy"[286]. Another milestone reached by Italy has been the appointment as President of the EU Blockchain Partnership[287] in July 2019.

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12) le transazioni che hanno per oggetto controversie relative ai rapporti giuridici menzionati nei numeri precedenti;
13) gli altri atti specialmente indicati dalla legge"
[278] Faini, F. (2020) Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione, op. cit., pp. 97
[279] Agnino F. (2020), Vendita di bitcoin e intermediazione finanziaria abusiva, ilpenalista.it available at http://ilpenalista.it/articoli/giurisprudenza-commentata/vendita-di-bitcoin-e-intermediazione-finanziaria-abusiva
[280] Please see Decreto legislativo del 24/02/1998 - N. 58 "*Testo unico delle disposizioni in materia di intermediazione finanziaria, ai sensi degli articoli 8 e 21 della legge 6 febbraio 1996, n. 52*"art. 91 and following
[281] Please see Decreto legislativo del 24/02/1998 - N. 58 "Testo unico delle disposizioni in materia di intermediazione finanziaria, ai sensi degli articoli 8 e 21 della legge 6 febbraio 1996, n. 52." art. 166 comma 1
[282] The government authority of Italy responsible for regulating the Italian securities market (Commissione Nazionale per le Società e la Borsa)
[283] As noted by Furnari S.L., (2020) I Bitcoin non sono un prodotto finanziario, Financial community hub available on https://fchub.it/i-bitcoin-non-sono-un-prodotto-finanziario/
[284] Source: http://www.consob.it/web/area-pubblica/scheda-3
[285] Please see https://www.mise.gov.it/index.php/it/198-notizie-stampa/2039027-intelligenza-artificiale-e-blockchain-selezionati-gli-esperti
[286] Please see https://www.mise.gov.it/index.php/it/198-notizie-stampa/2040469-la-blockchain-per-tutelare-il-made-in-italy
[287] Please see https://www.mise.gov.it/index.php/it/198-notizie-stampa/2039936-eu-blockchain-partnership-l-italia-ottiene-la-presidenza-per-un-anno

1.5) Blockchain: key benefits and limits

After having discussed the main blockchain features and its regulation, we can now address its limits and open questions, whilst highlighting the benefits of this technology (which we have previously briefly mentioned). For what concerns the advantages, the main benefit is surely that the data stored in blockchain is immutable and tamper-resistant. Since every operation is tracked on the blockchain and visible to anyone[288], this technology has been widely used for financial transactions. Earlier we have seen how the transactions' safety is ensured by the public-key cryptography and the validation mechanism. Thanks to its consensus mechanism, transparency and data record, blockchains allow parties that do not trust each other to complete transactions safely. Once the data is registered into the blockchain, changing or removing any transaction is an extremely troublesome and difficult operation. Additionally, thanks to the fact that thousands of devices hold a copy of the blockchain, if any technical problem would arise on one (or even more) of the nodes, the system would still keep functioning seamlessly. This feature is very interesting compared to traditional databases that are usually controlled by third entities and that might be using only a very limited number of servers, facilitating the attacks by malicious parties. Furthermore, if data is stored in physical archives, it can be corrupted even more easily. This traditional technique to store information requires parties to trust an intermediary or third entity (such as a bank or governmental authority), which is not the case with blockchain that, thanks to its trustless nature and mining process, has established itself as a new remarkable option. Therefore, not only the system does not require to trust an intermediary, but it also reduces the costs of transaction resulting from the cutting out of external organizations fees and thus enhancing efficiency[289]. The distributed nature of the ledger and its Peer-to-Peer network is also very important for what concerns the malicious attacks on the network: when most of the nodes are honest, the attacks will not be possible thanks to the fact that these operations will simply not be validated by the system.

1.5.1) Limits of the blockchain technology

As with any new technology, blockchain has its own drawbacks and this overview will not be complete without mentioning them as well. The first and foremost is the reputation that blockchain still holds in the general public due to its complexity and the association with illegal activities on the Dark Web[290]. Apart

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[288] The data is available to anyone only in public blockchains and the privacy issue of the identity of the parties is protected by the pseudonymity, so that even if the transaction is visible, it will be very problematic to discover the real identity of the parties. More on the privacy issue and its relation with the GDPR, in Europe, will be discussed when analyzing the disadvantages.

[289] This article focuses on the benefits that businesses can gain from using blockchain https://www.forbes.com/sites/ilkerkoksal/2019/10/23/the-benefits-of-applying-blockchain-technology-in-any-industry/?sh=6d8411da49a5

[290] An introduction to the Dark Web and its relation with blockchain can be found at the following link https://codeburst.io/immunity-on-the-dark-web-as-a-result-of-blockchain-technology-6693eb087bdd

from that, media is generally focused on cryptocurrencies and their volatility, usually depicting them as a risky tool for financial speculative trading and investments, discarding all the other blockchain applications. Blinded by the perception of easy and quick return on their investment, or scared at the financial loss that they will suffer if they start interacting with this new digital world, most people fall in the "too good to be true" bubble, without even understanding the difference between Bitcoin and blockchain. Awareness of a new technology is a very different concept than its understanding. What has really made cryptocurrencies so popular and widely used are the same reasons that create skepticism: in particular, the lack of a governmental authority governing the platform causes people to look at this technology with suspicion. Some[291] have thought that once a regulation will take place, banks and other institutions will gradually enter into the market, thus creating trust in people. The bad reputation of blockchain has been sadly reinforced by the numerous scams that took place on the platform: a study by Satis Group confirmed that in 2017, over 80% of ICOs were scams[292].

For what concerns the use of cryptocurrencies on the Dark Web, there are some features inherent in blockchains that allow and push the use of this technology for illegal purposes: anonymity and security of the transactions[293], for example. Although these incentives are undeniable, there are also factors discouraging the use of cryptocurrencies on the dark web[294]. The high cost of the units of these currencies such as Bitcoins and Ether, makes them very inconvenient to trade with. Additionally, the Dark Web is under constant supervision by authorities that fight the illegal activity that is conducted on it. The biggest players on the Dark Net Market are constantly being shut down and governments have no reason to reduce resources to win this fight[295]. Dark web users also are looking for their needs to be met immediately, given the illegal nature of the transactions and the risks connected[296]; now the speed at which the blockchain works is one of the problems that this type of users faces (both as seller and buyer) and that extends to lawful transactions as well[297].

[291] Rossi B. (2018) Crypto trust is key for survival, available on https://www.raconteur.net/finance/cryptocurrency/crypto-trust/
[292] Available on https://research.bloomberg.com/pub/res/d28giW28tf6G7T_Wr77aU0gDgFQ
[293] Budko D. (2018) Blockchain, Cryptocurrencies, and the Dark Web, "Reasons for Using Cryptocurrency on the Dark Web" available on https://dashbouquet.com/blog/blockchain/blockchain-cryptocurrencies-and-the-dark-web
[294] Budko D., (2018) Blockchain, Cryptocurrencies, and the Dark Web, "Reasons for Using Cryptocurrency on the Dark Web" op.cit., "Factors Discouraging the Use of Cryptocurrencies on the Dark Web"
[295] A life sentence behind the bars was the price that Ross Ulbricht, the brain behind SilkRoad, one of the biggest drug marketplace on the Dark Web, has to pay to this day after his arrest in 2013 (https://edition.cnn.com/2013/10/04/world/americas/silk-road-ross-ulbricht/index.html), or the arrest of Tomáš Jiříkovský, for drug trafficking online on the Dark Web and for stealing over 40 thousands Bitcoins (https://news.bitcoin.com/darknet-market-operators-who-stole-40-thousand-btc-face-prison-time/), just to name a few.
[296] Budko D., (2018) Blockchain, Cryptocurrencies, and the Dark Web, "Reasons for Using Cryptocurrency on the Dark Web", op.cit., "Factors Discouraging the Use of Cryptocurrencies on the Dark Web"
[297] Ibidem

Cryptocurrencies Transaction Speeds Compared to Visa & Paypal

VISA — 24,000

ripple — 1,500

PayPal — 60

BitcoinCash — 56

litecoin — 48

DASH — 20

ethereum — 20

bitcoin — 7

ripple — 193

1000 transactions
100 transactions
20 transactions
Company
Transactions per second

howmuch

[298] (Figure 2)

Because of the way the blockchain works, with the PoW method, mining and verification process, and most importantly due to the fact that it is a relatively new technology that still has space for further development, the difference in the number of transactions possible per second is quite noticeable (Figure 2). The blockchain technology, though, has all the tools to keep expanding and progressing as a form of payment, whilst searching for new ways to speed up the transaction process.

On top of these factors there are also two problems that are linked to each other: the transaction fees[299] and the wastage of resources[300]. As we have seen, the mining process requires an enormous amount of computational power. For every transaction in blockchains using PoW, thousands of miners will try to solve the puzzle underneath and only the first one will "win the competition", mine the new block and have access to the transaction fee. For every time miners are the fastest to manage to solve the hash function, there are many other times in which they could not. They would have still used a huge amount of computational power and resources but would not achieved any profit at the end of this process. Noticeably, there is a risk

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[298] This graph shows the number of transactions per second of some of the largest cryptocurrencies compared to PayPal and Visa (the research was published in January 2018) and is available on https://howmuch.net/articles/crypto-transaction-speeds-compared. It is surprising to see Ripple (a cryptocurrency), with such a wide margin from PayPal, the go-to platform for peer-to-peer online payments with over 218 million users. As the research shows, Ripple may have the capability to be the next payment solution on a larger scale.

[299] Budko D., (2018) Blockchain, Cryptocurrencies, and the Dark Web, "Reasons for Using Cryptocurrency on the Dark Web" , op.cit., "Transaction Fees"

[300] Sedlmeir, J., Buhl, H.U., Fridgen, G. et al. The Energy Consumption of Blockchain Technology: Beyond Myth. Bus Inf Syst Eng 62, 599–608 (2020). https://doi.org/10.1007/s12599-020-00656-x

that miners are willing to take with every transaction: the energy they have consumed (and thus paid for) might not grant them any profit, but it can actually be an economic loss for them. The result of this process is that miners will prioritize transactions with higher rewards and solve them first, while transactions with not so competitive rewards will have to wait more in order to be mined. Although unpleasant, this way of operating should not come with any surprise because, just like any other business, even blockchains operate in a "supply-and-demand" scenario, prioritizing the transaction that will profit miners more. For what concerns the wastage of resources there has been a report[301] that challenged the prejudice of the enormous power consumption of blockchain. In fact, this wrongful perception could cement the bad reputation of blockchain and could also prevent the widespread use of this technology due to a greater, more recent awareness of environmental issues in the public. Before considering the results of the report, we shall acknowledge that a lot of miners settle in geographical locations where the energy cost is lower to gain more profit and that, most importantly, blockchains are *"energy-intensive by design"[302]*: PoW consumes a lot of energy but efficiently defends blockchains from malicious attacks. The research, after calculating the energy consumed by blockchain[303], recognizes that the amount consumed is massive compared to the volume of transactions that it is possible to operate but shows how a widespread increase in the use of cryptocurrencies will not be as devastating on the environment, as others have wrongfully sustained[304]. In fact, in these researches they have failed to understand that the blocksize (even with its own issues[305]) can be increased and, by doing so, the energy consumption will remain constant while the data exchanged will increase[306]. Moreover, shifting from a PoW consensus mechanism to a PoS one will decrease exponentially the consumption of energy. We have seen how PoS does not require the solution of the complex puzzles by thousands of miners simultaneously and that it does not use as large amounts of computational power, but, with this consensus mechanism, validators are selected in relation to the amount of cryptocurrency that they have deposited and locked: the computational power required is rather lower compared to PoW and is unrelated to the network size. As some[307]have noted, this is the reason why more and more cryptocurrencies platforms have moved or are in the process of moving to PoW alternatives, especially PoS: noticeably there is Eos, Tezos and TRON (which are in the top 20 cryptocurrencies for market capitalization) that already

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[301] Ivi, pp 599–608
[302] Ivi, p. 601
[303] Ivi., pp. 599-603
[304] Mora C, Rollins RL, Taladay K, Kantar MB, Chock MK, Shimada M, Franklin EC in "Bitcoin emissions alone could push global warming above 2°C" have extrapolated "*the energy consumption of a single Bitcoin transaction to the order of magnitude required for handling payments on a global scale*" (Sedlmeir, op.cit. p. 603).
[305] Sedlmer, The Energy Consumption of Blockchain Technology: Beyond Myth ,op. cit. p. 603: "*In practice, however, the blocks cannot be enlarged at will. While in Bitcoin Cash, for example, the blocksize has been increased by a factor of 8 (compared to Bitcoin) without any problems, a significantly larger block size is currently not practicable. This is because, the larger a block is, the longer it takes for it to be propagated by the worldwide blockchain network. This can have a negative effect for latency (the time it takes to distribute a new block to all nodes) and, also, security [...] If, however, storage capacities (hard disks) and network speed continue to improve worldwide, a considerable increase in block sizes might be conceivable in the future. This would enable higher transaction rates without a noticeable increase in energy consumption*".
[306] Ibidem
[307] Ivi, p 604

use it and also Ethereum, which is the second largest cryptocurrency, is trying to shift to PoS as well. Even with a lower impact consensus mechanism, blockchains will still consume more energy than a regular centralized system, but the benefits they provide must be taken in consideration, and only at that point see if the pros outweigh the cons.

Finally, other than not being a direct "enemy" of climate, even if the number of transactions processed in the future will raise, a complete evaluation should take in consideration the unique opportunities that blockchains provide, outside of the payments and currencies areas, that concern new opportunities and business models[308] and these will be highlighted later in this dissertation.

Another problem with blockchain is the storage that is required on the hard drive of the devices. Anyone interested in becoming one of the nodes of the blockchain needs to make available a large storage space on their device in order for blockchain to run on it[309].

We have seen with smart contract how difficult it is to deal and to change something on the blockchain. What is inevitably an advantage for blockchain because it enhances security, can also become a problem. A hard fork is usually the solution: this happens when one chain is completely abandoned and the data recorded on the previous chain are no longer verified by the current chain. It creates a split in the chain, creating data that is no longer compatible with the blockchain. This operation is very difficult and demanding and creates many problems when, for some reason, the data added to the blockchain needs to be modified.

Lastly, we have only mentioned problems when the blockchain is made by honest nodes. But what happens in case of a malign attack? Normally, if the malign nodes are the minority, they will not be able to complete the attack. The PoW mechanism has been very effective in this sense over the years preventing the attacks. The only way for an entity to alter the blockchain would be to be in control of 51% of the hashing power: this is what we call a "*51% attack*". Although possible, there is no history of 51% attacks on the Bitcoin platform: as the platform grows and increase, the same happens to its computational capacity. The more it grows, the more resources should be spent to complete a 51% attack. The way blockchain works is that nodes are better rewarded when they act honestly. Most importantly a 51% attack would only be able to modify the most recent blocks, while to operate changes on the older blocks the computational power required would be immense. On top of that, the Bitcoin network is quite resilient and would quickly respond to an attack[310].

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[308] Ivi, p. 603
[309] Ibidem
[310] Source: https://academy.binance.com/en/articles/positives-and-negatives-of-blockchain

In conclusion, regulation and positive uses of the technology will increase the public trust in blockchains, making people understand the real value of this technology, beyond its wrongful uses and inaccurate perception on climate impact. The role of the media is fundamental in this sense, highlighting the benefits that this technology and its many applications can provide, beyond its strictly financial uses. Thanks to the fact that the technology is in its early stages, it is set to develop more and more over the years, solving some of the problems analyzed or finding new ways to face them.

1.5.2) Blockchain open issues

We have seen some of the new interpretative issues that have arisen, even after regulation took place: in fact, the process is still far from completed. We have seen how Italy is waiting for the setting of very important standards by the AgID concerning the technical requirements ensuring smart contracts the same status of effectiveness of regular contracts requiring the written form and for time-stamping. On top of that, there is the broader problem of the relation between regular and smart contracts regulation and the issues arising from tokens depending on their utility or security nature. Moreover, there are issues regarding the taxation of cryptocurrencies and tokens and more importantly the relationship between permissioned and permissionless blockchains and the privacy standards set by the GDPR.

1.5.2.1) Smart contracts and compatibility with Italian contract law

Starting with the doubts regarding the equivalence of smart contracts to regular contracts, the Italian "*Consiglio Nazionale del Notariato[311]*" has published a research paper in May 2019[312], commenting the l. 12/2019 and its compatibility with the "*Codice Civile*" for what concerns smart contracts. The paper analyzes the question of whether smart contracts can be regarded as regular contracts or if they should be deemed as a technological tool only concerned with the application of the clauses, previously agreed by the parties[313]. This last opinion is supported by the presence of the words "*esecuzione*" e "*effetti predefiniti dalle parti*", that suggest an earlier agreement between the parties[314]. Now, l. 12/2019 indicates also smart contracts as a binding legal source; this provision, though, is redundant considering that, together with the presence of other requirements, the pre-existing contractual relationship between the parties, disciplined by

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[311] It is the Italian political representative body of the category of notaries https://www.notariato.it/it/il-consiglio-nazionale-del-notariato

[312] The full text of the paper Manente M. "*L. 12/2019 – SMART CONTRACT E TECNOLOGIE BASATE SU REGISTRI DISTRIBUITI – PRIME NOTE"* is available on https://www.notariato.it/sites/default/files/S-1-2019-DI.pdf

[313] Ivi, p. 3

[314] Ibidem

the Italian Civil Code[315], is also suitable to become a binding legal source. It is also important to note that "*la forma*" is one of the elements of the contract: even if article 1325 cc seems to require a specific form only when it is prescribed by law, under Italian law a generic form is essential: unless the contractual will is somehow externalized, it cannot be relevant to the law[316]. The cases for which the law requires a specific form (for example, the written form) can also be under penalty of nullity of the acts themselves. Incorporating in smart contracts "*l'oggetto*" e "*la causa*" is not troublesome, but documenting "*l'accordo tra le parti*" might be, unless an identification process is set[317]. We have seen how the AgID shall set these standards and the *Consiglio Nazionale del Notariato* believes that, according to the formulation of art 8-ter of l. 12/2019, this identification process shall be different from the digital signature[318]; the legislator's choice of delegating the duty of finding this new process that will avoid phenomena of substitution of person to the AgID alone, is quite demanding. Furthermore, the *Consiglio Nazionale del Notariato* believes that proof of the agreement of the parties is the *execution*[319]of the software by both parties, with all the information stored and agreed previously. The last requirement of the contract is "*la causa*" which is defined in the report as the justificatory element that makes the purpose of the activity of the parties to be legally appreciable[320]. Sensibly, the *Consiglio* notes that this element will not be incorporated in the smart contract string of code, simply because it does not provide instructions to the device. If smart contracts will lack this element, they simply will be considered void under Italian law[321]. The report also suggests several solutions to this problem: it will be required to either "voluntarily" add additional information, not necessary for the execution of the software but essential to its legal qualification, or else the law will provide a "typification" of smart contracts with a predetermined *"causa"*, or finally, the introduction of a separate document integrating the omitted elements[322]. Other critics that the *Consiglio* has moved to the discipline,

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[315] "*Accordo tra le parti*" is one of the requirements of the contract (disciplined by art. 1321 cc) under Italian Law together with "*causa; oggetto; la forma, quando risulta che è prescritta dalla legge sotto pena di nullità*" ex art. 1325 cc and is thoroughly disciplined by articles 1326-1342 of the Civil Code.
[316] Manente M., "*L. 12/2019 – SMART CONTRACT E TECNOLOGIE BASATE SU REGISTRI DISTRIBUITI – PRIME NOTE*", *op.cit.,* p. 4
[317] Ivi, p. 5
[318] Ivi, p. 7
[319] The *Consiglio Nazionale del Notariato* questioned the meaning of the term "execution" as expressed in the l.12/2019. Believing that the legislator, in this case, has moved away from the legal sense of the term, the *Consiglio* believes that the meaning of "*esecuzione*" belongs to a different linguistic register. In fact, the legal meaning is the implementation of the obligation previously agreed ("*adempimento*") that extinguishes the contractual constraint and cannot create an obligation, as opposed to what art. 8-ter disciplines. On the contrary, the *Consiglio* believes that to understand the term execution, we should refer to the informatic linguistic register. In this sense the term execution would mean "*The performance of an instruction or program*" (pag.6 of the report, supra), and thus the start of the software.
[320] Manente M., "*L. 12/2019 – SMART CONTRACT E TECNOLOGIE BASATE SU REGISTRI DISTRIBUITI – PRIME NOTE*",*op.cit.,* p. 3, which defines *"la causa"* as *"l'elemento giustificativo che rende giuridicamente apprezzabile lo scopo a cui tende in concreto l'attività delle parti.*
[321] Ex art. 1418 cc in fact, it is a cause of nullity of the contract: "*Il contratto è nullo quando è contrario a norme imperative, salvo che la legge disponga diversamente. Producono nullità del contratto la mancanza di uno dei requisiti indicati dall'articolo 1325, l'illiceità della causa [1343], l'illiceità dei motivi nel caso indicato dall'articolo 1345 e la mancanza nell'oggetto dei requisiti stabiliti dall'articolo 1346. Il contratto è altresì nullo negli altri casi stabiliti dalla legge*".
[322] Manente M., "*L. 12/2019 – SMART CONTRACT E TECNOLOGIE BASATE SU REGISTRI DISTRIBUITI – PRIME NOTE*", *op.cit.,* p. 7

concern the application of the general norms of contracts to smart contracts, in particular regarding the interpretation and termination of contracts (for example the extreme complexity to encode a case of termination for excessive burden and the impossibility to change the data stored on the blockchain, due to its nature, even after a Court's judgement)[323]. Moreover, the report highlights how the more nodes take part to a blockchain, the more secure it becomes[324]. Although, l. 12/2019 does not provide any objective parameters regarding a minimum degree of decentralization. Finally, art. 8-ter makes reference, and thus recognizes and regulates, only smart contracts operating fully on DLTs, excluding other types of smart contracts that function on centralized systems, for expressed legislator's will[325].

1.5.3) The difficult interaction between the General Data Protection Regulation and blockchain

Coordinating technical features of the blockchain and rights introduced by National and European legislation can cause problems. This is evident with the correlation between the discipline of the protection of personal data and the blockchain infrastructure: the transparent, decentralized and immutable nature of the blockchain may not seem compliant with the centralized approach of the General Data Protection Regulation (GDPR) (Reg. 679/2016[326]) implemented in Italy with the d.lgs 196/2003[327], later modified by d.lgs 101/2018[328]. One of the blockchain features that we have previously analyzed is the pseudonymity: using the hash function is an application of a pseudonymization process and, since it may concern personal data, should be regulated by the GDPR. Article 4, par. 1, n. 5 defines pseudonymization as: "*processing of personal data in such a manner that the personal data[329] can no longer be attributed to a specific data subject without the use of additional information, provided that such additional information is kept separately and is subject to technical and organisational measures to ensure that the personal data are not*

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[323] Ivi, p. 8
[324] Ivi, p. 9
[325] Ivi, p. 11
[326] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)
[327] DECRETO LEGISLATIVO 30 giugno 2003, n. 196 Codice in materia di protezione dei dati personali ((, recante disposizioni per l'adeguamento dell'ordinamento nazionale al regolamento (UE) n. 2016/679 del Parlamento europeo e del Consiglio, del 27 aprile 2016, relativo alla protezione delle persone fisiche con riguardo al trattamento dei dati personali, nonche' alla libera circolazione di tali dati e che abroga la direttiva 95/46/CE)).
[328] DECRETO LEGISLATIVO 10 agosto 2018, n. 101 Disposizioni per l'adeguamento della normativa nazionale alle disposizioni del regolamento (UE) 2016/679 del Parlamento europeo e del Consiglio, del 27 aprile 2016, relativo alla protezione delle persone fisiche con riguardo al trattamento dei dati personali, nonche' alla libera circolazione di tali dati e che abroga la direttiva 95/46/CE (regolamento generale sulla protezione dei dati).
[329] Personal data is defined by Article 4, par. 1, n.1 as: "*any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person*".

attributed to an identified or identifiable natural person". Through the pseudonymization process, the natural person is identifiable thanks to the application of further information, and this is the reason why it is subject to the data protection regulation. The clash between blockchain and GDPR also concerns the respect of the principles of *data minimisation*[330] and *storage limitation*[331]: because of the way blockchain is designed it releases a copy of the data and distributes it to the nodes (clashing with the principle of data minimisation) and, due to its immutability, it stores data perpetually. Moreover, as noted by Faini[332], the presence and role of the data subject[333], controller[334] and processor[335] is crucial for the application of the data protection regulation; in some types of blockchains, though, the individuation of some of these figures might be very difficult. In fact, while for permissioned and hybrid blockchains, users are only granted access by the controller or by the processor and so these control authorities are easily identifiable, on the other hand, due to the openness and decentralization features, it becomes extremely hard for permissionless blockchains[336]. The lack of individuation of the controller is particularly problematic when the data subject chooses to exercise one of his rights linked to his data: the right of access (art. 15), the right to rectification and erasure (artt. 16 and 17), the right to restriction of processing (art. 18), the right to data portability (art. 20), the right to object (art. 21) and the right to not to be subject to a decision based solely on automated processing (art. 22). It is the data controller's duty to comply with GDPR's obligations, conversely the allocation of responsibility becomes extremely troublesome on blockchains since there are multiple users (nodes) that store a copy of the ledger and that can possibly have some implications with the data. Some of these rights seem to be in complete contrast with the blockchain infrastructure: how can the rights of rectification, erasure and restriction of processing align with the immutability and decentralization of blockchain? How can the right to obtain human intervention, *ex* art 22, coexist with the mainly technological infrastructure of blockchain?

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[330] Art. 5, par. 1, lett. c), reg. 2016/679: "*Personal data shall be:[…] adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed*"

[331] Art. 5, par. 1, lett. e), reg. 2016/679: "*Personal data shall be:[…] kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the personal data are processed; personal data may be stored for longer periods insofar as the personal data will be processed solely for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes in accordance with Article 89(1) subject to implementation of the appropriate technical and organisational measures required by this Regulation in order to safeguard the rights and freedoms of the data subject*".

[332] Faini, F. (2020) Il diritto nella tecnica: tecnologie emergenti e nuove forme di regolazione. Federalismi.it Anno XVIII-Fascicolo nr. 16/2020, p. 99

[333] Art. 4, par. 1, n. 1, reg. 2016/679, supra.

[334] Art. 4, par. 1, n. 7 reg. 2016/679: "*the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data; where the purposes and means of such processing are determined by Union or Member State law, the controller or the specific criteria for its nomination may be provided for by Union or Member State law*".

[335] Art. 4, par. 1, n. 8, reg. 2016/679: "*a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller*".

[336] Fink M. (2019) "*Blockchain and the General Data Protection Regulation. Can distributed ledgers be squared with European data protection law*", available on https://www.europarl.europa.eu/RegData/etudes/STUD/2019/634445/EPRS_STU(2019)634445_EN.pdf, pp.58-59

The European Parliament recognized the validity of the discussion around blockchain and the GDPR and published a study: "*Blockchain and the General Data Protection Regulation. Can distributed ledgers be squared with European data protection law?*"[337]. This study applies the GDPR to blockchain whilst examining the tensions and opportunities, highlighting the advantages that the technology can provide to the GDPR's objectives. One of the advantages that the technology can bring is the introduction of a faster data sharing process that does not require an intermediary, dropping transaction costs thanks to smart contracts. Moreover, another application can be establishing a new data-sharing process on data marketplaces[338] for the Digital Single Market, making Europe more competitive with artificial intelligence[339]. Furthermore, data economy can benefit from using blockchains and their features as a data management tool[340], if they are going to be purposefully designed: the technology can provide data subjects with more control on their data[341] (for example for data portability or right of access[342])[343]. The study deeply analyzes the tensions between blockchain and GDPR that we have previously mentioned, focusing on: the role of the data controller and the difficult allocation of his accountability in blockchains, not only due to the presence of multiple players but also due to contrasting definitions in case law (especially regarding joint controllers)[344]; the immutability nature of the blockchain and the correlation with the assumption of GDPR of the possibility to modify or erase data when necessary; the tension between data minimisation and purpose limitation with blockchain[345]. Recognizing the advantages and tensions between blockchain and GDPR, often hard to reconcile, and understanding that different problems arise depending on the different blockchain infrastructure (either them being public, private, permissionless etc..) and thus they require a case-by-case analysis[346]. Finally, the study provides three concrete policy recommendations.

Firstly[347], in order to enhance legal certainty, the study suggest a greater regulatory guidance through various initiatives (the drafting of specific guidance by supervisory authorities and the Data Protection Board or the updating on some of the less recent opinions of the Article 29 Working Party). These initiatives

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[337] Fink M. (2019) "*Blockchain and the General Data Protection Regulation. Can distributed ledgers be squared with European data protection law*" available on https://www.europarl.europa.eu/RegData/etudes/STUD/2019/634445/EPRS_STU(2019)634445_EN.pdf

[338] Fink, ivi, p. 91: "*in essence digital marketplaces where personal and non-personal data can be traded as a commodity*"

[339] Ivi, p. III and 91.

[340] Ivi, p. 92

[341] The European Parliament (27 November 2018) "*Report on Blockchain: a Forward-Looking Trade Policy*" (AB-0407/2018) para 14 reported that: "*blockchain technology can provide solutions for the 'data protection by design' provisions in the GDPR implementation on the basis of their common principles of ensuring secured and self-governed data*".

[342] Fink M. analyzes more in detail each single data subjects' right (for example the right of access or the right of erasure) and their interaction with the blockchain technology features. Please refer to Chapter 7, Fink, op.cit., (pp 71-84).

[343] Even though at present, these objectives might be difficult to put in practice, Fink (op.cit., pp 92-93) talks about how, for example, personal health data is already monitored by data subjects in Estonia, that can decide who is going to have access to this data and this leaves room for further developments in different sectors as well.

[344] Fink M., "*Blockchain and the General Data Protection Regulation. Can distributed ledgers be squared with European data protection law*" pp 37-59.

[345] Ivi, pp 65-68.

[346] Ivi, p. 96.

[347] Ivi, p. 96-98.

would provide legal certainty and thus would help designing blockchains that are compliant with the regulation: blockchain engineers have complained about the difficulty of designing a conforming infrastructure due to legal uncertainty[348]. Also, the study suggests how regulatory guidance would benefit the whole data economy, not only the blockchain sector[349].

Secondly[350], certification mechanisms and codes of conduct are tools that are mentioned by the GDPR and that are thought to help applying the GDPR to concrete contexts. In fact, the very nature of the GDPR is to be principle-based and time-proof, thus making it difficult, as we have seen with the several tensions currently present, to be applied to specific cases of personal data processing. Thankfully, the regulation itself provides these tools of certification mechanisms and codes of conduct with this very role. These aid-devices were introduced in a co-regulatory spirit, enhancing the collaboration between private and public sectors[351].

Thirdly[352], even though certification mechanisms, codes of conduct and regulatory guidance surely help applying the GDPR provisions to concrete cases, there are still circumstances in which technical limitations to compliance with the regulation will persist. This is the case of art 17 and the right of erasure, for example. In these cases, the study suggests further funding for interdisciplinary research with the aim to develop new solutions, both new technical and governance remedies, to make blockchain compliant by design[353].

Finally, the study has concluded that[354], the compatibility of blockchain with the GDPR can only be assessed on a case-to-case basis. In fact, the features of private and permissioned blockchains, make them more easily compliant with the GDPR's legal requirements, unlike public and permissionless blockchain[355]. Assessing, in a general fashion, that blockchains are either compliant or non-compliant with the GDPR is not possible: blockchains are a class of technologies with very different features and governance systems[356]. Secondly, the study finds that, even though some of the tensions between the GDPR and blockchains are originated by the latter's technical infrastructure, there are also some uncertainties regarding some provision of the Regulation, beyond the blockchain[357]. This lack of legal certainty that exceeds blockchain's application is highlighted in the study (for example the definition of data controller creates doubts when analyzing case-law, especially regarding the definition of joint-controllers, together with the concept of

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[348] Ivi, p. 96
[349] Ivi, p. 97
[350] Ivi, p. 98-99.
[351] Ivi, p. 98
[352] Ivi, p. 99-100.
[353] Ibidem
[354] Ivi, pp. 101-102.
[355] Ibidem
[356] Ibidem
[357] Ibidem

"erasure" ex art. 17) and it wishes for increased legal certainty through a clarification of dubious concepts, using the three policy recommendations outlined[358].

1.6)   An overview of the different blockchain applications

Following what has been analyzed in previous paragraphs it is appropriate to provide an overview of at least some of the many blockchain concrete applications. This technology has proven to be quite versatile, adapting to the needs of very different sectors so, before delving into the opportunities that the Contemporary Art sector can take from the technology (in Chapter 3), a focus on potential fields and current applications will be provided.

Following an application-oriented classification[359] we can see the different sectors of application in Figure 2[360]:

(Figure 3)

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[358] Ibidem
[359]The same approach taken by Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: current status, classification and open issues. Telematics and Informatics, 36, p. 60.
[360] Ivi, , p. 62

Blockchain is currently widely adopted for financial[361] applications: cryptocurrencies, business services, economic transactions and predictions markets that are thought to benefit consumers. We have seen how blockchains provide a secure, immutable intermediary free and trustless way of transferring funds and thus it is used in many different types of financial transactions (capital markets, loans management, securities transactions, general banking and financial auditing). Other financial-oriented areas may include commercial property and casualty claims processing, contingent convertible bonds, automated compliance, proxy voting and asset rehypothecation[362]. Finally, blockchain adoption by the financial sector can reduce costs for central finance reporting, compliance and centralised operations[363]. Thanks to blockchains these financial operations can be conducted in a faster and more transparent way.

As regards governance[364], the aim of blockchain is to provide new and more cost and time efficient ways for governments to provide the same services (with the same validity) of managing and holding official records of citizens and enterprises, with the added benefit of disintermediation and transparency, typical of the blockchain, and thus reducing the corruption phenomena sadly present in all government services management. Examples of these government services may be the registration of legal documents, identity management, marriage registration, voting and taxes management[365]. Likewise, there are plenty of blockchain startups that act as digital notaries[366], certifying the contents of documents and thus supplying an useful resolution tool in case of disputes: the data stored on blockchains is immutable and, thus, easily verifiable. Using this technology can reduce the time and costs of bureaucracy for the authentication of many documents: property or residency documents for example[367]. Another use can be the creation of digital demographic registries, for birth, marriage and death certificates[368]. Blockchain technology can also offer a more efficient and reliable voting platform, with verifiable, immutable data that complies with national legislations[369].

One more field of application can be the healthcare[370] sector: blockchain technology can be used for storing medical records which will reduce errors when managing this type of "supersensitive" data[371]. In fact, most of the current service providers managing health data are centralized and most importantly not interoperable, making it extremely burdensome for patients, when they want to switch practitioner, to

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[361] Ivi, pp 60-62 and also, for a deeper understanding of its practical uses: https://consensys.net/blockchain-use-cases/finance/
[362] Ibidem
[363] Ibidem
[364] Ivi, pp 63-64
[365] Ibidem
[366] "*Virtual Notary, Bitnotar, Blocksing, btcluck, and Chronobit*" Casino, op.cit., p. 64
[367] Ivi, p. 64
[368] Ibidem
[369] Ibidem
[370] Ivi, p. 65 and also, for a deeper understanding of its practical uses: https://consensys.net/blockchain-use-cases/healthcare-and-the-life-sciences/
[371] Ibidem

provide their medical records. In fact, since the extremely sensitive nature of this data, there are some requirements to be met in order to share them and often patients will have to seek redundant care or risk improper treatment due to poor communication during emergencies (for example in case of allergies or prior medical conditions)[372]. A decentralized system would prevent these delays and grant a rapid access to data thanks to the possibility of keeping a registry storing this data in a secure way[373]. Also, this could help patients be more in control of their own data management, deciding what to share with practitioners, according to the GDPR objectives that we have analysed in the previous paragraph. Furthermore, blockchains can also help with drug traceability, preventing the selling of counterfeit or illicit drugs that carry unknown side effects and that may pose a risk on patients' safety[374].

Blockchain can also address various energy[375] or sustainability applications: Casino has mentioned the fact that blockchain can: "*reduce costs and enable new business models and marketplaces, can better manage complexity, data security, and ownership along grids, can engage prosumers in the energy market acting as enabler for the creation of energy communities, can enhance the transparency and trust of the energy market system, can guarantee accountability while preserving privacy requirements, can enhance direct peer-to-peer trading to support the smooth operation of the power grid, and can better handle demand response and provide a framework for more efficient utility billing processes and transactive energy operations. Blockchain technology may also be used for issuing certificates of origin, particularly for green energy production and renewable energy source [...]*"[376].

The role of these certificates that traces and grants the provenance of goods should not only limited to energy sources. In fact, consumers have the same interest for the use of green sources for the production of their clothes, but also for the proof of origin and treatment of their organic food. Also, consumers are not willing to buy counterfeited clothes and accessories and are extremely interested in having proof of the safety of the food they eat. For these reasons blockchain has been used in luxury and retail[377] sectors and food and agriculture. More importantly, though, supply chain management[378], regardless of the industry, can greatly benefit from blockchains. Thanks to the transparency feature, there is proof regarding the provenance of products, auditability of asset records, enhanced tracking mechanisms and traceability

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[372] Ibidem
[373] Ibidem
[374] Ibidem
[375] Source: https://consensys.net/blockchain-use-cases/energy-and-sustainability/
[376] Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: current status, classification and open issues, op. cit., p. 67
[377] Source: https://consensys.net/blockchain-use-cases/retail-fashion-and-luxury/
[378] Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: current status, classification and open issues, op.cit., p. 66

assurance and overall better information management. The technology can also help reduce costs of the supply chain infrastructure, considering that paperwork can account to half of the transportation costs[379].

As per figure 3, there are countless others application of the blockchain technology and for every possible application, new business models have arisen. We will later examine the correlation and endless possibilities of one of the "*most emerging blockchain- related fields*"[380] of application: Intellectual Property management.

In conclusion, what is important to note here are the new possibilities offered by blockchain and highlighted throughout the chapter, leaving aside for a moment the specific applications. Blockchain has been proven to own many useful tools, thanks to its inherent features, that can be used in many circumstances; notably: the possibility of reducing costs, enhancing security and tracking of transactions leaving immutable records of them. Even though some tensions have arisen with previous regulation, many initiatives, both at national and supranational level, have been promoted in order to enjoy the disruptive potential of the technology. Being at a very early stage of development, there is no doubt that this technology will continue to expand and its applications in all the different sectors will become more and more frequent in our everyday life.

In this chapter we have analysed notions and elements that will be crucial for the understanding of this dissertation. Starting with an introduction of the development of this technology, we have later delved into the analysis of its technical elements and features. The use of this technology as a trust-worthy distributed database, thanks to its features of immutability, transparency and non-repudiability, is the foundation of the purpose of this dissertation: considering the opportunities offered for the protection of Intellectual Property Rights (Chapter Three). We have later also analysed smart contracts and tokens operating on blockchains. On one hand, we can conclude that smart contracts should be regarded as technological tools concerned with the execution of previously agreed clauses by the parties, on the other hand, tokens should be considered as digital representations of units of value, not only representing digital currencies, but also conferring rights to their holder. We have also focused our attention on the different types of smart contracts and tokens and the legal issues linked to these emerging technologies, concluding that a liberal approach should be taken by legislators towards their regulation, thus allowing the development of this technologic tools, whilst protecting citizens' rights. Furthermore, a comparative comparison has been provided on the regulation differences and similarities of DLTs and blockchain. We have concluded that legislators all around the world have preferred to focus on the regulation of DLTs instead of blockchains, leaving some aspects of the latter unregulated and causing interpretative issues. To complete our overview, we have analysed blockchain's multiple benefits which concern the safer and more secure infrastructure of the

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[379] Source: https://consensys.net/blockchain-use-cases/supply-chain-management/
[380] Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: current status, classification and open issues, op.cit., p. 63

distributed ledgers compared to centralized databases, whilst acknowledging their own peculiar challenges and problems, mostly regarding the reputation of the technology in the general public, the speed of transactions and the energy consumption. Finally, after we have discovered the many uses and different applications of the technology in industries operating in completely different sectors, we can now confidently conclude that the benefits outweigh the limits. In this chapter we have focused our attention on Italian Regulation, future initiatives and interpretative issues mostly regarding the correlation between smart contracts and typical contracts legislation and the relation between blockchain and the European data protection policy set in the GDPR. In the next Chapter our attention will be directed to the Italian Copyright Law and its typical features and most recent developments, in the light of which, on Chapter three, a thorough analysis on the application of blockchain for the protection of Intellectual Property Rights will be provided.

Chapter 2

The Italian copyright system: the moral and economic rights accruing to authors and the developments of their formulations.

The advent of the digital era has been disruptive in the lives of everybody. We all see how our lives are linked with technology: we may research on the internet any information we need, we may watch movies, read articles and share our photographs any minute we want. These operations are possible thanks to the creation of intellectual works, on one hand, and the incentive to create to their creators provided by a legal protection: the copyright. The same mechanism that has always been applied to the original work and to the limited number of the copies, now faces new challenges thanks to the possibility introduced by new technologies and the potentially infinite number of digital copies of the works. How is it possible that such a pre-existing mechanism can protect the rights of authors in our modern society? In this chapter we are going to focus on the evolution of copyright, from its beginning to the most recent implementations, providing an overview of the ways chosen by legislators to make copyright principles stay up to pace with these new situations. The previous chapter has focused on blockchain technology, its functioning and its legal issues; after having explained the modern copyright issues, in the third and final chapter we will provide an overview of the use of blockchain as a technological tool providing new opportunities to balance artists rights and the widespread fruition of intellectual works in current society. The possibility to digitalize any work results in the opportunity for anyone to create new copies and share them, possibly infringing the exclusive rights of creators when these operations do not fall under the exceptions granted by the law. In fact, it has been recognized how modern society is based on the constant exchange of information and, the widespread use of Internet has made the diffusion of copyrighted works extremely easy. Now, it is possible that some rights need to remain an exclusive prerogative of authors, while others may be granted an exception due to the social function of copyright. This chapter focuses on the second core element of this dissertation: the evolution of the copyright protection system. The aim of this chapter is, thus, twofold: on one hand it shows how the fundamental concepts of copyright protection needed to adapt to modern problems and on the other, lays the foundation, together with the first chapter, to understand the rights that blockchain technology can protect and how strictly interconnected copyright protection can become with technology.

In this chapter we are going to analyse the Italian discipline of copyright and, thanks to the harmonization process implemented by the European Institutions, reference will be made to the principal Directives as well. European Institutions have, in fact, recognized the cross-border value of the copyright protection

discipline throughout the territory of the Community due to the characteristics of the current society. Recently, the progress and evolution of technologies, have incremented even more the connection and constant exchange of information between Member States and new emerging issues occurred. The InfoSoc Directive (2001/29/EC) and the Copyright Directive (790/2019/EU) have been fundamental in the harmonization process. Furthermore, together with jurisprudential decisions, these Directives have provided the tools to better balance the rights of the authors in our society. In this chapter all these elements will be analysed. Firstly, an historical evolution of the copyright protection is provided, comparing the features in common law and civil law systems with the aim of highlighting their differences. Secondly, we will focus on the Italian discipline of copyright protection examining the requirements of protection. The figure of the author and the problems in the cases of employment relationship and non-human creations have also been discussed recently and their discipline has raised some complications. An overview is also provided of the different types of complex works, where the figure of the author is not always clearly distinguishable and it gives rise to different protection discipline. Furthermore, author's rights will be considered. Distinguishing between economic and moral rights and highlighting the differences of their general features, we will break down the main characteristics of every exclusive right accruing to authors and protected by the discipline. Lastly, these same rights will be inspected in the light of emerging issues to see how the discipline has adapted to the definition of new phenomena like linking or file sharing on a peer-to-peer network. Focusing on the most recent regulations and jurisprudential decisions there will also be presented a review on the evolution of Internet Service Providers liability and the innovations introduced by the 790/2019 Directive.

2.1) The aim of copyright

Before beginning the analysis of the evolution and the discipline of copyright in Italy it is crucial to point out its aim and functions. In order to understand copyright's role, we shall refer to the concept of intellectual property first. Copyright reflects the *summa divisio* between the different fields that are part of the broader concept of intellectual property and, therefore, we shall clarify the dissimilarity between the different fields that constitute the concept of intellectual property[1]. On one side we have copyright and related rights, while, on the other, we can find industrial property which comprises patents, designs and trademarks. Each of these areas has a specific role and all of them are important for fostering innovation. Copyright reflects the abstract line that ascribes "technology to patents" and "aesthetics to copyright"[2]. In the field of technology, creativity is intended as the research of new methods that deal with the satisfaction of human material

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[1] Falce, V. (2014). Intellectual property law in Italy. Wolters Kluwer Law & business, p. 23
[2] Ibidem

needs, while the "aesthetic" field refers to creations destined to intellectual uses only and has no direct functional use. Copyright is involved with the latter, dealing with authorship and safeguarding authors and their creativity. Without an instrument protecting authors rights, innovation would suffer greatly: authors would have less incentives to invest their time and funds into the development of their ideas. One of the methods to protect authors is the recognition of both moral and economic rights to them, providing a way to benefit from their creations and, as a result, stimulate innovation. Even though the idea in itself is not protected by copyright law, as we will later see, the protection assured to the expression of these ideas, regardless of their degree of actual innovative potential, instigates new creations and contributes to overall cultural progress of society.

2.2) The copyright history and evolution

Copyright is a relatively recent concept, in fact, the historical evolution of intellectual property only started in modern age in common law countries[3]. In fact, before the invention of printing, author's protections were almost non-existent, but after the diffusion of this instrument, new figures (like booksellers and printers) started to demand these rights in connection with authors' creations. Thanks to the printing technology, authors, publishers and technicians involved with any phase of the printing process, sought protection against those that were printing books without having the proper authorization[4]. In Great Britain, before the Statute of Anne, there was a particular situation: on one side, the system was based on privileges that were conferred to publishers by the King[5], on the other side, publishers created the Stationer's Register[6]: a record book created by an association of London's publishers. The Register granted publishing rights to the first person that registered the book, which was usually bought directly from its author by the publishers. This is considered an early form of copyright law[7] and, during the same period of time, it was also instituted a specific Tribunal that could rule on the barring of the illicit edition of books lacking the license[8]. This system and the protection granted, regarded only the intermediaries that received the printing privilege on the works they purchased from the authors, but not the authors themselves[9]. For the first time, with the

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[3] Johns A., Pirateria. Storia della proprietà intellettuale da Gutenberg a Google, Torino, 2011, pp. 31 – 60, 149 – 194; Izzo U., Alle origini del copyright e del diritto d'autore, Roma, 2010, pp. 45 – 127
[4] Giannone Codiglione, G. (2014). Illeciti su internet e rimedi nel diritto d'autore p. 2
[5] Ibidem
[6] Publishers had reunited in a Company of Stationers which had the role of regulating and managing all the activities connected to publishing books. This association imposed obligations on publishers regarding their behavior: the most important one was the registration of their works. Johns A., Pirateria. Storia della proprietà intellettuale da Gutenberg a Google pp.43-45. The Stationer's company was also authorized and acknowledged by the Kingdom thanks to the release of a patent. Izzo U., Alle origini del copyright e del diritto d'autore, p. 45
[7] According to https://en.wikipedia.org/wiki/Stationers%27_Register
[8] Ibidem
[9] Spedicato G., Principi di diritto d'autore. (2020). Mulino p. 16

Statute of Anne (or Copyright Act[10] of 1709) the rights of the authors were taken into account: it was granted protection to the proprietors of the books (not clearly differentiated by the figure of the authors[11]) for a limited period of time[12]. For the first time, an exclusive *right to copy*, was conferred to authors, albeit limited in time; it also introduced sanctions for those who violated the law on copyright. Besides the author's economic protection, great attention was paid to the social function of the regulation: the encouragement to learn.

Remaining in common law systems, another important step was taken by the United States that introduced the copyright principle directly in their Constitution, in 1787[13]. Great attention was given in the American regulation as well to the function of copyright protection: the promotion of progress of science and useful arts, comprising not only literary works, but all kinds of creations and, thus, expanding the principle to what is nowadays referred to as intellectual property. We can see how, in common law systems, copyright has a social function as a learning incentive for the public. At the same time, it provides creators with an economic incentive (the right of exclusivity for a limited time) that provides them with the possibility of an economic gratification, crucial for the advancement of their creative production.

Initially, the situation and the protections granted were not different in civil law countries: for example, in France the publishing rights were to be authorized by the King, that could provide the privilege to print and publish a book[14]. Conversely to Great Britain, though, in France there was never a stable organization like the Company of Stationers. In the same years as the development of the discipline in common law countries and due to the diffusion of these ideas, after the French Revolution greater attention was given to copyright[15]. In France, in 1991, La Chapelier presented to the Parliament a different notion to the one adopted up until that moment, strongly influenced by a giusnaturalistic approach[16]. He described copyright

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[10] The full title is "*An Act for the Encouragement of Learning, by vesting the Copies of Printed Books in the Authors or purchasers of such Copies, during the Times therein mentioned*"

[11] These interpretation difficulties are discussed by Johns A., Pirateria. Storia della proprietà intellettuale da Gutenberg a Google op. cit., p. 154 and Izzo U. Alle origini del copyright e del diritto d'autore, op. cit., p. 111.

[12] The protection granted by the Statute of Anne to creations was of fourteen years for new works (it could have been renewed for another period of fourteen years in case the author was still alive). For the creations that had been published before the Statute, the protection lasted twenty-one years.

[13] Section 8, art.1: "*The Congress shall have power (...) To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries*"

[14] The main differences with the British system regard the duration of the protection. The discipline, contained in the six Arrêts réglementaires (1777), provided a difference on the duration based on the subject: for the author it was indefinite while for the publisher it would last until the death of the author. The difference lies in the reasoning of the protection: the author is provided protection based on the desire to guarantee the right remuneration for his creative effort; on the other hand, the publisher was provided with the protection based on his expenses for the publishing of the book only. Izzo U. Alle origini del copyright e del diritto d'autore, op. cit., p. 161-162

[15] Ivi p. 155 ss

[16] Jointly noted by Sirotti Gaudenzi, A., & Menchetti, P. (2014). *Il nuovo diritto d'autore : la tutela della proprietà intellettuale nella società dell'informazione : con formulario e giurisprudenza su Cd-Rom : opere musicali, opere figurative, fotografie, format radiotelevisivi, software, e-book, banche dati* (8. ed.). Maggioli p. 40; Abriani N., Cottino G., Ricolfi M., Diritto Industriale, volume II del trattato di diritto commerciale, Cedam, Padova, 2001, p 340;

as an inviolable right[17], in response to the oppression of the monarchy which the citizens were subject to until the Revolution. The concept of the new *droit d'auteur* refused to look at copyright as a privilege allowed by the King, but it was presented as the most sacred, the most personal and unassailable right[18]. These concepts merged into the *Loi Lakanal*[19]. The most ground-breaking innovation that the French regulation brought was the idea of innate and pre-existing right for the author after the publishing of its creation with the aim of ensuring a proper economic gratification to the author itself for a limited period of time. Conversely to common law systems where the foundation of copyright is utilitaristic[20] and the regulation only referred to their right to copy, in the French regulation, the sole creation of the work is sufficient for the acknowledgement of copyright[21]. Together with the innate right of authorship, the French Regulation acknowledges also a social function as a basis for the economic exclusive from the moment the author decides to make his work available to the public. The French approach gives greater importance to the process of creation, conferring rights to creators directly from the creation, not requiring any formalities for the initiation of the protection and regardless of the potential and successive economic use of the creation. The features that the French Regulation provided to copyright influenced the discipline of copyright in civil law systems greatly: this regulation declared copyright as a natural, innate and personal property right of the author existing from the moment of creation of the work (even when it is only in the mind of the author) and it specifies that, from the moment of the publishing of said creation, the author is also entitled to an economic exclusive right, limited in time and disposable[22]. The balance between the personalistic and utilitarian approach is the fuel for the intellectual process of society.

For what concerns Italy, the evolution of copyright followed a similar path. Initially, the single pre-unitary States present on the Italian territory, based the copyright protection on the library privileges conferred by the Crown[23]. Similarly to other countries, over the years the idea of copyright evolved from the privilege: thanks to the introduction of regulation in the pre-unitary States[24], introducing instruments such as "*regie*

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[17] Later this vision would be resumed in the drafting of art 544 of Code Civil

[18] Sirotti Gaudenzi, A., & Menchetti, P., *Il nuovo diritto d'autore : la tutela della proprietà intellettuale nella società dell'informazione* op.cit., p. 40

[19] The full title is "*Décret de la Convention Nationale du dix-neuf juillet 1793 relatif aux droits de propriété des Auteurs d'écrits en tout genre, des Compositeurs de musique, des Peintres et des Dessinateurs*"

[20] Sirotti Gaudenzi, A., & Menchetti, P., *Il nuovo diritto d'autore : la tutela della proprietà intellettuale nella società dell'informazione* op.cit., p. 41

[21] Giannone Codiglione, G., Illeciti su internet e rimedi nel diritto d'autore op. cit. p 12

[22] Ivi, pp. 13-14

[23] For an in-depth study on the introduction of privileges in Italy, please refer to Franceschelli V., Il diritto d'autore, in Tratt. di dir. priv., dir. da P. Rescigno, 2° ed., vol. IV, Torino, 2009 p. 114 ss; Ubertazzi L.C:, I privilegi letterari sabaudi del '700, in AIDA, 1992 p. 321 ss.;

[24] The most important being art. 440 Of Codice Civile Albertino (1837) around ownership of the creations for authors, stating that "*Le produzioni dell'ingegno umano son proprietà dei loro autori*", the collaboration between the Austrian Emperor and the Regno di Sardegna (Manifesto senatorio 26 giugno 1840 n. 301, notificante la convenzione seguita tra S.M. il Re di Sardegna e l'Imperatore d'Austria a favore della proprietà e contro la contraffazione delle opere scientifiche, letterarie ed artistiche), the Stato Pontificio Laws and the Regno Delle Due Sicilie (respectively Editto del 28 settembre 1826 and Decreto 5 febbraio 1828 n. 1904, portante delle disposizioni onde assicurare la proprietà delle opere dell'ingegno agli autori di esse) that all recognized

patenti"[25], copyright started to be regarded as a property right accruing to the authors of the creations, a *diritto soggettivo.* Eventually, these views were adopted into a law in 1865[26] and it was also added an express reference to this type of property in the Codice Civile: article 437 stated that intellectual productions belong to their authors according to the rules established by special laws[27]. A new legislation on copyright was adopted in 1925[28], and only fifteen years later it was replaced by the L. 633/1941[29], still in effect[30], together with the provisions of artt. 2575-2583 of the V libro of the Italian Civil Code. The Italian copyright system adopted both the utilitarian and personality theories in a dualistic approach[31]: on one side we have the innate, inalienable moral rights, and on the other side we have the economic rights. Thanks to this dualistic approach, both the social function, as a tool for encouragement of learning and progress for society, and the economic right of the author, as an incentive for the continuation of creation of works thanks to the possibility of benefitting from his own creations, are the foundations of the Italian copyright. In this chapter we will analyse the main features of the Italian regulation on *Diritto d'Autore.*

2.3) Sources

The system of sources of Italian copyright is very articulated and develops on three levels: International, European and national. The aim of the International and European initiatives is to create standards for an harmonized management of the intellectual property rights in order to reduce the possibility of copyright violations between different countries.

Starting with the International level[32], Italy has adhered to several International Treaties and Conventions. The first and foremost is the Berne Convention[33], which established a common regulatory framework even between countries coming from different legal traditions. It is mainly concerned with the definition of

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copyright as a right of the authors of the creations. A complete collation of the pre-unitary regulation can be found on www.ubertazzi.it/pubblicazioni/codice-del-diritto-dautore/ , Ubertazzi L.C. Codice del diritto d'autore.

[25] Ubertazzi L.C., Alle origini piemontesi del diritto italiano d'autore, in AIDA, 1992 p. 308

[26] Regio Decreto n. 2337 del 25 giugno 1865 sui diritti spettanti agli autori delle opere dell'ingegno

[27] Art.437 states: "le produzioni dell'ingegno appartengono ai loro autori secondo le norme stabilite dalle leggi speciali"

[28] Regio Decreto n. 1950 del 7 novembre 1925 Disposizioni sul diritto d'autore, covertito con L. n.562 del 18 marzo 1926

[29] L. 633/1941 Protezione del diritto d'autore e di altri diritti connessi al suo esercizio

[30] The law has undergone some changes, for a complete list please refer to https://www.normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:1941-04-22;633!vig=

[31] A further understanding on the balance between this two approaches, together with an overall picture of the actual situation of copyright in Italy, is provided by Sica S. and D'Antonio V. in The balance of copyright in Italian national law, www.comparazionedirittocivile.it, 2010

[32] Sirotti Gaudenzi, A., & Menchetti, P. (2014). *Il nuovo diritto d'autore: la tutela della proprietà intellettuale nella società dell'informazione : con formulario e giurisprudenza su Cd-Rom : opere musicali, opere figurative, fotografie, format radiotelevisivi, software, e-book, banche dati* pp. 59-69

[33] The Berne Convention for the Protection of Literary and Artistic Works

protected works[34], criteria for protection and duration of said protection[35], and, most importantly, with authors' rights[36]. Chronologically, the next most important Conventions to which Italy has taken part to, are the Universal Copyright Convention (UCC)[37], the World Intellectual Property Organization Convention (WIPO)[38] and the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS)[39].

On the European level, it is worth mentioning Directive 2001/29/CE on the harmonization of certain aspects of copyright and related rights in the Information Society, Directive 2001/84/EC on the resale right for the benefit of the author of an original work of art and Directive 2006/116/EC on the term of protection of copyright and certain related rights, Directive 2009/24/EC on the legal protection of computer programs and lastly, Directive 790/2019 on copyright and related rights in the Digital Single Market.

Finally, on national level, we have previously mentioned the Italian copyright law, l. 633/1941, *Protezione del diritto d'autore e di altri diritti connessi al suo esercizio*, and articles 2575- 2583 of the Civil Code involved with regulating the same matter. Although provisions to intellectual property and the exclusivity right are not explicitly contemplated in the Italian Constitution, the doctrine has developed several opinions linking copyright to existing constitutional principles[40]. Among the most influential exponents of the doctrine[41], Ubertazzi introduced a distinction on the protection of moral and economic rights. The foundation for the protection of the former ones is identified in those articles recognizing human inviolable rights[42], the right for citizens to freely choose, according to their potential, a professional activity that promotes cultural and/or scientific progress of society[43], the right of freedom of expression[44] and the right of freedom for arts and sciences[45]. For what concerns the patrimonial aspect, the protection of labour and

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[34] Art. 2 of the Berne Convention: "*The expression "literary and artistic works" shall include every production in the literary, scientific and artistic domain, whatever may be the mode or form of its expression, such as books, pamphlets and other writings; lectures, addresses, sermons and other works of the same nature; dramatic or dramatico-musical works; choreographic works and entertainments in dumb show; musical compositions with or without words; cinematographic works to which are assimilated works expressed by a process analogous to cinematography; works of drawing, painting, architecture, sculpture, engraving and lithography; photographic works to which are assimilated works expressed by a process analogous to photography; works of applied art; illustrations, maps, plans, sketches and three-dimensional works relative to geography, topography, architecture or science*"

[35] Respectively art 3 and art 7 of the Berne Convention

[36] Artt. 8- 17 of the Berne Convention

[37] Adopted in Geneva in 1952 and was ratified by Italy in 1977, with the l. 306/1977

[38] Signed in 1967 and ratified by Italy in 1976, with the l. 424/1968. It is the Convention that constitutes the WIPO, an intergovernmental organization specialized in Intellectual Property. The aim of this Organisation (art.3) is to promote Intellectual Property between States and improve the cooperation between Unions. The functions conferred to the organization are listed in art 4 and regard the administration of the world harmonization procedure of Intellectual Property.

[39] It was signed in 1994 and ratified in Italy with l. 747/1994.

[40] On the matter please refer to Pagliarin C. (2021) Profili costituzionali della tutela dei diritti sui beni immateriali. In: Laimer S., Perathoner C. (eds) Italienisches, europäisches und internationales Immaterialgüterrecht. Bibliothek des Wirtschaftsrechts, vol 1. Springer, Berlin, Heidelberg and Santoro E., Note introduttive sul fondamento costituzionale della protezione del diritto di autore, in Dir. aut., 1975, pp. 307-329

[41] Ubertazzi L.C., voce Diritto d'autore, in Digesto delle Discipline Privatistiche-Sezione Commerciale, IV, Torino, 1989, p. 364 ss., in particolare 370 ss.

[42] Art. 2 of the *Costituzione della Repubblica Italiana* (Gazzetta Ufficiale del 27 dicembre 1947 n. 298)

[43] Artt 4 and 9 of the *Costituzione della Repubblica Italiana* (Gazzetta Ufficiale del 27 dicembre 1947 n. 298)

[44] Art 21 of the *Costituzione della Repubblica Italiana* (Gazzetta Ufficiale del 27 dicembre 1947 n. 298)

[45] Art. 33 of the *Costituzione della Repubblica Italiana* (Gazzetta Ufficiale del 27 dicembre 1947 n. 298)

all its forms and practices[46] is usually regarded as one of the foundations for copyright economic protection. This view is also confirmed by the joint analysis of art. 2575 of the Civil Code that places the process of creation in the V book, denominated "*Del Lavoro*". Moreover, the principle of private economic initiative[47] and the protection of personal property in all its forms[48], also provide valid constitutional principles for the justification of economic copyright protection.

2.4) The conditions and subjects to of copyright protection

Bearing in mind the aim of copyright protection as a tool to incentivize cultural and technical progress through the recognition of both moral and economic exploitation rights to the authors of the works, this section will focus on the conditions required to ensure protection to the works, for example the requirement of formal expression and creative character, together with the identification of the figure of the author and the protected works, especially those that are the result of a collaboration process between multiple authors.

2.4.1) Conditions for protection

Intellectual works, or *works of the mind* as defined by art. 1 l. 633/1941, are the object of the Italian copyright discipline. The object of copyright is typically considered a *diritto immateriale*: an intangible asset. As any other legal assets, intangible assets are comprised in the definition of art. 810 of the Civil Code defining them as the *things* that can be the object of legal rights. As the doctrine rightfully notes, we should provide the term "*things*" a broad interpretation[49], not only limiting it to tangible assets. In fact, even though intangible assets lack a physical dimension, the Italian legal system recognizes them protection in the case of a concrete application. In order to have access to intellectual works, we need a physical medium that incorporates the author's creation. It is important not to confuse the intellectual work with the physical object in which said work is incorporated: they remain two separate entities and the physical medium is simply the tool thanks to which the access to intellectual works is possible. We may conclude that, to enjoy an intellectual work, a physical entity is required. These two different but inseparable functions are referred to as *corpus mysticum* and *corpus mechanicum* and they are regulated differently. The object of copyright is the corpus mysticum, while the corpus mechanicum is regulated by civil law[50]. As we will later see, this

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[46] Art. 35 of the *Costituzione della Repubblica Italiana* (Gazzetta Ufficiale del 27 dicembre 1947 n. 298)
[47] Art. 41 of the *Costituzione della Repubblica Italiana* (Gazzetta Ufficiale del 27 dicembre 1947 n. 298)
[48] Art. 42 of the *Costituzione della Repubblica Italiana* (Gazzetta Ufficiale del 27 dicembre 1947 n. 298)
[49] Spedicato G., Principi di diritto d'autore. (2020), op. cit., p. 32
[50] Pirruccio P., Diritto d'autore e responsabilità del provider, in Giur. merito, 2012, 12, p. 2594, con rif. a Trib. Catania, sez. IV, 29 giugno 2004, n. 2286, in Resp. civ., 2005, 5, p. 426 ss.: expanded this concept to new technologies when examining a Court's

different discipline enables the possibility for the holder of the physical medium (for example a book) to dispose of it freely, while any actions referring to the intangible assets (for example the cinematographic adaptation of a work) is prohibited unless agreed differently[51].

International treaties establish one of the fundamental principles of copyright. Article 2 of WIPO Copyright Treaty establishes that copyright "*extends to expressions and not to ideas, procedures, methods of operation or mathematical concepts as such*" and the same approach is stated in article 9.2 of the TRIPS declaring that *"copyright protection covers expressions and not ideas, procedures, working methods or mathematical concepts as such*". This is one of the most important principles, hence it is placed in the International Treaties, declaring the idea/expression dichotomy[52]. The underlying ideas of intellectual works are not protected by copyright but their formal expression is. Both the internal and external forms of expression are protected by copyright law: with the former we refer to the particular articulation conferred by the author (the internal structure), and with the latter we refer to the perceptible form (its external appearance)[53]. Thanks to this principle, the same idea can be used in several works and, as long as the authors add their own creativity, they can be granted copyright protection. By not protecting the ideas an important balance was achieved: the social function of copyright, ex. Article 42 of the Constitution, thanks to the free circulation of ideas possibly creating innovation and benefitting the society, is respected; on the other side, the author's individual elaboration of ideas and their form of expression is also safeguarded[54].

The second element is the "creativity" or creative character or elaboration[55]. Art. 1 l. 633/1941 prescribes the presence of this element in order to grant protection to the works. We have analysed, previously in this dissertation, how copyright on one hand incentivizes the production of works, thanks to the recognition to authors of exclusive rights, and, on the other hand, it limits the freedom of third parties for what concerns the uses of the work. The requirement of creative character is the element that balances the social purpose of copyright with the limitation of the freedom of third parties because it qualifies the works as worthy of protection[56]. The originality required by the creative elaboration is intended as the personal contribution of the author that shows his individual expression, through not obvious choices. It is important that this new creation presents a *quid novi* with respect to previous works, a reflection of the author's own personality[57].

ruling. He claimed that copyright protects the formal expression of a creative idea (corpus mysticum), regardless of the physical support (corpus mysticum), including in this principle new technologies.

[51] Spedicato G., Principi di diritto d'autore. (2020), op. cit., p. 33

[52] On the subject, *ex pluris*: Fabiani M., Il diritto d'autore, in Tratt. di dir. priv., dir. da P. Rescigno, 1° ed., Torino, 1983, p. 133; De Sanctis V., (2005), I soggetti del diritto d'autore p. 384; Spedicato G., Principi di diritto d'autore. (2020), op. cit., p. 40-42.

[53] Spedicato G., Principi di diritto d'autore. (2020), op. cit., p. 42-45

[54] Falce V. (2014). Intellectual property law in Italy, op. cit., p. 26-27; Spedicato G., Principi di diritto d'autore. (2020), op. cit., p. 42.

[55] Fundamental on the matter, is the contribution of Oppo G., Creazione intellettuale,creazione industriale e diritti di utilizzazione economica, in Riv. dir. civ., 1969, I, pp. 1 - 45.

[56] Falce V. (2014). Intellectual property law in Italy, op. cit., p. 26

[57] Ibidem

Nonetheless, the law does not establish a minimum threshold of novelty: the works protected are the ones in which the personal input of the author, albeit minimal, is present and discernable in comparison to pre-existing works[58]. The protection is not linked to the merit of the artist nor to personal liking of the creative character and neither to the appreciation of its aesthetic value: as long as it is present and manifested in a physical form, protection is justified[59]. The concept of originality had evolved thanks to the European jurisprudence and doctrine[60] requiring that the creative character is recognized only when there is a possibility of expression of the author's personality thanks to a sufficient number of alternatives available. Basically, to recognize the creative character, the presence of the creative, non-obvious choices taken by the author and the presence of a certain margin of freedom within which the author had exercised its faculties of choice, shall be proven. We may conclude that, copyright protection is excluded when there is a lack of freedom of choice for the author or, although present, the author does not exercise it[61]. In the circumstances in which the freedom of choice for the author is absent or extremely limited (for example the medicine's leaflets) copyright protection cannot be granted[62].

A special mention must be given to industrial designs. They have been added to the list of copyright protected works of art. 2 l. 633/1941 in 2001[63], before which date, they were regulated by trademark law. In order to gain copyright protection, industrial designs require, besides the creative character, an artistic value. Italian jurisprudence[64] defined the parameters to consider when identifying the artistic value: for example, when it is created by a well-known artist, the recognition of aesthetic and artistic qualities in cultural and institutional environments, the display in museums exhibitions, the publication on specialized magazines, the awarding of prizes or its market value being so high that transcends its functionality. This further requirement that entails protection has raised great debate, due to the inevitable subjectivity of the appreciation of the artistic value and its dependency to external events[65]. Even though this interpretative orientation has appeared sufficiently consolidated in Italian jurisprudence, a recent ruling of the ECJ[66] seems to be in contrast with said interpretation. In fact, the ECJ on one hand confirmed the criteria of creative character, but on the other hand, excluded that industrial designs should be subject to more stringent measures. The current Italian regulation of art 2 l. 633/1941 appears to be in contrast with said decision, therefore, new developments on the matter are to be awaited in connection with this sentence.

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[58] Spedicato G., Principi di diritto d'autore. (2020), op. cit., p. 49-50
[59] Ibidem
[60] For example in the following cases: Painer (C-145/10), Football Dataco (C-604/10) e Renckhoff (C-161/17) as indicated by Spedicato G., Ivi, p.51
[61] Spedicato G., Ivi, p. 52
[62] Ibidem
[63] Legislative Decree 95/2001 which enacted the Directive 98/71/CE
[64] Cass. civ., sez. I, 23 marzo 2017, n. 7477, in «Il Foro italiano», 2017, I, cc. 1589 ss
[65] Spedicato G., Principi di diritto d'autore. (2020), op. cit., pp. 54-56
[66] Cofemel – Sociedade de Vestuário SA v G-Star Raw CV, (C-683/17)

2.4.2) The author and the protected works

After having understood the conditions for the protection we shall analyse the subjects and objects and further provisions disciplined. As we have previously mentioned, art. 6 l. 633/1941 establishes the moment from which copyright protection is acquired: "*Copyright shall be acquired on the creation of a work that constitutes the particular expression of an intellectual effort*". The mere creation and exteriorization are sufficient conditions for the creation of copyright. Since the creation is the instrument of acquisition of copyright, the exclusive rights accrue to the author of the intellectual work. It shall be highlighted that registration of the intellectual work is not required in order to enjoy copyright protection, nor it is its fixation[67]. The creation and exteriorization[68] of the work are necessary and sufficient requisites for the acquisition of the right, thus, no further activity is demanded[69]. Therefore, ex art. 6 l. 633/1941, the right of the author is automatically constituted from the moment of the act of "materialization" of the intellectual work[70]. Although not constitutive of the right[71], the registration has been proven particularly beneficial in judicial disputes, proving the moment of origin of the right for authors.

2.4.2.1) The author

As previously mentioned, copyright is acquired by its author on the creation of a work[72]. The person that is shown or that is announced as the author, even when using a pseudonym, should be regarded as such[73]. In civil law traditions, copyright is constituted both by economic and moral rights recognized to authors. Moral rights are strictly linked to the person of the author, being the expression of its own personality, and thus awarding them with a special right protecting individual interests that go beyond the economic ones, for example the right of protection to one's reputation[74]. The Berne Convention describes the author as the one

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[67] Art. 106 l. 633/1941

[68] Ex. Art 2 l. 633/1941 "*whether in written or oral form*" are sufficient requirements for protection.

[69] This principle is also found in the Berne Convention (art. 5)

[70] De Sanctis V.M., Il diritto di autore: del diritto di autore sulle opere dell'ingegno letterarie e artistiche. Giuffrè, Milano, 2003 p. 17; Santoro Passarelli, F., (1954), Dottrine generali del diritto civile, p. 87

[71] Despite the fact that art. 103 l. 633/1941 provides some forms of registration ("*In the absence of proof to the contrary, registration shall be accepted as proof of the existence of the work and of its publication. The authors and producers entered in the register shall be deemed, in the absence of proof to the contrary, to be the authors and producers of the works attributed to them. In the case of cinematographic works, the presumption shall be applicable to the entries made in the register referred to in the second paragraph*), these do not confer the right to authors, but only have evidentiary value.

[72] Art. 6 l. 633/1941; art. 2576 Civil Code

[73] Art. 8 l. 633/1941 "*A person who is shown, in the customary manner, as the author, or is announced as such in the course of the recitation, performance or broadcasting of a work shall, in the absence of proof to the contrary, be deemed the author of the work. Any pseudonym, professional name, initials or customary sign, well known as being equivalent to a true name, shall be deemed to have the same value as such true name*"

[74] The concept of moral rights is absent in common law systems.

whose "*name appears on the work in the usual manner*" creating conflicts in the individuation of the beneficiary of the right in some cases due to different national regulations. These uncertainties have been questioned by the doctrine[75] that has recognized some common principles that should be taken into account for the identification of authors in problematic circumstances[76].

In complex works, the final creation is the result of the input of more than one author, so questions arise in understanding who should be regarded as the author in cases in which the contributions are discernable or not and, also, when said creations are the object of a contract or, finally, when they are the product of artificial intelligence. Next section will clarify these circumstances after analysing the types of protected works.

2.4.2.2) The protected works

Both article 2575 of the Civil Code[77] and articles 1 and 2 of l. 633/1941[78], list the intellectual works that are granted protection. They refer to any work that features a creative character in the literature, music, figurative arts, theatre or cinematographic sector but also reference is made to databases, computer softwares and industrial design. Article 2 l. 633/1941 lists a series of works included in the protection;

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[75] Pavolini M., Sei personaggi in cerca di diritto d'autore, in Rivista diritto d'autore, Luglio/Settembre 1995, n. 3, pp. 405-420

[76] For example the placing mind over muscle and machine, the intent of the author to acquire this title and the correlation between originality and authorship, Ibidem

[77] This article describes the intellectual works that are granted protection; it refers to those works belonging to sciences, literature, music, figurative arts, architecture, theatre and cinematography in any form of expression.

[78] Article 1 l. 633/1941: "*Works of the mind having a creative character and belonging to literature, music, figurative arts, architecture, theatre or cinematography, whatever their mode or form of expression, shall be protected in accordance with this Law. Computer programs shall also be protected as literary works, within the meaning of the Convention for the Protection of Literary and Artistic Works, ratified and enforceable pursuant to Law no. 399 of June 20, 1978, as well as data-bases which, by reason of the selection or arrangement of their contents, constitute the author's own intellectual creation shall be protected as such by copyright*".
Article 2 l. 633/1941: "*In particular, protection shall extend to: 1) literary, dramatic, scientific, didactic and religious works, whether in written or oral form; 2) musical works and compositions, with or without words, dramatico-musical works, and musical variations that themselves constitute original works; 3) choreographic works and works of dumb show, the form of which is fixed in writing or otherwise; 4) works of sculpture, painting, drawing, engraving and similar figurative arts, including scenic art5) architectural plans and works; 6) works of cinematographic art, whether silent or with sound form, provided they are not mere documentaries protected in accordance with the provisions of Chapter V of Part II. 7) works of photographic art and works expressed with processes analogous to photograph, provided they are notsimple photographs, protected according to the provisions of Chapter V of Part II. 8) computer programs, in whatever form they are expressed, provided that they are original and result from the author's own intellectual creation. Ideas and principles which underlie any element of a computer program, including those which underlie its interfaces, shall be excluded from the protection afforded by this Law. The term "computer program" shall include their preparatory design materials. 9) databases under point II of art. 1, meant as collections of works, data or other independent materials which are systematically or methodically arranged and can be individually accessed by electronic or other means. The copyright protection for databases shall not extend to their contents and shall be without prejudice to any rights subsisting in said contents. 10) Works of industrial designs which themselves have a creative and artistic value*". The translation from Italian to English of the text of both of these articles, and the rest of the articles that will be mentioned in the rest of this dissertation, is taken from the WIPO site. Please find the full English text of the Law at the following link: https://www.wipo.int/edocs/lexdocs/laws/en/it/it211en.pdf

although arguably broad, this list is to be considered non-exhaustive and merely illustrative[79]. Due to the heterogeneity of the works present on the list, and considering that the law is not able to foresee the new forms that intellectual works can take in the future, protection should be granted to these new forms and methods that are the result of cultural and/or technical progress[80].

Once a work fulfills the requirements for protection, as we have previously analysed, it is considered worthy of protection[81]. In complex works, the protection extends to the single fragments of the work[82], when they are distinguishable, and to the integral work as well. In some cases, for example those of creations created in cooperation, it may be difficult to identify the different contributions of the authors and their rights. The interpreter should consider some elements in order to identify the right type of complex works: are the contributions distinguishable or undistinguishable? Are they dependent or independent? What was the intent of the authors?

Starting the analysis of the different types of complex works, article 3 of l. 633/1941 defines and regulates collective works; they are "*works formed by the assembling of works, or part of works, and possessing the character of a self-contained creation resulting from selection and co-ordination with a specific literary, scientific, didactic, religious, political or artistic aim [...] shall be protected as original works, independently of and without prejudice to any copyright subsisting in the constituent works or parts thereof*"[83]. Collective works should be regarded as a whole[84]; in them, the single contributions realized by different authors shall be regarded independent[85]. In collective works, whoever coordinates the activity is considered the author ex art. 7 l. 633/1941. Collective works are characterized by a double level of originality: both the single contributions and the coordination and selection activity are to be considered original works and, thus, worthy of independent copyright protection. Magazines and newspapers have a slightly different system: in them, the economic exploitation rights belong to the publisher and authors are

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[79] In the past, part of the minority doctrine and jurisprudence sustained the exhaustiveness of this list of protected works (Corte app. Milano, 2 ottobre 1981, Pret. Monza, 26 luglio 1985). This particular view started to gain popularity before the introduction of the n.8 of art. of l. 633/1941 that officially recognized protection to computer softwares. A large number of jurisprudential judgments have been produced on the possibility of recognition of the copyright protection for emerging creative works. In fact, similarly to computer softwares, television formats (Pret. Torino, 8 aprile 1987, n. 79), fictional characters (Pret. Ascoli Piceno, 21 marzo 1991), websites or the graphic layout of a magazine (Trib. Milano, 7 marzo 2008) have all raised interest on the question of the recognition of copyright protection. Nowadays, it is believed that the absence of exhaustivity in the list of protected works presented in art. 2 l. 633/1941, allows protection to these emerging phenomena (as long as they fulfill the other requirements for protection) that could have not been predicted by the legislator in 1941 and that emerge with the progress of technology and society (Ubertazzi L.C., Commentario breve alla legislazione sulla proprietà industriale e intellettuale, Cedam, 1987, p. 448).
[80] Falce, V. (2014). Intellectual property law in Italy, op. cit. p. 25
[81] Corte Cass., 28 February 1997, n. 1807.
[82] Art. 19 l. 633/1941
[83] Art. 3 l. 633/1941 provides as examples works"[…]*resulting from selection and co-ordination with a specific literary, scientific, didactic, religious, political or artistic aim, such as encyclopaedias, dictionaries, anthologies, magazines and newspapers*".
[84] Abriani N., Cottino G., Ricolfi M., Diritto Industriale, op. cit., p. 380
[85] Sirotti Gaudenzi, A., & Menchetti, P. (2014)., op. cit., pp- 80-81 and Ammendola M., Ubertazzi L.C., Il diritto d'autore, Utet, Torino, 1993, p. 389

able to use their own contributions to the collective work, separately, unless the parties have agreed otherwise[86]. The publisher of the newspaper or magazine, though, has a greater power thanks to the fact that he has the right, unless agreed differently and without prejudice of the moral rights of the author, to introduce modifications or reductions to the article, as required by the nature and aims of the newspaper[87]. This "compression" of the author's rights is only limited to the collective work and, once the purpose linked to the collective work fades, authors retrieve the possibility of full freedom of action in relation to separate uses[88].

Furthermore, we may be faced with joint works. The difference between these two types of works results in a different protection system for their authors. Joint works[89] are works created by indistinguishable and inseparable contributions. In this case, copyright belongs to all the co-authors that shall exercise it jointly. The rules that regulate property owned in common[90] are applied to this circumstance: every decision regarding the works (for example publication or modification) should be taken on an unanimous basis, if it is considered an act of extraordinary administration. A qualified majority will suffice in cases of ordinary administration. In case of unjustified refusal of one of the co-authors for the utilization of the work, it is possible to appeal to legal authorities[91]. Also, unless agreed otherwise, the principle of equality of value of each contribution is presumed. A debate sprung regarding the exercise of moral rights of the co-authors: some commentators proposed a difference in the categorization of these rights in order to allow the right of integrity and right to authorship to be exercised independently and the remaining moral rights of withdrawal and first publication, to be exercised only after an unanimous agreement. The reasoning behind this idea is that the first two rights are linked to the single authors, while the final two are strictly linked to the joint creation. Some commentators have turned their attention on the intent of the authors. In this type of works, in the final product, the contribution of the single author is not distinguishable, and thus he cannot be provided with an independent moral right. Furthermore, it is important to highlight the converging intent of authors joining in the creation of a work: they accept the possibility of reduction of their personal creativity, in favour of the final jointly created product[92].

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[86] Art. 38 l. 633/1941
[87] Art. 41 l.633/1941
[88] Ammendola M., Ubertazzi L.C., Il diritto d'autore, op,cit., p. 394
[89] Art. 10 l. 633/1941 "*If the work has been created by the indistinguishable and inseparable contributions of two or more persons, the copyright shall belong to all the joint authors in common. In the absence of proof of a written agreement to the contrary, the indivisible shares shall be presumed to be of equal value. The provisions which regulate property owned in common shall be applicable. Furthermore, moral right may be asserted, at any time individually by any one joint author; and the work, if unpublished, may not be published, nor be modified or utilized in a form differing from that of first publication, without the agreement of all the co-authors. However, in the event of unjustified refusal by one or more joint authors, publication, modification or new utilization of the work may be authorized by the judicial authority upon such conditions and terms as that authority may order*"
[90] The discipline of the property owned in common is established in art. 1100 ss. of the Civil Code.
[91] Falce, V. (2014). Intellectual property law in Italy, op. cit. p. 32
[92] De Sanctis V., (2005), I soggetti del diritto d'autore, p. 76-77.

Additionally, we have composite works, similar to joint works, they follow most of their regulation, with some adjustments. In this case, the contributions of the single authors are distinguishable on the final product and, thus, rights can be enjoyed separately. At the same time, though, the final product shall be identified as a whole. In fact, these types of works, although produced by different authors and enjoyable separately, when experienced at the same time, produce a new unitary effect, in which this new identity of the work prevails[93]. For this reason, the application of the rules for commonly owned property are applied, but they are eased in certain circumstances[94]. Article 33 provides a few examples of composite works: these are operas, operettas, melogues, musical compositions with words and dance and ballet music[95]. In case of absence of contractual agreement between the authors of the different "fragments" of composite works for the economic exploitation of the unitary work, the three consecutive articles[96] regulate the relations between the co-authors. Precisely, art. 34 regulates the relations between the compositor of the music and the author of the literary part, in those compositions containing music and words, providing that the author of the musical part is entitled to exercise the exploitation rights of the common creation (except for the rights deriving from the association of the parties), and that the profits are shared in proportion to the value of their contributions. According to paragraph 5 of the same article, each contributor can use his own work independently. Art. 35 provides that the author of the literary part is not entitled to use his part together with a different musical work, except for the situations indicated in the article[97]. The aim of this principle is to prevent an economic prejudice to one of the authors, caused by the independent use of the composite work.

Cinematographic works are to be considered in a category of their own[98] even though they have many similarities to composite works. For what concerns the economic rights of the cinematographic work produced, they belong to the producer[99], while the authors of the plot, scenery, screenplay, music and artistic direction are considered "*joint authors*"[100]. This title grants them the right to prevent the producer to make adaptations, transformations or translations without their consent[101] and the right to have their names

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[93] Greco P., Vercellone P., I diritti sulle opere dell'ingegno, in Trattato di diritto civile italiano redatto da diversi giureconsulti sotto la direzione di Filippo Vassalli, Utet, Torino, 1974, p. 97 e 11

[94] Ubertazzi L.C., (2003), Spunti sulla comunione sui diritti d'autore, p.508

[95] Art. 33 l. 633/1941

[96] Artt. 34-35-36 l. 633/1941

[97] Art. 35 l. 633/1941 "*1. If, after the final text of the manuscript of the literary contribution has been sent to the composer, he does not set it to music within five years in the case of a libretto for an opera or operetta, or within one year in the case of any other literary work to be set to music; 2.If, after having been set to music and considered by the parties as being ready for performance, the work is not performed within the periods specified in the preceding subparagraphs, unless longer periods have been afforded for performance by Articles 139 and 141;3. If, after a first performance, the work ceases to be performed for a period of ten years in the case of an opera, an oratorio, a symphonic poem or an operetta, or for a period of two years in the case of any other composition. In the cases specified in subparagraphs (2) and (3), the composer may make use of the music in other ways*"

[98] Falce, V. (2014). Intellectual property law in Italy. op. cit , p. 33

[99] Artt. 45-46 l. 633/1941

[100] Art. 44 l. 633/1941

[101] Art. 46 l. 633/1941

mentioned in the cinematographic work, together with their professional capacity[102]. Also, if the producer fails to complete or to show the cinematographic work within a fixed period of time, the contributors can dispose of the work without restrictions[103]. On the other hand, for what concerns the cinematographic adaptation, the producer can introduce modifications, restricted to the necessity of the cinematographic adaptation only, unless agreed otherwise[104].

Derivative works, which are disciplined by art 4 l. 633/1941[105], refer to any type of work which, originating from another work, qualifies as an autonomous creation equipped with its own separate copyright protection. Differently from the types of works analysed up until now, there is no collaboration between the original and "derivative" authors and, thus, derivative works should not be intended as complex works[106]. In order to acquire the independent protection mentioned, derivative works shall feature a creative elaboration of the underlying work. The difference between counterfeited works and derivative works is in the intent of the second author[107]: whilst both the final products may present minimum differences from the original work, in counterfeited works these differences are marginal, they do not own a creative character and are only added with the purpose of masking said counterfeiting; in derivative works, authors present their own creative elaboration to a pre-existing work, making sure that their separate creative input is recognizable by third parties[108]. The duty to detect the presence of the creative manifestation, which is the element that distinguishes the counterfeit works from those derived, is left to the judge[109]. In derivative works, the legislator focused on the protection of the form of expression of the authors recognizing to it an intrinsic value which makes the works deserving of their own protection. No prejudice should be suffered by the original work, and thus the second-generation author is required to obtain an authorization by the original creator. Derivative works are strictly connected to the social function of copyright: by adding their own creative character to original works, "derivative" authors promote cultural innovation and progress[110].

While explaining the different types of works we shall focus our attention on the opportunities provided by technology. The digitalization of copyrighted creations has, in fact, increased the efficiency of unauthorized copying of all the types of works described above: file sharing, linking, downloading, sending works via e-

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[102] Art. 48 l. 633/1941
[103] Art. 50 l. 633/1941
[104] Art. 47 l. 633/1941
[105] Art. 4 l. 633/1941 *"Without prejudice to the rights subsisting in the original work, works of a creative character derived from any such work, such as translations into another language, transformations into any other literary or artistic form, modifications and additions constituting a substantial remodelling of the original work, adaptations, arrangements, abridgements and variations which do not constitute an original work, shall also be protected".*
[106] Spedicato G., Principi di diritto d'autore. (2020), op. cit., p. 78
[107] Accordingly, Cass, civ., sez I, 27 ottobre 2005, n. 20925, in Rivista di Diritto Industriale, 2006, fasc. 3, p. 290, stated that the relevant aspect to take in account is not the possibility of confusion of the works, but the illicit and unauthorised reproduction of the work, even though it is masked in a way that does not render immediately recognizable the original work.
[108] Sirotti Gaudenzi, A., & Menchetti, P. (2014). Il nuovo diritto d'autore: la tutela della proprietà intellettuale nella società dell'informazione, op. cit., pp. 81-83
[109] Ibidem
[110] Falce, V. (2014). Intellectual property law in Italy, op. cit., p. 34

mail are all different expressions of exclusive author's rights[111]. The simplicity and broad availability of these operations allows infringers to produce unlimited amounts of copies of protected works identical to the original in a short amount of time and for a very little cost, unlike what would happen with the reproduction and distribution of a physical painting, for example. We have seen in the previous sections that fixation on a physical medium is required for copyright protection, so how does this requirement apply to digital copies? By inserting "*by any means[112]*" the exclusivity right is extended to digital copies as well: an authorization from the right-holders is required to perform any act of diffusion or reproduction, even online, unless it is an act that falls within the exceptions[113]. Article 5 of InfoSoc Directive disciplined the exceptions and limitations that Member States could implement, as we will see later, and it establishes one mandatory exception of the right of reproduction in the case in which the copying is transient and essential for the transmission of a work[114]. Accordingly, the balance of interests needs to be maintained also in reference to the digital world and it is object of dispute: on one hand we have the economic rights of the artists seeking control and compensation over the unauthorized copies of their works, and on the other the function of encouragement of progress and innovation is increasing thanks to the easier availability. At the same time, overprotection of copyrighted works may excessively restrict innovation and access to information and we must note that it is also impossible to inspect every operation on the global online world. One of the solutions proposed is the liability of service providers that in order to avoid joint liability, in light of the provisions of the 790/2019 Directive, will have to prove that they have taken their best efforts in preventing the upload of copyrighted material on their platforms and, at the same time, deleting it upon the request of right-holders[115]. Others[116] believe that an effective way to deter infringement is by increasing the number and amount of pecuniary sanctions, awarding right-holders damages and effectively prosecuting the criminally liable infringers and suing facilitators. Finally, technological measures of protection are encouraged by the InfoSoc Directive[117], an example of which may be digital watermarking, which poses problems since its inherent easily corruptible nature[118]. All these instruments can be useful only to an extent, both service providers and users produce an amount of data that cannot be put under surveillance. For this reason, a new method that can achieve balance between the copyright's social function and the interest of authors may be blockchain. This technology, after the registration of the work on the network, is able to

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[111] Atanasova, I. (2019). Copyright infringement in digital environment. Economics & Law, 1(1), 13-22.
[112] Art 2 InfoSoc Directive
[113] One of the most important exceptions is the exception for private use.
[114] Please refer to 2.5.4) Exceptions and limitations to the scope of copyright protection for a better understanding of the exceptions and limitation and to 2.6.1) Evolutionary profiles and definition of emerging issues for those provided by the InfoSoc Directive.
[115] Please refer to 2.6.2) The liability of Internet Services Providers for copyright infringement
[116] Lemley, M. A., & Reese, R. A. (2003). Reducing digital copyright infringement without restricting innovation. Stan. L. Rev., 56, 1345.
[117] Recital 13-14, 49 and Article 6 of the Infosoc Directive
[118] Sharma, R.K., Decker, S. Practical Challenges for Digital Watermarking Applications. EURASIP J. Adv. Signal Process. 2002, 542025 (2002)

track the online uses of copyrighted work: by proving provenance any interested party can quickly and autonomously assess if the work is the original or a copy. This instrument also allows artists to manage their rights, in a very effective way, by setting smart contracts providing them automatic remuneration for each use of their works, an opportunity that may also render intermediaries obsolete. These features will be explored in the latest chapter.

2.4.2.3) Works created in the context of the employment relationship

As observed previously, art. 6 l. 633/1941 recognizes copyright to the author since the moment of its creation. In an employment relationship setting though, intellectual works can be the object of the contract between employer and employee and this particular situation raises questions on authorship and the consequent recognized rights of the creation. Currently, Italian legislators have implemented some derogations to copyright discipline in regard to some types of works performed in the fulfillment of employment obligations[119], although no general principle is provided. In fact, employers are exclusively entitled to the exercise of economic rights on computer programs, databases and industrial designs created by an employee in the execution of his duties or under the instructions of his employer, unless agreed otherwise[120]. The same discipline is adopted, within the limits of the object and purpose of the contract, to photographs produced in the execution of a contract[121]. In these cases, the exclusive rights of economic exploitation of the works are automatically conferred to the employer, due to his economic effort for the payment of the employee's salary. Still, the question regarding authorship of the types of works not regulated by specific articles of l. 633/1941 remains. Some believe that the absence of a general discipline indicates that the aforementioned cases are exceptions and that, in other situations, art. 6 l. 633/1941 should be applied[122]; others believe that the absence is only caused by historical reasons of the intellectual property discipline and that, in the current society, intellectual works constitute fundamental assets for companies[123]. The approach adopted by the majority of the doctrine and jurisprudence is the latter, emphasizing the fact that the exploitation of economic rights on the creation for the employer is only limited to the object and purpose of the employment contract[124]. Aside from these obligations, the other rights accruing to the authors, remain to the employee. Usually, in the contract, the employer establishes object and purpose in a way that allows him to exploit all the different forms of the creation, resulting in the fact that all the

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[119] Artt. 12-bis ,12-ter and 88 l. 633/1941
[120] Ibidem
[121] Art. 88 l. 633/1941
[122] Spedicato G., Principi di diritto d'autore. (2020), op,cit. pp.62- 63
[123] Ivi, pp. 64-65
[124] Ibidem

economic rights accrue to him[125]. The agreement on the conditions of the contract is, thus, crucial. If the contract provides for the express attribution to the employer of certain rights, there is no question on the authorship[126]. Where there is no expressed attribution, the interpreter will have to look at the purpose of that contract and decide if the disputed economic rights fall in the object and purpose of the employment contract[127]. In any case, due to their nature, moral rights cannot be the object of a contract. Works created in an employment relationship have started to become more and more common in the art sector as well. Ever since Leonardo Da Vinci[128] there have been artists that have been able to produce their works thanks to their assistants' technical abilities. This phenomenon has been exasperated by a growing number of contemporary artists that do not *make* (as in physically produce) their artworks: they hire artisans, external collaborators and junior painters that execute their works under their direction. There are several reasons behind this particular way of operating: for some, like Damien Hirst, creating art and craftmanship are two very separate things and the value of an artist is not recognizable by his technical skills[129]; for some others, the realization of their works requires more people to be brought out in reality[130], and for others their creative and directive input is sufficient[131]. This phenomenon represents the growing importance that conceptual art has developed in the contemporary context, although, many have critiqued this way of operating of the artists. This dispute goes beyond the scope of this dissertation, but we must recognize how artworks and employment relationships can also be, maybe unexpectedly, intertwined.

2.4.2.4) Non-human creations

In cases in which the intellectual work is not created by a human, for example in cases of artificial intelligence or animal creation, attributing authorship can be challenging. The questions regard the fact whether entities different from humans can be authors, therefore if they can provide their creations with the creative character, and, if so, to whom the moral and economics rights should be attributed[132]. This debate

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[125] To better understand this dynamic, an example is useful. The agreement on the employment contract conditions for an illustrator working for a company producing animated movies is very important. Under the conditions of the contract for the realization of an animated feature film, it is very likely that the employer expands the purpose of the contract to the marketing of objects deriving from the characters of the cartoon (such as books, games, T-shirts, etc.). In this way, the rights on the work, with the exception of moral rights, will belong to the employer as they fall within the scope of the contract. (cfr. Spedicato G.op. cit. p. 66)

[126] Spedicato G., Principi di diritto d'autore. (2020), op,cit. p. 66

[127] Ibidem

[128] Please refer to https://www.flavorwire.com/251160/artist-who-do-not-make-their-own-work

[129] Please refer to https://mcarte.altervista.org/damien-hirst-non-artista/

[130] Just think at the Christo and Jeanne-Claude's projects: we do not expect them to singularly wrap the bridges in Paris or Francis Alÿs "Faith Moves Mountains" (2002), in which it was possible to physically move a mountain thanks to the help of 500 volunteers (https://www.flavorwire.com/251160/artist-who-do-not-make-their-own-work)

[131] Takashi Murakami, for example, has been directing an art production studio where the role of the artist is limited to supervising, sketching and provide essential direction to the assistants (Ibidem)

[132] Many authors have expressed their thoughts on this fairly recent matter: ex pluris Grimmelmann J., (2016), There's No Such Thing as a Computer-Authored Work - and It's a Good Thing, Too, 39 Columbia Journal of Law & the Arts; Pearlman R., (2018),

is very active since there is not a strong position between those that recognize the authorship of creations on non-humans, and those who deny it. One of the most famous cases, involves the copyright on a selfie taken by a monkey[133]. The photographer, owner of the camera that the monkey borrowed for the selfie, claimed copyright on the photographs because he claimed that he had willingly left the camera close to the monkey in hope the animal would use it. Following this line of reasoning, the photographer claimed ownership on the selfie because he adduced the creative character, thanks to the choice of leaving the camera near the monkey and setting its technical features, while the monkey used the device unknowingly. The animal association representing the animal's interest, on the other hand, claimed ownership based on the fact that the animal was the material author of the photograph. The American court, in the end, ruled that the animal lacks the legal capacity required for the recognition of copyright, but also ruled that the photographer's input was minimum and not sufficient for the recognition of the creative character. Given the peculiarity of the case, it comes with no surprise that the mediatic echo was remarkable. In response to this case, in fact, the American Copyright Office introduced the human authorship requirement: "*The U.S. Copyright Office will register an original work of authorship, provided that the work was created by a human being*"[134]. Therefore, this important provision extends its application also to intellectual works created by artificial intelligence independently. The American approach was initially adopted in the European Community as well, although no provision declared so explicitly. For example, to what regards software[135] or databases[136] regulation, the authors are identified in the physical person or the group of people that created them. Furthermore, the elements of serious criticality in the relationship with copyright refer to the attribution of moral rights to artificial intelligence, which main purpose is to defend author's *personality*, and the fact that calculation parameters of the duration of the right is based on the *death* of the author[137]. The doctrine did not fail to point out that the Directives on the topics just mentioned recognize authorship of softwares and databases, to both physical and legal persons. Therefore, the issues regarding the duration and the attribution of moral rights of computer-generated content can also be found in regard to softwares and databases and could be solved by using the same parameters. Intellectual property is strictly linked to innovation and society evolution, adapting its principles to new and previously unforeseeable phenomena. One of the first countries to implement a regulation regarding artificial intelligence creation

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Recognizing Artificial Intelligence (AI) as Authors and Inventors Under U.S.; Intellectual Property Law, 24 Rich. J. L. & Tech. no. 2; Samuelson P., (1986), The Future of Software Protection: allocating ownership rights in computer-generated works, p. 1185-1228; Spedicato G., Creatività artificiale, mercato e proprietà intellettuale, Rivista di Diritto Industriale, fasc.4, 1st Ottobre 2019, p. 253

[133] *Naruto, et al. v. Slater, et al.,* no. 16-15469 (9th Cir. April 23, 2018) available on http://cdn.ca9.uscourts.gov/datastore/opinions/2018/04/23/16-15469.pdf

[134] Compendium: Chapter 300, copyrightable authorship n.306 available at https://www.copyright.gov/comp3/chap300/ch300-copyrightable-authorship.pdf

[135] Art. 2 par. 1 Directive 2009/24/CE

[136] Art. 4, par. 1 Directive 96/9/CE

[137] Spedicato G., Principi di diritto d'autore. (2020), op,cit. pp. 79-86

was Great Britain[138]. The regulation provides protection for creations "*generated by computer in circumstances such that there is no human author of the work*". The author is considered the person *"by whom the arrangements necessary for the creation of the work are undertaken"*. European institutions, on the other hand, still have to affirm their position clearly. An European Parliament resolution[139], has declared that even though there are no specific norms on robotics, to these circumstances it is possible to apply pre-existing principles, albeit with appropriate precautions. This approach appears to be in favour of the integration of computer-generated creations in the copyright regulation. A subject that is still undergoing intense study is the identification of authors in these "*humanless*" creations[140]. In reference to non-human creations, and particularly the use of artificial intelligence and machine-learning, we may see how this new technology has sparked interest in the contemporary art sector[141]. In 2018, the famous auction house Christie's, was the first to auction an artificial intelligence generated painting: the portrait of Edmond de Belamy, which was sold for $432,500[142]. Now, the subject portrayed is a fictional character, whose physical features were generated by the artificial intelligence only, by learning and examining thousands of previous paintings. The artists behind the portrait, the Paris based art-collective Obvious, have been accused of using in the generation of the painting a code that was not created by them, and thus contributing minimally to the final product[143]. So the question revolves on the attribution of authorship and, once again, on the concept of creative elaboration: who is the artist, the art-collective or the one that generated the code? The allocation of credit and authorship, as we have seen in this paragraph, can result extremely problematic in relation to AI generated artworks and we may only wait for further jurisprudential or legislative indications to clarify the matter. Nonetheless, the sale of this portrait has been considered an historical milestone in the relation between AI and contemporary art and, although sparking controversy, has shed light on this new phenomenon that is gaining popularity in the art sector; for this reason, it is important to highlight this newly established relationship in our overview of the most recent developments and emerging issues of copyright. Also, although artificial intelligence in the art sector has been used mostly for the creation of artworks, there are further uses of this technology that deserve recognition. AI is used as an e-marketing tool recommending artworks to collectors based on their previous internet activities, such as browsing and

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[138] Chapter 9 par. 3 of the Copyright, Designs and Patents Act

[139] European Parliament resolution of 16 February 2017 with recommendations to the Commission on Civil Law Rules on Robotics (2015/2103(INL))

[140] There are different opinions on who should be regarded the author. Some believe that it should be the developer of the artificial intelligence system, some other its producer, and finally some believe that even the user may be considered the author. Further hypotheses consider the joint ownership regime as the most viable option (Spedicato G. Principi di diritto d'autore. (2020), op,cit. p. 83)

[141] Sidorova, E. (2019, September). The Cyber Turn of the Contemporary Art Market. In Arts (Vol. 8, No. 3, p. 84). Multidisciplinary Digital Publishing Institute, pp. 6-8

[142] According to https://www.nytimes.com/2018/10/25/arts/design/ai-art-sold-christies.html

[143] Please refer to https://www.theverge.com/2018/10/23/18013190/ai-art-portrait-auction-christies-belamy-obvious-robbie-barrat-gans

purchases[144]. Furthermore, besides the use of AI in Virtual and Augmented reality artworks, new platforms using AI for the authentication of artworks are starting to grow[145]. These platforms use machine-learning technology to detect forgery by analysing single strokes on the painting. If we pair this new technology with the opportunities provided by blockchain for the online proof of provenance and traceability of works, we may upgrade even more the trust in this latter technology. In fact, there are also some platforms that use AI to recognize when a work that is ascribed on the blockchain is used on the internet[146] and, thanks to an image similarity match method, can even locate the artworks when they have been edited and modified by third parties[147]. At this point, authors can contact the users or service providers where their works have been uploaded and, thanks to the rules implemented by the recent Copyright Directive, can have the unauthorized work removed. Further in this dissertation we will examine these aspects.

Edmond de Belamy, Obvious, 2018

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[144] Sidorova, E. (2019, September). The Cyber Turn of the Contemporary Art Market. In Arts (Vol. 8, No. 3, p. 84). Multidisciplinary Digital Publishing Institute, p. 7

[145] Ibidem

[146] Anderson, S. (2018). The Missing Link Between Blockchain and Copyright: How Companies Are Using New Technology to Misinform Creators and Violate Federal Law. North Carolina Journal of Law & Technology, 19(4), 1 pp. 28-29

[147] The platform mentioned is called WhereOnTheNet, https://www.whereonthe.net/t1avjb

2.5) Author's rights: moral and economic rights

The identification of the author is crucial for the recognition of copyright protection. The ultimate purposes of copyright are both personal and social: on one side by incentivizing the creation process thanks to the exclusive on the exploitation of the economic rights, and on the other side, the same incentive benefits the entirety of society thanks to dissemination of knowledge. What allows these purposes to take place is precisely the recognition of exclusive rights accruing to authors. Civil law systems, like Italy, follow a dualistic approach recognizing both moral and economic rights protecting, respectively, author's personality and the economic use of the work.

2.5.1) Economic rights

Economic rights are granted by art. 12 l. 633/1941 and articles 13-18-bis of l. 633/1941 discipline them singularly. The exclusive right to the economic utilization of the intellectual works is granted in any form and manner. All the economic rights have some elements in common. First and foremost is the limited duration of the protection established at 70 years after the death of the author[148]. The parameter of the death of the author is also taken in consideration for works published posthumously; conversely, the criterion of first publication, "*whatever the form in which the publication was effected*"[149], is used in the case of anonymous or pseudonymous author[150], granting protection for 70 years after said first publication. If the true identity of the author is revealed[151], then the usual term of 70 years since the death of the author is applied. Completing the analysis of the duration we may also cite the fact that the 70 years term, in cinematographic works, starts after the death of the last survivor of a specific group of people that contributed to the final work[152]. An interesting duration discipline is also appreciable for joint and collective works[153]. In joint works[154], the duration is determined by the death of the last surviving joint-author, while, in collective works "*the duration of the exploitation rights of each joint-author and contributor shall be determined by the respective lifetimes of such contributor*", while the duration of rights of exploitation of

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[148] Art. 25 l. 633/1941. Initially the duration of protection was established at 50 years after the death of the author, but it was raised with l. 52/1996

[149] Art. 27 l. 633/1941

[150] The only exception to this procedure is when the pseudonym has the same value of the true name, which occurs when it is well known as being equivalent to a true name. In this case the parameter used is the one calculating 70 years after the death of the author.

[151] By the authors himself or by the people indicated in art. 23: "*his spouse and children and, in the absence thereof, by his parents and other direct ascendants and descendants, and in absence of such ascendants and descendants, by his brothers and sisters and their descendants*", or by people authorized by the author in the forms established by art. 24 l. 633/1941

[152] Art. 32 l. 633/1941: "*the artistic director, the authors of the scenario, including the author of the dialogue, and the composer of the music specially created for use in the cinematographic or assimilated work*"

[153] Art. 26 l. 633/1941

[154] "*[...]and of dramatico-musical and choreographic works and works of dumb show*", Ibidem

the work considered as a whole, lasts 50 years from the first publication[155]. Another common element is the independence in the exercise of economic rights: exercising one economic right does not exclude the exclusive exercise of the other rights[156]. The economic rights expressed in articles 13 and following, are not the only forms of economic rights protected, but they are specific and typical manifestations of it. In fact, article 12 l. 633/1941, provides a general protection on any economic utilization of the work. Thus, economic rights own a feature that is not present in moral rights: the transferability. It is in the author's power to decide either to exercise his right, to transfer it to third parties through lucrative licenses or contracts, and it is also possible for authors to even waive their right in order to render their work of public domain[157]. The only limit recognized by the doctrine[158]is that the global transfer of the right is impossible due to the presence of the inalienable author's moral right of withdrawal of the work from commerce. The widespread use of internet and new technologies has amplified the number of methods to exercise these economic rights in ways that are not pre-determined by the current rules, creating new situations that required careful regulation to prevent infringements.

The three most relevant economic rights are the right of reproduction, the right of distribution and the right of communication to the public. Firstly art 13 l. 633/1941, concerning the right of reproduction, states that "*The exclusive right of reproduction concerns the multiplication of copies of the work in all or in part, either direct or indirect, temporary or permanent, by any means or in any form, such as copying by hand, printing lithography, engraving, photography, phonography, cinematography, and any other process of reproduction*". The original text of this article has been reformed by the InfoSoc Directive[159] 2001/29/CE: the purpose of this Directive was to expand the copyright protection to the issues originated by the advent of new technologies. The "*multiplication of copies of the work*" includes any method used for this purpose: art. 13 provides a non-exhaustive list of the typical techniques used for reproduction and also states that any other process of reproduction is included in the protection. Therefore, the incorporation of said work can take place on any medium, regardless of the fact that it is physical or digital. The protection involves

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[155] "*[...]except in the case of magazines, newspapers and other periodical works to which the provisions of Article 30 shall apply*" which establishes that the duration of these types of works runs from the year of publication of each part or volume
[156] Art. 19 l. 633/1941
[157] This is the field of Creative Commons Public Licenses (CCPL). Thanks to this instrument the author decides which of his rights are of exclusive utilization. In the agreement, he can allow third parties (the licensees) to dispose freely of his work or not. For example, he can insert a "no derivative" (ND) clause, thanks to which his work cannot be modified, or a "no commercial uses" (NC) clause thanks to which only individual or teaching uses are allowed or even the "share alike" (SA) clause, thanks to which users can modify the original work, and thus a derivate work that has to be shared with a license identical to the one they linked to the original work. The last type of clause is the Attribution (BY) one, where it allows for the copy, distribution etc.. provided that the indications regarding the author are maintained. Please refer to www.creativecommons.org for more information.
[158] De Sanctis V., Fabiani M, I contratti di diritto d'autore, Giuffrè, Milano, 2000, p. 12 ss
[159] Directive 2001/29/CE of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society, implemented in Italy with Decreto Legislativo 68/2003

both the copies carried out with lucrative or commercial purpose and, also, those lacking these features[160]. For what concerns the form of reproduction, it is also considered a copy the one that gives rise to a work in a similar or in a different form, following a change in the support incorporating the work[161]. New technologies have rendered the process of reproduction extremely easier, thanks to the use of digital copies that are difficult to trace due to the absence of a physical medium. Possible copies are originated not only from the original work (direct copy), but also from one of its copies, resulting in a "copy of a copy" (indirect copy) that is indistinguishable from the original[162]. These new circumstances are the ones that have created the need for an expansion of the definition of "copy". Thanks to the provisions of the InfoSoc Directive, the concept of temporary copies is now disciplined since their online use is immeasurable. In fact, every time we have access to a work on our digital devices, a temporary copy is created: online browsing through websites containing intellectual works, any online enjoyment of a work, and especially download or sharing, all create temporary copies. Does this mean that the exclusive right of reproduction accruing to the author does not allow the enjoyment of the works online, subjecting any use of the work to author's control? No, in fact, article 5 of the Infosoc Directive provides some exceptions on the exclusive right in order to prevent the complete paralysis of the digital enjoyment of works. The requirement for these exceptions is that they shall not conflict with a normal exploitation of the work and that they do not prejudice the legitimate interests of the author[163]: for example, current event reporting, illustration for teaching or scientific research, uses necessary for "public security" purposes and personal reproductions[164] are exempted. The Directive also provided for a case of mandatory exclusion, which was implemented in Italy by art. 68-bis 633/1941, establishing that "*[…] temporary acts of reproduction which have no independent economic significance, which are transient or incidental and integral and essential part of technological process and whose sole purpose is to enable the transmission in a network between third parties by intervention of an intermediary or the lawful use of a work or other subject matters shall be exempted from the reproduction right*"[165].

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[160] On the matter: Trib. Roma, 17 febbraio 1962 in Dir. Autore , 1963, p. 58; Trib. Bolzano, 3 maggio 1994, in Dir. Autore, 1995, p. 260; Corte app. Venezia, 25 novembre 1994 in Dir. Autore, 1995, p. 559; Corte app. Bologna, 11 gennaio 2001, in AIDA, 2003,p. 894.
[161] Corte app. Torino, 6 agosto 2001, in AIDA, 2003, Rep. I.7
[162] Hugenholtz P.B., The future of Copyright in a digital environment, Kluwer Law International, The Hague, 1996, p. 125
[163] Art. 5, co. 5 Directive 29/2001/CE
[164] Art. 71-sexies l. 633/1941
[165] The relevance of this provision is crucial in regard to online browsing since such operation necessarily requires the reproduction of a temporary copy on the device utilized by the user. The reproduction is in fact compliant with the requirements established by the Directive: it is a transient temporary copy, vital for the functioning of the technological operation (browsing) and with the only purpose of consenting it. This matter has been the object of an important decision of the Luxembourg Court the case C360/13, Public Relations Consultants Association td vs Newspaper Licensing Agency Ltd.

Another important exclusive exploitation right is the one disciplined by art. 16 l. 633/1941[166]: the right of communication to the public. Differently from art. 15 disciplining the right of public performance[167], therefore for the enjoyment of a present public, the right of communication to the public concerns the exclusive right of the author to use any of the means of remote diffusion for the enjoyment of the work for a distant audience[168]. Two are the fundamental elements of this right that should be analysed: the notion of public and the notion of communication. The InfoSoc Directive has influenced the current formulation of the article, requiring a broad interpretation of the definition of communication to the public[169]. The Directive includes in the definition of communication any transmission or retransmission of the work to the public[170]. The original purpose of the Directive is the achievement of a higher degree of protection for authors[171] especially in connection to the widespread use of new technologies. Article 16 l. 633/1941 provides a non-exhaustive list of technologies used for such purpose. Hence, for example, the definition of *any wireless means* for the communication to the public extends to Internet. As regards the definition of public[172] there are some fundamental elements: the indeterminacy of the subjects[173], the potential character of the diffusion[174] and the numerical relevancy of the subjects[175]. The act of making available the work to the public, so that they can access it individually and in the moment they choose, has been intended broadly[176] by the jurisprudence and has been the object of the Directive 2019/790/UE that will be analysed afterwards in this dissertation. Furthermore, the second paragraph of article 17 establishes that the right of communication to the public "*shall not be exhausted by any act of communication to the public, including*

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[166] Art. 16 l. 633/1941 "*1. The exclusive right of communication to the public of the work by wire or wireless means concerns the use of any means of diffusion at a distance, such as telegraphy, telephony, radio or television broadcasting, and other like means including communication to the public by satellite and cable retransmission, as well as the encrypted transmission by means of specific conditions of access; it also includes the making available to the public of a work in such a way that members of the public may access it from a place and at a time individually chosen by them. 2. The right referred to in paragraph 1 shall not be exhausted by any act of communication to the public, including the acts of making available to the public*".

[167] Art. 15 l. 633/1941 "*The exclusive right of public performance or recitation concerns the performance or recitation however carried out, and for payment or not, of a musical, dramatic or cinematographic work, of any other work suitable for public showing, and of oral works*". The second paragraph of the article also establishes that the performance performed without lucrative and intent within the normal circle of family, community, school or a retirement home shall not be intended public.

[168] Spedicato G., Principi di diritto d'autore (2020), op. cit., p. 104

[169] Recital 23 of InfoSoc Directive.

[170] Ibidem

[171] Recital 9 and 10 of InfoSoc Directive.

[172] The jurisprudence has intervened a considerable amount of time on the matter, disciplining emerging problems on the definition of public. For example in the following important decisions: ITV Broadcasting (C-607/11), Reha Training (C-117/15) e GS Media (C-160/15).

[173] Thus excluding circumstances in which the public is composed of known subjects, for example in case of mailing lists that lack this requirement.

[174] The actual fruition of the work by the public does not have any relevance, what matters is the possibility of enjoyment through the transmission of the work to the public.

[175] Referring to the non-exceeding of a "non-insignificant" threshold below which the act of communication to the public made by a different subject than the author is economically irrelevant.

[176] Including, for example, hyperlinking and streaming of audio and video of protected works in the concept of communication and making available to the public.

the acts of making available to the public", indicating that, for example, the publication of a work online does not imply its distribution, but should be intended as a communication to the public[177].

Moving to the right of distribution, we shall examine art. 17 l. 633/1941[178]. The object of the right of distribution is the exclusive right of the author to transfer the ownership, through sale or any other form of transfer of ownership, of the physical form of his work or its copies. The fixation on a tangible support is a requirement of the right of distribution[179], together with its transfer of ownership[180]. Therefore, in cases in which the production in series is possible, the right of distribution is strictly intertwined with the right of reproduction insofar the author can decide the number of copies of his works to be reproduced and then distributed. The two requirements of the right of distribution (the transfer of ownership and the original work or its copies, as tangible objects) do not include those circumstances in which there is the transfer of the work, but there is no transfer of ownership[181]. The utmost importance of this exclusive right is in the fact that it allows authors the possibility to satisfy their economic interest. In fact, authors can determine the number of circulating works throughout the European territory[182]. The profit aspect of the distribution of the works is essential in the right of distribution[183]; it is also important to note that it has a limit. The first sale doctrine, in fact, establishes that once the ownership of the work has been transferred, the author has no right on it anymore[184]. The buyer can freely dispose of it: the principle of exhaustion is in fact disciplined by the legislator to temper the interests of the buyer and the right of distribution of the author that, therefore, cannot be intended as unlimited. The author, after the first sale of his work, or its copies, has no control on the following operations as long as they are carried out by a lawful right-holder. The principle of exhaustion is extended to any sale following the first that is carried out throughout the European territory; for what concerns the importation of copies in the EU or the exportation of them outside the EU, these are prohibited

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[177] Sirotti Gaudenzi, A., & Menchetti, P. (2014). Il nuovo diritto d'autore: la tutela della proprietà intellettuale nella società dell'informazione, op.cit., p. 104

[178] Art. 17 l. 633/1941 "*1. The exclusive right of distribution concerns the right to market, place in circulation or make available to the public, by whatever means and for whatever purpose a work or copies thereof and also includes the exclusive right to introduce into the territory of the countries of European Community, for distribution, copies of a work made in countries not members of the European Community. 2. The distribution right shall not be exhausted within the European Community in respect of the original or copies of the work, except where the first sale or other transfer of ownership in the Community is made by the right holder or with his consent. 3. What is provided for under paragraph 2, shall not apply to the making available to the public of a work in such a way that members of the public may access it from a place and at a time individually chosen by them, even when the making of copies of the work is permitted. 4. For the purposes of exhaustion under paragraph 2, the free delivery of copies of a work for promotional purposes or for teaching or scientific research, when carried out or authorized by the right holder, shall not be deemed to be exercise of the exclusive right of distribution*".

[179] The principle of fixation on a physical support has been established by both the Recital number 28 of the InfoSoc Directive and art. 6 of WCT.

[180] This orientation was confirmed by an ECJ decision in the case Peek & Cloppenburg (C-456/06)

[181] For example in the case of rental: Due to the independence nature, as we have previously mentioned, the exhaustion of the right of distribution does not prevent the control of the author (art. 18-bis l. 633/1941).

[182] Art. 17 co. 1 l. 633/1941

[183] Sirotti Gaudenzi, A., & Menchetti, P. (2014). Il nuovo diritto d'autore: la tutela della proprietà intellettuale nella società dell'informazione, op.cit., p. 105; Cass. Civ., sez. I, 7 aprile 1997, n. 8304

[184] Spedicato G., Principi di diritto d'autore (2020), op. cit., p. 117

without a previous consent of the author[185]. The InfoSoc Directive introduced some exclusions to the principle of exhaustion in the case of simple communication or for works accessible in the place and moment that the user can independently choose. Highlighting the lucrative requirement of the right of distribution, the delivery of free copies is not an exercise of the right of distribution[186]. Furthermore, making a work available to the public does not exclude the right of distribution, due to the independent nature of economic rights.

An atypical right is the one disciplined by articles. 144-155 l. 633/1941, the "*diritto di seguito[187]*" or resale right[188]. It establishes the payment of a percentage to authors of figurative art or manuscripts for every professional sale following the first sale. The discipline of the resale right has been the center of the 2001/84/CE Directive[189], later implemented in Italy with d.lgs 118/2006[190]. By "*following sale*", as explained by the second paragraph of art. 144 l. 633/1941, we refer to any subsequent sale which requires the intervention of professional figures of the art market (auction houses, art galleries or any art dealer in general)[191]. The resale right accrues to the authors of the artworks[192] and it is considered an atypical right because, although carrying the elements of economic rights, like the limited duration of 70 years after the artist's death, it also has some aspects in common with moral rights, for example the inalienability and non-transferability, typical elements of moral rights[193] as we will see in the next paragraph. It can be regarded as an exception of the right of distribution: the author has no control on the commercialization of his works but his economic interests are still, partly, satisfiable[194]. The reasoning behind this exception is that the type of works object of the article, such as paintings, sculptures or manuscripts[195], are usually limited or unique editions, that cannot be produced in series due to their nature; furthermore, differently from most of the other intellectual works, the works of figurative art tend to acquire value with time, especially when paired with the growing recognition of the author in the art world, thus the protection granted to figurative artist

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[185] Ibidem
[186] Art. 17 co. 4 l. 633/1941
[187] Ex pluris: Calabi, G., Hecker, S., Sarro, R., & Busani, A. (2020). Le opere d'arte e le collezioni. CEDAM pp. 112-113; Fabiani, M. (2004). L'armonizzazione in Europa del diritto di seguito sulle opere d'arte figurativa, in Studi di diritto industriale in onore di Adriano Vanzetti: proprietà intellettuale e concorrenza. Milano, Giuffrè, pp.525-536; Stabile, S. (2017). Il diritto di seguito nel mercato dell'arte contemporanea. Economia e diritto del terziario-Open Access, (1).
[188] Also typically referred to also as "*droit de suite*"
[189] Directive 2001/84/EC of the European Parliament and of the Council of 27 September 2001 on the resale right for the benefit of the author of an original work of art
[190] Decreto Legislativo 13 febbraio 2006, n. 118 "Attuazione della direttiva 2001/84/CE, relativa al diritto dell'autore di un'opera d'arte sulle successive vendite dell'originale"
[191] Furthermore, paragraph 3 of art. 144 l. 633/1941, establishes that the resale right is not applied when the seller in the subsequent sale purchased the artwork or manuscript directly from its author, less than three years prior the second sale and for a price that does not exceed €10000
[192] The extent of the percentage accruing to authors is based on the price at which the work is sold. Specific rules are disciplined by art. 150 l. 633/1941
[193] Spedicato G., Principi di diritto d'autore (2020), op. cit., p. 122-123
[194] Ibidem
[195] Art. 145 l. 633/1941 lists all the different works object of the resale right.

is different[196]. The percentage accruing to the figurative artist is deposited by the seller to S.I.A.E, the Italian collecting society invested of this role. S.I.A.E.'s duties are to collect the artist's percentage, communicate to them the fact that a sale took place and subsequently pay them their fee, net of the S.I.A.E.'s commission[197]. There have been developed faster, less expensive ways to carry out this process. As will be shown in the third chapter, it can take place automatically thanks to smart contracts operating on blockchain, without the presence of any intermediary[198].

Attention should also be given to the exclusive right of translation and modification of the work in any form[199]. Any adaptation or modification of a work should obtain an authorization by its author. The elaboration of pre-existing works is allowed when the creative character of the second author is distinguishable and the new work is only inspired by the previous work. Thanks to the presence of the said creative elaboration, the works will convey a different, autonomous message and it should be expressed through the personal expression of the second author[200].

2.5.2) Moral rights

Together with economic rights, the Italian legislation also attributes protection in defense of the personality of the author: the moral rights. Moral rights are commonly recognized to authors only in civil law systems and International Treaties do not require the implementation of them in the parties' legislation[201]. In civil law Countries, the copyright system revolves around the author and the expression of his personality, so, due to the personalistic-centered approach and the intrinsic value of the process of creation[202], a protection on these elements is expected. In common law systems, conversely, the discipline is centered on the economic management and organization of the creation of the work. By not recognizing a different value

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[196] Recital n. 3 of the Directive 2001/84/CE declared that the aim of the resale right is to establish a balance between the economic situation and interests of figurative artists and the other types of creators that can benefit from their works, more easily.
[197] Art. 154 l. 633/1941
[198] Technically, S.I.A.E. is the Italian collecting society entitled for the payment of the artist's percentage related to the resale right. Although, artists are not obliged to subscribe to S.I.A.E. and can exercise their rights autonomously.
[199] Art. 18 l. 633/1941 "*The exclusive right of translation concerns all forms of modification, adaptation and transformation of a work as referred to in Article 4. An author shall also have the exclusive right to publish his works in a collection. Finally, he shall have the exclusive right to make any modifications to his work*".
[200] This phenomenon has been longly debated in relation to "Appropriation Art" described as "*opere artistiche che reinterpretano immagini preesialistenti tratte dall'arte e dalla cultura di massa, cambiandone totalmente il significato*" in Ord. Trib. Milano, 13 luglio 2011 in the decision of the famous Fondazione Alberto e Annette Giacometti vs Fondazione Prada, Prada S.p.A. e John Baldessari case.
[201] For example art. 9 of TRIPS imposes to members of the World Trade Organisation (WTO) to adhere to the provision on the Berne Convention regarding economic rights, with no mandatory requirement to conform to the moral rights discipline. The types of rights, not included in the patrimonial rights and mentioned in the Berne Convention, are the right to paternity and the right to integrity. Ricolfi (op.cit., p. 472) mentions a case in which the director John Huston's heirs had the possibility of object to the change in coloration of one of the movies in France, but the same right could not be exercised in the USA, where the director had previously signed a contract withdrawing his moral rights.
[202] Spedicato G., Principi di diritto d'autore (2020), op. cit., p.137

to this aspect of copyright, authors can dispose of their moral rights in the same way as patrimonial rights: transfer and withdrawal of these factors are allowed[203]. Moreover, both systems allow authors to decide whether or not to publish their work and the difference lies in the possibility of the renunciation of said right for the author[204]. In Italy, moral rights are considered independent from economic rights, included when these latter are transferred[205]. Moral rights are also un-renounceable, or unavailable, because the author cannot withdraw them, even with an express manifestation of his will; they are also inalienable, meaning that they cannot be validly transferred, and they are also imprescriptible since legal action is always possible for their recognition, by the author himself or by his legates[206].

The first faculty of the author concerns the publication of his work. In fact, both in the case of creation of a masterpiece or a poor-quality work, it is in the author's faculty to publish its work or not. There is no expressed provision regulating this right of the author, although, some scholars, attribute it to art. 12 l. 633/1941 because it is believed that the right of publication of one's work, implies a consequent right of non-publication[207]. This right is enforceable until the publication of the work. Questions raised by the possibility of unpublished work after the author's death is resolved by providing the right of publishing of the work to his legates, unless the author had expressly forbidden the publication or had set a date for the publication[208].

The paternity right, disciplined by art. 20 l. 633/1941, is recognized to the author after the publication of his work. It consists in the right to claim ownership on the work by the author himself and, thus, being recognized as its author; it is also referred to as "right to attribution"[209]. He has the faculty to use his own name, a pseudonym or complete anonymity and, thanks to the imprescribability of moral rights, he always has the option to reveal his true identity[210]. The author is under no obligation to reveal his connection to the creation. The paternity right also confers to the author a reclaiming faculty that allows him to deny the wrongful attribution of a work to him, when he is not its author[211]. The right of paternity seems in contradiction with the phenomenon of ghost writing[212]: in these cases, the recognized author is different from the actual author. It seems as if the author withdraws his paternity right, or at least transfers it, and

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[203] Abriani N., Cottino G., Ricolfi M., Diritto Industriale, op. cit. pp. 471-472
[204] Sirotti Gaudenzi, A., & Menchetti, P. (2014). Il nuovo diritto d'autore: la tutela della proprietà intellettuale nella società dell'informazione, op.cit., p. 109
[205] Art. 20 l. 633/1941
[206] Art.23 l. 633/1941
[207] Spedicato G., Principi di diritto d'autore (2020), op. cit., p. 140-141
[208] Art. 24 l. 633/1941
[209] Falce V. (2014) Intelllectual Property law in Italy, op. cit. p. 47
[210] Ibidem
[211] Sirotti Gaudenzi, A., & Menchetti, P. (2014). Il nuovo diritto d'autore: la tutela della proprietà intellettuale nella società dell'informazione, op.cit., p. 110-111
[212] Ghost writing is the phenomenon in which a person hires a writer with the purpose to write a text that is credited to a person different as the author. With this operation, the person hiring the writer is regarded as the author of the work. Object of ghostwriting are usually speeches that celebrities, politicians or important figure use in their job, but the phenomenon extends also to biographies, music and art.

thus the agreement should be considered void. Instead, ghost writing is usually disciplined in the contracts as an editing activity of the ghost writer on the client's work. It shall be considered that the ghost writer can always exercise his right of paternity and reclaim authorship[213].

The right to integrity of the work consists in the right to "*object to any distortion, mutilation or any other modification of, and other derogatory action in relation to the work*[214]" that can be prejudicial to the reputation and honor of the author. Thanks to the independence principle, the author can enforce this right even after transferring economic rights to third parties. This right can be compromised through acts of third parties that change the way the works are communicated to the public, for example by directly altering the work or by indirectly presenting the work so that the message it conveys is distorted, discrediting the work of its author and damaging his reputation[215]. The damage of the author's honor or reputation is a necessary requirement, so in the case of marginal modifications that do not result in said damage, the author will not be able to appeal to the right of integrity[216]. By damaging the author's honor or reputation we shall refer to uses of the work that create a wrongful conviction on the author's personality, both for the author or the public[217]. The diffusion of digital copies has extremely simplified the possibility for third parties to modify intellectual works using devices readily available to anyone, and possibly damage author's honor and reputation. Blockchain, once again, can be a valid ally for authors. This technology, in order to validate transactions, confronts the hashes and the network only validates them if no changes in the hash occur. By modifying an intellectual work, as we have seen in the first chapter, the hash will change as well, thus making immediately visible that the work has undergone external modifications. Furthermore, new forms of AI are developing and, thanks to an image similarity research algorithm, are able to detect modifications of original works in subsequent applications[218]. There are some cases in which the author cannot oppose to the modifications[219] required by, for example, technical reasons necessary for the construction of works of architecture. The same prohibition is extended to the completed architectural works as well[220].

The last moral right protected by Italian regulation is the right to withdraw the work from the market[221]. By exercising this right the author requests the inhibition of future commercialization of his work in any form it may occur due to the rise of "*serious moral reasons*". Given the severity of the consequences of withdraw of the work from the market on the economic sphere of third persons, the requirements to enforce this right

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[213] Falce V. (2014) Intelllectual Property law in Italy, op. cit p. 48
[214] Art. 20 l. 633/1941
[215] Spedicato G., Principi di diritto d'autore (2020), op. cit., p. 145
[216] Ibidem
[217] Falce V. (2014) Intelllectual Property law in Italy, op. cit. p.48-49
[218] The success of these technological measures has been proven by the growing use of them in automatic filtration systems used by social media to prevent the upload, and consequent possible joint liability, of copyrighted works onto their platforms.
[219] Art. 41 and 47 l. 633/1941, respectively on newspapers articles modified by the nature and purpose of said newspaper and to the works utilized in a cinematographic work.
[220] Art. 2 co. 2 l. 633/1941
[221] Art. 2582 of the civil code and art. 142-143 l. 633/1941

are definitely more stringent. Firstly, it can only be exercised by the author and not his legates[222]. The existence of serious moral reasons needs to be assessed by a judicial court and it refers to ethical, philosophical, political and religious reasons[223]. Accordingly, the exercise of this right is not linked to the simple afterthought on the publication of the work due to the change of circumstances, in an opportunistic fashion, but genuine repentance and drastic change of ideas, insofar the work is not an expression of the personality of the author anymore[224]. This requirement will have to be proven before the Judge that will decide on the enforceability of the moral right. Moreover, the exercise of this right is subjected to further requirements: the author shall notify the person to which he transferred rights and give adequate public notice through the notification to the Office of the President of the Council of Ministers[225]; in addition, he shall compensate every right-holder suffering a loss caused by the withdraw[226].

2.5.3) Neighbouring rights

Our assessment of the evolution of the copyright discipline would not be complete without making reference to related or neighboring rights, also given the principles presented by the 790/2019 Directive. Furthermore, we may note how contemporary art is strictly linked to different mediums: not only physical art, but also live performances[227], lights shows and digital experiences involving augmented reality can be part of an artwork. For this reason, different new subjects may be interested in the making available of these new artworks. The importance of these figures has been recognized ultimately by art. 18 of the 790/2019 Directive[228] which establishes a "*principle of appropriate and proportionate remuneration*" for authors and performers transferring their exclusive rights for the exploitation of their works. In fact, Member States are free to adopt any "*mechanisms and take into account the principle of contractual freedom and a fair balance of rights and interests*" to reach said result. Thus, similarly, the opportunities provided for the management of authors rights proposed in this dissertation (blockchain and the use of smart contracts granting automatic

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[222] Greco P., Vercellone P., I diritti sulle opere dell'ingegno, op.cit. pp. 119 ss.

[223] Falce V. (2014) Intellectual Property law in Italy, op. cit. p. 51

[224] Spedicato G., Principi di diritto d'autore (2020), op. cit., pp .147-149

[225] Art 142 l. 633/1941

[226] Ibidem

[227] Marina Abramovich has challenged the rules of performance art, not only form an artistic point of view but also form a legal one. Performances are a one-off, real time events based on "raw immediacy and ephemeral nature" and, as it is shown in this section, performers and executors do not enjoy the same protection granted to authors. She complained on this lack of protection, since anyone could potentially re-enact her performances without asking her authorization. At the same time, she allowed only people chosen by her, mostly her students, to re-enact her performances in the museum exhibitions all around the world dedicated to her work. This system created by Abramovic has been referred to as re-performance: changing the spectators, the executors and the setting, the performance and what it communicates remains the same but at the same time changes constantly, adapting to the new setting (https://www.artesvelata.it/re-performance/). She also coherently refused to re-interpreter famous performance-art pieces of other artists without their authorization. Please refer to http://www.onthecommons.org/performance-art-property

[228] Please refer to 2.6.3) Directive on Copyright in the Digital Single Market

and fractionated remuneration, in light of one's input to the final product) may be a valid tool that Member States can implement also for the people entitled to neighboring rights. As we will see in chapter three, this can be an effective method to provide fairer compensation to artists and executors, in line with the principle of reducing value-gap as presented in the Directive 790/2019. We may now begin to focus on the main features of neighboring rights, following the purpose of this chapter to provide an overview of the evolution of the copyright discipline. Copyright protection, in fact, includes also certain categories of people that are not authors but that contribute to the fruition of the work. Given their important role and skills but, most importantly, their creative, financial or technical input in the intellectual work, they deserve protection but lack the necessary requirement of creative character[229]. Hence, neighboring rights are attributed. Given their scope, neighboring rights are conferred to an extremely heterogenous category of people which all have one thing in common: their contribution shows some kind of connection to the work. For example, we may have different types of performers which contribution is artistically connected to the intellectual work or contributions that are connected to entrepreneurial activities or the execution of the work or even contributions connected to the technical elements of the work. Neighboring rights importance is mostly referred to economic aspects and they have been the object of different international regulations[230]. The general principle applicable to neighboring rights is their independence from copyright. Examples of works to which are recognized related rights are critical editions of works falling under public domain, theatrical sketches, simple photographs, non-creative databases for which a consistent economic contribution was required and engineering project indicating new technical solutions[231].

2.5.4) Exceptions and limitations to the scope of copyright protection

We have analysed the rights that the Italian legislation recognizes to authors, protecting the personality of the author and also his economic interests. Also, we have pointed out some cases (for example the first sale doctrine or the limited duration of economic rights) that take into account the individual rights of third parties, also worthy of separate protection. In fact, the *ius excludendi alios* should not be considered unlimited when it collides with valid interests of third parties[232]. There are some circumstances in which the utilization of an intellectual work is allowed by third parties, although an authorization from the author

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[229] Falce V. (2014) Intellectual Property law in Italy, op. cit. p. 63
[230] Rome Convention for the Protection of Performers, Producers of phonograms and broadcasting organisations; WIPO Performance and Phonograms Treaty; Directive 2019/790/UE
[231] Falce V. (2014) Intellectual Property law in Italy, op. cit. p. 63
[232] A proper balance between the two contrasting interests is also seeked in Directive 790/2019/UE. In fact, Recital 6 states that *"The exceptions and limitations provided for in this Directive seek to achieve a fair balance between the rights and interests of authors and other rightholders, on the one hand, and of users on the other. They can be applied only in certain special cases that do not conflict with the normal exploitation of the works or other subject matter and do not unreasonably prejudice the legitimate interests of the rightholders"*.

may be required[233]. Author's prerogatives should be balanced with the contrasting needs of third parties, in view of the prevention of copyright abuse[234]. European Institutions dealt with this issue and, in an harmonization attempt of this phenomenon, the InfoSoc Directive introduced a list of exceptions and limitations[235]. Furthermore, Directive 2019/790/UE has also introduced additional mandatory exceptions and limitations in the specific cases in which the Directive is concerned. The number of exceptions and limitations is extremely high, for example, the reproduction of protected works for personal use[236] or operations with the aim of cultural promotion[237] are strictly linked to the increased use of digitalization of the current society. In the InfoSoc Directive especially, the list of exceptions and limitations is quite vast because its purpose was to provide effective ways to balance authors' interests and the copyright social function in the Information Society. Legislators understood the copyright revolution that was taking place: intellectual works were not linked to their materiality anymore thanks to digital copies that were undistinguishable from the original and easily shareable by everyone. On one hand, European Institutions were looking for new means to control this new phenomenon, on the other, they decided to create some areas in which copyright protection would cease to operate in view of the social function of copyright. On the international level, the recognized tool used to influence and orient the discipline of exceptions and limitations in national legislations is the three-step test[238]. The three-step test allows exceptions and limitations in specific cases that are clearly determinable, that do not conflict with the normal exploitation of the intellectual works and that do not cause an unreasonable prejudice to right-holders. Due to the vagueness of the formulation, it created multiple interpretation problems whilst still obtaining success, as shown by the fact that it has been referenced in its main elements in the 790/2019/EU Directive[239]. Together with the creation of these areas in which copyright discipline is not applied, the Information Society and its evolution, requires new methods to track the uses of copyrighted works online. How can exclusive rights be granted to right-holders if they do not know who is using their works and how? Digital copies and fast and inexpensive sharing methods available to everyone may be a threat to the exclusive rights of authors; the research of ways to completely control and compress the unauthorized diffusion of intellectual works has revealed to be fruitless and considered impossible. Contrarily to this approach, in the third chapter of

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[233] Spedicato G., Principi di diritto d'autore (2020), op. cit., pp 189-191

[234] Ivi, pp. 191-194; Falce V., Intellectual property law in Italy, op.cit. p 57-62

[235] Art. 5 InfoSoc Directive (2001/29/CE). The list of exceptions and limitations provided allows Member States to choose those to implement except for "*Temporary acts of reproduction referred to in Article 2, which are transient or incidental [and] an integral and essential part of a technological process and whose sole purpose is to enable:*
(a) a transmission in a network between third parties by an intermediary, or
(b) a lawful use
of a work or other subject-matter to be made, and which have no independent economic significance". This choice is explained in Recital 32 of the Directive as a way to take into account the different legal traditions of Member States, whilst making sure that the harmonization purpose is respected through a cohesive application of exceptions and limitations.

[236] Art. 68, 71-bis and 71-sexies l. 633/1941

[237] Art. 69, 69-bis l. 633/1941

[238] It is recognized by many international treaties. For example: art 9 of the Berne Convention, art 13 of TRIPS, art 10 of WCT and art 16 of WPPT.

[239] Spedicato G., Principi di diritto d'autore (2020), op. cit., pp 194-197

this dissertation we will provide an overview of the different features of blockchain, for example the immutability of the records, and examine its application to track the online unauthorized diffusion of the copyrighted intellectual works, in the cases in which they do not fall under the exceptions and limitations.

2.5.5) The role and functions of S.I.A.E and the other collecting societies

In the previous paragraphs we have analysed the plethora of rights accruing to the authors of intellectual works. Due to their multiplicity, the personal management of all these rights can become a quite complex and time-consuming operation for authors. To respond to this exigency, art 180 l. 633/1941 provided for the figure of collecting societies, intermediaries in the management of the author's rights. In fact, their main activities involve: "*1.the granting of licenses and authorizations for the exploitation utilization of protected works, for the account of and in the interests of the right-holders; 2. the collection of the revenues arising from the licenses and authorizations; 3.the distribution of that revenue among the right-holders[240]*". The collecting societies are invested of other duties as well, but the granting of licenses and the subsequent collection and distribution of the proceeds constitute the core of their activities[241]. Collecting societies simplify the licensing process by eliminating the individual negotiating process for authors and, thus, reducing the transaction costs and times[242]. Also, these collecting societies help the economic satisfaction of authors[243]. On the other hand, the assignment of rights to the collecting companies is simply a prerogative of the author; this possibility does not prejudice the faculty of authors to exercise their rights independently[244]. In Italy S.I.A.E. (Società italiana degli autori ed editori) was the only collecting society and, until very recently[245], it has operated in a monopolistic regime since it was provided the exclusivity right to act as intermediary in the management of authors rights[246]. The principle of legal monopoly conferred to the national collecting society has evolved during the years and it has begun to be considered

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[240] Similarly, collecting companies have been disciplined in the 2014/26/UE Directive (Barnier Directive).

[241] Spedicato G., Principi di diritto d'autore (2020), op. cit., p. 216

[242] Sirotti Gaudenzi, A., & Menchetti, P. (2014). Il nuovo diritto d'autore : la tutela della proprietà intellettuale nella società dell'informazione, op.cit. p. 126

[243] Spedicato G., Principi di diritto d'autore (2020), op. cit. p. 217

[244] Ibidem

[245] There is also the SCF (Società Consortile Fonografici) involved with the neighboring rights of the producers of phonograms and the Nuovo IMAIE (Nuovo Istituto Mutualistico per la tutela dei diritti degli Artisti Interpreti Esecutori) concerned with the neighboring right of artists and performers. Only recently d.l 148/2017 has withdrawn the right of exclusivity in the management of right of S.IA.E. allowing the presence of other collecting societies. Recently, Soundreef has become S.I.A.E.'s biggest competitor.

[246] Art. 180 l. 633/1941 "*The right to act as an intermediary in any manner whether by direct or indirect intervention, mediation agency or representation, or by assignment of the exercise of the rights of performance, recitation, broadcasting, including communication to the public by satellite, and mechanical and cinematographic reproduction of protected works, shall belong exclusively to the S.I.A.E.*".

by the ECJ[247] not compatible not only with the competition principles in the internal market[248], but also with the principle of freedom to provide services in the Community[249]. These orientations in the jurisprudence and doctrine resulted in the drafting of the Barnier Directive[250] that, with the purpose of harmonization, allows for the liberalizations of said services and also grants the possibility to authors to choose any collecting society established in the European Territory[251]. The Barnier Directive has allowed right-holders to freely choose the collecting society to entrust with the management of their rights, opening the market to pluralism in providing the same services on which the S.I.A.E. had previously the monopoly on[252]. It has been noted that together with Italy, only the Czech Republic was the other Member State in which there was still an active monopoly regime for these services. New operators have started to gain a market share and Soundreef, at least in Italy, has proven to be a direct and valid competitor to S.I.A.E. as an intermediary in the management of rights. Interestingly enough, The Barnier Directive makes no direct reference to one important role of collecting societies: the payment of the percentage accruing to artists enjoying the resale right, which has been explained previously in this chapter. Currently, therefore, S.I.A.E. is the only entity in charge of this duty, even though new technological tools like blockchain and smart contracts can be a valid alternative for the compensation of artists after the first sale of their creations. In fact, since the provisions of smart contracts can be freely agreed by the parties, an automatic feature granting compensation directly to the artist after every sale of his work may be implemented in the code.

One of the functions of S.I.A.E. is the keeping of public registers[253]. As we have seen, the registration does not attribute copyright to the authors, since it is granted to them in the moment of creation, but it provides proof of existence of the work and of its publication since the day of the registration. This evidence may be fundamental in judicial disputes. This feature is also one of the features used in the relation between blockchain and copyright: as it will be shown in the third chapter, blockchain provides immutable records

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[247] An important ECJ decision ruled accordingly (C-351/12 Krajský soud v Plzni). It indicated that the imposition of significantly higher fees, compared to the economic value of the service provided and to the fees charged for the same service in other Member States indicate an abuse of dominant position. Furthermore, national legislation reserving the exercise of collective management of copyright to a single collecting society and preventing users to benefit from the services provided by collecting societies established in other Member States, are to be considered in contrast with articles 102 and 56 TFEU. The noteworthy impact of this sentence has been implemented in the principles set out in the Barnier Directive.

[248] Art. 102 TFEU

[249] Art 56 of the Treaty on the Functioning of the European Union "[…] *restrictions on freedom to provide services within the Union shall be prohibited in respect of nationals of Member States who are established in a Member State other than that of the person for whom the services are intended*".

[250] Directive of the European Parliament and of the Council of 26 February 2014 on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market (Directive 2014/26/UE) enacted in Italy by d.l. 35/2017

[251] Recital 4 of Directive 2014/26/UE

[252] The implementation of the Barnier Directive in Italy with the dlgs 35/2017 has sparked controversy with the AGCM (Autorità garante della concorrenza e del mercato) due to the imperfect and incomplete liberalization granted by the provisions, please refer to https://www.agendadigitale.eu/mercati-digitali/la-liberalizzazione-incompleta-della-gestione-collettiva-dei-diritti-dautore-e-connessi/

[253] It is explicitly required by art 103 the keeping of a specific cinematographic works registry and the keeping of a specific registry for computer programs.

of transactions that will help trace and control the diffusion of intellectual works online. It is more convenient than the regular registries because it is available, in any moment, to anyone with an internet connection and it ensures enhanced security on the data thanks to its decentralized nature. Furthermore, S.I.A.E. can pursue its activities in every country in which it has an organized representation[254], while blockchain is a global technological tool and, thanks to its decentralized nature, does not require the presence of physical offices in order to be deployed.

2.6) The regulation of digital innovations

The elements of success of a copyright discipline lie in the rights granted to authors, with the final purposes to satisfy the authors economic interests and the diffusion of knowledge. Probably as important is also the ability of the system to respond to emerging issues and provide a discipline to their uncertainties. In fact, copyright is strictly linked to innovation and it should be able to regulate phenomena that could not have been foreseen. For this reason, copyright regulation should keep the same pace as innovation and in our ever-evolving society it can be very complex: constant technologic innovations require updated interpretations and regulation in order to adapt to emerging needs. Since most of these innovations go beyond national territorial borders, a process of harmonization is required. The role and importance of copyright has been recognized by European institutions very early[255]. Our society is, in fact, characterized by the constant exchange of data and diffusion of texts, images and computer programs, has been described as "The Information society"[256]. This is the name that has been provided to this European project, aiming at the creation of a society based on communication and exchange of information[257]. The development of technology is, thus, recognized and encouraged when setting new regulations on copyright protection in the evolved society. The combined use of jurisprudence and the sources of law aid the fundamental process of harmonization aiming to eliminate "*significant differences in protection and thereby in restrictions on the free movement of services and products incorporating, or based on, intellectual property, leading to a refragmentation of the internal market and legislative inconsistency[258]*". This process started with the

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[254] Art. 180 co. 3 l. 633/1941

[255] Two Green Paper were published on the matter: Green Paper on Copyright and the challenge of technology, COM (88), 172 (published in 1988) and Copyright and related rights in the information society- green paper, COM (95) 382 (published in 1995)

[256] Viterbo A, Codignola,A., L'informazione e l'informatica nella società della conoscenza, in Dir. Informazione e informatica, 2002, p. 23.

[257] Aa. Vv., Dizionario dell'Unione Europea, Simone, Napoli, 2000 p. 517

[258] Recital 6 of InfoSoc Directive. We shall also highlight the following sentences of the Recital "*The impact of such legislative differences and uncertainties will become more significant with the further development of the information society, which has already greatly increased transborder exploitation of intellectual property. This development will and should further increase. Significant legal differences and uncertainties in protection may hinder economies of scale for new products and services containing copyright and related rights*".

Infosoc Directive[259] and, due to constant evolution of technologies and their widespread use, it has been updated during the course of these years. Besides the InfoSoc Directive, concerned with the harmonization of copyright principles, there have been multiple other Directives disciplining specific technologies and uses: electronic commerce, databases, softwares, rental lending just to name a few[260]. Once again from the implementation of InfoSoc Directive, society has undergone through enormous changes: just think to the impact of social media on copyright. The culmination point of one of the hardest challenges faced by copyright is the Directive (EU) 2019/790[261] that symbolizes the shift from the Information Society to the Digital Single Market[262]. One of the purposes of this highly debated Directive is to protect online uses of protected content, re-establishing the balance in favour of artists and authors, instead of the service providers that are gaining enormous profits, through advertising, on the back of the content shared on their platforms. The implementation process of this Directive by Member States will surely give rise to further insights. Extremely crucial has been, moreover, the role of the European Court of Justice that, by ruling on specific cases, has been able to remedy to the legislation's shortcomings and will continue to do so. We have already mentioned some of the most important provisions that have been part of the harmonization process and, in this section, we will focus on the new formulations and interpretations provided in the most recent rulings and Directives.

2.6.1) Evolutionary profiles and definition of emerging issues

The first fundamental Directive that helped harmonize copyright protection in the Information Society was the Directive 2001/29/EC on the harmonisation of certain aspects of copyright and related rights in the Information Society. It kept copyright protection at pace with the evolution of technology thanks to the introduction of new formulations of the typical economic rights in the context of the emerging circumstances. These new situations struggled to fit into the older definitions of the different economic rights of the authors and due to the interpretative differences between Member States and the cross-border

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[259] The tile of the Directive is self-explanatory, with regard to its purpose: Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society
[260] Respectively disciplined by Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ('Directive on electronic commerce'), Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases ("Database Directive"), Directive 2006/115/EC of the European Parliament and of the Council of 12 December 2006 on rental right and lending right and on certain rights related to copyright in the field of intellectual property ("Rental and Lending Directive"). Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs.
[261] Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC
[262] It is an extremely detailed Directive and it is worth mentioning the titles in which it is divided: general provisions (I), measures to adapt exceptions and limitations to the digital and cross-border environment (II), measures to improve licensing practices and ensure wider access to content (III), measures to achieve a well-functioning marketplace for copyright (IV), and final provisions (V).

nature of the Information Society based on the exchange of information, a harmonization intervention was required. The InfoSoc Directive did not introduce new rights accruing to authors in reference to these new circumstances but adapted and expanded the scope of the typical economical rights to these more modern cases, through new formulations and the establishment of exceptions and limitations.

The right of reproduction was interested by the provisions of Article 2 of the Directive. The right of reproduction is defined as "*the exclusive right to authorise or prohibit direct or indirect, temporary or permanent reproduction by any means and in any form, in whole or in part*". The reference to the *any means* of reproduction and to temporary copies, as we have seen, allows to include in the right of reproduction also the digital copies[263]. The diffusion of the author's copies is extremely difficult to control online due to the many ways for users can share these works. For example, the nature of linking is still debated. Links refer the user to an internet page located in a platform different from the starting one: it may be a page on the same website, like the home-page (*surface linking*) or it may be a page of a different website (*deep linking*)[264]. The case of linking, although with a problematic potential in reference to the information it refers the user to[265], does not in itself produce a copy of the work. The linking process, in fact, simply brings the user to another page, facilitating the access to information already available for them. It represents a mere connection to another internet page and no digital copy of the information is, therefore, produced.

The right to communication to the public, that we have previously analysed is also affected by the InfoSoc Directive. It concerns the diffusion by any means and making available of the work to the public, including the ways in which the public itself can choose the place and time to access them. Moreover, it is not exhausted by any act of communication to the public, including the making available. This means that every single diffusion of copyrighted work online shall be authorized, unless it falls within the exceptions and limitations provided by the law. The definition of communication to the public appears to be intended in a broad way[266] and European Jurisprudence has acted accordingly[267]. In fact, the Courts dealt with the right

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[263] As noted by Spedicato G. op.cit. p. 97, some Member States (France and Spain) before the Directive, when referring to the right of reproduction, required the fixation into a physical form of the copy.

[264] Reference is also due to *framing*, which has become less common, which refers to the creation of a "window" inside the web page hosting the content or information of another website. This content was visible independently by the clicking on the page where it was originated. It is typically considered illicit (Trib. Genova 22 dicembre 2000 and Sirotti Gaudenzi A., Framing vietato quando diventa concorrenza parassitaria, in Italia Oggi, 2001. On the difference between surface linking, deep linking and framing please refer to Riccio G.M., La responsabilità civile degli internet providers, Torino, 2002. Pp. 216 ss

[265] A decision of the German Federal Court ruled on the possibility of deep linking to a protected work. Accordingly,the activity of deep linking has been considered not infringing the rights of the author of the protected work since it did not produce a copy of the work (BGH, 17 luglio 2003 - I ZR 259/00)

[266] Recital 23 of InfoSoc Directive "This right should be understood in a broad sense covering all communication to the public not present at the place where the communication originates. This right should cover any such transmission or retransmission of a work to the public by wire or wireless means, including broadcasting. This right should not cover any other acts".

[267] In these decisions (Cause C-403/08 – C-429/08, the ECJ ruled that the transmission of a football match on a Television in a bar is an act of communication to the public. The requirements of distant and new audience and the profit purpose were found by the Court.

of communication to the public, as intended by art. 3 paragraph 1 of the InfoSoc Directive, in many decisions[268]. In the light of the interpretations provided we shall intend the public as new, distant, not determined and numerically consistent. The importance of the widening of the formulation of this right lies in the possibility for it to adapt easily to the many types of transmission of works realized with new technologies[269]. In this sense, the phenomenon of deep linking should be intended as an act of communication to the public when a protected work is shared online[270] to a public that fulfills the requirements established previously, together with the necessary requirement of lucrative intent or purpose[271]. Moreover, file sharing of copyright protected works in a peer-to-peer network[272]is illicit[273]. P2P networks were created with the aim of file sharing[274] but are commonly used for the diffusion of copyrighted works. This operation should be regarded as an act of communication to the public, thus exclusively enforceable by the right-holder, unless it falls within the exceptions established by the law[275]. The cases of illegal file sharing are regulated by article 171-ter of l. 633/1941, while the simple download is regulated by art.174-ter of the same law. The contemporary download and upload, which is the functioning of file sharing, is criminally sanctioned[276] even when lucrative purposes are absent. Nonetheless, the Italian Supreme Court has ruled on the absence of criminal relevance when the upload and download of musical files has no lucrative purposes.

As regards the right of distribution, article 4 of the InfoSoc Directive includes in the protection every form of transfer of ownership of the original or its copies. Differently than the right of communication to the public, the lucrative scope is not required, and the protection extends to any distribution of the work, included the free ones[277].

The InfoSoc Directive, with the aim of ensuring a fair balance between the rights and interests of right-holders and users for the use of copyrighted work in the digitalized society especially, has introduced a list of exceptions and limitations, with particular reference to reproduction rights and communication to the public, the core economic rights in the digitalized society. It should also be noted that reference is made to

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[268] In both C-162/10 (Phonographic Performance Ireland Limited (PPL)vs Ireland) and C-306/05 (Sociedad General de Autores y Editores de España (SGAE) c. Rafael Hoteles) it has been intended as act of communication to the public the availability of Television and radio dìfor Hotel's customers. In C-135/10 (Società Consortile Fonografici (SCF) c. Marco Del Corso) the dentist was not committing an act of communication to the public by the diffusion of phonograms in the waiting rooms.

[269] Ricolfi M. op. cit. p. 440 sustained that the right of communication to the public now forms an "exclusive right of access".

[270] C-360/10, Belgische Vereniging van auteurs, componisten en uitgevers CVBA (SABAM) vs Netlog NV and also C-160/15.

[271] Since no definition has been provided by the legislator, this interpretative approach is the most common.

[272] File sharing can take place through the use of a centralized system where each user requests a service to the server or in a peer-to-peer network where computers are connected to each other and share files. It is important to highlight that peer-to-peer networks are legal but the diffusion of copyright protected content is not.

[273] Ex. Art 171-ter l. 633/1941

[274] One of the most famous rulings on P2P networks is the one involving Napster, Inc. and A&M Records, Inc. (239F.3d 1004)

[275] An example of sharing of copyrighted works occurs when the author himself decides to share his works for advertising or social purposes.

[276] 171-ter 633/1941

[277] Ubertazzi L.C., Diritto d'autore, op. cit, p. 87

the fact that exceptions and limitations should be activated when they do "*not conflict with the normal exploitation of the work and do not unreasonably prejudice the rightholders[278]*". The list of exceptions and limitations provided by the Directive is quite extensive[279] and Member States could decide which one to implement. The only mandatory exception that Member States had to implement is the one disciplined in art 5 paragraph 1 stating "*Temporary acts of reproduction referred to in Article 2, which are transient or incidental [and] an integral and essential part of a technological process and whose sole purpose is to enable: (a) a transmission in a network between third parties by an intermediary, or (b) a lawful use of a work or other subject-matter to be made, and which have no independent economic significance, shall be exempted from the reproduction right[280]*". These exceptions and limitations have been implemented in l. 633/1941 in articles 65-71-decies, mainly[281], and discipline multiple different cases. Worthy of attention are also the exceptions for educational purposes[282] and the private reproduction for personal and non-lucrative uses[283].

More recently, European Institutions intervention has focused on emerging issues. The so-called Portability Regulation[284], for example, aims at eliminating the obstacles that do not allow the access to paid content, enjoyable online, to which European Citizens have subscribed to, for the time they are absent from their Country but still in territory of the Union. The regulation establishes that there is no copyright infringement because the territoriality exclusivity that may be object of the license is not attacked: the public does not change since the subscribed subject is the same, he is only in a different Member State. The Regulation[285] states that the obligation to enable cross-border portability is only mandatory for the paid services, while for free services, it is a matter of decision of the provider.

2.6.2) The liability of Internet Services Providers for copyright infringement

Commercial activities conducted online thanks to the use of new technologies have a clear cross-border connotation and they are linked to one of the types of actions that became possible thanks to the development of digital technologies. Online commercial activity has been the object of the Directive on

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[278] Art. 5 par. 5 InfoSoc Directive and art. 71-nonies l. 633/1941
[279] Art, 5 InfoSoc Directive
[280] As we have seen infra the importance of this disposition lies in the fact that it describes the technology required for the browsing, since a temporary copy is created every time a page is opened on the user's device.
[281] Other exceptions and limitations are provided for in articles 15, 64-ter, 64-quater, 64-sexies, 97 and 102-ter
[282] Art. 70 l. 633/1941
[283] Art. 71-sexies 71-septies l. 633/1941
[284] Regulation (EU) 2017/1128 of the European Parliament and of the Council of 14 June 2017 on cross-border portability of online content services in the internal market
[285] Art. 3 Reg. 2017/1128

electronic commerce (Directive 2000/31/CE[286]) and later implemented in Italy with d.l. 70/2003. The provisions of this Directive have also been used for the individuation of liability in cases of online copyright infringement. Online diffusion of intellectual works has in fact grown to be very common, also thanks to the widespread use of social media allowing everyone to share content. The possibility to create, share and modify digital works in such an easy way, brought out new issues and possibilities. The communication to the public of an intellectual work, as we have seen, is one of the exclusive rights of authors; it can be extremely beneficial for the author because he can gain recognition, or it can also be used as a way to satisfy his economic interest. On the other side, online publication of one's work can be detrimental to his honor or damage its economic interests. For example, an artist exercises his exclusive right and shares a digital copy of his intellectual work online. This process of making available to the public, as we have seen in the previous sections, accrues only to him and to the people to which he had transferred his right. In reality, though, every internet user having access to the artwork published can create a copy and redistribute it without authorization, even when there are no exceptions allowing such user behavior. The problem is therefore, twofold: on one hand the artist has the necessity to better control the online uses of his work (we will see in chapter three that blockchain technology and its traceability feature can help him with this issue), on the other hand we need to assess if only the user is liable of the infringement or if the platform on which such infringement has taken place is also participating in it. Therefore, it is important to understand whether or not the service providers are involved with the copyright infringements taking place on their platforms, they may or may not have knowledge of this operation happening due to the extreme amount of information processed, or worse, if service providers are also benefitting from it[287]. As with most copyright principles, the concept of service providers liability has evolved together with technological innovation. Initially, according to the e-commerce Directive, Internet Service Providers are described as "*any natural or legal person providing an information society service[288]*", which is intended as "*any service normally provided for remuneration, at a distance, by electronic means and at the individual request of a recipient of services[289]*". Article 15 of the Directive states that Member States shall not impose a general obligation on Internet Services Providers "*to monitor the information which they transmit or store, nor a general obligation actively to seek facts or circumstances indicating illegal activity*". No general obligation of surveillance is imposed to providers on the information that stores or transmits, although in the case of knowledge of illegal activity providers are obligated to inform the competent authorities and remove the

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[286] Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ('Directive on electronic commerce')

[287] Magni S., Spolidoro S.M., La responsabilità degli operatori in Internet: profili interni e internazionali, in Dir. inf., 1997, p. 61 e ss.; Riccio G.M., La responsabilità civile degli internet providers, Torino, 2002; Bocchini R., La responsabilità civile degli intermediari del commercio elettronico, Napoli, 2003; Gambino A.M., Le responsabilità civili dell'Internet service provider, Napoli, 2006; Cassano G-Cimino I.P., Il nuovo regime di responsabilità dei providers: verso la creazione di un novello «censore telematico»? Un primo commento agli artt. 14-17 del d. lgs. n. 70/1003, in Giur. it., 2004, p. 671;

[288] Art 2 of the e-commerce Directive

[289] Ibidem

information upon their request[290]. Furthermore, together with this general provision, the Directive specifies three different liability situations: mere conduit, caching and hosting[291]. In the first two cases, the service providers are considered exempt from liability as long as they are not involved with the information transmitted[292] and their activity is "*of a mere technical, automatic and passive nature, which implies that the information society service provider has neither knowledge of nor control over the information which is transmitted or stored*"[293]. Although, the most frequent case when copyright infringement is involved is when the information is non-temporarily stored by the service provider: the case of hosting. In this circumstance, non-liability is granted to the service provider on condition that "*(a) the provider does not have actual knowledge of illegal activity or information and, as regards claims for damages, is not aware of facts or circumstances from which the illegal activity or information is apparent; or (b) the provider, upon obtaining such knowledge or awareness, acts expeditiously to remove or to disable access to the information* [294]". In the case of proven non-liability of the service provider, the only responsible for the violation of copyright would be the user. The Italian Legislative Decree implementing the Directive, provided that service providers were obliged to remove the illicit information from their platform, upon order of the competent authority and not only upon notice of infringement coming from the right-holder[295]. The problem arose because the period of time between the notice of infringement and the request of removal coming from the competent authority was too long. The longer the waiting time, the bigger the economic, and eventually moral, damage would be suffered by the author suffering copyright infringement. To improve protection, jurisprudence[296] has introduced the figure of "active provider". It is considered active provider the subject that puts in place an activity that is not simply passive and neutral, gaining financial benefits from the content stored on the service and, in some ways, contributing to the organization of said

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[290] As we will later see, this is the approach that has been chosen by Italy in reference to the "actual knowledge of illegal activity".
[291] Artt. 12-13-14 Directive 2000/31/EC. Mere conduit is the simple transportation of information and the service provider is identified as a simple carrier of information or the one that simply provides internet access. Caching is the activity of the internet provider and refers to the temporary storage of information performed for the sole purpose of making the transmission of the information more efficient. and hosting is the non-temporary storage of information.
[292] Recital 43 Directive 2000/31/EC includes the fact that the service provider cannot "*modify the information that he transmits*".
[293] Recital 42 Directive 2000/31/EC
[294] Art. 14 Directive 2000/31/EC
[295] The *actual knowledge of illegal* activity ex. Art 14 Dir. 2000/31 has rose many doubts. Given that providers have no obligation of surveillance, knowledge of illegal activity can be reached by a notice of infringement or by a order of the competent authority. An ECJ decision (CJEU, 18 June 2009, Case C-487/07, L'Oréal SA, Lancôme Parfums et Beauté & Cie SNC et Laboratoire Garnier & Cie c. Bellure NV, Malaika Investment Ltd e Starion International Ltd.), similarly to other ruling recognizing the simple notice of infringement as sufficient, ruled that the circumstances indicating illegal activity should be identified as the circumstances in which a diligent economic operator would recognize an illegal activity. By this line of thought, the internet service provider would have to judge on the illegality of the conduct described on the notice of infringement, and since it would entail a heavy duty on the provider, the Italian legislator chose the order of the competent authority as the valid tool for the knowledge of illegal activity that would cause the elimination of the information.
[296] The most important on the definition of active provider are Court of Milan, 20 January 2011, *RTI v. ItaliaOnline Srl,* Court of Milan 19 May 2011, *RTI v. Yahoo! Italia Srl. And* Corte di Cass., sent. n.18727/2019. This last sentence has indicate some factors indicating the active role of the providers, for example filtering, selection, indexing, clustering, organization, evaluation as well as use, modification, extraction and promotion of content. (Lasorsa borgomaneri, N., La responsabilità dell'ISP per la violazione del diritto d'autore: dal caso RTI/YOUTUBE alla delibera AGCom, in Cassano G., Scorza G., Vaciago G., (2012), Diritto dell'internet. manuale operativo. Casi, legislazione, giurisprudenza, p. 425).

content on the platform. Also, in case of detected lucrative purpose, the service provider can be liable of the illicit activity together with the user because, said purpose, implies knowledge of illegal activity. Thanks to this system, the providers that fall under the definition of "*active*", were encouraged to immediately remove the illicit information stored on their platform, from the moment they received the notice of infringement form the right-holder, in order to not occur in legal litigation. For what concerns the excessive duration of the proceedings in establishing either the behavior was illicit or not, AGCOM has now a key role thanks to an enforcement procedure for digital copyright introduced by "*Regolamento in materia di tutela del diritto d'autore sulle reti di comunicazione elettronica e procedure attuative ai sensi del decreto legislativo 9 aprile 2003, n. 70*". Greater efforts are now required to service providers following the Directive 2019/790/EU[297]. Online content-sharing services providers now have to prove that they have made their best efforts "*to ensure the unavailability of specific works and other subject matter for which the right-holders have provided the service providers with the relevant and necessary information[298]*". Art. 17 also confirms the not application of a general monitoring obligation[299] but now affirms that the content shared on the platforms of providers, should be intended as an act of communication to the public, even when the content is uploaded by its users, and thus the provider should demonstrate that they have made their best efforts in obtaining an authorization by the right-holder or acted expeditiously[300] upon receiving "*a sufficiently substantiated notice from the rightholders, to disable access to, or to remove from their websites, the notified works or other subject matter, and made best efforts to prevent their future uploads in accordance with point*"[301]. Great debate has arisen from this disposition with some highlighting its almost-censorship aspect. One of the means to ensure this protection for these service providers that manage an enormous amount of data has been the introduction of technological measures like digital watermarking or automatic filtration systems[302]. Although they cannot completely fulfill the needs of service providers, they surely prove that they have taken an effort to prevent copyright infringement. Digital watermarking, on the other hand, are typically used by creators to trace copyright infringements but there are multiple technical difficulties for its implementation[303]. More effective ways to gain more control over the diffusion of one's work, other than simplifying the management of rights without the presence of an intermediator and proving authorship, are provided by the blockchain and will be later discussed. We can clearly sense a

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[297] Art. 17 Directive 790/2019

[298] Art. 17 co. 4 Directive 790/2019

[299] Art. 17 co. 8 Directive 790/2019

[300] The so-called *notice and action procedure*. Similar mechanism already implemented in the USA with the notice and takedown system.

[301] Ibidem. This provision is intended to clarify the interpretation issues identifying the circumstances of liability of service providers.

[302] Recital 13 of the InfoSoc Directive states that "*A common search for, and consistent application at European level of, technical measures to protect works and other subject-matter and to provide the necessary information on rights are essential insofar as the ultimate aim of these measures is to give effect to the principles and guarantees laid down in law*"

[303] Please refer to Sharma, R.K., Decker, S. Practical Challenges for Digital Watermarking Applications. EURASIP J. Adv. Signal Process. 2002, 542025 (2002) for a careful analysis of the trade-offs that should be considered by digital watermarking.

shift in the regulation of the liability of service providers that aggravates the minimum degree of cooperation that service providers have to prove in order to achieve the exemption of liability. This shift is influenced by the evolution of technology and by a more careful intention to safeguard the economic interests of copyright holders in these emerging scenarios[304].

2.6.3) Directive on Copyright in the Digital Single Market

The Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC is a Directive that is a part of the Digital Single Market project, and it represents the point of arrival of the evolution of copyright that we have analysed throughout the chapter. European Institutions have sensed a change in society which required an updating of the provisions of the Information Society Directive, with the aim to better adapt copyright protection tools to the new and changed scenario based on newer forms of communication and methods of dissemination of knowledge deemed unthinkable until recently. Besides economic factors with the perspective of removing the value-gap between service providers and authors, the Directive aims at encouraging the promotion of pluralism and cultural diversity, the dissemination of knowledge and safeguarding a high level of protection of copyright and related rights[305]. The so-called Copyright Directive addresses different legal profiles: the content-sharing service providers liability, rights to publications in journalism, data mining exception, preservation of cultural heritage exception, the exception for the use of protected works in educational activities, access and availability of audiovisual works on on-demand platforms, the fair remuneration of authors and performers. In the previous paragraph we have discussed the shift produced by the Directive which produced new burdens for service providers and the classification as communication to the public of acts shared on their platforms, requiring authorization by the authors. The other article that raised a lot of debate is Art. 15[306]. It recognizes copyright protection, for the duration of two years, to publishers on the online use of their press publications by information society service providers, in order to grant to authors of these publications a fairer remuneration[307]. In fact, it has been detected how users' access to online press publication has skyrocketed in the last years. The availability of online press publications has given rise to new business models

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[304] For a deeper understanding of the possibilities and issues of the new liability regime please refer to Mazziotti, G. What Is the Future of Creators' Rights in an Increasingly Platform-Dominated Economy?. IIC 51, 1027–1032 (2020) and Moscon, V. Free Circulation of Information and Online Intermediaries – Replacing One "Value Gap" with Another. IIC 51, 977–982 (2020).

[305] Zancan, M. (2019). La nuova direttiva sul diritto d'autore e sui diritti connessi nel mercato unico digitale. MediaLaws, 2, 338-345.

[306] For a deeper understanding of the debate on press publisher's rights, together with an assessment of the newly introduced mandatory exceptions and limitations and platform's liability system, please refer to Ferri, F. The dark side(s) of the EU Directive on copyright and related rights in the Digital Single Market. China-EU Law J (2020).

[307] The economic rights recognised by art. 15 Dir. 790/2019 are the rights provided for in Article 2 and Article 3(2) of Directive 2001/29/EC: namely the right of reproduction and the right of making available

(implemented by user-generated content providers and media monitoring services) that reuse publishers work, through citation or linking, without awarding authors a fair compensation[308]. The aim of this new copyright protection is to make sure that publishers can recoup their economic investments[309]. The protection is not extended to private and non-commercial uses, hypertextual links and short extracts of press publications are also excluded from said protection[310]. Object of this new copyright protection are press publications, defined by article 2 as follows " *a collection composed mainly of literary works of a journalistic nature, but which can also include other works or other subject matter, and which: (a)constitutes an individual item within a periodical or regularly updated publication under a single title, such as a newspaper or a general or special interest magazine; (b) has the purpose of providing the general public with information related to news or other topics; and (c) is published in any media under the initiative, editorial responsibility and control of a service provider*"[311]. Providers will have to abide to copyright protection provisions and award the authors of journalistic works with an appropriate share of the earnings caused by the use of their press publications. Appropriate and proportionate compensation is also the object of article 18, for what concerns the related rights of authors and performers. The Directive also establishes that Member States need to put in place a mechanism thanks to which authors and performers may claim additional remuneration when it turns out disproportionately low[312]. Blockchain technology, through the use of smart contracts, provides effective ways for a fairer and automatic compensation system and should be considered as a valid ally for this purpose, also in light of the definition of common rules in the harmonization project, thanks to its cross-border nature. As regards other provisions contained in the Directive, data mining is defined by article 2 as "*any automated analytical technique aimed at analysing text and data in digital form in order to generate information which includes but is not limited to patterns, trends and correlations*". This activity is used in research setting for scientific research purposes. The Directive in art. 3-4 establishes a new exception or limitation for data mining, when the data analysed is protected by copyright. In fact, the data mining process requires the reproduction of a copy of protected work. Although, this operation is considered marginal for the purposes of the copyright and, thus, a mandatory exception or limitation of copyright, for as long as necessary for the purposes of text and data mining[313], is established. For what concerns the use of public domain (or out-of-commerce works) by cultural heritage institutions[314], the Directive regulates the collective licenses with an extended effect that

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[308] Recital 54 Directive 790/2019
[309] Recital 54 Directive 790/2019
[310] Art.15 Directive 790/2019
[311] The interpretation of the definition of "press publications" has been the centre of debate and it is believed that it may cause interpretative issues in the future. On the matter, please refer to Czarny-Drożdżejko, E. The Subject-Matter of Press Publishers' Related Rights Under Directive 2019/790 on Copyright and Related Rights in the Digital Single Market. IIC 51, 624–641 (2020).
[312] Art. 20 of Directive 790/2019
[313] Art. 4 of Directive 790/2019
[314] The legal shortcomings and gaps of the provisions regarding the use and reproduction of public domain works, especially in reference to new technologies, and propositions aiming at guiding the implementation in Member States, in view of an

simplifies the conclusion of license agreements. Art. 6 provides for an exception to the right of reproduction to allow the preservation of works. The Directive also introduced an exception on the use of works for teaching activities using digital methods[315] and regulation on video-on-demand-services[316].

Concluding our analysis of the fundamental features of Italian copyright, following the European harmonisation process, we have evidence on how intertwined copyright protection is to the innovation brought by new technologies. In fact, the typical definitions of the author's rights protected by this discipline had to adapt to new circumstances. To keep up with the pace of innovation, and in order to discipline new emerging issues that were un-foreseeable before, both the job of the legislator and the role of the Courts have been crucial. With the same approach, in the following chapter, we will examine the opportunities that the application of blockchain technology can provide to copyright protection. One of the most complex problems originated by the widespread use of Internet, has been the research of a way to control the diffusion of intellectual works online. Given the enormous amount of users of online-sharing content services, both social media and peer-to-peer networks, file sharing can cause some problems to the right-holders of protected works. In fact, the exclusive rights accruing to authors and creators are very difficult to control online: every user can create multiple copies that may not be destined to private use or covered by the other exceptions; he can also modify the intellectual works and subsequently share them online, thus damaging authors moral and economic interests. In this situation, we have seen how an implementation of a general surveillance obligation for service providers cannot become a requirement since it would be, although useful for copyright related purposes, a burden too heavy for service providers and difficult to implement. For this reason, different legal and technological instruments have been implemented: service providers must show their best efforts in preventing copyright infringement and, for this purpose, technological measures[317] like automatic filtration or digital watermarking systems are employed. These systems have been proven to be not sufficient to control the diffusion of copyrighted works online and sometimes in contrast with the exceptions and limitations granted by the law. In the next chapter we will analyse the use of a technological instrument providing an immutable record of the uses and ownership transfers of intellectual works to ensure advanced protection and proof of provenance: the blockchain. These opportunities provided by blockchain technology can undoubtedly help contrast copyright infringement; this technological tool has also more applications providing an easier and automatic compensation system through the use of smart contracts, another technological tool that has been examined in the first chapter. Furthermore, after an overview of the different uses of blockchain for copyright

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harmonized discipline and a pro-open culture spirit, for these provisions are highlighted by Wallace, A., Euler, E. Revisiting Access to Cultural Heritage in the Public Domain: EU and International Developments. IIC 51, 823–855 (2020)

[315] Art. 5 Directive 790/2019

[316] Artt. 13 Directive 790/2019

[317] The possibility to utilize technological measures to prevent copyright infringement has been introduced in the InfoSoc Directive. Please refer to Recital 13-14, 49 and Article 6 of the Directive.

protection, we will focus on Cryptoart: an, arguably, art movement that, by using NFTs tokens and smart contracts, introduces digital scarcity, simplifies the market and diffusion of artworks, proves authentication and ownership of the works to possible collectors while being able to manage artists' economic interests without the need of an intermediary or collecting society. Overall, the entire assessment provided in this chapter of the main features of copyright protection and its evolution, together with the analysis of author's rights, has presented the emerging issues faced in our current society that will serve as a basis to understand, in the next chapter, how blockchain can be a very valid tool in granting protection and controlling infringements.

Chapter three
The use of blockchain technology in copyright protection

In this final chapter we will explore the opportunities provided by blockchain for the protection of authors' rights. Thanks to its features, blockchain infrastructure has been utilized in many different sectors: from the most famous role in digital payments thanks to cryptocurrencies, to supply-chain management, to food industry, the list of opportunities provided by blockchain is truly never-ending. In this section we will focus on one of the applications that is having a growing success: the use of blockchain in the protection of intellectual property rights. As we have seen previously, intellectual property is a broad category that includes different types of creation: patents, trademarks, designs and intellectual works. Here, we are going to concentrate on the use of blockchain for the protection of intellectual works, precisely copyright protection, focusing on its application for Crypto Art. We have seen how the global diffusion of Internet and its extensive use in our modern society has influenced, together with almost any other sector, the artists' rights regarding their creations: we have gone from the protection granted to a limited and fixed number of originals and copies to a lack of possible control over thousands of digital copies, even though the artists' rights extend to them. The possibility of creating thousands of digital copies that are no different from the original work is, in fact, available to anybody and this situation has exponentially raised the number of copyright infringements, seriously harming author's rights. We must note here that, sometimes, internet users do not perform these actions with the malicious purpose of harming authors: dealing with copyright issues has typically been a matter of insiders, people working in the field of intellectual property. It should come with no surprise that users may be unaware of the fact that they are committing an infringement, simply based on how easily technology allows them to do so. The technical possibility and ease of performing an action resulting in the exercise of an exclusive right, for example sharing a copy of an artwork of an emerging artist, may be confused with the legitimacy of the said action by the uninformed user. Furthermore, it is very difficult even for the mindful user to trace back the artist, when he is faced with a digital work. Now, to avoid overprotection and taking into account the social function of copyright as a tool for the diffusion of knowledge and incentive for innovation, some situations fall within the exceptions and limitations granted by the law. When this does not happen, though, an authorization from the artist is required. We have seen how the satisfaction of the author's economic interests is a strong incentive for the perpetuation and fostering of innovation and cultural progress. Additionally, the very nature of copyright might be another obstacle for the control over the diffusion of works online[1]. In fact, copyright is granted

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[1] Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges. Computer law & security review, 34(3), p. 552

to authors automatically at the end of the process of creation of their works. No registration, no external certifications are required in order to have one's right recognized; this provision, although important because it does not establish the compulsoriness of further actions that might require an expense in terms of price and time, has made control over digital works very hard to obtain. The problems arising from the lack of physicality of the works and the growing number of information exchanges through the Internet, were addressed by European Institutions in a harmonizing perspective, consistently with the cross-border nature of the phenomenon. In addition to adapting the definitions of typical authors' rights to new problems, there also have been introduced measures to limit and control online infringements, as we have seen. Besides the introduction of exceptions and limitations, a more burdensome regime of service providers liability, the introduction of an action of takedown[2] and the use of technological measures of protections have been established to prevent infringements. These systems, however, proved to be inadequate. In this chapter we will explore the opportunities provided by blockchain that, thanks to its features, may be a valid ally in ensuring control on the diffusion of works online and granting artists fairer remuneration. For the former purpose, the transparency, immutability, incorruptibility and disintermediation characteristics of the distributed ledger technology, will prove to be extremely useful. In addition to these features, the possibility to implement smart contracts on blockchain infrastructure will grant an easier management of rights and a more adequate compensation without the need to recur to costly intermediaries, usually retaining a conspicuous part of the artists' earnings. Before examining one of the sectors that may majorly profit from the adoption of blockchain in copyright protection, we will focus on the challenges that this technology, still in the earliest phases of its development, is facing and the proposed solutions to fix these problems. Will the implementation of this advanced technological infrastructure fix the copyright protection problems generated by the large-scale use of Internet technology?

3.1) Registration of works on the blockchain

In order to obtain the recognition of copyright on someone's works, national[3] and international laws and treaties[4] affirm that there is no compulsory obligation to fill any further requirement: no registration of the works is required. The simple exteriorization of the author's creation, and in some Countries the fixation on a physical medium, in addition to a creative elaboration, are the only requisites to obtain copyright protection. Basically, sufficient condition to be identified as the author of an intellectual work, and thus be

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[2] Anderson, S. (2018). The Missing Link Between Blockchain and Copyright: How Companies Are Using New Technology to Misinform Creators and Violate Federal Law. North Carolina Journal of Law & Technology, 19(4), p. 28

[3] Art. 6 l. 633/1941

[4] Art. 5, paragraph 2 of the Berne Convention

entitled of the exercise of exclusive rights, is the creation of the work itself[5]. This system was very intelligently designed because it provides a strong incentive for progress and innovation: not requiring any expense, in terms of cost and time, or any further burden, has stimulated artists and authors to create, with the certainty that their economic and moral interests pertaining to the work, would be recognized regardless. This simple structure managed to balance the social function and economic interests of the authors for a long time but was put into crisis by the advent of technology and digital copies, as we have addressed multiple times in this dissertation. The question thus becomes: is this system still suitable to protect authors' rights, in reference to the online diffusion of their works? It has been noted that the sharing of one's own works online implies the complete loss of control on its following uses, since anyone can download, share and modify them[6]. The authors, in fact, cannot easily acknowledge when infringements take place, and when they manage to detect them, taking legal actions against the single infringers may be very burdensome, in terms of legal fees and time spent chasing their remuneration[7]. An interesting opportunity is the one provided by the registration on the blockchain of intellectual works[8]. This tool may, in fact, be an interesting ally in preventing online infringements, whilst, obviously, not being essential for the enjoyment of copyright protection. One of the features of blockchain is transparency: anyone equipped with an internet connection can have access to all the information stored on public blockchains. As described in the first chapter, these distributed ledgers can be imagined as databases containing verified information about transactions. Once a transaction is shared on the network of nodes it is provided with a time-stamp, establishing the precise time and date in which this operation took place/it has been verified; after the verification by the network, the intellectual work is provided with a proof-of-existence, indicating the moment of creation thanks to the time-stamp. The hash is the digital string of characters created by the mathematical function and it refers to a single set of information. We have previously seen that we should intend the definition of *transaction* registered on blockchain broadly, comprising not only the record of

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[5] This feature is typical of copyright, differently from Intellectual Property rights (for example in the case of patents and trademarks) that require registration in apposite offices. In these cases, typically, the registration procedure is costly, time consuming and only limited to the specific country in which it registered; blockchain may make this process much easier, by replacing institutions and effective in more than a single country. Some have foreseen a non to distant future in which the registration process may be carried out by a collaboration between blockchain and Artificial Intelligence that would render human intervention very marginal. In fact, for example for patents, the three requirements of novelty, inventive step and susceptibility of industrial application will be identified directly by the Artificial Intelligence. Similarly the assessment of non-similarity for designs and likelihood of confusion for trademarks can be carried out by computers reducing the involvement of institutions but guaranteeing the same degree of security. Fully automated registration process is only one of the many possibilities that the technology can provide to for Intellectual property rights: establishing prior art or earlier use and thus avoiding or at least simplifying litigation, reducing the cost and expanding the protection globally are just some of the functions that blockchain will provide. The result of this ease in the procedures and, most importantly, in the lowering of transaction costs, is the advancement of the main goal of intellectual property: fostering innovation. Please refer to Gürkaynak, G., Yılmaz, İ., Yeşilaltay, B., & Bengi, B. (2018). Intellectual property law and practice in the blockchain realm. Computer law & security review, 34(4), 847-862.
[6] Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges, op.cit., p. 554
[7] Ibidem
[8] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing p.13-14

commercial operations, but also any set of data that, transformed into an hash, can be encoded on a new block and, if verified by the network of nodes, added to the blockchain[9]. If any changes to the data occur, the string of code will be completely different. In this case, the transaction will be rejected by the network of nodes and the block will not be inserted in the blockchain. Not without reason, the hash is also referred to as digital fingerprint: it identifies only a specific set of information. Hence, registering intellectual works on the blockchain implies the creation of an hash that refers to the said works only. It provides the possibility to encode in the distributed ledger the intellectual works so that any use of them, anywhere in the world, can be tracked in real time. In fact, blockchain has been designed in such a way that every transaction requires to be recorded on the ledger in order to be effective[10]. Besides public registries, based on a voluntary basis, the possibility to register one's works on a databank is being offered by a growing number of private blockchain-based companies[11], like Verisart[12] and Artory[13], recognizing the convenience for the economic coordination of users and rights-holders. The exigence arose because public and governmental held copyright registries are not present globally, since many copyright legislations do not discipline them, nor they are harmonised[14]. Registering a work on a registry[15], both blockchain-based or publicly held, although not productive of direct legal effects, ensures a higher degree of evidentiary value in potential future proceedings, thanks to the time-stamp provided by a trusted central organization, in case of traditional registries[16], or by the blockchain infrastructure. Using a mixed system of private and public registries, together with the presence of other entities managing authors' rights, like collecting societies, results in the dissemination of authors' information between many subjects[17] and does not provide the utility hoped to potential users. The communication between these numerous entities may also be problematic: they are mostly not interoperable and have no incentive to share information due to reasons of economic

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[9] Please refer to Chapter 1 "Breaking down the Blockchain technology" for further analysys of the functioning of blockchain and the role of hashes, nodes and blocks.

[10] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, Australian Intellectual Property Journal 144 p. 2

[11] Kiemle, M. Blockchain and Copyright Issues. (January 2019).4iP Council p. 2

[12] https://verisart.com/

[13] https://www.artory.com/

[14] Despite the dispositions of the Berne Convention on the prohibition of mandatory formalities, there are public and private registries, on a voluntary or semi-mandatory basis. For example, in the U.S., the registration on public registries is not required to enjoy copyright protection, but it is mandatory in the case the parties would want to promote a copyright infringement proceeding. Conversely, in Germany public registries are not mentioned nor disciplined in any law, while in Spain the registration is simply voluntary and, once done, it provides with an existence and authorship presumption (please refer to Kiemle, M. Blockchain and Copyright Issues. (January 2019).4iP Council p.1). As regards the Italian regulation, art.103 l. 633/1941 establishes a situation similar to the one in Spain: "*In the absence of proof to the contrary, registration shall be accepted as proof of the existence of the work and of its publication. The authors and producers entered in the register shall be deemed, in the absence of proof to the contrary, to be the authors and producers of the works attributed to them*". For an assessment of the evolution of the registry regulation in Italy, please refer to https://www.iusinitinere.it/levoluzione-dei-registri-delle-opere-protette-dal-diritto-dautore-14196

[15] Fisher, K. (2019). Once upon time in NFT: Blockchain, copyright, and the right of first sale doctrine. Cardozo Arts & Entertainment Law Journal, 37(3) p. 632

[16] De Filippi, P., McMullen, G., McConaghy, T., Choi, C., De La Rouviere, S., Benet, J., & Stern, D. (2018). How Blockchains Can Support, Complement, or Supplement Intellectual Property: Working Draft, Version 1.0, COALA, p. 4

[17] Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges, op.cit., p.552

convenience; this lack of transparency may pose greater uncertainty in cases of issues for the determination of the right owner or in case of licensing requests[18]. In fact, a third party interested in reaching a licensing agreement for using, for example, a song of an emerging artist in an advertising campaign for a small shop, will be met by an inefficient and confusing system, and may not be able to assess who is entitled of copyright protection. At this point, due to the amount of transaction costs required, in terms of time and price, they may refrain from the use of the song in the campaign or they may risk committing copyright infringement, simply due to the inability to identify the rightful owner. The original songwriter will suffer a damage in any case: he will not be compensated or, if the small shop owner manages to identify the songwriter, part of his compensation will be directed to the intermediary. In this situation, an international, secure, trustless, time and cost user-friendly technology[19] may provide the same services with an enhanced degree of security, in an easily accessible database to potential users, that can quickly obtain licenses and satisfy the economic interests of the authors[20]. It has been noted how blockchain technology can create a "*trustless trust*[21]" system based on its tamper-proof nature and its time-stamping feature that can provide an immutable and reliable proof of existence of the work, enforceable in the event of litigation. Particularly useful to gain more control on the uses of an intellectual work online, blockchain is a technology that can disrupt the structure of typical registries thanks to decentralization and lack of any trusted central figure or intermediary[22], minimize litigation and keep a record of all the transactions pertaining to an artist.

The possibility of implementation of blockchain-based registries inevitably raises important questions: what type of blockchain would be more desirable? And, most importantly, who should manage such extensive and fundamental registry? As regards the first question[23] we have already examined[24] the different types of blockchains: public, private and consortiums. It is not possible to *a priori* say that one type of blockchain is always superior to the other: it all depends on the specific use. On one hand, public blockchains ensure better censorship resistance and cryptographic integrity; plus, any interested person can join them. These blockchains are fully decentralized and transactions are visible to anyone: transparency is surely its strongest factor in our analysis for a copyright registry. On the other hand, for such a global copyright registry, the speed of processing of transactions is equally as important, provided the large number of transactions expected. While public blockchains lack in this aspect, private blockchain are more efficient. Private blockchains, however, are managed by a central entity and they are best used in smaller

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[18] Kiemle, M. Blockchain and Copyright Issues op.cit., p. 2
[19] As noted by Tresise, A., Goldenfein, J., & Hunter, D. in What blockchain can and can't do for copyright (p.4-5) there have been some attempts in the past in the creation of a registration system: the European Global Repertoire Database and the International Music Joint Venture. Both of these attempts, however, failed.
[20] Ibidem
[21] Werbach, K. (2018). Trust, but verify: Why the blockchain needs the law. Berkeley Tech. LJ, 33, 487, p. 63
[22] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, op cit., p. 2
[23] This question has been raised in Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, op cit., p. 5, but the authors decided not to express their preference for the most appropriate type of ledger.
[24] Please refer to Chapter 1.2) Blockchain terminology and DLT technology, infra

organizations where the information should be kept private; thus, this system may be burdensome for potential users to have access to because it might create a figure similar to an intermediary retaining a fee for the service provided. Furthermore, consortium blockchains are not controlled by a single central organization, they are more secure than private blockchains (thanks to the bigger number of nodes and customizability of access control) and they are more efficient than public blockchains. Also, the possibility of a joint control is ideal in case of collaboration between different organizations. This leads us to the second question: should the registry be managed at national, international level or by private player?[25] On International level, a WIPO controlled registry might be a viable solution, granting access to information about works to potential users, while on a domestic level, each government would have to implement its registration systems[26], on a strictly voluntary basis. In both cases the funding of such a project, without a supranational regulation requiring its mandatory implementation, might be an issue. An implementation of any of this kind has been considered unlikely and unforeseeable in the near future, unless a change in the international regulation, for example in art. 5 of the Berne Convention, happens[27]. As regards private parties, however, some projects have already emerged with the purpose of registering, tracking on the blockchain and alerting authors of when their works are being used[28], while providing potential users information on the works regardless of which is the author or potential user Country of origin, in a truly global perspective typical of our society. Furthermore, a private player might have an economic incentive that governmental organizations lack: besides managing the registry and making information available to potential users, they may also directly provide access or license the works to potential users, acting also as marketplaces. The company business models can be twofold: on one hand it will provide registration to the works, while on the other, the company in charge of the registry may take a fee for its service in case of licensing[29]. The adoption of this well-established business model[30] may be the key to achieve a blockchain-based copyright registry for those more business-centered companies. Establishing the proof-of-existence via registration and managing the license procedure might be extremely economically attractive. If we had

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[25] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, op cit., p. 5

[26] Ivi, p. 6

[27] Ibidem

[28] Projects like Verisart, Artory, Blockai, Pixsy, TinEye, Ascribe, Mediachain and Proof of Existence, which have been criticized because whilst being able to track transactions and sometimes identify copyright infringements they do not have he necessary tools to remove such violations. Authors will still have to report to the platform on which the protected works have been uploaded and, some, believe that this operation provided by these blockchain start-ups are no different than the regulatory tools provided to citizens by governments. More on this dispute at the following link https://bitcoinmagazine.com/articles/is-blockchain-powered-copyright-protection-possible-1470758430 and Anderson, S. (2018). The Missing Link Between Blockchain and Copyright: How Companies Are Using New Technology to Misinform Creators and Violate Federal Law. North Carolina Journal of Law & Technology, 19(4), p. 29

[29] Many hybrid start-ups acting as marketplaces and registries are emerging. A start up that set out the basis to implement this business model, according to Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, op cit., p.6, is Binded. It has been noted how Binded claim to "*make money by creating new opportunities*" seems to be connected to the fact that they may take a license fee in the future.

[30] This business model is based on the finder's fee, defined by Investopedia as follows: "A finder's fee or referral fee is a commission paid to the person or entity that facilitated a deal by linking up a potential customer with an opportunity" and it has been implemented by, between the others, Apple on the transactions taking place on the AppStore, Ibidem.

to imagine which existing type of private company might be interested in the management and licensing of works based on such a registry, it can be expected that collecting societies might want to be involved. In fact, these entities have already started to understand the opportunities that blockchain can provide for their business and clients, so they are starting to invest and explore the future possibilities[31]. Even though the intervention of collecting societies in blockchain may reduce the benefits of independent authors' management of their own rights, as we will see in the next paragraph, we may still expect a faster service and less expensive fees from the collective societies, due to higher competition on the market. Concluding this section, some hope may be harbored that these entities, already at the center of a large international network for the protection of copyright, may also decide to operate in a truly global perspective[32]. With the purpose of building an international copyright registry, the different entities could merge their data on a single blockchain-based platform and feature all the works present on their databases to potential users all over the world. While providing proof-of-existence, that authors may find useful when demanding the remotion of copyright infringements or in litigation, the registry may become a source of income for these private companies that could take a fee for every licensing agreement concluded on their platform. In such an operation the type of blockchain that seems more appropriate is the consortium blockchain: the presence of multiple organizations that would maintain the network, seeking similar treatment and sharing information in a collaborative environment, are all requirements that seem to point to the consortium blockchain as the most viable option. At the current time, though, it is still unforeseeable if such an operation can come to reality. For now, privately-held registries are exploring the possibilities on the market.

Moving on from the idea of building of a register comprehensive of all the information relating to intellectual works that may interest potential users, perhaps still simply utopistic given the current state and early development of the technology, we should now address the current issues encountered by privately held registries on the market, and their possible solutions. The first problem concerns the input of data on the blockchain. We have seen that any set of data can be transformed into a hash by the mathematical function: both physical paintings and exclusively digital art, for example, can be encoded in the blockchain. The verification process on the network proves provenance[33] and leaves an immutable record of the transactions, but it does not provide any evidence on the rightful ownership on the works in the "off-chain" world. In case of incorrect data input, due to human error or intentional fraud, the immutability feature of the blockchain, constitutes a major drawback in such circumstance. In fact, in the case of improper data

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[31] In Italy S.I.A.E. and Soundreef have shown interest in the matter, please refer to the following articles: https://forbes.it/2019/12/10/la-blockchain-nel-futuro-anche-della-siae/ ; https://www.soundreef.com/blog/tutela-musica-blockchain/

[32] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing p.18

[33] Whitaker, Amy. Art and Blockchain A Primer, History, and Taxonomy of Blockchain Use Cases in the Arts Artivate: a Journal of Entrepreneurship in the Arts vol. 8, no. 2, summer 2019 New York University p. 32-33

input, blockchain would permanently register an inaccurate representation of copyright on the work. Erroneous data input may take place both at the time of the first registration, by wrongfully attributing authorship of an intellectual work, or by not updating the chain with further ownership transactions. Furthermore, a Court's ruling may establish a change of ownership on an intellectual work and thus rendering the information stored on the blockchain not conforming to reality. The relationship between blockchain encoded and "off-chain" transactions may, thus, be problematic: how can blockchain remain up to date at all times when transactions on the same copyrighted works may also occur in real life, and thus are not automatically registered[34]? For example, the sale of a physical painting encoded in the blockchain may also take place in a physical art gallery, and the parties may deliberately decide not to register this transaction. In this case, a third user deploying blockchain to track the rightsholder of said painting, will be faced with an ownership record that does not reflect reality[35]. Since blockchains are unable to autonomously respond to off-chain transactions, this situation brings us to the "all-or-nothing" approach: right-holders should decide to either conclude all the agreements in the real world or on the blockchain, to ensure accuracy of data[36]. Off-chain uses, following a transaction registered on the blockchain, might result in copyright infringements when no record of these further transactions is left on the blockchain, or no control over authorship is implemented at the moment of registration[37]. Due to the immutability of the transactions stored on the blockchain, should a preventive control be required by the private companies managing these registries? These platforms, aware of the possibility of faulty data input, often set their Terms and Conditions in such a way to limit their liability on the content posted by their users[38]. This aspect has been deeply criticized in more than one occasion. Verisart, for example, a company registering artworks on the blockchain, proving their provenance and tracking their further uses[39], has released a certificate proving Terence Eden as the author of…the *Mona Lisa*![40] He documented this gesture in his blog, expressing his doubts on the blockchain hype[41]. Especially in physical art, proving provenance of an artwork is strictly connected to the economic sphere of the transaction: only a professional and verifiable source, like an art

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[34] Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges, op. cit. p. 557

[35] Whitaker, Amy. Art and Blockchain A Primer, History, and Taxonomy of Blockchain Use Cases in the Arts Artivate: a Journal of Entrepreneurship in the Arts vol. 8, no. 2, summer 2019 New York University p. 40

[36] Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 3

[37] Due to an initial inaccurate data input or subsequent unrecorded ownership transactions, author's economic and moral rights can be damaged because third parties may have acquired rights by people that are not the legal right-holders anymore.

[38] Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 3

[39] Please refer to https://verisart.com/about#about-us

[40] Whitaker, Amy. Art and Blockchain A Primer, History, and Taxonomy of Blockchain Use Cases in the Arts Artivate: a Journal of Entrepreneurship in the Arts vol. 8, no. 2, summer 2019 New York University p. 34

[41] He questioned the fact that the owner of an artwork registered on the blockchain may sell a fake copy of it whilst maintain the original in his vault, since a digital certificate cannot be attached to a physical work. Furthermore, he deemed Verisart requirements for the registration of an artwork not appropriate to a platform creating immutable records: a simple email address and a picture of the work were sufficient. Please refer to his blog post at the following link: https://shkspr.mobi/blog/2018/06/how-i-became-leonardo-da-vinci-on-the-blockchain/.

gallery or organization, can establish the authenticity and provenance of an artwork[42]. The attribution to a specific artist justifies the price agreed for the transaction, consistent with the artist's market value. Attribution for art collectors is, therefore, fundamental and it is connected to the reputation of the professionals recognizing the provenance of an artwork in the physical world. Contrary to Verisart, another platform, Artory, combines the blockchain-based registration with the knowledge of art professionals, providing at the same time immutable ownership records and authenticity of the works. The purpose of the company is to secure records providing proof of ownership on the blockchain, and it offers the possibility to collectors to request that trusted partners of the platform authenticate their works. Registering an artwork on Artory provides, in fact, a further layer of security: when an artwork is verified, it is provided with a digital signature by vetted art institutions. For this reason, the platform distinguishes between verified and not-verified artworks. Furthermore, Artory is also a completely anonymous service and this discretion is immensely appreciated by collectors. These features helped Artory in securing very important collaborations: for example the one with Christie's, for the first registration on blockchain of an auction sale that was worth $323 million[43]. Blockchain registries alone, on the other hand, can only provide proof-of-existence via time-stamping and ensure the tracking and immutability of the transactions records but, as we have seen, they do not provide a guarantee of the reliability and trustworthiness of the information stored and they do not make reference to "off-chain" originated transactions[44]. Two solutions are contemplated to avoid cases of ownership conflict, in cases in which both "off-chain" and "on-chain" transactions took place[45]. The first solution requires the presence of a governmental authority, on a permissioned blockchain, that will be provided with the opportunity to rectify the content of the blockchain to make sure it reflects the current situation. In the case of a Court judgement attributing the ownership of a work to a different subject, for example, the role of this central administrator will be to modify the blockchain accordingly to the judicial decision. The introduction of this figure will compress some of the most successful features of the blockchain like censorship-resistance and decentralization. The second proposed solution is the enforcement, carried out by authorities, of the obligation to implement changes in the blockchain by specific users. The problem with this solution is that these users should be identified, and in permissionless blockchain it is not an easy operation, due to anonymity. Furthermore, it requires the employment of outdated enforcement tools, particularly improficient in cross-border operations. Both of these solutions

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[42] Anderson, S. (2018). The Missing Link Between Blockchain and Copyright: How Companies Are Using New Technology to Misinform Creators and Violate Federal Law. North Carolina Journal of Law & Technology, 19(4), p. 30

[43] Source: https://www.ledgerinsights.com/christies-registers-323-million-art-sale-on-blockchain/

[44] These are the main elements of a very thorough response, examining the most controversial sentences of Eden's blog post and mostly regarding the actual functioning of the art market based on trustworthy provenance and reputation of the art professionals, provided by an insider and blockchain expert Roy Huang. Please refer to his article "*Why a Random Mona Lisa Provenance will not matter on blockchain*" available at the following link https://medium.com/hry-publication/why-a-random-mona-lisa-provenance-will-not-matter-on-blockchain-efabb665703b

[45] Both Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges, op.cit., p.557 and Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 3 reach similar conclusions.

have major drawbacks and may not be sufficient in fixing conflict between blockchain-based and off-chain transactions. A third option is providing the power of administration and validation of authorship and ownership to multiple cultural entities and experts: museums, universities and research institutions would all have a similar role on the attribution of authorship of the works. Even this solution has its flaws because it raises questions on who is going to choose which entities will be granted the status of verified users with these enhanced powers, whether the presence of these authorities will damage the openness of the blockchain and the fact that they will not be able to prove authorship of the works of emerging artists[46].

In conclusion, besides the challenges that emerge when dealing with a technology in its early stage of development, we have presented an overview of the opportunities provided by blockchain-based copyright registries. Private companies and start-ups will likely continue to invest in this field with the creation of registries made interoperable thanks to the blockchain. In fact, if the number of users starts to grow, it will positively impact the attractiveness of the blockchain, by creating a network effect[47]. These registries are providing the possibility to drastically reduce online copyright infringements and, thanks to the tracking of transactions, finally provide an effective way to control the diffusion of works online. Furthermore, in the following section of the chapter we will focus on the satisfaction of economic interests for artists and authors that register their works on the blockchain. For what concerns the challenges presented, we should keep in mind that further developments are expected in the future[48] and the sooner governments will start to get involved in the regulation of this technological tool, the sooner legal certainty will be acquired[49].

3.2) Rights management on the blockchain

The diffusion of digital copies and the great amount of content available online, subject to the rules of many different jurisdictions, has created problems for authors for the recovering of license fees and led to the Digital Rights Management (DRM) system for protection[50]. DRM systems are proprietary technological measures that restrict the access, duplication and distribution of digital works only to authorized users. Designed to protect copyrighted material they have revealed to be quite controversial: they are expensive,

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[46] Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 4

[47] The network effect implies that a system is highly dependent on the number of its users. The value of a product depends on the number of its users: an example is telephone network. Similarly, the more works will be registered on the blockchain, the more valuable they will become. Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges, op.cit., p.558

[48] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing p. 19-20

[49] Fisher, K. (2019). Once upon time in NFT: Blockchain, copyright, and the right of first sale doctrine. Cardozo Arts & Entertainment Law Journal, 37(3) p. 631

[50] DRM systems are described as "*software and hardware that defines, protects and manages rules for accessing and using digital content (text, sounds, videos, etc.)*" by Finck, M., & Moscon, V. (2019). Copyright Law on blockchains: Between new forms of rights administration and digital rights management 2.0. IIC-International Review of Intellectual Property and Competition Law, 50(1), p. 79.

require a lot of development time, have been previously hacked and might also conflict with the exceptions and limitations granted by the law[51]. Consequently, DRM systems often fail in their purpose and they are extremely vulnerable to external hacking[52]. The most viable option for remuneration seems the conclusion of an agreement between the parties, a process that is typically carried out by intermediaries, but such operation is not time efficient and requires high transaction costs on both parties[53]. In these circumstances, blockchain can be a valid alternative to these systems dealing with permissions and remuneration to authors instead of access and control of permissions[54]. It can simplify transactions and, through smart contracts, regulate the further possible uses of an intellectual work[55], avoiding the proprietary characteristics typical of DRM and also increase security against hackers. Easier licensing on blockchain platforms is considered to be the revolution on copyright protection brought by the technology[56]. Furthermore, platforms sharing user-generated content, for example Youtube and Spotify, have been criticized because of the value-gap that their terms of conditions create. In fact, most of the revenues, typically earned by advertising, goes to the platform owners and not to the authors sharing the work. This situation has been noted by European legislators that have implemented provisions in the most recent Copyright Directive aimed at a fairer remuneration of authors[57]. As we have previously mentioned, one of the means to overcome the typical licensing drawbacks and enforce copyright law in a more balanced manner can be the implementation of blockchain and the use of smart contracts. We have seen in the first chapter that smart contracts are computer programs that are able to self-execute the provisions of an agreement between the parties. The use of smart contracts on DLT technologies makes them particularly appealing: the execution of the terms, once the conditions are met, is automated and guaranteed and the presence of an intermediary is not required; furthermore, thanks to the distributed and tamper-proof nature of blockchain, the security of a

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[51] Basically, DRM provides a mixture of technological protection measures and right management information to allow private parties to gain some control on the digital copies, sometimes to the detriment of the public objectives of copyright, breaching the exceptions and limitations provided by the law. For example, if a technological measure of protection has been implemented on a CD-Rom which prevents any user to create their copy, the exception for the reproduction destined to private use cannot be ensured. The various DRM systems can therefore expand excessively the control over the works, limiting users' experience. For a better understanding on how blockchain can be implemented in improving issues generated by DRM systems, please refer to Finck, M., & Moscon, V, Copyright Law on blockchains: Between new forms of rights administration and digital rights management 2.0., op.cit., p. 79-89 and Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, op cit., p. 7-8.

[52] Efroni, Z. (2011). Access-right: the future of digital copyright law. Oxford University Press, USA, p. 198

[53] The implementation of creative commons licenses has been proposed as one of the methods to help remove transaction costs and simplify the licensing process. The problem is that this type of license agreements is designed to facilitate the sharing of copyrighted works (it is mostly used for the distribution of software) and it is meant to be royalty- free; thus, the economical satisfaction of authors cannot be granted. Savelyev, A. (2018). Copyright in the blockchain era: Promises and challenges, op.cit., p. 553.

[54] Kiemle, M. Blockchain and Copyright Issues, op. cit., p.6

[55] For example, blockchain platforms could provide unlimited use of a digital work to a user while ensuring that the material cannot be copied. The rights and permission granted with the license would be encrypted in the smart contract. Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, op cit., p.7

[56] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright, op cit., p. 8

[57] Art. 18 Directive 790/2019 that states a "*Principle of appropriate and proportionate remuneration*"

transaction is ensured even when the parties do not trust each other[58] and can remain anonymous. As a result of the application of smart contracts, contractual terms are immediately and automatically executed, lowering transaction costs; the parties can rely on the trust provided by the underlying technology and the risk of interpretative uncertainty is reduced[59]. We can now see how this efficiency can be implemented in copyright centered transactions. Thanks to the tracking of digital assets provided by the registries, potential users will be able to identify the rightsholder and seek authorization for the use of intellectual works easily, while authors would gain more control over their works. The simplification of this process, together with the user-friendly accessibility to information on the registries, may help decrease the number of copyright violations. Furthermore, blockchain provides the opportunity for authors to autonomously license their works directly to interested users[60]. Smart contracts also allow, in exchange of the license, automated micropayments[61], thanks to which authors can choose to be remunerated even for each single use of their works, included transient and temporary uses[62]. Smart contracts also allow a high degree of billing granularity[63] so that the provisions of the agreement can be set in order to facilitate the management of works made in collaboration: for example, a smart contract might automatically remunerate all the copyright owners based on their percentage of copyright ownership, each time the work is object of a new transaction[64]. The opportunity of easier licensing together with automated micropayments[65] is one of the most disrupting opportunities introduced by the blockchain that has the potentiality to change the present copyright system. Start-ups like Ujo Music[66], Ascribe[67], Bittunes[68] and Mycelia[69] use smart contracts to facilitate the sale of music in digital files, offering a solution for the unauthorized access to their songs and instant remuneration to artists, in a "fair trade[70]" in music approach.

Current licensing systems, on the other hand, are based on the role of intermediaries: the process of licensing or the monitoring and enforcement of one's rights cannot be carried out by the individual efficiently[71]. The intermediaries and collecting societies retain a fee from the remuneration of the authors for their services.

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[58] Finck, M., & Moscon, V. (2019). Copyright Law on blockchains: Between new forms of rights administration and digital rights management 2.0, op. cit., p. 92
[59] Ivi, p. 93
[60] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright p. 9
[61] Micropayments, combined with crypto currencies, allow the payment of very small sums, in the order of fractions of cents. Finck, M., & Moscon, V. (2019). Copyright Law on blockchains: Between new forms of rights administration and digital rights management 2.0, op. cit., p. 95 and Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 6
[62] Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 6
[63] Ibidem
[64] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright p. 9
[65] Micropayments, combined with crypto currencies, allow the payment of very small sums, in the order of fractions of cents. Finck, M., & Moscon, V. (2019). Copyright Law on blockchains: Between new forms of rights administration and digital rights management 2.0, op. cit., p. 95 and Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 6
[66] https://ujomusic.com
[67] https://www.ascribe.io/
[68] http://www.bittunes.com/
[69] http://myceliaformusic.org/
[70] As it has been defined by https://medium.com/@peterkaminski/mycelia-fair-trade-music-distribution-98285eb2c136
[71] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright p. 10

In fact, these companies' duties are manifold: they contract with the interest parties, maintain a register with the commercial operations performed and, while keeping a record of the payments, they collect the royalties on behalf of the authors[72]. Even though collecting societies have been criticized for lack of transparency, delays in letting authors access their remuneration, abuse of their dominant position and overall inefficiency, nonetheless they have still been the elected choice of authors for the management of their rights. Notwithstanding these issues, collecting societies still had better resource than the individual for what concerns the enforcement of the rights and authors had the opportunity to commission these operations to an external entity so that they could concentrate on the creation of new works. The payment of the fee and minor inefficiencies were the "*price*" that had to be paid to enjoy economical satisfaction. Collective management organizations have been proved to abuse their monopolistic position[73]. In fact, due to high entry barriers and high costs of production, together with the recognition of management powers only to a single entity (before the European Barnier Directive), collecting societies have been the only alternative for a long time both for right-holders, only having access to a single infrastructure for the management of their rights, and for potential users, subject to the price set by these entities for the licenses on the works present on their repertoires. Their problematic behavior includes discriminatory income distribution, the refusal of registration and access to the works of foreign artists and excessive charging for their services[74]. In order to try and contain this phenomenon, there have been multiple judicial decisions and regulation incentivizing competition in the sector[75]. Concerns regarding an appropriate remuneration have been expressed recently in the 790/2019 Directive[76]. Once again, the music industry can be used as an example. Without collecting societies, musicians would have to singularly negotiate with every single interested user. Therefore, the implementation of blockchain can be a viable of alternative. It can provide transparency and the possibility of direct involvement for the individual in the fixation of licensing conditions and management of his rights that, thanks to self-executing smart contracts, can be more practical. The role of intermediaries and collecting societies may become obsolete and the transaction costs caused by their fees could now be lowered. Moreover, authors could access their remuneration instantly, without any delays in the access of their compensation. Although individual negotiation on blockchain

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[72] Ivi, p. 9

[73] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright p. 11-12.

[74] Ibidem

[75] The exigency for the harmonization of the procedures and entities involved in the collective management of copyright has been the object of the Barnier Directive (Directive 2014/26/EU). The Directive grants more efficiency and transparency in the operations and introduced greater liberalization, fostering competition between the collecting societies established in the Member States. It provided the freedom of choice for users, that now can let any collecting society present in the territory of the Community manage their rights "*irrespective of the Member State of nationality, residence or establishment of either the collective management organization or the rightholder*". This last provision has not been implemented in Italy with dlgs. 35/2017, that still grants exclusivity to S.I.A.E. to a degree. Please refer to https://www.nctm.it/news/articoli/italy-implements-the-barnier-directive-the-long-and-rough-journey-towards-the-opening-of-the-market-for-copyright-collection-societies

[76] Art. 18 790/2019 : "*Member States shall ensure that where authors and performers license or transfer their exclusive rights for the exploitation of their works or other subject matter, they are entitled to receive appropriate and proportionate remuneration*".

seems a reasonable option, collecting societies may retain a role on blockchain-based systems as well. In fact, they have started to invest in the building of their own blockchain-based registries through which they can offer the same services to individuals that are not interested in understanding how to manage their rights on the platform. In order to be competitive in this sector, collecting societies will have to offer better services and lower fees: blockchain can be used to acquire both.

One of the sectors in which this system is already taking place is the music industry, as we have just seen. In this sector, in fact, licensing the same song to multiple interested parties does not interfere with the value of the work; if anything, the more a song is legally copied, downloaded and shared, the more royalties will be earned by the author. Contrarily, for what concerns the management of artworks and manuscripts, it has been provided a different system: the resale right or *droit de suite*. This atypical and exclusive right is not disciplined in every jurisdiction[77]; its main features in the Italian discipline have been previously analysed[78]. It retains features of both exclusive and moral rights and its main purpose regards the economic satisfaction of figurative artists and authors of manuscripts. The type of works created, differently than those of musicians, for example, cannot be mass produced and distributed and artists' economic satisfaction can only be based on the sale of the originals or the limited-edition pieces. Furthermore, since the artworks tend to increase in value over time, after the first professional sale, it has been envisaged a particular remuneration system. Artists are guaranteed the payment of a percentage on the sale price of their works. Collecting and later distributing the payment is a prerogative of S.I.A.E., the Italian collecting society invested of this duty. As we have seen in this paragraph, the role of intermediaries could be reduced thanks to the adoption of the blockchain. The intellectual works could be added to the blockchain using the hashing function while a seal with a QR code is attached to the physical work[79]. Moreover, the underlying provisions of smart contracts could be set in such a way that for every sale of the work, artists can automatically enjoy the payment of a percentage[80]. Smart contracts can, thusly, embed a payment to the artist for each transaction involving the artwork[81]. Instead of relying on fixed percentages regulated by the law[82], artists will be able to decide the percentage that they can collect after every resale, due to their contractual freedom, and they will be keeping track of the uses of their artworks thanks to the blockchain. The fact that artists themselves are able to register the artwork on the blockchain, also reduces the time and money spent on the

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[77] Although harmonized in Europe with the Directive 2001/84/EC, it is not recognized by the United States, for example. In Italy it is disciplined by articles 144-155 l. 633/1941
[78] Please refer to 2.5.1) Economic rights
[79] When a CryptoSeal is applied to a work of art, the physical-digital link it creates allows artists to follow their work throughout his life, as well as proof of its origin. One of the ways of implementing it is by applying an adhesive attached to the back of the work, representing a QR code linking the physical work to the registered blockchain records. It is an effective method to link a physical work with its digital records. Please refer to https://medium.com/blockchain-art-collective/artist-resale-rights-are-improving-heres-why-the-blockchain-is-behind-it-cfbae7b30626
[80] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing pp. 11-12
[81] Ibidem
[82] Art 150 l. 633/1941

verification of attribution because the technology proves the provenance of the works[83]. Blockchain technology also makes the sale of stolen, and registered, works extremely problematic as the missing link would be evident after a simple inspection of the records. Furthermore, the removal of the seal would be a sufficient clue for further investigation[84]. As we have seen, the only concern may regard the false data input at the moment of the registration on the blockchain by a fraudulent user. In these cases, the knowledge of professionals in the art market would still be crucial: their role would revolve around the certification of authenticity of the work and around the detection of forgery of the registered work. Even though bad actors will always exist, their behavior could be more easily detected thanks to the blockchain. In conclusion, blockchain allows greater contractual freedom for artists for pursuing their economic interests. The resale right management may not be an exclusive prerogative of collecting society[85]. By allowing users to control the successive distribution of their works and gain compensation for each use, the purpose of reducing the number of copyright violations and provide fairer remuneration can effectively be reached by blockchain technology. The possibility of providing authorization to the use of one's work easily on a user-friendly blockchain platform and the potential remuneration extended to transactions following the first one, can create a convenient alternative to previously operating mechanisms.

There are some challenges that this potentially disruptive system for remuneration and copyright protection is facing[86]. Users would have to individually contract with artists on the blockchain-based platforms, instead of continuing to use aggregating competitors, like streaming services. In order to do so, blockchain would have to process an enormous number of transactions[87]. While examining the limits of blockchain[88], in the first chapter, we have pointed out how the speed of processing transactions, due to PoW verification systems, is one of the biggest drawbacks of the technology. We have seen how more efficient verification systems, like PoS, that require less computational power, are being introduced but the further development of the technology is crucial if we seek to implement blockchain in the mainstream use. At the present state of technology, such global implementation remains still utopistic[89]. Furthermore, more doubts regard the means of payment required for the enjoyment of the works[90]. The mandatory use of cryptocurrencies may be the other big drawback that could prevent the success of such services. The other problems that these license agreements may face are linked to the nature of smart contracts: immutability of the records in the

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[83] Please refer to Fisher, K. (2019). Once upon time in nft: Blockchain, copyright, and the right of first sale doctrine. Cardozo Arts & Entertainment Law Journal, 37(3) p. 632 and https://medium.com/blockchain-art-collective/artist-resale-rights-are-improving-heres-why-the-blockchain-is-behind-it-cfbae7b30626
[84] Ibidem
[85] S.I.A.E is currently recognized by the Italian Copyright Law as the only entity with the management of the operations concerning the resale right. Art. 154 l.633/1941
[86] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright p. 9
[87] Ibidem
[88] Please refer to 1.4.1) Limits of the blockchain, infra
[89] Kiemle, M. Blockchain and Copyright Issues, op. cit., p. 7
[90] Tresise, A., Goldenfein, J., & Hunter, D. (2018). What blockchain can and can't do for copyright p. 9

case following the declaration of nullity of the contract, the detection of illegal object or outcome or supervening impossibility, that we have examined when referring to the features and problems of smart contracts[91]. These new systems have the chance to completely disrupt the current copyright licensing system, although, further technical evolution is necessary.

Lastly, we are going to conclude the assessment of the benefits that blockchain can provide with orphan works[92]. Orphan works are the object of Directive 2012/28/EU[93] and they are copyright protected works whose authors is not known or is uncontactable[94]. Although there is not a general definition, the Directive's discipline extends to different types of works: printed works, cinematographic works and phonograms "*contained in the collections of publicly accessible libraries, educational establishments or museums as well as in the collections of archives or of film or audio heritage institutions[95]*". Before considering a work as "orphan" a diligent search, by the consultation of appropriate sources[96], must be implemented in order to identify the rightsholder. Some institutions[97] are granted an exception or limitation to the right of reproduction or making available to the public by "*digitisation, making available, indexing, cataloguing, preservation or restoration[98]*" and for the purpose to ensure the diffusion and access to knowledge, typical of the social function of copyright. In case of the status of orphan comes to an end, a fair remuneration should be granted to the newly-found author[99]. It has been proposed a system to solve the problems regarding orphan works, composed by three components and that uses a blockchain-based registry system[100]. Firstly[101], in order to facilitate the costly operations of a diligent search, the use of artificial intelligence for the search of the rightsholder is proposed. Secondly[102], it has been envisaged a blockchain-based registry recording all the searches for a work's owner. By showing evidence, through the records on the blockchain, a potential user is able to prove that attempts have been made in diligently searching for the author of the work. The third component[103] is a legal mechanism that deems a work as "orphan" after concluding that the search executed can be regarded as diligent. Not only this system would assure that the behavior of a potential user is legal, by providing evidentiary rule in a potential proceeding for copyright infringement, but it will create a structure that is able to issue the status of orphan after analysing a relevant

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[91] Please refer to 1.2.1.2) Smart contracts problems, infra

[92] Goldenfein, J., & Hunter, D. (2017). Blockchains, orphan works, and the public domain. Columbia Journal of Law & the Arts, 41(1), pp. 1-44.

[93] Implemented in Italy with dlgs. 163/2014

[94] Art. 2 Directive 2012/28/EU

[95] Art. 1 Directive 2012/28/EU

[96] Art. 3 Directive 2012/28/EU

[97] Art. 1 Directive 2012/28/EU: "*publicly accessible libraries, educational establishments and museums, as well as by archives, film or audio heritage institutions and public-service broadcasting organisations, established in the Member States*"

[98] Art. 6 Directive 2012/28/EU

[99] Art. 6 Directive 2012/28/EU

[100] Goldenfein, J., & Hunter, D. (2017). Blockchains, orphan works, and the public domain, op.cit. pp. 1-44

[101] Ivi, pp. 17-22

[102] Ivi, pp. 22-25

[103] Ivi, pp. 25-31

number of searches on the same work. The underlying aim of this system, and accordingly to European legislative provisions, is to not prevent the use of orphan works simply because the process of diligent search, that needs to be carried out, is typically extremely time-consuming and expensive. By proving that a diligent search has been performed through a secure and immutable system, potential users could use orphan works without fearing legal actions against them in case of the end of the status of orphan[104]. Blockchain, once again, provides new opportunities, unforeseeable in typical registries, that have the opportunity to solve real-life problems.

We may conclude that blockchain-based approaches seem to be the perfect solutions for modern copyright problems: they provide security and transparency on the transactions, allow the tracking of the uses of intellectual works consenting fairer remuneration to authors, they cut-out the intermediary consenting to the author to single-handedly manage his rights and operate on a global scale, regardless of the difference in the jurisdiction. We have seen the potential applications that blockchain can implement for copyright protection, but we should not forget the challenges that this technology will face in the following years. The fact that it is still at its early development stages, once again, gives hope that currently unforeseeable solutions will be implemented or that solutions providing involvement of authorities or differentiated users with the greater powers on the platforms, will enforce more control and ensure greater data accuracy. New technical and legal architectures need to be implemented to make sure that blockchain can reach its full potential in copyright protection. We have mentioned throughout this dissertation some issues emerged in recent times, due to digitalization, and applications of blockchain in the art world. In the next section we are going to focus on one recent phenomenon taking place in the digital art sector[105], attracting more and more attention thanks to the introduction of online scarcity of the works and investments perspectives: the CryptoArt.

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[104] Ivi, pp. 41-44

[105] Sidorova, E. (2019, September). The Cyber Turn of the Contemporary Art Market. In Arts (Vol. 8, No. 3, p. 84). Multidisciplinary Digital Publishing Institute. P. 90

3.3) The CryptoArt phenomenon

In the physical world, a transaction typically concerns the exchange of a physical object for a payment. The traditional art market operates accordingly: by buying a painting, the buyer acquires ownership and possession of the physical object. Selling the original work, requires the transfer of that unique piece to the buyer, resulting in the impossibility of access to the work by a third party if the rightsholder does not allow it. In digital art, there is a different situation. After the sale, there are still digital copies in circulation accessible to anyone interested. Due to easy reproduction processes provided by technology, it is possible to anyone to have access to a digital copy of the original digital work. The value of an artwork depends on its attribution to the original artist and the reputation that this latter has. The digital art, moreover, exasperates this phenomenon because there is no recognizable difference in the external appearance of the artwork and its copy: they are both high-definition JPEGs files. For these reasons, the art market has originally suffered from the dematerialization provided by technology[106]. Blockchain, together with the multiple opportunities that the technology can provide in the fight against online copyright infringements and fairer remuneration to authors, as we have seen in this chapter, can also revolutionize the digital art sector[107]. It creates an alternative to advertising-based systems for the remuneration of artists. It is now possible for the artist to obtain remuneration from the buyer directly in their digital wallet and for every use of their works thanks to micropayments[108]. In fact, digital artworks were usually thought to have really limited economic value due to their easy reproducibility. In many cases, and unless some technological measures of protection are applied to prevent the reproduction, users instead of buying art from their authors would simply create a copy, committing a copyright violation, confident in the fact that it will remain unpunished. Blockchain technology, on the other hand, allows more control on the diffusion of the work. Other than the proof-of-provenance and easier remuneration system, blockchain can introduce scarcity thanks to the use of NFT tokens[109]: only one person will be recognized as the owner of the work. Blockchain, therefore, provides a more up-to-pace approach: whilst the works will still be accessible to everyone, the proof of ownership on the works will be ensured by a NFT token[110]. This new system, together with recurring themes in the artworks regarding the imaginaries and techniques has created a new phenomenon, that some see as a new art movement, the Crypto art, whose features will be analysed in this section.

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[106] Ivi, p. 85
[107] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing p. 6
[108] Ibidem
[109] Ivi, p. 8-9
[110] Fisher, K. (2019). Once upon time in NFT: Blockchain, copyright, and the right of first sale doctrine. Cardozo Arts & Entertainment Law Journal, 37(3) pp. 630-631

In the latest Art Market survey[111], the value of online sales of artworks amounted to $5.9 billion, roughly 9% of the global art market by value, the second highest level of the last 10 years. Part of these sales was made online through blockchain technology[112], which shows the opportunity that these operations have to increase their market share. Besides the proof-of-provenance, immutable records and easier remuneration systems granted by the blockchain, there is an even more recent feature that can be implemented: scarcity. Since 1936[113], and especially after the advent of Internet, some doubts were raised on the value of artworks after the implementation of procedures that could allow the identical reproduction of the original works. With reproduction systems, the singularity of the works, their *aura of uniqueness* strictly connected to their economic value, ceases to exist[114]: the fact that they can be reproduced in multiples takes away their sacrality. Due to the digitalization this problem has amplified: the cost and the time spent for the act of reproduction has been drastically reduced while the audience potentially reached has multiplied. Technology made the creation of digital copies extremely efficient. Furthermore, the copies of digital works are identical to the original and the number of copies can potentially be infinite. Every single user can create multiple digital copies of a work, at the expense of the artists' economic rights. As the process of unauthorized reproduction of the works kept taking place, until recently there were no available methods to grant the scarcity of the works. Introducing non-fungible tokens has finally provided this opportunity: thanks to the scarcity we can now assess the uniqueness of the piece connected to the NFT token, which allows the market to attribute value to artworks even when they are exclusively in a digital format. We have already encountered NFT tokens[115] when analysing the structure and function of blockchain technology. Non-fungible tokens (or NFTs) are a type of tokens operating on the blockchain that represents a unique asset. They are not interchangeable, which means they cannot be exchanged with other tokens of the same type: the asset they represent is unique and is not fungible. An example of fungible assets are currencies and cryptocurrencies: one Bitcoin or one Euro have the same qualities of any other Bitcoin or Euro, so exchanging my coin for another of the same value would provide me with the same opportunities. The same line of reasoning cannot be applied to NFT tokens: the asset they represent is unique. The protocol used in NFTs Tokens are ERC-721 and, more recently, ERC-1155. Thanks to the fact that they can refer to a unique asset, NFTs Tokens have been implemented to represent artworks. Thanks to NFTs Tokens, we can prove authenticity and ownership[116] of an asset and create digital scarcity[117]. This type of token can also be used as a digital certificate of provenance: the interested party can browse through the records of previous

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[111] Downloadable from https://theartmarket.foleon.com/2020/artbasel/a-2020-mid-year-survey/

[112] Please refer to https://medium.com/paradigm-fund/blockchain-creativity-and-arts-intertwine-d3c42739312f

[113] When the essay of Walter Benjamin "The Work of Art in the Age of Mechanical Reproduction" was published.

[114] Fernandez M.P, Gustafsson Stina, Lakoubay F. (2019) There is no Such Thing as Blockchain Art - A report on the current status of the intersection of Blockchain p. 21

[115] Please refer to 1.2.2.2) Fungible and non-fungible tokens

[116] Fisher, K. (2019). Once upon time in nft: Blockchain, copyright, and the right of first sale doctrine. Cardozo Arts & Entertainment Law Journal, 37(3) p. 631

[117] https://101blockchains.com/non-fungible-tokens-nft/

transactions and trust the information shown due to the security granted by the blockchain technology[118]. Basically, NFTs have restored the *aura* that only original works had, and provided secure provenance information, not needing an intermediary[119] to attest and certify it: NFTs finally allow the trade of digital goods with the same characteristics as if they were physical goods[120]. Typically, artists publish their work on one of the online marketplaces, that will be examined below, and auction them for a specific price, using cryptocurrencies. By publishing their work, artists create (the correct term is "mint") an NFT token with the information on the author, price and time-stamp proving the provenance associated to that artwork. This operation creates a transaction on the blockchain that is cryptographically signed by the artist to prove authorship and authenticity[121]. When two parties agree on the conditions for the sale of a digital artwork, the NFT token is transferred from the digital wallet of the artist to the digital wallet of the buyer[122]. A second transaction is registered on the blockchain and, as such, it retains all the typical qualities of blockchain transactions like security and transparency[123]. As we have seen, the artist is granted remuneration for every resale of his work and the platforms usually take a very inexpensive commission (called "gas") for minting a token or concluding a transaction[124]. This system has been thought to have the potential to completely reshape the business models of creative industries[125]. At the end of the transaction, since the object is a digital asset, third parties could still have access to the work. Currently, some artists and marketplaces allow unlockable content[126] which means that the buyer will be able to download high-definition versions of the artwork only after the conclusion of the sale. Typically, though, artworks can be copied and shared by third parties thanks to the common "copy and paste" or "screen capture" procedures. These third parties have also the possibility to resell the digital copy without remunerating the artist. So why would anyone want to buy CryptoArt? The NFT token attached to the artwork is the answer. It grants the authenticity of the work, it provides scarcity and attributes value to the digital asset serving as a certificate. The digital copies lack these features and, thusly, even though their physical appearance might be identical, they lack economic value. An example in the traditional art world would make it clearer:

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[118] Fernandez M.P, Gustafsson Stina, Lakoubay F. (2019) There is no Such Thing as Blockchain Art - A report on the current status of the intersection of Blockchain p. 21

[119] Anderson, S. (2018). The Missing Link Between Blockchain and Copyright: How Companies Are Using New Technology to Misinform Creators and Violate Federal Law. North Carolina Journal of Law & Technology, 19(4), p. 30

[120] Please refer to https://www.artnome.com/news/2018/1/14/what-is-cryptoart

[121] Whitaker, Amy. Art and Blockchain A Primer, History, and Taxonomy of Blockchain Use Cases in the Arts Artivate: a Journal of Entrepreneurship in the Arts vol. 8, no. 2, summer 2019 New York University p. 33

[122] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view p. 3; 6-8.

[123] Ibidem

[124] For further, and more technical information on the functioning of NFTs tokens, please refer to https://medium.com/@hex6c/cos%C3%A8-la-crytoart-bcef4f75f6f6 and https://medium.com/@hex6c/how-cryptoart-works-technically-9eb3c3b1cf2e and Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp. 6-8

[125] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing p. 19-20

[126] This feature was added by the NFT marketplace Rarible (https://rarible.com/)

acquiring the NFT associated with *The Birth of Venus* of Botticelli is the equivalent of having ownership of the original, while the digital copies are the equivalent of the pictures of the painting that have been sneakily taken in the museum or a print bought at the gift-shop[127]. The digital copy without the certificate of authenticity would still exist, but it will have no value[128]. Certified ownership, though, is not the only reason that pushes collectors into buying art. Having, non-exclusive, access to a digital asset may not be a sufficient condition to convince most people to spend their money. CryptoArt, in fact, has a strong investment component[129], not only due to the nature of cryptocurrencies, but also because collectors can easily resell an artwork on a marketplace and speculate thanks to an appreciation of value of the artwork. Just like the traditional art world, if an artist gains recognition, or is greatly hyped, the value of his unique pieces will increase. Furthermore, a passionate person buying art may be interested in acquiring the status of collector or might want to economically support an artist whose work he really likes[130]. The reasons that may bring a person to buy art are endless, just like with any other collection[131].

Providing a definition of CryptoArt is not simple since there is no agreement both in the art[132] and the technology sector[133]. The main interpretation[134] is that CryptoArt is a phenomenon regarding digital artworks published on blockchains in the form of NFTs tokens. For others, we should refer to CryptoArt only when a work represents the ethos and socio-cultural environment influenced by blockchain and cryptocurrencies. For this interpretation, CryptoArt is only made by those creations that manage to merge the art and tech world in their works. In any case, the digital works object of CryptoArt are usually still or animated images[135], usually made thanks to the use of technology[136], they can also have sound or other technological features, like augmented reality. Regardless of the definition there have been some common features detected in CryptoArt[137]: the artworks are created and traded digitally; it is a geographically

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[127] Please refer to https://medium.com/swlh/what-the-heck-is-cryptoart-41f8af965e92

[128] Fernandez M.P, Gustafsson Stina, Lakoubay F. (2019) There is no Such Thing as Blockchain Art - A report on the current status of the intersection of Blockchain p. 5 (downloadable from https://www.academia.edu/39464761/There_is_no_Such_Thing_as_Blockchain_Art_A_report_on_the_current_status_of_the_intersection_of_Blockchain_and_art) p. 7

[129] Lotti, L. (2016). Contemporary art, capitalization and the blockchain: On the autonomy and automation of art's value. Finance and Society, 2(2), pp. 96-106

[130] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view p. 24

[131] For a thorough analysis of the reason behind digital art collecting please refer to http://www.coinspiration.org/redefining-ownership-rare-digital-art-market/

[132] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp. 13-18

[133] "There is no Such Thing as Blockchain Art - A report on the current status of the intersection of Blockchain" (Fernandez M.P, Gustafsson Stina, Lakoubay F.) attempts to provide a definition of of CryptoArt, both from a technological and artistic point of view.

[134] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view p. 3; 6

[135] Ivi, pp.24-25

[136] Please refer to https://medium.com/@hex6c/cos%C3%A8-la-crytoart-bcef4f75f6f6

[137] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp.13-18. Please also refer to https://www.artnome.com/news/2018/1/14/what-is-cryptoart

agnostic movement, and it has been considered the first actually global movement since it gathered artists from all over the world contemporarily; it does not require the presence of intermediaries, everyone can participate without needing the sponsorship of a gallery and even anonymously; it allows for a reinterpretation on how the art business in light of greater collaboration between creators; artists' compensation is fairly remunerated since platforms' commission fee is typically very low; it's everchanging, artworks reference real-time society's events and artists usually experiment with new technological techniques[138]. CryptoArt, in fact, has been recognized to have its own aesthetic and cannot be judged by traditional artistic standards[139]. For example, even though Memes have recently started to interest the traditional art world[140], they have been one of the fundamental elements of CryptoArt. Their ephemerality contrasts with the typical purpose of art, but their immediate communicative power[141] regarding real-time events has been widely recognized[142].

One of the first experiments[143] with the concept of non-fungibility were, in fact, Rare Pepes. They are some sort of digital collectible cards featured on a separate digital wallet, representing a frog-like cartoon that acquired internet fame through memes. For the first time, a device was linked to the image granting their rarity thanks to the blockchain. There are several external and conceptual characteristics to respect in order to be considered a Rare Pepes, concerning the dimension and the popularity of the Meme implemented in the work, which are safeguarded by a community of so-called "Scientists"[144]. Besides the controversy of the character and the uses that were made, placing it as a symbol of alt-right movements, Rare Pepes have been considered the ancestors and origin of Cryptoart's culture, aesthetic and technology. Thanks to their importance they have been sold for thousands of dollars: at the first Rare Digital Art Festival, the highest sum auctioned for one of these collectible digital cards was the equivalent of $39.200[145].

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[138] Ibidem

[139] For a list of the elements that compose a meme please refer to Fernandez M.P, Gustafsson Stina, Lakoubay F. (2019) There is no Such Thing as Blockchain Art - A report on the current status of the intersection of Blockchain pp. 9-10

[140] Memes have been the object of the exhibition "Two Decades of Memes" at the Museum of the Moving Image, Queens New York. Please refer to https://www.washingtonpost.com/entertainment/museums/museums-wants-2-show-u-memez-now-they-shud-be-careful/2019/04/05/6a44b5a4-559d-11e9-814f-e2f46684196e_story.html?utm_term=.7e3282b23515 and https://www.vice.com/en_us/article/j54897/memes-have-finally-made-it-to-the-museum

[141] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view p. 6

[142] Fernandez M.P, Gustafsson Stina, Lakoubay F. (2019) There is no Such Thing as Blockchain Art - A report on the current status of the intersection of Blockchain p. 10

[143] Please refer to the following link for an overview of the NFTs History: https://medium.com/@Andrew.Steinwold/the-history-of-non-fungible-tokens-nfts-f362ca57ae10

[144] Please refer to https://fivethirtyeight.com/features/pepe-the-frog-symbolism-cryptoart-blockchain/

[145] As reported by https://www.theparisreview.org/blog/2018/01/23/much-pepe-scenes-first-rare-digital-art-auction/ and https://www.vice.com/en/article/ev57p4/i-went-to-the-first-live-auction-for-rare-pepes-on-the-blockchain

Homer Pepe[146] sold for the equivalent of $39.200

Following Rare Pepes, as we have previously seen[147], the first experiments of NFTs tokens on the Ethereum blockchain were CryptoPunks and CryptoKitties. These NFTs represent different types of unique and automatically-generated characters that, in the case of CryptoKitties, were even able to interact between each other thanks to a breeding feature. These limited number pixelated punk characters and, most importantly, these adorable breedable digital cats were fundamental for development of NFTs applications and served as a tool to share the opportunities offered by blockchain to the mainstream audience[148] that looked with suspicion at this new technology due to its association with illegal activities[149]. The success of these collectibles characters has been extraordinary: as of the time of writing the total value of all sales of CryptoPunk amounts at $51 million dollars[150], while the highest paid CryptoKitty was sold for a value of $170.000[151], and, in the period of most hyped they were responsible for clogging Ethereum[152].

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[146] Source: https://www.theparisreview.org/blog/wp-content/uploads/2018/01/dqme2zfew5uw7fskaydx6jxt9k9hrqswymeqzqfcap9jusl_1680x8400.jpeg

[147] Please refer to 1.2.2.2) Fungible and non-fungible tokens

[148] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing p. 13

[149] The data gathered by nonfungible.com, show that people who own CryptoKitties tend to play other NFT games as well, making CryptoKitty a perfect platform for beginners to get accustomed to the blockchain, while collecting digital pets. The data is available at the following link: https://nonfungible.com/blog/non-fungible-tokens-communities-analysis-2019

[150] Accessed on 11/02/2021 at the following link https://www.larvalabs.com/cryptopunks. An exponential growth considering that on 19/11/2020 the total value of the sales was $7.47 million dollars.

[151] Source: https://thenextweb.com/hardfork/2018/09/05/most-expensive-cryptokitty/

[152] Source: https://www.coindesk.com/loveable-digital-kittens-clogging-ethereums-blockchain

Some examples of CryptoPunks[153]

Dragon, the CryptoKitty sold for the equivalent of $170.000[154]

After the hype for CryptoKitties went down. NFTs continued to develop new application. One of the sectors in which it is mostly used is the gaming world[155]. It provides unique assets to players for the customization of their avatars and the NFT tokens are operable on multiple platforms. At the same time, NFT marketplaces platforms selling artworks have been gaining more and more ground, as new projects appeared. One of the most important events in 2020 has been the "art-drop" Of Beeple's artworks[156]. Beeple is in fact a very renowned artists and graphic designer that has collaborated with some of the most famous brands: Apple, Space X and Louis Vuitton, just to name a few. Due to his huge social media following and due to the immense repertoire of artworks (he has been adding a new digital artwork to his portfolio every day for the last 13 years), he decided to sell some of his works on the NiftyGateway platform[157]. The "drop" was so successful because there were originals and limited editions of his works, making sure that both very wealthy and beginner collectors could afford them. His works were auctioned for a total of $3.5 million and set a new record for the platform[158].
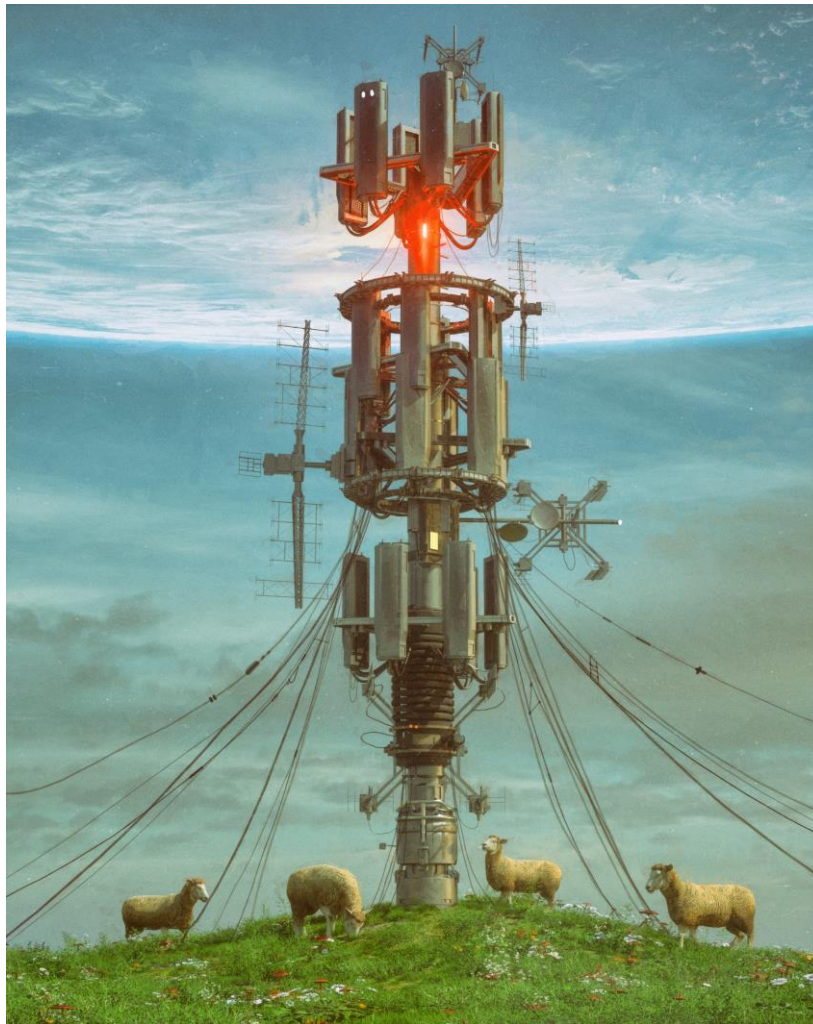
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[153] Source: https://www.larvalabs.com/cryptopunks
[154] Source: https://thenextweb.com/hardfork/2018/09/05/most-expensive-cryptokitty/
[155] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp. 30-31
[156] Source: https://www.blockchain4innovation.it/arte/crypto-art-la-rarita-di-un-bit/
[157] https://niftygateway.com/
[158] Source: https://observer.com/2020/12/net-artist-beeple-nifty-gateway-auction-record/

Moon Farm, Beeple, 2020[159]

As shown by the latest Art Market survey[160], Millenial collectors were the one using online sales platforms the most and used social media[161] to find new artists. Probably due to a different relationship with technology than older generations[162], they are more likely to be interested in exclusively digital art rather than physical art[163]. Decentralized art marketplaces continue to emerge and affirm their position as mediators, and sometimes also curators, in online art sales. Both the interest of millennial collectors having a strict relationship with technology and the spread of the use of these marketplaces, are considered to be the key factors for the increase of global online art sales[164] from the current $5.9 billion to $9.32 billion forecasted for 2024[165]. Besides Verisart and Artory, the two main companies previously examined that

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[159] Source: https://twitter.com/beeple/status/1344506621003767808/photo/1
[160] Source: https://theartmarket.foleon.com/2020/artbasel/online-sales/
[161] Potts, J., & Rennie, E. (2019). Web3 and the creative industries: how blockchains are reshaping business models. In A Research Agenda for Creative Industries. Edward Elgar Publishing p.19
[162] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view p. 6
[163] Source: https://medium.com/paradigm-fund/blockchain-creativity-and-arts-intertwine-d3c42739312f
[164] Ibidem
[165] More data about this prevision can be found at the following link https://www.statista.com/statistics/284586/global-online-art-market-sales-2013/

provide blockchain-based registries, many marketplaces have developed for the sale of CryptoArt. These marketplaces allow artists to sell their works using NFTs and create a sense of community between creators, but also with collectors[166]. In fact, similar to social media, artists have their own profile on which they can upload their works up for sale. They can be imagined as hybrids between a catalogue and a digital gallery. Besides the artists' profiles the platforms often organize digital exhibitions and host events on virtual worlds, like DecentraLand[167] or CryptoVoxels[168], in which artists can network and showcase their works. Some of these platforms focus on the process of registration (Verisart an Artory) some others choose accurately the artists they feature after a process of digital curatorship through original exhibitions formats, for example using VR technology (SuperRare[169] and KnownOrigin[170]), others focus on the sense of community, stimulating conversations and collaboration between artists (DaDa[171]), others have the goal of reaching the mainstream and do not use only cryptocurrencies (NiftyGateway[172]) while others automatically create proceeds that go to a charitable cause for every sale of the work (Cryptograph[173]) and some do not only sell digital artworks but also gaming items and all types of digital collectibles (OpenSea[174]). As we have seen, the number of projects flourishing thanks to the interaction of blockchain and the art market is relevant and growing. These marketplaces also collaborate with traditional art institutions like auction houses or museums or with virtual worlds that are interoperable with NFTs. The element that these platforms have in common, leaving aside their differences, is the artist-centric approach, helping artists develop their art, business and community[175].

In the last few years blockchain has been actively proliferating in the art sector. From offering proof-of-provenance, fairer and automatic remuneration systems and digital scarcity, blockchain has finally found solutions thanks to which artists can gain more control on their works. In the previous chapter we have analysed authors' rights, how they have been challenged by digitalization and the necessary law adaptations that have been made. In our latest chapter we have provided new and viable solutions to these problems: registration and management on the blockchain and the use of NFTs to provide digital scarcity. Moreover, we have seen the opportunities that CryptoArt can provide for a new generation of artists that, thanks to

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[166] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp 18-20

[167] https://decentraland.org/ and a brief introduction to the platform can also be found in Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view p. 31

[168] https://www.cryptovoxels.com/

[169] https://superrare.co/ and a brief introduction to the platform can also be found in Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp. 27-28

[170] https://knownorigin.io/ and a brief introduction to the platform can also be found in Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp. 28-30

[171] https://dada.nyc/artgallery

[172] https://niftygateway.com/

[173] https://www.cryptograph.co/

[174] https://opensea.io/

[175] Franceschet, M., Colavizza, G., Smith, T., Finucane, B., Ostachowski, M. L., Scalet, S., ... & Hernandez, S. (2019). Crypto art: A decentralized view pp. 18-20

social media and blockchain-based marketplaces, can connect with collectors and build a community and reputation. Blockchain has revealed to have the potential to solve some recent copyright protection issues and it can positively impact artists. The typical business models of the creative sector can be reshaped thanks to these new platforms and technologies; the fact that some of them have collaborated with world-famous auction houses, their massive base of artists and collectors and the volume of transactions prove that the interest in this field is exponentially growing. Although the future seems bright, we shall not forget the issues faced by the technology: the current technical inadequacy to large-scale operations required by the mainstream market, the impossibility to amend or delete transactions executed by smart contracts, their irreversibility, and the fact that inconsistencies between the physical and the digital world may take place due to an incorrect data input. The answers to these problems, unfortunately, remain mostly unanswered. Only the development of the technology will be able to provide new solutions and, since the technology has only been around for a few years, there is surely hope that fundamental innovations and important investments will be made. Technology is ever-changing and new and unforeseeable solutions emerge frequently, just think to how in 10 years Internet has become more and more an indissoluble part of our lives. The relationship between art and innovation is set to progress as opportunities arise each day.

Conclusions

Technological innovation deeply challenges copyright protection. Especially the latest technical developments have spread extensively and gained great popularity among an immense number of people. Above all, the capillary diffusion of electronic devices and technology, produced new problems for the respect of authors' rights, since each person is abstractly capable of copyright infringement and rarely caught and punished. This area of law had to face unforeseeable and previously undisciplined circumstances, adapting quickly to the new scenario, in a harmonized way, to ensure an appropriate level of protection to this cross-border phenomenon. Technological progress is unstoppable and everchanging and laws struggled to keep up with these innovations. Internet and the digitalization provided important opportunities for the dissemination of knowledge, but they also posed threats to authors' exclusive rights. In fact, due to the availability of digital copies, an unlimited number of identical works can be shared with people all over the world and authors lack effective control on the diffusion of their creations. Furthermore, their economic interests are not easily satisfied and enforced: while the number of copyright infringements is growing, authors have no means to stop the violations. In an attempt to try to contain this phenomenon and to balance authors' exclusive rights and the social function of copyright, European Institutions have started to intervene. The InfoSoc Directive, Directive (EU) 2001/29, introduced new definitions of authors' exclusive rights, new exceptions and limitations and established the use of technical measures of protection, like watermarking or automatic filtration, to prevent unauthorized uses. Furthermore, the Copyright Directive, Directive (EU) 790/2019, aimed at the modernization of the previous provisions in the evolved scenario. It introduced further exceptions, strengthened the role of Internet Service Providers with an extended regime of liability also establishing a reporting procedure that can result in the removal of copyrighted works and implemented a principle of fairer remuneration for authors. These measures, although helpful, have been deemed unsuitable to effectively prevent the violations.

On the other hand, blockchain technology proposes practical solutions to these emerging issues and has the potential to revolutionize the copyright protection system. On one hand, technology has been the cause for the creation of new problems, on the other hand, a technological tool like the blockchain can also help to find new solutions. Surprisingly, the answer to technology-generated complications can be found in the application of an emerging technological tool.

Blockchain technology can be used for the registration of intellectual works on the ledger. This faculty, due to the features of immutability and traceability of the records, conferred by the decentralized technology, grants secure information on the ownership and provenance of copyrighted works. The technological tool

allows authors to regain control on the diffusion of their works, since every sale or different uses of them are registered on the ledger. Furthermore, it provides a digital evidence, thanks to the invariable time-stamp, of the exact date and time of registration of the work, becoming a persuasive argument to be used in case of litigation. Moreover, blockchain provides access to information on intellectual works to third parties in a very straightforward way that was not possible before, making it possible for third parties to verify the information recorded, check the ownership records and easily identify the author, simply thanks to their internet connection. At the same time, even though anyone has access to the transactions' records, the infrastructure maintains the anonymity of the parties.

Blockchain technology also creates a new system for the remuneration of authors. It is more efficient than the traditional method because it is based on smart contracts concluding transactions and registering them on the blockchain in full autonomy. Thus, it does not require the presence of intermediaries, it reduces transaction costs and facilitates the immediate payment of royalties for every subsequent use or sale of their works, allowing authors to independently manage the rights on their creations. This system also offers the possibility of immediate compensation for every single use of an intellectual work, even those that are temporary, thanks to micropayments. Furthermore, it offers the possibility of granular billing in respect of fractional ownership of the works created in collaboration.

Additionally, the use of Non-Fungible Tokens has created new opportunities. They are a peculiar type of tokens operating on the blockchain that represent a specific asset, and thus are not interchangeable. These tokens have introduced a fundamental aspect: scarcity in the digital world. A token refers exclusively to a single set of data, making its sale comparable to the sale of physical assets. It provides an effective solution to the problems generated by digital copies, and the subsequent copyright infringements, affecting authors' rights. Ultimately, blockchain truly has the capability to reduce copyright infringements by tracking the uses of intellectual works while granting a fairer and immediate remuneration to authors.

In order to present a comprehensive contribution, this dissertation not only examined the benefits of blockchain technology for copyright, but also provided an exhaustive analysis of the challenges that will need to be faced, by legal and technological experts, in order to make blockchain reach its full potential in the future. For example, as regards registration, questions arise on the idea of a unique global registry of intellectual works, accessible by any potential user at any time and from every part of the world. At the current time, we have concluded that it may still seem utopistic: the challenges presented are both of a technical nature, due to the inability of the technology to process such a high number of transactions, and legal, due to International Conventions not prescribing any formalities to grant copyright protection. Furthermore, this system raises problems on both the type of blockchain to be used in such a situation and the opportunity to preserve the presence of a public authority governing the registry. The other main problem attains to the data input on the blockchain: a malicious actor may either register false information

or the registry may not be up to date if any subsequent physical sale takes place and they are not registered. Currently, the solution provided by some platforms is to consult experts before the registration, while others simply state their irresponsibility on the data registered in their terms and conditions. The last obstacle encountered, concerns the irreversibility of smart contracts and the immutability of the transactions registered on the blockchain. A situation in which any changes need to be implemented on the blockchain, due to human error or judicial decision, raises some problems. These questions seem to remain unanswered at the moment, but there is hope that greater interest and constant research will provide the solutions needed, considering the immaturity of the development of the technology.

Finally, in this dissertation we have provided a real-time example of a sector that has already started benefitting from the blockchain infrastructure: the art market. The aim of this case-study is to provide an overview on this emerging artistic movement and, most importantly, to present a practical and powerful example of the impact that this technology can have on the market and how creative business models can profit from this system. In fact, the latest Art Market Survey has highlighted how, in the first six months of 2020, online sales impacted greatly the total global sales. Multiple online marketplaces selling unique digital pieces and creating a sense of community between artists and collectors have born and grown in the last few years. These platforms have appealed mostly the younger generations of collectors, more familiar with technology than older generations and less attached to the traditional physicality of artworks. The platforms use NFTs to sell original digital works and, thanks to the feature of scarcity provided by them to digital artworks, these tokens suit perfectly the need of assessing provable uniqueness to artworks. Even though these works remain reproducible and copiable by third parties, only the holder of the token will be regarded as the legitimate owner. Together with some peculiar characteristics of the type of subjects represented and the use of technological techniques for the realization of the works, the success of blockchain-based digital art has, arguably, created a new artistic movement: the CryptoArt. Some scholars have even claimed that it is the first real global artistic movement, influencing artists coming from different parts of the world, simultaneously. Furthermore, the technology is also useful for the remuneration of artists. Other than automatic compensation, for every resale of their artworks, artists perceive a percentage on the price of the resale. This function is fundamental in those Countries that do not discipline the resale right for artists and, in those Countries that do, it facilitates the remuneration process by not requiring the presence of an intermediary or collecting society. Another opportunity provided by blockchain in the art world, is the proof of provenance after the registration: when the artist himself registers the work on the blockchain there are no doubts on the authenticity or on the attribution of the artworks, and no valid accusations of forgery can be made. Moreover, the registration allows an effective control on the uses of artworks online: every transaction regarding the work is automatically registered and the artist is remunerated. Thanks to this technology, also physical works can be registered in the blockchain, even

though, considering the current level of maturity of the technology, it gives better results with digital art. In fact, tracking the transactions of a physical work and being sure that the work object of the sale is the original may be problematic. QR codes linking to the blockchain records may be attached to the physical work, but the problem remains open in the event of incorrect data input by a malicious actor.

Blockchain technology has the tools to revolutionize and improve copyright protection. The success that this technology is currently having in the art sector proves the effectivity of the opportunities provided. Nonetheless, there are still some important challenges that are currently precluding its extensive adoption and technical questions that remain unanswered and that need to be addressed. We shall point out that the technology is still at its initial phases of existence, only being active for a few years; new solutions are constantly researched and when they will be implemented, blockchain will be able to reach its full potential. At this time, it seems to represent a viable resource with great potential, although still presents important limitations. Currently, it is interesting to see private projects and companies, like blockchain-based registries and marketplaces, that are growing and reaching a vast public, exponentially gaining interest and economic growth, while putting artists and their works at the center of their business model. The effect seems paradoxical, authors that rightfully lamented lack of legal protection in this new environment, given the threats of digitalization and dematerialization, are finally provided with technological tools that can contravene some distortions of the system and even grant a better protection of their economic and moral rights.

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