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**The Application of Blockchain for the  
Intellectual Property Protection**

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# CONTENTS

<b>SUMMARY</b>	<b>I</b>
<b>PREFACE</b>	<b>II</b>
<b>ABBREVIATIONS</b>	<b>III</b>
<b>1. INTRODUCTION</b>	<b>1</b>
1.1 BACKGROUND	1
1.2 PURPOSE AND RESEARCH QUESTIONS	2
1.3 METHODOLOGY AND MATERIAL	2
1.4 DELIMITATION OF THE SUBJECT	2
1.5 OUTLINES	3
<b>2. THE REVOLUTION OF BLOCKCHAIN: ADVANTAGES OR ISSUES?</b>	<b>4</b>
2.1 DESCRIPTION OF THE BLOCKCHAIN TECHNOLOGY	4
2.1.1 <i>Definition of the blockchain</i>	4
2.1.2 <i>The characteristics of the blockchain</i>	5
2.1.3 <i>The different categories of blockchains</i>	9
2.1.4 <i>An example of a financial transaction with Bitcoin</i>	11
2.2 BUSINESS APPLICATIONS OF BLOCKCHAIN	11
2.3 OTHER TECHNOLOGIES RELATED TO THE BLOCKCHAIN	14
2.3.1 <i>Smart contracts</i>	14
2.3.2 <i>Oracles and IoT</i>	15
2.4 THE DISADVANTAGES OF THE BLOCKCHAIN	17
2.4.1 <i>Technical limits of the blockchain</i>	17
2.4.2 <i>The expensive costs of the blockchain</i>	18
2.4.3 <i>The anonymity of the network</i>	18
<b>3. BLOCKCHAIN FOR THE PROTECTION OF INTELLECTUAL PROPERTY RIGHTS 20</b>	
3.1 THE EUROPEAN IP LEGAL FRAMEWORK AND ITS CHALLENGES	20
3.2 THE BLOCKCHAIN IN THE SERVICE OF IP	23
3.2.1 <i>Blockchain as an evidence of the ownership of IP rights</i>	23
3.2.2 <i>Blockchain for the support and management of IP contracts with the smart contracts</i>	36
3.2.3 <i>Blockchain as an enforcement tool of IP rights in the fight against counterfeit</i>	44

<b>4. CONCLUSION</b>	<b>48</b>
<b>BIBLIOGRAPHY</b>	<b>51</b>
1. PRIMARY SOURCES	51
1.2 <i>EU laws (Treaties, Regulations and Directives)</i>	51
1.2 <i>National Laws and Acts</i>	51
2. SECONDARY SOURCES	52
2.1 <i>Articles</i>	52
2.2 <i>Books</i>	53
2.3 <i>Conferences</i>	53
2.4 <i>EU communications and reports</i>	53
2.5 <i>Thesis and researches papers</i>	55
2.6 <i>Websites and Blogs</i>	55
2.7 <i>White papers, reports and guides</i>	57

# Summary

With a far going protection of IP rights, the EU aims to protect the assets of companies which invested in innovative products. If the EU framework provides a far going mechanism of protection of IP rights, the complexity and the cost of this mechanism have been a barrier to the access of IP rights. In addition to these structural issues, the digital revolution introduced new challenges for the rightsholders. Blockchain can provide solutions to the protection of intellectual property rights. It offers the possibility for the rightsholder to register an IP right to the relevant authorities, to prove the ownership of a right, to manage these rights and collect the licensee fees attached to them, and lastly, to fight against counterfeit goods and contents. Blockchain can also be used by the other stakeholders who can control the origin of the good, its authenticity, but also verify if its own creation does not infringe any rights. In a digital context where these rights are fragilized, blockchain seems to be the perfect digital solution for extending the scope of protection of IP rights.

But each solution has a price. Some of the factors that explain the lack of investment in the blockchain technology from public and private investors are the impossibility of identifying the members of a public network in the event of infringement of a right, the high costs that this technology represents, the technical knowledge that is required to use such a technology, and finally, the absence of a legal framework.

Most of the issues in the blockchain are linked to the immaturity of the technology. For this reason, it is important, to give time to the technology to mature before introducing rules which prohibit blockchains totally. So, if blockchain can be used for the protection of IP rights, a theoretical framework that provides a better understanding of the technology, and the potential applications and challenges it can raise is necessary. A better understanding in the area will contribute to the creation of a new legislation, and therefore, to new innovative tools for the protection of IP rights.<sup>1</sup>

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<sup>1</sup> Jeanne Pia Mifsud Bonnici, Melania Tudorica and Joseph A Cannataci, 'The European Legal Framework on Electronic Evidence: Complex and in Need of Reform' in MA Biasiotti and others, *Handling and Exchanging Electronic Evidence across Europe* (1st edn, Springer 2018), 196

# Preface

The wise Cicely Tyson is certainly right when she said that “*challenges make you discover things about yourself that you never really knew. They're what make the instrument stretch — what makes you go beyond the norm.*”

These last years have been the most challenging period of my life. I have crossed several countries, learned different cultures, follow an intensive program, while trying to become an accomplished professional and women. The word “challenges” seems to be appropriate for describing all the emotions, experiences I have been through.

Despite this, I do not have any regrets. These challenges are part of myself. They reflect the battles that I fought with my soldiers in order arrive where I am at this day.

Today, I would like to thank you, my soldiers, for always being on my side, even during the worst wars.

Thank you to my beloved mom Absatou, my sisters Marie-Antoinette and Dorianne, Jérôme, Kanny, Amina, Becaye, Patricia, Ibrahima, and my family for being my constant source of motivation.

Thank you to my friends Janis, Willy, Dianna-Laure, Koralie, Louise, Margaux, Erika, Claudia, Emily, Zhengmin, Adam, Alexia, Fanny, Martina, Nora, Violeta, Meeri, Unali, Sani and Babs who have always trusted me.

Thank you to all my teachers and my supervisor Ulrika Wennersten for being my mentors in my journey.

# Abbreviations

AI: Artificial Intelligence

DLT: Distributed Ledger Technologies

eIDAS: electronic Identification, Authentication and Trust Services Regulation

EPO: European Patent Office

EU: European Union

EUIPO: European Union Intellectual Property Office

IoT: Internet of Things

IP: Intellectual Property

LC: Letter of Credit

P2P: Peer to Peer

MS: Member State

SMEs: Small and Medium Enterprises

TFEU: Treaty on the Functioning of the European Union

# 1. Introduction

## 1.1 Background

With all its crises, the 21<sup>st</sup> century represents an age of uncertainty for economic actors but also a period of opportunities for the companies and the society.<sup>2</sup> Among them, the financial crisis of 2007-2008 is one of the most important events which has a permanent impact on the industry. This crisis has mainly brought out questions regarding the capacity of the financial institutions protected by the States to shield the interests of the individuals. But if the financial system failed in their mission, how to ensure the protection of the private assets? As a response to this new challenge, a mysterious individual named Satoshi Nakamoto wrote the *blockchain's White Paper* in 2008.<sup>3</sup> Although the author's name is fictitious, the relevance of this book is evident, and its content led to the creation of blockchain technology. The mechanism described in it has been introduced as a new way to transfer financial data without relying on a centralized government, such as a bank or the States, which have failed to protect the interest of individuals. While this technology has mainly been developed for the financial sector, its application has been extended in several areas. Thus, despite its tragic economic effects, the financial crisis also led to the creation of a new technology<sup>4</sup>.

The potential application of this technology and its creative nature can promote new business opportunities. Blockchain can therefore be used in various sectors, such as finance, insurance, and more surprisingly, also for the Intellectual Property (IP) rights.

The objective of IP rights is to encourage companies and people to develop new technologies while ensuring that they can benefit from this technology. Using blockchain for extending the method protection of IP rights can participate to the economic growth within the European Union (EU). However, we must determine if such application of the blockchain is possible or even desirable from the legal and technical perspective.

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<sup>2</sup> Paul Burns, *Entrepreneurship and Small Business: Start-up, Growth and Maturity* (4<sup>th</sup> edn, Palgrave, 2016), pages 3 to 4.

<sup>3</sup> Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (Bitcoin.org, 2008) <<https://bitcoin.org/bitcoin.pdf>> accessed 4 May 2020.

<sup>4</sup> Ahmed Afif Monrat, and others 'A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities', (2019) 7 IEEE, page 117143.



## **1.2 Purpose and Research questions**

The objective of this thesis is to assess the benefits and challenges that blockchain can raise in the current EU intellectual property legal framework. This assessment will help to determine the impact that blockchain technology can have on the protection of EU IP rights. However, this thesis does not aim to offer a proposal for a new IP or blockchain laws. The results of this assessment can help IP rights holders, investors, the legislator or lawyers to explore the impacts of this technology on the IP rights and its legal framework before to make an amendment of the current system or to develop a blockchain. Based on this information, blockchain stakeholders can determine if the development of blockchain for the protection of IP rights is desirable or require to adopt a legislative act.

## **1.3 Methodology and Material**

To assess the impact of the use of blockchain for the protection of IP rights, this thesis will provide concrete examples of the application of the blockchain at each stage of the lifecycle of IP rights. Consequently, we will analyze the application of blockchain for the creation of IP rights, during its development, and to finish, during its defense. For each example of application provided, we will assess the benefits of blockchain for the IP protection, but also the legal issues it can raise.

I will use the applicable EU rules (decisions of the Court of Justice, Directives, Regulations, Treaties) to assess the legality of the blockchain's application. As a tool of interpretation of these legislative acts, I will use all scientific researchers' papers, books websites, communication of the EU institutions, and international legislations that are relevant for the various analyses.

Furthermore, due to the digital nature of the technology and the philosophy attached to it, a lot of technical information is described in an open source website. For these reasons, articles published in a blog or website related to the blockchain will be also take into account.

## **1.4 Delimitation of the subject**

While this essay deals with the application of blockchain for the protection of IP rights, this technology has several impacts on various areas of law. Due to the restrictive time and space

of this research, this thesis will not develop all the legal issues related to the application of blockchain in the IP sector. Only the most relevant areas for our discussion will be addressed. This analysis will focus on the applicable EU law, and therefore will exclude the specific rules applicable within the Member States, or in international law.

The objective of this paper is not to present all the IP rights within the EU and their scope of protection, but it will rather determine how their creation, management and enforcement can be improved with a blockchain.

This essay aims to describe how blockchain can be used for the protection of IP rights. The question of the protection of blockchains, and its patentability under EU IP law will not be addressed in this paper.

## **1.5 Outlines**

To assess the impact of the use of blockchains for the protection of EU IP rights, this thesis will describe the technology of the blockchain and related technologies (2), before to analyze how blockchains can contribute to IP protection (3). The last section will conclude this thesis (4).

## 2. The revolution of blockchain: advantages or issues?

To understand the opportunities and challenges that occur regarding the blockchain technology for the IP legal framework, it is necessary to describe at first the function of this invention from a technical perspective (2.1). Secondly, we will describe how blockchain is a source of impulsion for the creation of new business opportunities (2.2) and for the development of other digital systems (2.3). To conclude this section, we will outline some of the criticism surrounding blockchains (2.4).

### 2.1 Description of the blockchain technology

After defining the technology of the blockchain (2.1.1), we will develop their characteristics (2.1.2), describe the different types of blockchains (2.1.3), how they can be used (2.1.4), and their impacts in different industries (2.1.5).

#### 2.1.1 Definition of the blockchain

A blockchain, or Distributed Ledger Technologies (DLT), can be described as a decentralized digital database<sup>5</sup> which allows individuals to store data in a sequence of blocks<sup>6</sup> and execute some operations without the participation of a central government.<sup>7</sup> The data stored in one block are linked together with other blocks. The connected blocks form a chain, hence the name ‘blockchain’.<sup>8</sup> In a blockchain, the transactions are validated by several entities and not only by a unique organization, as it can be the case in a centralized system. It is only if there is a consensus among the blockchain’s community that the operations will be stored in the blocks. Through these elements, blockchain can be defined as “a decentralized database containing

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<sup>5</sup> Michèle Finck, ‘Blockchain and the General Data Protection Regulation: Can distributed ledgers be squared with European data protection law?’ (Study, Panel for the Future of Science and Technology STOA, July 2019), page 1.

<sup>6</sup> Ahmed Afif Monrat, and others ‘A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities’, (2019) 7 IEEE, page 117138.

<sup>7</sup> Pascal Asselot, ‘In a Nutshell: Blockchain and IP’ (*European IP Helpdesk*), <<http://iprhelpdesk.eu/ip-highlights/ip-special-blockchain/blockchain-in-a-nutshell>> accessed 23 April 2020.

<sup>8</sup> Ahmed Afif Monrat, and others ‘A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities’, (2019) 7 IEEE, page 117138.

sequential, cryptographically linked blocks of digitally signed asset transactions, governed by a consensus model”.<sup>9</sup>

### 2.1.2 The characteristics of the blockchain

The innovative character of the blockchain is due to 4 essential elements. The first characteristic of blockchain is the decentralized nature of the system. In the blockchain, contrary to centralized systems (such as banks, in which one central entity is responsible for the maintenance of the entire system), the system is maintained by several entities. The data is incorporated, maintained and monitored by a network of users connected to the systems with a computer.<sup>10</sup> These users are the peers and form a *peer to peer network* (P2P).<sup>11</sup> Each peer is connected to the system thanks to a computer, also called a node.<sup>12</sup> Peers have the responsibility to control and incorporate the data in the block. As soon as a sufficient number of peers defined in advance have verified the information or the transaction, it can be added to the block. A copy of the blockchain is distributed to all the nodes of the networks.<sup>13</sup> Based on this description, it appears that the decentralized characteristics of the blockchain emanates from the decentralization of the actors of the chains but also of the decentralization of the storage of the data itself. This system brings several advantages. The first advantage is linked to the fact that each node contains a copy of the blockchain. If the information is stored in different nodes instead of a central place, the server will always have a copy of the data in several nodes. So, even in the case of a cyberattack or destruction of the storage facilities, the data will always be preserved. The second advantage of this system is that it cannot be corrupted. This property is linked to the fact that it does not rely on a central authority, but rather on an entire network.<sup>14</sup> Subsequently, blockchain is more than a new innovation. Blockchain has created a new path

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<sup>9</sup> Karim Sultan and others, ‘Conceptualizing blockchains: characteristics & applications’ (11th IADIS International Conference on Information Systems, Lisbon, 14-16 April 2018), page 54.

<sup>10</sup> Nathan Fulmer, ‘Exploring the Legal Issues of Blockchain Applications’, (2019) 52(1) Akron Law Review, pages 166 to 167.

<sup>11</sup> Stephen Kilcommins, ‘Blockchain Basics – A deeper look’, (*Medium*, 21 February 2019), <<https://medium.com/@GECKOGovernance/blockchain-basics-a-deeper-look-c34acd186ad2>> accessed 23 April 2020.

<sup>12</sup> Ibid.

<sup>13</sup> Ibid.

<sup>14</sup> Florent Loriaux, ‘L’utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?’ (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), page 6.

for individuals to execute operations and, share data by cooperating in a network without a central authority in which they would have to trust.<sup>15</sup>

This first characteristic is also linked to the second essential element of the blockchain: the proof-of-work of consensus. In addition to the creation of a decentralized system, blockchain also creates an auto-regulated structure. Indeed, in the absence of a centralized authority which can verify the data stored and regulate the system if needed, the blockchains call upon the different users from the network to regulate the system. As described previously, when a transaction is requested by two users, the data is sent to all the nodes. Each data that need to be stored in the blockchain is transformed into a cryptographic code thanks to a hashing algorithm. This hashing system aims to store the data in a reduced number of bits. Most of the blockchains use the SHA-256 hashing algorithm, which contains 64 characters and takes 256 bits in memory<sup>16</sup>. Although the data was sent to the nodes to be registered in the blockchain, the information has to be verified by the networks for being executed.<sup>17</sup> As outlined previously, the blockchain aimed to offer a decentralized mechanism which the users can trust. Since the protection of the integrity of the blockchains cannot be made by a central authority,<sup>18</sup> it has to be realized by a decentralized mechanism on which individual can trust because it cannot be corrupted. In its *White Paper*,<sup>19</sup> Nakamoto introduced the idea of a consensus mechanism.<sup>20</sup> With this process, the operations are not validated by a central authority anymore, but rather agreed by the network thanks to a consensus.

In practice, not the entire network has to validate the operation. A group of specialized users, called miners, verify the information sent by the two parties. It is only when the cryptographed

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<sup>15</sup> Nathan Fulmer, 'Exploring the Legal Issues of Blockchain Applications', (2019) 52(1) Akron Law Review, page 169.

<sup>16</sup> Stephen Kilcommins, 'Blockchain Basics – A deeper look', (*Medium*, 21 February 2019), <<https://medium.com/@GECKOGovernance/blockchain-basics-a-deeper-look-c34acd186ad2>> accessed 23 April 2020.

<sup>17</sup> Nathan Fulmer, 'Exploring the Legal Issues of Blockchain Applications', (2019) 52(1) Akron Law Review, page 168.

<sup>18</sup> Stephen Kilcommins, 'Blockchain Basics – A deeper look', (*Medium*, 21 February 2019), <<https://medium.com/@GECKOGovernance/blockchain-basics-a-deeper-look-c34acd186ad2>> accessed 23 April 2020.

<sup>19</sup> Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System* (Bitcoin.org, 2008) <<https://bitcoin.org/bitcoin.pdf>> accessed 4 May 2020.

<sup>20</sup> *Ibid*, pages 3 and 8.

code is verified that they will be included in the block, and the operation will be executed.<sup>21</sup> Proof-of-work, therefore, refers to the fact that miners have to solve a cryptographic problem to validate an operation.<sup>22</sup> Consequently, the operation needs to be controlled by the blockchain community in order to be validated. The community recognized the algorithm verified by the miners as valid, and therefore constitutes a consensus. This code recognized as legitimate becomes “the algorithm consensus”.<sup>23</sup> Once this code is validated by the network, it can be added in the block but cannot be replaced. Consequently, a central authority, such as a bank, does not have the possibility to modify, change, or corrupt the information sent by the users. The question remains how miners are incentivized to verify the code set by the users. What are the interests of the miners in this operation?

In most of the public blockchains, miners are incentivized to verify and valid the code, and subsequently the operations, with the crypto-currencies, also called “tokens”.<sup>24</sup> The miner who succeeds to solve the mathematical problem that consist to find the new block that need to be added to the chain is awarded with tokens. This new block contains a piece of the transaction code that needs to be stored in the blockchain. So, such money is delivered only if they have found the new block that will be added to the chain. Each time a miner is the first one to control and insert a block in the chain, he/she receives a token. Thanks to this remuneration system, miners are encouraged to compete in order to find a new code to crypt.<sup>25</sup>

The third characteristic of the blockchain is that the stored information is permanent and tamper-proof.<sup>26</sup> Each information incorporated in a block cannot be replaced because the blockchain is kept in all the nodes of the community. However, the system is not infallible because it is possible to change the data stored.<sup>27</sup> To modify the information, the person has to

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<sup>21</sup> Kevin Werbach, ‘Trust, but verify: why the blockchain needs the law’, (2018) 33(489) Berkeley Technology Law Journal, pages 503 to 504.

<sup>22</sup> Nathan Fulmer, ‘Exploring the Legal Issues of Blockchain Applications’, (2019) 52(1) Akron Law Review, page 169.

<sup>23</sup> Karim Sultan and others, ‘Conceptualizing blockchains: characteristics & applications’ (11th IADIS International Conference on Information Systems, Lisbon, 14-16 April 2018), page 52.

<sup>24</sup> Nathan Fulmer, ‘Exploring the Legal Issues of Blockchain Applications’, (2019) 52(1) Akron Law Review, page 169.

<sup>25</sup> Nathan Fulmer, ‘Exploring the Legal Issues of Blockchain Applications’, (2019) 52(1) Akron Law Review, page 168.

<sup>26</sup> Karim Sultan and others, ‘Conceptualizing blockchains: characteristics & applications’ (11th IADIS International Conference on Information Systems, Lisbon, 14-16 April 2018), page 53.

<sup>27</sup> Nathan Fulmer, ‘Exploring the Legal Issues of Blockchain Applications’, (2019) 52(1) Akron Law Review,

remove all the information from all the nodes. Even if such operation requires lot of resources, it is possible to remove an information by accessing all the computers of all the users at the same time.

The stored information is also permanent because each block is composed of a piece of the hash code from the pervious,<sup>28</sup> creating therefore an immutable chain of information.<sup>29</sup> If one code is changed it will also destroy the links between the blocks. So, if all the blocks are connected together with the hashing code of the previous block, the only way to alter a block is to fix all the “cryptographic links in the chain”<sup>30</sup>. However, such type of modification is only possible if there is only one copy of the blockchain in a single node, and therefore is not applicable to a P2P network.<sup>31</sup>

The last characteristic of the blockchain is its transparency and the auditability of the information. Everyone can get access and control the information stored in the blockchain.<sup>32</sup> The advantage of such a system is that the information cannot be corrupted because all the information can be retraced in the system.

Through this description of the different characteristics of the technology, blockchain represents more than a simple data center. It creates a new system where individuals do not have to trust in a central entity but in the code.<sup>33</sup>

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page 170.

<sup>28</sup> Stephen Kilcommins, ‘Blockchain Basics – A deeper look’, (*Medium*, 21 February 2019), <<https://medium.com/@GECKOGovernance/blockchain-basics-a-deeper-look-c34acd186ad2>> accessed 23 April 2020.

<sup>29</sup> Kevin Werbach, ‘Trust, but verify: why the blockchain needs the law’, (2018) 33(489) *Berkeley Technology Law Journal*, page 505.

<sup>30</sup> Stephen Kilcommins, ‘Blockchain Basics – A deeper look’, (*Medium*, 21 February 2019), <<https://medium.com/@GECKOGovernance/blockchain-basics-a-deeper-look-c34acd186ad2>> accessed 23 April 2020.

<sup>31</sup> *Ibid.*

<sup>32</sup> Valentina Gatteschi and others, ‘Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough?’, (2018) 10(2) *Future Internet*, page 4.

<sup>33</sup> Jean-Maxime Rivière, ‘Blockchain technology and IP – investigating benefits and acceptance in governments and legislations’ (2018) 3(1) *Junior Management Science*, page 6.

### 2.1.3 The different categories of blockchains

In addition to the properties described previously, blockchains can also be classified according to the publicity or privacy of their network.<sup>34</sup> A public blockchain is written on an open source software<sup>35</sup> publicly available.<sup>36</sup> The blockchain does not have an owner.<sup>37</sup> Thereby, all the information is accessible to all individuals, everybody is free to join the network, and maintain the blockchain without obtaining the authorization of a centralized authority.<sup>38</sup> In the opposite, private or “permissioned” blockchains are not publicly available but are rather run on a private software owned by an entity, a company, or an individual.<sup>39</sup> Only users selected by the owner of the blockchain, also called “consortium”, can join the network and participate in the maintenance of the blockchain. In this case, only a restricted number of users can read or write in the blockchain.

Beside the creation of a classification within blockchains, each category provides some advantages. Even if private blockchains do not have all the characteristics of traditional public blockchains, they have some advantages.<sup>40</sup>

Private blockchains have been created mainly by banks, big organizations or companies who want to benefit from the blockchains advantages (its security, the decentralized storage of the data, the immutability of the operation...),<sup>41</sup> without necessarily adhering to Nakamoto’s philosophy of a decentralized data system which aims to remove the use of a middleman

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<sup>34</sup> Karim Sultan and others, ‘Conceptualizing blockchains: characteristics & applications’ (11th IADIS International Conference on Information Systems, Lisbon, 14-16 April 2018), page 53.

<sup>35</sup> Alec Liu, ‘Who’s Building Bitcoin? An Inside Look at Bitcoin’s Open Source Development’, (MOTHERBOARD, 7 May 2013), <[https://www.vice.com/en\\_us/article/9aa4ae/whos-building-bitcoin-an-inside-look-at-bitcoins-open-source-development](https://www.vice.com/en_us/article/9aa4ae/whos-building-bitcoin-an-inside-look-at-bitcoins-open-source-development)> accessed 4 May 2020.

<sup>36</sup> Karim Sultan and others, ‘Conceptualizing blockchains: characteristics & applications’ (11th IADIS International Conference on Information Systems, Lisbon, 14-16 April 2018), page 53.

<sup>37</sup> Ibid.

<sup>38</sup> Reynier Burnaby Lautier, ‘Intellectual Property Protection Strategies for Blockchain Technology Applications’ (Master Thesis, Delft University of Technology, 2018), page 55.

<sup>39</sup> Karim Sultan and others, ‘Conceptualizing blockchains: characteristics & applications’ (11th IADIS International Conference on Information Systems, Lisbon, 14-16 April 2018), page 53.

<sup>40</sup> Florent Loriaux, ‘L’utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?’ (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), page 8.

<sup>41</sup> Shermin Voshmgir, Valentin Kalinov, *Blockchain: A Beginners Guide*, (Blockchain Hub, 30 September 2017) <<https://s3.eu-west-2.amazonaws.com/blockchainhub.media/Blockchain+Technology+Intro.pdf>> accessed 4 May 2020, page 14.



completely.<sup>42</sup> In a private blockchain, all users need to be selected by the organization before joining the community. With this selection the owner can identify all the users of the blockchain.<sup>43</sup> This selection offers two advantages it limits the use of the system by undesirable individuals (such as criminals or terrorists who can use the blockchain anonymously); and secondly, it is easier to track the activity of the member, and therefore to do the adequate modification in the system in case of mistakes.<sup>44</sup> Each transaction sent to the system has to be validated by a restrictive consortium.<sup>45</sup> Consequently, illegal, suspicious, or operations considered unauthorized by this consortium can be rejected by the consortium.<sup>46</sup> Lastly, since the operations are only validated by a restrictive number of users and only authorized users can join the community, the verification of a transaction is simplified, and therefore shorter.<sup>47</sup> As a result, private blockchains also offer a faster solution than public blockchains.<sup>48</sup>

When it comes to public blockchains, they offer the possibility for individuals to create a transparent network accessible to all individuals.<sup>49</sup> In addition, all operations can be requested by the users, even those who are illegal since their validation does not depend on their legality but rather on the validity of the code.

To conclude this section, beyond the technical differences that distinguish private and public blockchains, the real debate that opposes them are more ideological. Each model asks in essence whether we want to be regulated by an "anonymous and decentralized" or by a "centralized" society.

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<sup>42</sup> Ibid, pages 5 to 10.

<sup>43</sup> Ahmed Afif Monrat, and others 'A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities', (2019) 7 IEEE, page 117139.

<sup>44</sup> Shermin Voshmgir, Valentin Kalinov, *Blockchain: A Beginners Guide*, (Blockchain Hub, 30 September 2017) <<https://s3.eu-west-2.amazonaws.com/blockchainhub.media/Blockchain+Technology+Intro.pdf>> accessed 4 May 2020, page 14.

<sup>45</sup> Ibid.

<sup>46</sup> Ibid.

<sup>47</sup> Valentina Gatteschi and others, 'Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough?', (2018) 10(2) Future Internet, page 25.

<sup>48</sup> Florent Loriaux, 'L'utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?' (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), page 8.

<sup>49</sup> Shermin Voshmgir, Valentin Kalinov, *Blockchain: A Beginners Guide*, (Blockchain Hub, 30 September 2017) <<https://s3.eu-west-2.amazonaws.com/blockchainhub.media/Blockchain+Technology+Intro.pdf>> accessed 4 May 2020, pages 13 to 14.

### 2.1.4 An example of a financial transaction with Bitcoin

To fully understand the blockchain's mechanism, its advantages and the issues it can raise, this part will illustrate a financial transaction made with Bitcoin. Bitcoin is the first public blockchain in the world. It has been created in 2008 by Satoshi Nakamoto, therefore, it also respects its philosophy of a digital society.<sup>50</sup> To illustrate the functioning of this ledger, we will describe a financial transaction between two individuals, A and B, realized on the Bitcoin blockchain. If A decide to transfer money to B, A has to send this money on B's account by entering B's public key. To verify B's/its identity, B has to enter its private key which must match the public key received. The operation is broadcasted to all the nodes of the network. Miners will have to verify the transactions. It is only when the network has approved the transactions that it will be added to the blockchain. This block will be attached to the previous one thanks to a hash crypto code which corresponds to the code of the previous block.

## 2.2 Business applications of blockchain

The European Commission has defined blockchain as a “tool for building a fair, inclusive, secure and democratic digital economy”.<sup>51</sup> It can be used as a solution to many issues in several sectors<sup>52</sup>. For example, it can be used for transferring and storing assets in a secure manner,<sup>53</sup> for creating a cryptocurrencies,<sup>54</sup> for storing records in a secure and immutable manner,<sup>55</sup> for avoiding the legal censorship or regulation of a central government/bank for regulated/prohibited activities,<sup>56</sup> for creating automated contracts, also called smart contracts,<sup>57</sup> which are autonomously activated when some pre-defined conditions are met,<sup>58</sup> for tracking

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<sup>50</sup> Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, (Bitcoin.org, 2008) <<https://bitcoin.org/bitcoin.pdf>> accessed 4 May 2020.

<sup>51</sup> European Commission, 'Blockchain Technologies', (*Europa, 15 December 2017*), <<https://ec.europa.eu/digital-single-market/en/blockchain-technologies>> accessed 4 May 2020.

<sup>52</sup> Ahmed Afif Monrat, and others 'A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities', (2019) 7 IEEE, page 117143.

<sup>53</sup> Valentina Gatteschi and others, 'Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough?', (2018) 10(2) Future Internet, page 24.

<sup>54</sup> Ibid.

<sup>55</sup> Ibid.

<sup>56</sup> Ibid.

<sup>57</sup> Ibid.

<sup>58</sup> Ibid.

the activities of the users and their assets/goods,<sup>59</sup> for proving the ownership of a good or service<sup>60</sup>... Even if the scope of application of blockchain has not been fully explored, it offers a numerous range of opportunities for companies which goes beyond the creation and transfer of Bitcoin's cryptocurrencies.<sup>61</sup>

Blockchain, and more precisely smart contracts, can also be used in the trade-finance sector by the banks as a tool for the payment of some loans, credits such as the Letter of Credit (LC). A Letter of Credit is a payment method used by traders. Contrary to a traditional bank transfer which guarantees the immediate transfer of the assets from one account to another, the LC guarantee the payment of the merchandise to the buyer only after the good delivery of the products. If the LC offers a protection for both the buyer and the seller, it requires a lot of investments (i.e. administrative and logistical) from the bank to ensure that the conditions of the payment are met. The complexity of the operation justifies its higher price, reason why trading parties are, in counterparty, less attracted by it. Using blockchain can reduce the costs of the operations by ensuring the autonomous payment of the goods at the moment of their delivery, without a human intervention.<sup>62</sup> This technology requires the use of additional systems as Oracles, or sensors as Internet of Things (IoT), to ensure that the condition for the executing of the contract are met.

Besides its application in the financial sector, blockchain can also be used in the insurance sector. One of the major issues this industry faces is the lack of trust from customers who think that the objective of insurance companies is to reduce the amount of the compensation,<sup>63</sup> but also, the lack of trust of the insurance companies towards the customers who fraud to obtain more compensation.<sup>64</sup> Blockchain and smart contract can be used as a middleman between the

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<sup>59</sup> Valentina Gatteschi and others, 'Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough?', (2018) 10(2) Future Internet, page 31.

<sup>60</sup> Ibid.

<sup>61</sup> Alexander Weir, 'Introductory Article: The Enormous Potential of Blockchain' (*European IP Helpdesk*), <<http://iprhelpdesk.eu/ip-highlights/ip-special-blockchain/article-alex-weir>> accessed 23 April 2020.

<sup>62</sup> Johannes-Tobias Lorenz and others, *Blockchain in Insurance-Opportunity or Threat?* (McKinsey & Company Report, July 2016) <<https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>> accessed 11 May 2020, page 4.

<sup>63</sup> Taras Havrylyukh, 'How to Make Smart Contracts Work for the Insurance Industry', (*Intellias blog*, 18 October 2018) <<https://www.intellias.com/how-to-make-a-smart-contract-work-for-the-insurance-industry/>> accessed 11 May 2020.

<sup>64</sup> Ibid.

parties to ensure the automatic compensation in case of damages detected by Oracles or IoT.<sup>65</sup> An automatic treatment of the claim process will also reduce the administrative tasks invested by both parties in case of disaster.<sup>66</sup> Among other benefits, blockchains can help to improve the product offer by insurance companies, diminish the risk of frauds in case of false declaration,<sup>67</sup> and therefore, redirects the competition within the market to the quality of the insurance offers and not the level of trust given by the consumer to the company.

Blockchain also had an impact in the supply chain sector. As described briefly earlier, blockchain technology can be used to track goods. It can, therefore, be used by shipping companies for locating any goods and their origins.

Furthermore, the blockchain technology also had an impact in the education. It can be used for storing data of students, but it can also be used to reduce the frauds during the exam by identifying the origin of the creation.

As outlined by the topic of this thesis, another area in which blockchain can have a considerable impact is the intellectual property (IP). Thanks to the transparency of the data and their traceability,<sup>68</sup> blockchain can be used to certify the ownership of a creation, to register and keep a record automatically of a work without the intervention of the author,<sup>69</sup> to transfer the ownership when a specific event is met with a smart-contract,<sup>70</sup> but also, to create new enforcement mechanisms with a decentralized Courts in case of infringement of intellectual property rights.<sup>71</sup> This thesis will focus on these numerous applications of blockchain for the IP protection in the next part of this essay.

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<sup>65</sup> Johannes-Tobias Lorenz and others, *Blockchain in Insurance-Opportunity or Threat?* (McKinsey & Company Report, July 2016) <<https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/Blockchain%20in%20insurance%20opportunity%20or%20threat/Blockchain-in-insurance-opportunity-or-threat.ashx>> accessed 11 May 2020, page 4.

<sup>66</sup> Ibid, page 5.

<sup>67</sup> Ibid.

<sup>68</sup> Aviv Gidron, 'Beyond the Hype of Blockchain - A Scenario-Based Analysis of the Potential Applications in the Music Industry' (Louvain School of Management, Université Catholique de Louvain, 2019), page 46.

<sup>69</sup> Pascal Asselot, 'In a Nutshell: Blockchain and IP' (*European IP Helpdesk*), <<http://iprhelpdesk.eu/ip-highlights/ip-special-blockchain/blockchain-in-a-nutshell>> accessed 23 April 2020.

<sup>70</sup> Florent Loriaux, 'L'utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?' (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), pages 41 to 46.

<sup>71</sup> Kevin Werbach, 'Trust, but verify: why the blockchain needs the law', (2018) 33(489) *Berkeley Technology Law Journal*, page 548;

To conclude this section, blockchain seems to open up new opportunities for different sectors but also to solve a lot of the issues faced by companies in general. The usefulness of this technology is endless. The wide range of application of this technology offers also new opportunities for companies, who can develop new businesses (e.g. the creation of a betting platform which is not regulated by any national law, and therefore avoid any censorship) or improving the quality of their products (e.g. for the creation of a self-insurance system or P2P insurance). If blockchain technology opens the doors to many applications in a lot of sectors, many of these applications also depend on other related technologies. In the following party we will describe the other technologies that have been developed in order to support blockchain's applications.

## **2.3 Other technologies related to the blockchain**

By requiring new technological development to implement such business ideas, blockchain does not only constitute a business catalyzer. It has also push for the development new technologies. To apply some of the blockchain ideas described in the previous part, companies often need to create a smart contract (2.3.1), or Oracles or Internet of Things (2.3.2).

### **2.3.1 Smart contracts**

The idea of smart contracts existed before Nakamoto's *White Paper* but it could only be implemented with the blockchain.<sup>72</sup> Smart contract refers to contractual clauses coded into a software in a manner that when a specific event defined in the contract is met, the program autonomously implements the terms of the contract without any human intervention.<sup>73</sup> Smart contract offers the possibility to record the contractual terms as well as the behaviour of each party (and potentially all the enforcement requests made by the parties). Most importantly, it provides the opportunity to self-execute the contractual provisions.<sup>74</sup>

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<sup>72</sup> Valentina Gatteschi and others, 'Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough?', (2018) 10(2) *Future Internet*, page 24.

<sup>73</sup> Merit Kõlvart, Margus Poola, and Addi Rull, 'Smart Contracts' in Tanel Kerikmäe and Addi Rull, *The Future of Law and eTechnologies* (1<sup>st</sup> edn, Springer Cham, 2016), page 133.

<sup>74</sup> *Ibid*, page 134.

This automatized contract constitutes an advantage to the parties who can rely on “an intelligent agent”<sup>75</sup> to enforce the terms, and therefore reduce the risks of malicious behaviours, trust issues between the parties, and the cost of a middleman or agent for executing the contract,<sup>76</sup> as it can be the case in the insurance sector for example.

Ethereum has exploited this technology for creating the second biggest blockchain in the world after Bitcoins. It offers the possibility for individuals to create smart contracts on an open source software, without having to rely on a centralized system, for executing the transaction established in the contract if some specific conditions are met.<sup>77</sup>

Smart contract executes the contract if certain events occur. In the following sub-section, we will discuss of the technologies which have been developed for monitoring such “events”.

## 2.3.2 Oracles and IoT

### 2.3.2.1 Oracles

Oracles are agents or services that collect information from the “real world” and send them to the smart contract.<sup>78</sup> Their main purpose “is to provide information to other smart contracts in order to monitor the fulfillment of the terms of the contracts”.<sup>79</sup> Once the smart contract receives accurate information from the oracles, the contract can be executed. Even if oracles refer to digital technology in this context, the source of information can also be an individual or an organization. Smart contracts who only rely on a unique (centralized oracle)<sup>80</sup> or a

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<sup>75</sup> Merit Kõlvart, Margus Poola, and Addi Rull, ‘Smart Contracts’ in Tanel Kerikmäe and Addi Rull, *The Future of Law and eTechnologies* (1<sup>st</sup> edn, Springer Cham, 2016), page 134.

<sup>76</sup> Ibid.

<sup>77</sup> Ibid, page 144.

<sup>78</sup> Valentina Gatteschi and others, ‘Blockchain and Smart Contracts for Insurance: Is the Technology Mature Enough?’, (2018) 10(2) *Future Internet*, page 24.

<sup>79</sup> Muharem Kianieff, *Blockchain Technology and the Law: Opportunities and Risks* (1<sup>st</sup> edn, Taylor & Francis, 2019).

<sup>80</sup> Eric C Jansen, ‘How Oracles Make Smart Contracts Work’ (*Finivi*, 28 June 2018) <<https://www.finivi.com/oracles-make-smart-contracts-work/>> accessed 19 May 2020.

network of oracles (decentralized oracle)<sup>81</sup> to obtain the external information are sometimes called “smart oracles”.<sup>82</sup>

The information collected by the oracles can be diverse. It can be for example the weather forecast, result of a political election, a medical record, or a judicial decision.<sup>83</sup>

### 2.3.2.2 Internet of Things (IoT)

The last category of technology related to blockchain is the IoT. Although there is no universal definition of Internet of Things (IoT), there is a general consensus on their application. IoT are devices connected to the internet which are used to communicate with anything established previously.<sup>84</sup> When it comes to blockchain, IoT are generally sensors that can provide information on an environment. It can, for example, monitor the temperature inside a house, the level of ink in a printer, and send the relevant information to the blockchain.<sup>85</sup> So, thanks to IoT, we can improve the access to information of the blockchain.<sup>86</sup>

Oracles and IoT can improve the access to information of the blockchain, and therefore increase the possibility of automatization in a smart contract. Since the data are not added manually by a user but automatically collected by IoT and oracles, these technologies also increase the quality of the data stored.<sup>87</sup>

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<sup>81</sup> Eric C Jansen, ‘How Oracles Make Smart Contracts Work’ (*Finivi*, 28 June 2018) <<https://www.finivi.com/oracles-make-smart-contracts-work/>> accessed 19 May 2020.

<sup>82</sup> Stefan Thomas and Evan Schwartz, *Smart Oracles: A Simple, Powerful Approach to Smart Contracts* (Codius, 17 July 2014) <<https://perma.cc/S5TV-Q3JH>> accessed 20 May 2020.

<sup>83</sup> Shermin Voshmgir, ‘Blockchain Oracles’ (*Blockchainhub Berlin*, July 2019) <<http://blockchainhub.net/blockchain-oracles/>> accessed 20 May 2020.

<sup>84</sup> Khaled Salah Mohamed, *The Era of Internet of Things* (1<sup>st</sup> edn, Springer Cham, 2019), page 1.

<sup>85</sup> Tom Lyons, Ludovic Courcelas, ‘Convergence of Blockchain, AI and IoT (*The European Union Blockchain Observatory and Forum*, Thematic Report, 21 April 2020) <[https://www.eublockchainforum.eu/sites/default/files/report\\_convergence\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/report_convergence_v1.0.pdf)> accessed 28 May 2020, page 9.

<sup>86</sup> Subhas Chandra Mukhopadhyay, *Internet of Things. Smart Sensors, Measurement and Instrumentation* (Volume 9, Springer Cham, 2014), page 1.

<sup>87</sup> Tom Lyons, Ludovic Courcelas, ‘Convergence of Blockchain, AI and IoT (*The European Union Blockchain Observatory and Forum*, Thematic Report, 21 April 2020) <[https://www.eublockchainforum.eu/sites/default/files/report\\_convergence\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/report_convergence_v1.0.pdf)> accessed 28 May 2020, page 10.

To conclude this section, it can be said that, the combination between blockchain and other technologies opens the doors for new applications. Nevertheless, it is also important to outline that the blockchain technology still is immature and has not been fully explored yet. To understand the benefits of the blockchain, it is also necessary to analyse its weaknesses in the following section.

## **2.4 The disadvantages of the blockchain**

Blockchain does not only represent new opportunities. It also brings some uncertainties and concerns. This section will discuss some of the issues raised by the blockchain related to its technical limits (2.4.1), its expensive costs (2.4.2), the anonymity of the users (2.4.3) and the inadaptability of the legal framework (2.4.4).

### **2.4.1 Technical limits of the blockchain**

As outlined in the previous part, the information is stored permanently in a public blockchain. While this characteristic of blockchains ensures the incorruptibility of the data store it also constitutes an issue. In a public blockchain it is almost impossible to change the data store in the nodes.<sup>88</sup> Therefore, if a user requests a modification or cancellation of a transaction, the blockchain cannot technically operate such type of requests. The impossibility for the user to change their consent to a transaction has raised several concerns, especially in regard of the EU consumer protection rules. The legality of the blockchain in regard of EU consumer law will be developed in the third section of this essay regarding the concrete application of blockchain for the IP rights.

Additionally, blockchain is based on the validation of the information by a consensus among the community. If this consensus mechanism avoids any centralized decision on the operation by a unique entity, it also increases the complexity of the procedure for the validation of a transaction. The slow speed at which operations are recorded in the networks is another issue that explains why cryptocurrencies are not popularized yet.<sup>89</sup>

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<sup>88</sup> Kevin Werbach, 'Trust, but verify: why the blockchain needs the law', (2018) 33(489) Berkeley Technology Law Journal, page 505.

<sup>89</sup> Aviv Gidron, 'Beyond the Hype of Blockchain - A Scenario-Based Analysis of the Potential Applications in the Music Industry' (Louvain School of Management, Université Catholique de Louvain, 2019), pages 35 and 64.



## 2.4.2 The expensive costs of the blockchain

The second issues of blockchain is related to its important cost. In the blockchain, data are encrypted with a hashing system before to be stored in the block. Additionally, miners are incited to code and store such information with a mathematical game.<sup>90</sup> However, an important source of energy is necessary for encrypting the data with a hashing system,<sup>91</sup> for solving the mathematic problem, and transfer all the information in all the nodes.<sup>92</sup> For example, Bitcoin blockchain consumes approximately 55 billions kWh per year, which represents between 0.071% to 0,273% of world production.<sup>93</sup> This high energy consumption can raised several concerns from the environment protection perspectives.

## 2.4.3 The anonymity of the network

In the network users are identified by their public key which is a digital signature similar to an email address.<sup>94</sup> Since each user is identified with a digital signature, it is difficult to identify the author of an operation.<sup>95</sup> If the protection of the anonymity of the users can be perceived as an advantage, it has led to serious concerns. Blockchain can potentially be used for illegal transactions such as money laundering,<sup>96</sup> capital flight, financing of criminal activities, betting systems...<sup>97</sup>

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<sup>90</sup> See Section 2.1.2 on the characteristics of the blockchain

<sup>91</sup> Aviv Gidron, 'Beyond the Hype of Blockchain - A Scenario-Based Analysis of the Potential Applications in the Music Industry' (Louvain School of Management, Université Catholique de Louvain, 2019), page 25.

<sup>92</sup> Florent Loriaux, 'L'utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?' (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), page 12.

<sup>93</sup> Ibid, page 13.

<sup>94</sup> Kevin Werbach, 'Trust, but verify: why the blockchain needs the law', (2018) 33(489) Berkeley Technology Law Journal, page 505, footnote 77.

<sup>95</sup> Ibid.

<sup>96</sup> Tom Lyons, Ludovic Courcelas and Ken Timsit, 'Legal and Regulatory Framework for Blockchain and Smart Contracts' (*The European Union Blockchain Observatory and Forum*, Thematic Report, 27 September 2019) <[https://www.eublockchainforum.eu/sites/default/files/reports/report\\_legal\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf)> accessed 17 May 2020, page 15.

<sup>97</sup> Kevin Werbach, 'Trust, but verify: why the blockchain needs the law', (2018) 33(489) Berkeley Technology Law Journal, page 493.

The anonymity of the user also constitutes a problem for the enforcement of the rights, especially in regard of the IP law. If a right is infringed by one of the users via the platform, the other users cannot obtain its identity.<sup>98</sup>

Several observations can be made to conclude this section. Blockchain technology opens the doors to many applications and can be seen as a solution to many problems. However, the technology itself also needs to be improved. The immaturity of the technology, and its hypothetical applications in several industries, make it difficult to fully assess its general impact without a concrete application.

While the issues describe above represent a limit to the development of blockchain in many industries,<sup>99</sup> they also have been the source of inspiration for private blockchains. As for public blockchains, private blockchains aim to create an automatized ledger. However, such network allowed is only accessible to a restricted number of users which can be identified.<sup>100</sup> Furthermore, given the fact that the information has to be authorized by a smaller number of users, the operation is validated faster. Therefore, the network needs to rely on less resources to carry the transactions. Additionally, the action of the members can be tracked by the consortium and changed if needed.<sup>101</sup>

To fully evaluate the impact of the blockchain for the companies, this essay will analyze a concrete application of blockchain in one of the sectors that can benefit more of this technology: the IP sector.

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<sup>98</sup> Tom Lyons, Ludovic Courcelas and Ken Timsit, 'Legal and Regulatory Framework for Blockchain and Smart Contracts' (*The European Union Blockchain Observatory and Forum*, Thematic Report, 27 September 2019) <[https://www.eublockchainforum.eu/sites/default/files/reports/report\\_legal\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf)> accessed 17 May 2020, page 11.

<sup>99</sup> Aviv Gidron, 'Beyond the Hype of Blockchain - A Scenario-Based Analysis of the Potential Applications in the Music Industry' (Louvain School of Management, Université Catholique de Louvain, 2019), page 64.

<sup>100</sup> Ahmed Afif Monrat, and others 'A Survey of Blockchain From the Perspectives of Applications, Challenges, and Opportunities', (2019) 7 IEEE, page 117139.

<sup>101</sup> Shermin Voshmgir, Valentin Kalinov, *Blockchain: A Beginners Guide*, (Blockchain Hub, 30 September 2017) <<https://s3.eu-west-2.amazonaws.com/blockchainhub.media/Blockchain+Technology+Intro.pdf>> accessed 4 May 2020, page 14.

### 3. Blockchain for the protection of intellectual property rights

Blockchain technology can have an important impact in several sectors. The IP sector is one of the sectors for which blockchain would have a positive impact. To assess the benefits and the issues that this technology can raise in this specific sector, we will in this part describe the current European IP legal protection (3.1), and how the blockchain can be put in the service of the IP protection (3.2).

#### 3.1 The European IP legal framework and its challenges

All companies aim to develop their assets or creations. To fully enjoy the benefits of these creations, companies often protect their work with an intellectual property right. This right ensures that the benefits of the creation will go to its author and prohibits the use, the reproduction and even the trade of the creation without the consent of its author/inventor.<sup>102</sup> Therefore, IP rights aim to protect the intangible assets of the companies such as their products, their innovative creation, and also their brand attached to it, which represents more than fifty percent of the value of the company.<sup>103</sup> A strong intellectual property right regime encourages companies to invest in new product and business,<sup>104</sup> reason why each country has introduced an intellectual property regime to develop the economic growth.

Within the European Union, IP rights are protected by the national system of Member States and the EU level. Article 118 of the Treaty on the Functioning of the European Union (TFEU)<sup>105</sup> confers an explicate competence to the EU to legislate in the area of the IP.<sup>106</sup> Even

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<sup>102</sup> Robert Pitkethly, 'IP strategy' in Anatole Krattiger and others, *Intellectual Property Management in Health and Agricultural Innovation: a handbook of best practices* (2<sup>nd</sup> edn, Volume 1, MIHR, PIPRA, Oswaldo Cruz Foundation and and bioDevelopments-International Institute, 2007), page 459.

<sup>103</sup> European Commission, 'Internal Market, Industry, Entrepreneurship and SMEs': Intellectual Property', (*Europa*) <[https://ec.europa.eu/growth/industry/policy/intellectual-property\\_en](https://ec.europa.eu/growth/industry/policy/intellectual-property_en)> accessed 11 May 2020.

<sup>104</sup> European Commission, 'Intellectual property: Protecting Europe's know-how and innovation leadership' (*Europa*, 29 November 2017) < [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_17\\_4942](https://ec.europa.eu/commission/presscorner/detail/en/IP_17_4942)> accessed 11 May 2020.

<sup>105</sup> Consolidated version of the Treaty on the Functioning of the European Union (2012) OJ 1 326/47.

<sup>106</sup> European Parliament, 'Fact Sheets on the European Union: Intellectual, industrial and commercial property'

if not all the area of EU is fully harmonized, IP law is the only area of private law which has been fully “Europeanized”.<sup>107</sup> The EU IP legal system is composed of central authorities in charge of the registration and the management of the rights within the EU, the European Union Intellectual Property Office (EUIPO) and the European Patent Office (EPO), of a legal framework which ensures the protection of the IP rights, and a judicial system for ensuring the enforcement of these rights.<sup>108</sup> However, it is important to keep in mind that the European Union does not remove all the competence from the Member States. They still have the competence to adopt some legislative acts to protect IP rights.<sup>109</sup> In parallel to the EU IP’s protection, each Member State has also a national registration authority, its national rules and its national courts.<sup>110</sup> These different levels of protection (national, regional with the EU and even international to international agreements) offer the possibility for the inventors and creators to benefit of several mechanisms for protecting the same work, in the same jurisdiction. The multiplication of the IP “tools” contributes to strengthen the number of protections granted to an invention/creation, and thus to reinforce the rights of the author.

In addition to the multi-level protection mechanisms, the EU IP legal framework also offers a far going range of protections such as patents, trade secrets, trademarks, designs, copyrights, plant varieties, geographical indications, and the combat against counterfeiting and piracy.<sup>111</sup>

Facing all these complex protection mechanisms, it is important that companies adopt an intellectual property strategy<sup>112</sup> in order to protect their assets but also to improve their competitiveness.<sup>113</sup> Each intellectual property right has its own benefits, objectives and cannot

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(*Europarl*, January 2020) <[https://www.europarl.europa.eu/ftu/pdf/en/FTU\\_2.1.12.pdf](https://www.europarl.europa.eu/ftu/pdf/en/FTU_2.1.12.pdf)> accessed 14 May 2020, page 1.

<sup>107</sup> Justine Pila and Paul Torremans, *European Intellectual Property Law* (1<sup>st</sup> edn, Oxford University Press, 2016), page 39.

<sup>108</sup> *Ibid.*

<sup>109</sup> European Parliament, ‘Fact Sheets on the European Union: Intellectual, industrial and commercial property’ (*Europarl*, January 2020) <[https://www.europarl.europa.eu/ftu/pdf/en/FTU\\_2.1.12.pdf](https://www.europarl.europa.eu/ftu/pdf/en/FTU_2.1.12.pdf)> accessed 14 May 2020, pages 1 and 7.

<sup>110</sup> Justine Pila and Paul Torremans, *European Intellectual Property Law* (1<sup>st</sup> edn, Oxford University Press, 2016), page 39.

<sup>111</sup> European Parliament, ‘Fact Sheets on the European Union: Intellectual, industrial and commercial property’ (*Europarl*, January 2020) <[https://www.europarl.europa.eu/ftu/pdf/en/FTU\\_2.1.12.pdf](https://www.europarl.europa.eu/ftu/pdf/en/FTU_2.1.12.pdf)> accessed 14 May 2020, pages 1 to 6.

<sup>112</sup> For the definition of an ‘IP strategy’ see the article of Robert Pitkethly, ‘IP strategy’ in Anatole Krattiger and others, *Intellectual Property Management in Health and Agricultural Innovation: a handbook of best practices* (2<sup>nd</sup> edn, Volume 1, MIHR, PIPRA, Oswaldo Cruz Foundation and and bioDevelopments-International Institute, 2007).

<sup>113</sup> The European IPR Helpdesk, ‘Your Guide to IP in Europe’ (*Iprhelpdesk*, 2017)

be used for all creations. Companies must therefore assess the scope, advantages and issues that these rights offer before they choose one of these mechanisms.

Although the European Intellectual property law offers a far going mechanism of protection for innovative work, this system has to face several challenges.

The first issue is the absence of a unique harmonized IP system within the EU. Each MS has its own national legal framework for protecting IP rights. This system is completed by an EU framework. The objective of the centralized mechanism is to simplify the registration of IP rights in the other MS. However, this centralization mechanism does not remove the territoriality nature of IP rights: IP rights “remain a national matter”.<sup>114</sup>

Thus, if authors/inventors can obtain an EU IP right, the administrative cost and the complexity of the mechanism hinder the access to this right. Furthermore, the territoriality nature of these rights, constitutes a real barrier to the enforcement of the rights when most of the infringements are realized online.<sup>115</sup> Thus, if the internet has been a major factor of development for different companies, it also facilitates the infringement of IP rights.

The second issue that will be developed is directly related to the digital revolution. Most of the IP rules have been adopted before the digital revolution. While this revolution has created new business opportunities, it has also increased the number of infringements of IP rights. With the internet, it became easier to copy protected contents illegally, to pirate the systems of the company, or to order goods which infringed IP rights.<sup>116</sup> These infringements do not only impact the rightsholders but represent a real threat to all the business sectors within the EU. According to the communication of the Commission IP, infringements have created a total loss of EUR 48 billion for the businesses in 2016, but also for the Member States who lost their tax revenues and other social contributions.<sup>117</sup> These losses have a particular impact on the clothing, luxury goods, pharmaceutical and cultural industries.<sup>118</sup> Despite this warning signals,

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<<https://www.iprhelppdesk.eu/sites/default/files/documents/EU-IPR-Guide-IP-in-Europe.pdf>> accessed 17 May 2020, page 3.

<sup>114</sup> Justine Pila and Paul Torremans, *European Intellectual Property Law* (1<sup>st</sup> edn, Oxford University Press, 2016), page 555.

<sup>115</sup> Annette Kur and Thomas Dreier, *European Intellectual Property Law* (1<sup>st</sup> edn, Edward Elgar Publishing, 2013), page 449.

<sup>116</sup> European Commission, ‘Communication from the Commission to the European Parliament, the Council and the Economic and Social Committee: A balanced IP enforcement system responding to today’s social challenges’ COM (2017) 707 final, page 1.

<sup>117</sup> *Ibid*, pages 1 and 2.

<sup>118</sup> *Ibid*, page 1.

the actual legal framework is not adapted to the digital revolution. The EU has adopted several policies (i.e. the Digital Single Market) to improve and support the enforcement of these rights, but stronger actions need to be taken.<sup>119</sup> To ensure a better protection of IP rights in a digital context, the legal framework has to take into account digital technologies.<sup>120</sup>

These challenges in EU IP law reduce the efficiency of the EU mechanisms and, therefore, impacts the scope of protection of IP law. In this digital context, a digital technology as blockchain can offer a solution to many of these issues. The next section of this thesis will develop the different applications of blockchain for the protection of IP rights and their consequences.

## **3.2 The blockchain in the service of IP**

As developed in the previous sub-section, the level of protection afforded to the rightsholders under EU IP law has been affected by, firstly, the complexity of the EU IP system and, secondly, by the digital revolution which has led to new methods of creations and an increase of the number of infringements. In this particular context, blockchain can be a tool for solving some of these issues. Blockchain can be used to reinforce the IP rights during all its life: from its creation to its enforcement. Thus, in this part, we will develop concrete examples of the application of blockchain for the creation of the proof of the ownership of the rights (3.2.1), for its management (3.2.2) and for its enforcement in the fight against counterfeits (3.2.3).

### **3.2.1 Blockchain as an evidence of the ownership of IP rights**

Intellectual property rights confer the ability to the author to protect their creations. In case of infringement of such rights, authors have the possibility to ask the competent court to stop the exploitation, distribution or use of their work.<sup>121</sup> However, some of these IP protection mechanisms, such as copyright and trade secrets, do not require a registration to confer the

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<sup>119</sup> Ibid, page 2.

<sup>120</sup> Ibid, page 3.

<sup>121</sup> Justine Pila and Paul Torremans, *European Intellectual Property Law* (1<sup>st</sup> edn, Oxford University Press, 2016), page 555.

rights to the owner.<sup>122</sup> Therefore, the question is how to prove the ownership of work, even when it has not been registered? Article 6(1) of the Directive 2004/48/EC on the enforcement of IP rights answers to this interrogation by requiring that the party has to present “reasonably available evidence sufficient to support its claims” for enforcing its rights.<sup>123</sup> Therefore, if the party succeed to bring the evidence of the ownership of the work, he/she/it can enforce its rights.<sup>124</sup> Depending of the type of work, the ownership of the right can be proved by several means: with a certification conferring the IP rights (i.e. an IP registration); or by bringing factual evidences of the authorship/inventorship of the work.<sup>125</sup> In this last case, the party has to bring an evidence that he/she has created the work.

In this section, we will firstly analyse how blockchain can be used for the registration (3.2.1.1) and for proving the authorship/inventorship the work (3.2.1.2), before to analyse the legal status of these evidences collected through the blockchains (3.2.1.3).

### 3.2.1.1 Using blockchains for the registration of the IP rights

Most of the IP protection mechanisms, such as trade mark, design and patent, require a registration in order to grant a protection to the author.<sup>126</sup> If the EU IP legal framework offers sometimes centralized registrations for all the Member States, the administrative burden, the legal complexity, and the cost of the system is an obstacle for Small and Medium Enterprises (SMEs)<sup>127</sup> who do not have the resources for investing in an IP protection.<sup>128</sup> Blockchain and

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<sup>122</sup> European Parliament, ‘Fact Sheets on the European Union: Intellectual, industrial and commercial property’ (*Europarl*, January 2020) <[https://www.europarl.europa.eu/ftu/pdf/en/FTU\\_2.1.12.pdf](https://www.europarl.europa.eu/ftu/pdf/en/FTU_2.1.12.pdf)> accessed 14 May 2020, pages 1 to 7.

<sup>123</sup> Directive (EU) 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of the intellectual property rights (2004) OJ L195/16, Article 6(1).

<sup>124</sup> European IPR Helpdesk, ‘Fact Sheet: Inventorship, Authorship and Ownership’ (*Iprhelpdesk*, March 2013) <<http://www.iprhelpdesk.eu/sites/default/files/newsdocuments/Fact-Sheet-Inventorship-Authorship-Ownership.pdf>> accessed 23 May 2020, page 2.

<sup>125</sup> Florent Loriaux, ‘L’utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?’ (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), pages 27 to 28.

<sup>126</sup> Anna Leida Mölder, ‘How blockchain can change how we view IP rights’ (*AWA Point*, 12 November 2018) <<https://awapoint.com/blockchain-can-change-view-ip-rights/>> accessed 22 May 2020.

<sup>127</sup> European IPR Helpdesk, ‘Your Guide to IP in Europe’ (*Iprhelpdesk*, 2017) <<https://www.iprhelpdesk.eu/sites/default/files/documents/EU-IPR-Guide-IP-in-Europe.pdf>> accessed 17 May 2020, page 3.

<sup>128</sup> Robert Pitkethly, ‘IP strategy’ in Anatole Krattiger and others, *Intellectual Property Management in Health and Agricultural Innovation: a handbook of best practices* (2<sup>nd</sup> edn, Volume 1, MIHR, PIPRA, Oswaldo Cruz

related technologies offer the possibility to solve some of the issues related to the registration procedure.

Companies are not the only stakeholders that can benefit from the registration of IP rights with the blockchain technology. It can also be an asset for IP authorities and public administration. Once the IP authority has ensured that the registration fee has been paid by the applicant, they upload the description of the work or the work itself in the database. Then it will be compared to the other registrations or works submitted to its services.<sup>129</sup> If similarities are found with another registration, the application does not fulfill the novelty criteria which are required to prove that the creation is innovative. Additionally, depending on the IP rights, the IP has to assess whether all requirements for the registration are fulfilled.<sup>130</sup> Such mechanism can be costly for the administration because they require an important source of data, and to compare the information collected, sometimes in several MS, with several sources of data within the EU and the MS.<sup>131</sup>

The complexity of the procedure, the decentralized nature of the data are other technical obstacles that slows down the deliverance of registration, and therefore, the IP protection. Blockchains can be a solution that makes the IP registration procedure faster, easier and less costly.<sup>132</sup>

It can, firstly, be used to assess automatically whether the work created can fulfil the criteria (mainly the requirements novelty, the innovative nature; and additionally, for patent, the industrial applicability of the creation).<sup>133</sup> To do so, the blockchain can be used as a database which store all the previous works submitted in all the Member States, and, thanks to external

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Foundation and and bioDevelopments-International Institute, 2007), page 469.

<sup>129</sup> Anna Leida Mölder, 'How blockchain can change how we view IP rights' (*AWA Point*, 12 November 2018) <<https://awapoint.com/blockchain-can-change-view-ip-rights/>> accessed 22 May 2020.

<sup>130</sup> For the list of all the requirements for each IP right, see European IPR Helpdesk, 'Your Guide to IP in Europe' (*Iprhelpdesk*, 2017) <<https://www.iprhelpdesk.eu/sites/default/files/documents/EU-IPR-Guide-IP-in-Europe.pdf>> accessed 17 May 2020.

<sup>131</sup> Anna Leida Mölder, 'How blockchain can change how we view IP rights' (*AWA Point*, 12 November 2018) <<https://awapoint.com/blockchain-can-change-view-ip-rights/>> accessed 22 May 2020.

<sup>132</sup> Gönenç Gürkaynak and others, 'Intellectual Property law and practice in the blockchain realm' (2018) 34(4) *Computer Law & Security Review*, page 855.

<sup>133</sup> For the list of all the requirements for each IP right, see European IPR Helpdesk, 'Your Guide to IP in Europe' (*Iprhelpdesk*, 2017) <<https://www.iprhelpdesk.eu/sites/default/files/documents/EU-IPR-Guide-IP-in-Europe.pdf>> accessed 17 May 2020.



Artificial Intelligence (AI) softwares, it can be identified whether new applications are similar to pre-existing work, and therefore fulfill the criteria of novelty.<sup>134</sup>

From the perspective of the applicants, blockchain can be used as a tool for making a pre-assessment on the admissibility of the registration without submitting it.<sup>135</sup> If the criteria of admissibility of the registration are fulfilled, it can be used additionally to send a formal application autonomously to the IP authorities.

Blockchain can also facilitate the procedures by centralizing all the data (either national, regional and international) in the same program. Subsequently, the administration can assess the registration application autonomously without any human intervention.<sup>136</sup> Thanks to this mechanism, blockchain can resolve the lack of protection of some works which are not immediately protected due to the cost and the complexity of the procedure.<sup>137</sup>

However, despite these advantages, the public administration is not ready to implement such types of technologies. The high cost, the degree of digital knowledge required by the employees/users for being able to use the technology, the immaturity of the technology, the lack of a legislative framework from blockchain<sup>138</sup> and the absence of an unique international IP database<sup>139</sup> are many reasons that hold back public authorities to adopt blockchains. For these reasons, even if the technology can already be used as a tool for the registration system, it can never replace the administrative and legal obligations of the parties.<sup>140</sup>

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<sup>134</sup> Gönenç Gürkaynak and others, 'Intellectual Property law and practice in the blockchain realm' (2018) 34(4) Computer Law & Security Review, page 855.

<sup>135</sup> Ibid.

<sup>136</sup> Ibid, page 856.

<sup>137</sup> Alexander Weir, 'Introductory Article: The Enormous Potential of Blockchain' (*European IP Helpdesk*) <<http://iprhelphdesk.eu/ip-highlights/ip-special-blockchain/article-alex-weir>> accessed 23 April 2020.

<sup>138</sup> Gönenç Gürkaynak and others, 'Intellectual Property law and practice in the blockchain realm' (2018) 34(4) Computer Law & Security Review, page 855 to 857.

<sup>139</sup> Anna Leida Mölder, 'How blockchain can change how we view IP rights' (*AWA Point*, 12 November 2018) <<https://awapoint.com/blockchain-can-change-view-ip-rights/>> accessed 22 May 2020.

<sup>140</sup> Florent Loriaux, 'L'utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?' (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), page 42.

### **3.2.1.2 Using blockchains for the evidences of the authorship/inventorship of the work?**

In the previous section we have demonstrated that blockchain can be used to register the IP rights, and therefore create a certification which proves the ownership of the right. But it is not its only possible application. Thanks to its hashing system, blockchain can store information in an immutable, reliable and transparent manner.<sup>141</sup> Therefore, it can also be used to store and provide tamper proof evidence of the ownership, or the authorship/inventorship of the work in an immutable database.<sup>142</sup>

### **3.2.1.3 The legal status of the evidences of the rights collected in a blockchain**

Blockchain can be used for producing acts or factual evidences of the ownership of IP rights. However, the legality of the documents created through this recent technology can be argued. In this part, we will examine whether the data collected in a blockchain can constitute an evidence of the ownership of the IP rights before the Courts.

- **The importance of the evidences in civil proceedings**

When the author/inventor has obtained an IP right, he/she can prevent any third party to use its work without its consents. The rightsholder can take an action before the civil court to enforce this right.<sup>143</sup> With a civil proceeding, the owner tries to “redress” the tort made against its IP rights. During this procedure, the rightsholder must present some evidences for establishing the infringement of intellectual property rights”.<sup>144</sup> The evidences collected can be used in two circumstances: for proving a legal fact (e.g. the creation of the work); or it can be used as a proof of the authenticity of an act (e.g. the proof of the registration of the IP rights).<sup>145</sup>

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<sup>141</sup> Ibid, page 33.

<sup>142</sup> Alexander Weir, ‘Introductory Article: The Enormous Potential of Blockchain’ (*European IP Helpdesk*) <<http://iprhelphdesk.eu/ip-highlights/ip-special-blockchain/article-alex-weir>> accessed 23 April 2020.

<sup>143</sup> Justine Pila and Paul Torremans, *European Intellectual Property Law* (1<sup>st</sup> edn, Oxford University Press, 2016), page 577.

<sup>144</sup> Directive (EU) 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of the intellectual property rights (2004) OJ L195/16, Recital 20.

<sup>145</sup> Florent Loriaux, ‘L’utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?’ (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), pages 27 to 28.

In IP law, the EU legislator has introduced procedural rules “to ensure that effective means of presenting, obtaining and preserving evidence are available”.<sup>146</sup> Although the notion of evidence is important, the Directive does not specify the type of evidence that can be accepted by the Courts during a civil proceeding, especially when it comes to evidence collected digitally. In fact, as outlined by the Commission in its Guidance on certain aspects of the Directive 2004/48/EC,<sup>147</sup> there is no explicit indication on whether IP law allowed evidences collected electronically or digitally,<sup>148</sup> and more precisely whether the data collected digitally in the blockchain can be considered as a valid evidence in EU law.

In order to assess the answer to this question, it is important to determine firstly if blockchain’s data can be considered as digital or electronic evidences. The Directive 2004/48/EC does not define the notion of ‘digital’ or ‘electronic evidence’. However, the European Commission addressed some of the issues related to the collection of the evidence and the digital context in its Guidance on certain aspects of Directive 2004/48/EC on the enforcement of intellectual property rights,<sup>149</sup> without defining the notion of digital or electronic evidences. Despite this lack of clarity, it suits to mention some of the attempts to provide a definition.

- **Definition of electronic and digital evidences**

Electronic evidences have been firstly defined in EU law in the Proposal for Regulation of the European Parliament and of the Council on European Production and Preservation Orders for electronic evidence in criminal matters.<sup>150</sup> Article 2(6) of the Proposal defined electronic evidence as “evidence stored in electronic form by or on behalf of a service provider at the time of receipt of a production or preservation order certificate, consisting in stored subscriber data, access data, transactional data and content data”.<sup>151</sup> This definition can be considered as narrow. It only includes the data collected within a digital platform, and therefore does not

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<sup>146</sup> Directive (EU) 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of the intellectual property rights (2004) OJ L195/16, Recital 20.

<sup>147</sup> European Commission, ‘Guidance on certain aspects of Directive 2004/48/EC of the European Parliament and of the Council on the enforcement of intellectual property rights’ COM (2017) 708 final.

<sup>148</sup> Ibid, page 21.

<sup>149</sup> Ibid.

<sup>150</sup> European Commission, ‘Proposal for Regulation of the European Parliament and of the Council on European Production and Preservation Orders for electronic evidence in criminal matters’ COM (2018) 225 final.

<sup>151</sup> Ibid, Article 2(6).

include evidences originated from all digital devices.<sup>152</sup> This restrictive definition of ‘electronic evidence’ can be explained by the nature of the act itself. Indeed, this Proposal aimed to create a cooperation between the Member States for crimes that used digital services.<sup>153</sup> In this context, the definition of electronic evidence is only intended to criminal matters realized in online services. The scope of the Proposal does not include all the digital activities, such as those in the blockchains. Consequently, the definition of ‘electronic evidence’ does not have for objective to be extended outside of the scope of this Directive, and therefore outside of the scope of criminal activities realized through online platform.

To overcome the restrictive applicability of the first definition to criminal matters, Maria Angela Biasiotti suggested a broader definition of ‘electronic evidence’ that includes all the type data, indifferently of their origin. According to her, “electronic evidence is any data resulting from the output of an analogue device and/or a digital device of potential probative value that are generated by, processed by, stored on or transmitted by any electronic device. Digital evidence is an “[e]lectronic [e]vidence which is generated or converted to a numerical format”.<sup>154</sup> Based on this definition, any evidence generated in a numerical format is a digital evidence. Since blockchains generated data through the computer system online, it can potentially create electronic, and more precisely, digital evidences. However, the question now is whether such evidence can be declared admissible by the Courts or authority in regards of IP protection.

- **The admissibility of digital evidences in IP law**

As outlined in the Guideline<sup>155</sup> and Evaluation reports<sup>156</sup> of the Directive 2004/48/EC, the use of digital evidences in IP law enforcement procedures is not regulated by the Directive. In the

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<sup>152</sup> Hong Wu and Guan Zheng, ‘Electronic evidence in the blockchain era: New rules on authenticity and integrity’ (2020) 36 Computer Law & Security Review, page 3.

<sup>153</sup> European Commission, ‘Proposal for Regulation of the European Parliament and of the Council on European Production and Preservation Orders for electronic evidence in criminal matters’ COM (2018) 225 final, pages 1 to 2.

<sup>154</sup> Maria Angela Biasiotti, ‘A Proposed Electronic Evidence Exchange across the European Union’ (2017) 14 Digital Evidence and Electronic Signature Law Review, page 4.

<sup>155</sup> European Commission, ‘Guidance on certain aspects of Directive 2004/48/EC of the European Parliament and of the Council on the enforcement of intellectual property rights’ COM (2017) 708 final, page 21.

<sup>156</sup> European Commission, ‘Evaluation accompanying the Communication from the Commission to the Institutions on Guidance on certain aspects of Directive 2004/48/EC of the European Parliament and of the Council on the enforcement of intellectual property rights’ SWD (2017) 431 final, page 10.

absence of specific rules in the matter, the legality of digital evidence has to be determined by national procedural rules. Although Member States still have competence for establishing procedure rules for the collect of evidences, most of them do not have a legislate framework adapted to the digital context, and more precisely to the issue of the blockchain.

- **The admissibility of evidences collected within a blockchain during a civil proceeding**

As described previously, EU law did not introduced rules for digital evidences. Therefore, the actual legal framework does not provide a clear answer on the admissibility of the evidences collected on the blockchains. However, this situation is not similar in all countries. At the international level, only China and the States of Vermont and Arizona, have granted a legal status to evidences collected in a blockchain.<sup>157</sup>

Contrary to the other States, the Vermont decided to adopt the first law related to the admissibility of blockchain evidences.<sup>158</sup> Thus, the Court Procedure rules of the Vermont Statutes law<sup>159</sup> recognizes the authenticity of blockchain data that meet certain requirements.<sup>160</sup>

In China, the recognition of blockchains evidences was done gradually. The legislator started by recognizing the legality of digital evidences in the Civil Procedure Law in 2012 for criminal matters.<sup>161</sup> In 2018, the Chinese Court of Hangzhou, one of the three Chinese Court specialized in internet related cases,<sup>162</sup> took another step. It recognized that “electronic data stored on a blockchain could be treated as electronic evidence”.<sup>163</sup> More recently, in 2019 the Court also

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<sup>157</sup> Florent Loriaux, ‘L’utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?’ (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), pages 28 to 29.

<sup>158</sup> Jean-Maxime Rivière, ‘Blockchain technology and IP – investigating benefits and acceptance in governments and legislations’ (2018) 3(1) Junior Management Science, page 9.

<sup>159</sup> The Vermont Statutes Annotated (2017) Title 12 §1913.

<sup>160</sup> Greg McMullen and Florian Glatz, ‘Blockchain & Law in 2017: Finally friends or still foes?’ (*Medium*, 20 January 2017) <<https://medium.com/ipdb-blog/blockchain-and-law-in-2017-f535cb0e06c4#.96qcsc1mu>> accessed 24 May 2020.

<sup>161</sup> Hong Wu and Guan Zheng, ‘Electronic evidence in the blockchain era: New rules on authenticity and integrity’ (2020) 36 *Computer Law & Security Review*, page 3.

<sup>162</sup> Guodong Du and Meng Yu, ‘China Establishes Three Internet Courts to Try Internet-Related Cases Online: Inside China’s Internet Courts Series -01’ (*China Justice Observer*, 16 December 2018) <<https://www.chinajusticeobserver.com/insights/china-establishes-three-internet-courts-to-try-internet-related-cases-online.html>> accessed 24 May 2020.

<sup>163</sup> Hong Wu and Guan Zheng, ‘Electronic evidence in the blockchain era: New rules on authenticity and integrity’ (2020) 36 *Computer Law & Security Review*, page 2.

recognized “the authenticity and integrity of electronic evidences not only stored but also generated by a blockchain”.<sup>164</sup>

While there is no European framework related to digital evidences, the increasement of infringements, crimes in the digital sectors will certainly attract the interest of the EU legislator to address the question of the admissibility of blockchain evidences.<sup>165</sup>

The “time-stamped, immutable and traceable characteristics of blockchains”<sup>166</sup> could suggest that evidence collected within the blockchain are admissible because the information collected is trustworthy.<sup>167</sup> However, as outlined by the EU Blockchain Observatory Forum, it is not because a data has been stored in the blockchain, or the operation has been executed in the case of a smart contract, that the information are considered as legally admissible, or that the information are legally binding for the parties before a Court.<sup>168</sup> So, from the legal perspective, the main problem with blockchain evidence is not the origin of the data, but its authenticity and integrity.<sup>169</sup> But how do we ensure the authenticity and incorruptly of digital information? The answer to this question will be developed in the next section.

- **The legality of blockchains content and identification system**

The electronic Identification, Authentication and Trust Services (eIDAS) Regulation<sup>170</sup> is relevant for determining the legality of digital evidences collected in a blockchain.<sup>171</sup> The

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<sup>164</sup> Ibid.

<sup>165</sup> Jeanne Pia Mifsud Bonnici, Melania Tudorica and Joseph A Cannataci, ‘The European Legal Framework on Electronic Evidence: Complex and in Need of Reform’ in MA Biasiotti and others, *Handling and Exchanging Electronic Evidence across Europe* (1st edn, Springer 2018), page 211.

<sup>166</sup> Gönenç Gürkaynak and others, ‘Intellectual Property law and practice in the blockchain realm’ (2018) 34(4) *Computer Law & Security Review*, page 853.

<sup>167</sup> Ibid.

<sup>168</sup> Tom Lyons, Ludovic Courcelas and Ken Timsit, ‘Legal and Regulatory Framework for Blockchain and Smart Contracts’ (*The European Union Blockchain Observatory and Forum*, Thematic Report, 27 September 2019) <[https://www.eublockchainforum.eu/sites/default/files/reports/report\\_legal\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf)> accessed 17 May 2020, pages 11 to 12.

<sup>169</sup> Hong Wu and Guan Zheng, ‘Electronic evidence in the blockchain era: New rules on authenticity and integrity’ (2020) 36 *Computer Law & Security Review*, page 5.

<sup>170</sup> Regulation (EU) 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 (Electronic Identification, Authentication and Trust Services, eIDAS) (2014) OJ L257/73.

<sup>171</sup> For the relevance of the eIDAS Regulation to blockchain, see the Jérémie Grandsenne, ‘e-Identity Workshop Report’ (*The European Union Blockchain Observatory and Forum*, Workshop Report, 7 November 2018) <[https://www.eublockchainforum.eu/sites/default/files/reports/workshop\\_5\\_report\\_-\\_e-identity.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/workshop_5_report_-_e-identity.pdf)> accessed 25 May 2020, page 6.

objective of this Regulation is to ensure level of security for digital service by establishing “a legal framework for electronic signatures, electronic seals, electronic time stamps, electronic documents, electronic registered delivery services and certificate services for website authentication”.<sup>172</sup> Therefore, this Regulation aimed to ensure the legality of the electronic data sent and used in an online service.

As demonstrated previously, evidences collected in a blockchain can be defined as digital evidences. Two type of evidence can be generated with a blockchain: (i) a proof of the registration of IP rights generated in a blockchain; and (ii) the proof of the authorship/inventorship which are only stored in a blockchain. Thus, the blockchain can be used to create a content or to associate an author/inventor with a work thanks to a digital signature.

As this Regulation defines electronic documents as “any content stored in electronic form, in particular text or sound, visual or audiovisual recording”, any documents stored in the blockchains, as literal or artistic work (e.g. texts, sounds, any audio or visual recordings), can be defined as ‘electronic document’.<sup>173</sup> For this type of documents stored or created in a blockchain, Article 46 of the eIDAS Regulation clearly stated that “an electronic document shall not be denied legal effect and admissibility as evidence in legal proceedings solely on the grounds that it is in electronic form”.<sup>174</sup> Therefore, EU law does not seem to deny the admissibility of the acts, such as the registration certification, stored or created within a blockchain.<sup>175</sup>

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<sup>172</sup> Regulation (EU) 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 (Electronic Identification, Authentication and Trust Services, eIDAS) (2014) OJ L257, Article 1(c).

<sup>173</sup> Carlos Gomez Munoz, ‘SSI and EIDAS: A Vision on How They Are Connected’ (*Futurium - European Commission*, 20 May 2019) <<https://ec.europa.eu/futurium/en/eidas-observatory/ssi-and-eidas-vision-how-they-are-connected-share-your-views>> accessed 25 May 2020, page 3; and Jérémie Grandsenne, ‘e-Identity Workshop Report’ (*The European Union Blockchain Observatory and Forum*, Workshop Report, 7 November 2018) <[https://www.eublockchainforum.eu/sites/default/files/reports/workshop\\_5\\_report\\_-\\_e-identity.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/workshop_5_report_-_e-identity.pdf)> accessed 25 May 2020, page 6.

<sup>174</sup> Regulation (EU) 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 (Electronic Identification, Authentication and Trust Services, eIDAS) (2014) OJ L257/73, Article 46 and Recital 63.

<sup>175</sup> Tom Lyons, Ludovic Courcelas and Ken Timsit, ‘Legal and Regulatory Framework for Blockchain and Smart Contracts’ (*The European Union Blockchain Observatory and Forum*, Thematic Report, 27 September 2019) <[https://www.eublockchainforum.eu/sites/default/files/reports/report\\_legal\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf)> accessed 17 May 2020, page 12.

But, to attest the ownership of the work, the author/inventor does not have only to present some proves of the works, or certifications. He/she has also to prove that he/she is the one who have stored or created this document in the blockchain, and therefore that the work is attached to its account.

Although documents stored or collected in a blockchain seems to enjoy a presumption of admissibility under the eIDAS Regulation, the same outcome is not applicable for the identification systems using blockchains.

The traditional objective of a signature in a contract is to identify the parties and their acceptance of the terms attached to it.<sup>176</sup> However, in the digital area, parties are not only recognized with their physical presence and handwritten signature but thanks to electronic signatures, which is more practical for online transactions.<sup>177</sup>

In EU law, the eIDAS Regulation recognizes three type of electronic signatures (we speak more precisely of “eSignatures” when it is the signature of a natural person,<sup>178</sup> and “eSeals” when it is the signature of a legal person<sup>179</sup>): a “simple electronic signature” (SES),<sup>180</sup> an “advanced electronic signature” (AES)<sup>181</sup> and a “qualified electronic signature” (QES).<sup>182</sup> Although these signatures offer many advantages for online operations, the EU legislator stated that all the electronic signatures do not have the same legal validity. The qualified electronic signature is the only electronic signature that have the same legal effect than a handwritten signature,<sup>183</sup> and therefore can be legally binding before the Court.<sup>184</sup>

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<sup>176</sup> Zottola and others, ‘Online Contract Formation’ (2018) 22(4) Journal of Internet Law, pages 3 to 4.

<sup>177</sup> Ibid, page 4.

<sup>178</sup> Regulation (EU) 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 (Electronic Identification, Authentication and Trust Services, eIDAS) (2014) OJ L257/73, Article 3(10).

<sup>179</sup> Ibid, Article 3(25) and Recital 59.

<sup>180</sup> Ibid, Article 3(10).

<sup>181</sup> Ibid, Article 26.

<sup>182</sup> Ibid, Articles 3(11) and 28.

<sup>183</sup> Ibid, Article 25(2) and Recital 49.

<sup>184</sup> Tom Lyons, Ludovic Courcelas and Ken Timsit, ‘Legal and Regulatory Framework for Blockchain and Smart Contracts’ (*The European Union Blockchain Observatory and Forum*, Thematic Report, 27 September 2019) <[https://www.eublockchainforum.eu/sites/default/files/reports/report\\_legal\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf)> accessed 17 May 2020, page 12.



Following this reasoning, we should assess if the electronic identification in a blockchain has the same legal effect than handwritten signature, and therefore meet the requirements in the eIDAS Regulation of a “qualified electronic signature”, for being consider as an admissible evidence of the identity of the owner of the act stored in the blockchain.

To ensure to the receiver that the information is transmitted by the appropriate person,<sup>185</sup> the eIDAS Regulation required two conditions, in addition to the obligation to fulfil the requirements for an advanced electronic signature.<sup>186</sup> Firstly, qualified electronic signatures must be created by a Qualified Trust Services Providers<sup>187</sup> thanks to a certified creation device<sup>188</sup>(a “qualified signature creation device”) that meet the security requirements imposed by the Regulation.<sup>189</sup> Secondly, these Qualified Trust Services Providers must verify the identity of the signatory. After this control, they must issue a certification (“qualified certificate for electronic signatures”)<sup>190</sup> as a proof that the qualified electronic signature comply with the applicable standards.<sup>191</sup> Therefore, qualified electronic signature certificates delivered by a Qualified Trust Service Provider ensure the legality of the electronic signature in a digital service.<sup>192</sup> This specific type of service provider must be appointed by a conformity body (“the conformity assessment body”).<sup>193</sup> However, in our case, blockchains technology has not been recognized yet by the Member States as a Qualified Trust Service Providers. Some authors even

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<sup>185</sup> Jérémie Grandsenne, ‘e-Identity Workshop Report’ (*The European Union Blockchain Observatory and Forum, Workshop Report*, 7 November 2018) <[https://www.eublockchainforum.eu/sites/default/files/reports/workshop\\_5\\_report\\_-\\_e-identity.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/workshop_5_report_-_e-identity.pdf)> accessed 25 May 2020, page 7.

<sup>186</sup> Florent Loriaux, ‘L’utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?’ (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), page 32.

<sup>187</sup> Regulation (EU) 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 (Electronic Identification, Authentication and Trust Services, eIDAS) (2014) OJ L257/73, Article 3(20).

<sup>188</sup> Ibid, Article 29 and Annex II.

<sup>189</sup> Ibid, Article 30 and Annex II.

<sup>190</sup> Ibid, Article 3(15) and Annex I.

<sup>191</sup> Ibid, Article 3(15) and Annex I.

<sup>192</sup> Carlos Gomez Munoz, ‘SSI and EIDAS: A Vision on How They Are Connected’ (*Futurium - European Commission*, 20 May 2019) <<https://ec.europa.eu/futurium/en/eidas-observatory/ssi-and-eidas-vision-how-they-are-connected-share-your-views>> accessed 25 May 2020, page 4.

<sup>193</sup> Regulation (EU) 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 (Electronic Identification, Authentication and Trust Services, eIDAS) (2014) OJ L257/73, Article 3(18).

argued that blockchains are excluded from the scope of the Regulation<sup>194</sup> because “they are used exclusively within close systems”,<sup>195</sup> and therefore, they cannot have the certification of Qualified Trust Service Providers. Consequently, it seems that blockchains do not have the power to deliver qualified electronic signature which are legally binding to the parties.<sup>196</sup>

To conclude this development, it appears that the admissibility of the evidences collected through a blockchain remains arguable. If in some countries, such as China or some States in the United States, blockchain evidences are considered as trustworthy, the actual EU legal framework does not provide any indication on the legality of these digital evidences. Therefore, blockchain seems to be more a storage facility than a tool for the enforcement and protection of several rights.<sup>197</sup> The inadequacy of the legal framework to incorporate the digital innovation can partially explain the potential inadmissibility of blockchain evidences. But, the lack of specific rules related to the blockchain cannot justify alone the fact this technology does not provide enough guarantee on the security of the information and the users for being considered as a trust service provider certified by the Member States.

Thereby, evidences collected through a blockchain will be admissible if the EU legislature gives a legal status to evidences collected within a blockchain<sup>198</sup> by the recognition of blockchain-based signatures as a derogation to the general legal framework,<sup>199</sup> or if the future improvement of the technology succeeds to meet the criteria imposed by the actual framework.

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<sup>194</sup> Florent Loriaux, ‘L’utilisation de la blockchain en propriété intellectuelle est-elle une évolution souhaitable ?’ (Master Thesis, Faculté de Droit et de Criminologie, Université Catholique de Louvain, 2019), page 34.

<sup>195</sup> Regulation (EU) 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 (Electronic Identification, Authentication and Trust Services, eIDAS) (2014) OJ L257/73, Article 2(2).

<sup>196</sup> Tom Lyons, Ludovic Courcelas and Ken Timsit, ‘Legal and Regulatory Framework for Blockchain and Smart Contracts’ (*The European Union Blockchain Observatory and Forum*, Thematic Report, 27 September 2019) <[https://www.eublockchainforum.eu/sites/default/files/reports/report\\_legal\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf)> accessed 17 May 2020, page 12.

<sup>197</sup> Hong Wu and Guan Zheng, ‘Electronic evidence in the blockchain era: New rules on authenticity and integrity’ (2020) 36 *Computer Law & Security Review*, page 8.

<sup>198</sup> Hong Wu and Guan Zheng, ‘Electronic evidence in the blockchain era: New rules on authenticity and integrity’ (2020) 36 *Computer Law & Security Review*, page 9.

<sup>199</sup> Tom Lyons, Ludovic Courcelas and Ken Timsit, ‘Legal and Regulatory Framework for Blockchain and Smart Contracts’ (*The European Union Blockchain Observatory and Forum*, Thematic Report, 27 September 2019) <[https://www.eublockchainforum.eu/sites/default/files/reports/report\\_legal\\_v1.0.pdf](https://www.eublockchainforum.eu/sites/default/files/reports/report_legal_v1.0.pdf)> accessed 17 May 2020, pages 11 to 13.

### 3.2.2 Blockchain for the support and management of IP contracts with the smart contracts

The second application of blockchain for the IP protection is the management of IP contracts. The acquisition of IP rights does not give only access to rights. It also represents an asset for the owner who can exploit them.<sup>200</sup> Thus, once the author/inventor obtains the ownership of the work, he/she can dispose of its rights at his/her convenience, but can also restrict other parties to use, reproduce or sell their work without their consent. Since, IP rights protect the author/inventor at each step of the lifecycle of the work, the management of such rights should include firstly to monitor each IP right; secondly, to ensure that a fair compensation is given to the author/inventor for the use of the work; and finally, to ensure that their rights are not infringed by any third party.

Although management of IP rights is necessary for exploiting its benefits, it requires a lot of investigations, resources, and a good knowledge of the IP law. By lack of resources or knowledge, many artists do not even claim the compensation of their rights.<sup>201</sup> To avoid this type of situations, many authors use agents, also called collective management organizations,<sup>202</sup> to handle this matter. However, the fair redistributions of the benefits generated by these rights are sometimes contested by the authors who judge that the compensations are unprecise or long to be obtained.<sup>203</sup>

Blockchain can be used to remove the need of a middle-man and reducing the cost that represent the exploitation of the rights, especially in the copyright system. In this part, we will explain how the blockchain can help for tracking the work and their use for the payment of the licensee fees related to copyright (3.2.2.1) with an example in the music industry (3.2.2.2), before to analyse the legal issues these applications of smart contract can raise (3.2.2.3).

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<sup>200</sup> WIPO, 'Managing the Intellectual Property Assets of Your SME' <[https://www.wipo.int/sme/en/ip\\_business/managing\\_ip/managing\\_ip.htm](https://www.wipo.int/sme/en/ip_business/managing_ip/managing_ip.htm)> accessed 26 May 2020.

<sup>201</sup> Libby Botsford, 'Rethink Music Releases Report on Transparency and Fairness in the Music Industry' (*Berklee Institute for Creative Entrepreneurship*, 14 July 2015) <[https://www.berklee.edu/news/fair\\_music\\_report](https://www.berklee.edu/news/fair_music_report)> accessed 26 May 2020.

<sup>202</sup> Alice Barbet-Massin and Véronique Dahan, 'Les apports de la blockchain en matière de droits d'auteur' (2018) 8 *Bulletin Rapide Droit des Affaires*, page 22.

<sup>203</sup> Alice Barbet-Massin and Véronique Dahan, 'Les apports de la blockchain en matière de droits d'auteur' (2018) 8 *Bulletin Rapide Droit des Affaires*, page 22.

### 3.2.2.1 Smart contract for tracking the works and ensuring the payment of the licensee fees in copyright

The profited generated by the IP rights depends on the ability of the owner to manage the property. To better protect their interests, ownership often used an agency. In the copyright system, most of the authors choose to mandate a Collective Management Organization (CMO) for the management of their rights.<sup>204</sup> CMO have for responsibility to monitors the works and their use, to negotiates and collected the fee related to their uses (or licenses fee), and to distribute the benefits of these exploitations to the right holder.<sup>205</sup> The advantages of a collective management scheme is that it can simplify the management and exploitation of the IP rights for the owner of the rights in a complicated system where the same work can sometimes be owned by several persons (e.g. a music can be created by a performer, the songwriter, the producer and the broadcaster).<sup>206</sup> Thus, all the owners of the work do not have to manage individually the exploitation of the work, and contact each company that might be interested by their work. The CMO can do such operations on the behalf of all the rightsholders.<sup>207</sup> Additionally, CMO simplified the process for the users who want to use, promote or distribute the works (such as radio station, journals, television). Users do not have to obtain the individual right for using the work from each owner. Instead, they can make a general request for seeking the rights for several works owned by different rightsholders but managed by the same organization.<sup>208</sup>

However, as outlined in the introduction of the section, using a CMO involves some risks.<sup>209</sup> The EU legislator has stated that these CMO often managed the right independently, without including necessary the rightsholders. Must of the rightsholders are not included in the decision-making processes for their own rights.<sup>210</sup> This management system led to number

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<sup>204</sup> WIPO, 'Collective Management of Copyright and Related Rights' <<https://www.wipo.int/copyright/en/management/>> accessed 26 May 2020.

<sup>205</sup> Ibid.

<sup>206</sup> Ibid.

<sup>207</sup> European Commission, 'Memo on the Directive on collective management of copyright and related rights and multi-territorial licensing – frequently asked questions' MEMO 14/79 (2014) 4 February 2014, page 2.

<sup>208</sup> European Commission, 'Memo on the Directive on collective management of copyright and related rights and multi-territorial licensing – frequently asked questions' MEMO 14/79 (2014) 4 February 2014, page 2.

<sup>209</sup> Ibid, page 4.

<sup>210</sup> Ibid, page 4; and Directive 2014/26/EU 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 (2014) OJ L84/72, Recitals 21 to 22.

difficulties for the rightsholders who seeks to exercise their rights.<sup>211</sup> Most of the problems encountered are related to the lack of information related to the management of their rights, and the delay in the payment of the royalties related to their exploitation.<sup>212</sup> These issues reduce, thereby, the benefits in the exploitation of IP rights. In response to these issues, the EU has introduced the Directive 2014/26/EU on collective management of copyright and related rights<sup>213</sup> in order to protect the interests of rightsholder who chose to be represented by a CMO.<sup>214</sup> However, the digital revolution has increased the possibility for individuals to sell and transfer the work, which also increase the difficulty for the author to monitor and control the use of their creation.<sup>215</sup> So, despite the tentative of the EU legislator to facilitate the choice of rightsholder by improving the transparency of CMO systems, the copyright law did not succeed to mitigate all of the issues faced by the authors.<sup>216</sup>

In addition to this legislative act, blockchain can also be used as a solution for increasing the rights of the owners during their management and exploitation. Indeed, we have demonstrated earlier that blockchain can be used for storing the data related to a work or its ownership. Once the information related to a work (e.g. its characteristics, the work itself, the author/inventor, the ownership and the nature of the right granted, its localization) is stored in the blockchain, the rightsholders can use a smart contract for tracking its use.<sup>217</sup> Each time an AI software, as Oracles or IoT, detects the application of their work, they can send a notification to their owner.<sup>218</sup>

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<sup>211</sup> Directive 2014/26/EU 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 (2014) OJ L84/72, Recital 5.

<sup>212</sup> European Commission, 'Memo on the Directive on collective management of copyright and related rights and multi-territorial licensing – frequently asked questions' MEMO 14/79 (2014) 4 February 2014, page 4.

<sup>213</sup> Directive 2014/26/EU 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 (2014) OJ L84/72.

<sup>214</sup> Ibid, Recital 55, Articles 1 and 4.

<sup>215</sup> Miriam Ettl and Paul W.J. de Bijl, 'A next step for territorial copyright licenses for on-demand audio-visual services in the light of the EU Digital Single Market' (2019) 21(10) *Information, Communication & Society*, pages 1308 to 1309.

<sup>216</sup> Ibid, page 1314.

<sup>217</sup> Gönenç Gürkaynak and others, 'Intellectual Property law and practice in the blockchain realm' (2018) 34(4) *Computer Law & Security Review*, page 857.

<sup>218</sup> Ibid.

Additionally, once the program detected that a user has used the work or request to use this work, the owner can decide to sign a licensee agreement that will be run by the smart contract. Each time that the work is used or displayed by a user, the smart contract will execute the licensee agreements and collected the fees attached to it, without any intervention.<sup>219</sup> Thus, smart contracts can ensure that the rights of the rightsholders are protected, that their work is not used without their consents, and that they received a fast fair retribution of their work,<sup>220</sup> without referring to a middle-man.<sup>221</sup>

Moreover, from another perspective, blockchain can also be useful for the end-users. They can use the registration mechanism to ensure that their use of the work or any digital resources does not infringe any rights publicly available,<sup>222</sup> or to check the origin/authenticity of a good.<sup>223</sup>

### **3.2.2.2 Case study: the application of smart contract in the music industry**

The music industry is the first sector that can benefit from this technology. With the digital revolution, new business idea has been developed. In the music industry, this has been manifested in the creation of new modes of music distribution.<sup>224</sup> Most of the music are now distributed digitally. This new form of distribution was the precursor of new consumerism model: the music can be downloaded via a music downloaded services, but can be listen on-demand via streaming platform.<sup>225</sup> If online use of the music has been a real innovation for the industry, it has also increased the number of infringements of copyrights. Even if the EU InfoSoc Directive on the harmonization of copyright law<sup>226</sup> required that a license must be

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<sup>219</sup> Alice Barbet-Massin and Véronique Dahan, 'Les apports de la blockchain en matière de droits d'auteur' (2018) 8 Bulletin Rapide Droit des Affaires, page 23.

<sup>220</sup> EY Global, 'How blockchain can impact the intellectual property life cycle' (EY, 18 June 2010) <[https://www.ey.com/en\\_gl/advisory/how-blockchain-can-impact-the-intellectual-property-life-cycle](https://www.ey.com/en_gl/advisory/how-blockchain-can-impact-the-intellectual-property-life-cycle)> accessed 11 May 2020.

<sup>221</sup> Alice Barbet-Massin and Véronique Dahan, 'Les apports de la blockchain en matière de droits d'auteur' (2018) 8 Bulletin Rapide Droit des Affaires, page 22.

<sup>222</sup> Aviv Gidron, 'Beyond the Hype of Blockchain - A Scenario-Based Analysis of the Potential Applications in the Music Industry' (Louvain School of Management, Université Catholique de Louvain, 2019), pages 46 to 47.

<sup>223</sup> Gönenç Gürkaynak and others, 'Intellectual Property law and practice in the blockchain realm' (2018) 34(4) Computer Law & Security Review, page 859.

<sup>224</sup> Aviv Gidron, 'Beyond the Hype of Blockchain - A Scenario-Based Analysis of the Potential Applications in the Music Industry' (Louvain School of Management, Université Catholique de Louvain, 2019), page 1.

<sup>225</sup> European Commission, 'Memo on the Directive on collective management of copyright and related rights and multi-territorial licensing – frequently asked questions' MEMO 14/79 (2014) 4 February 2014, page 4.

<sup>226</sup> Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the harmonisation

obtained for each use,<sup>227</sup> it still difficult for the owners to identify the users, and therefore, to collect to the licensing fees attached to their music. This problem is further increased if the rightsholders used a CMO. CMOs often want to distribute music they manage in all possible markets.<sup>228</sup> Thus, they often used online platform for distributing the music in all the territories. However, as outlined by the Commission, many collective management organizations today are not ready for this: “they do not have the capacity to process data from service providers (like Spotify or Nokia Music) on music downloads and streaming, or to match this data with their repertoire of songs”.<sup>229</sup> This technological incapability to monitor all this information explained the lack of transparency, the incorrect invoicing or difficulties to collect the fees related to the exploitation of the music.<sup>230</sup>

This discussion around the music royalties have led several artists to protest against the actual model of distribution.<sup>231</sup> Some artists went further and decided to create their own streaming service connected to a smart contract. PeerTracks and Soundac blockchain illustrates this tendency. PeeTracks is a music streaming platform.<sup>232</sup> Contrary to the other online platform, each time a song is streamed the artists are retributed thanks to Soundac’s smart contract. This system enables music’s owners to take control of the management of their works without having to use CMO or major streaming company.<sup>233</sup> Another advantages of this type of smart contract is that it also allowed the owner to introduce a different price mechanism according to the use of their work. Thus, the price of the royalties will be adjusted if, for example, the work is used for commercial, private, or for public purposes.<sup>234</sup>

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of certain aspects of copyright and related rights in the information society (InfoSoc Directive) (2001) OJ L167/10, Recital 53.

<sup>227</sup> Directive 2014/26/EU 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 (2014) OJ L84/72, Recital 37.

<sup>228</sup> European Commission, ‘Memo on the Directive on collective management of copyright and related rights and multi-territorial licensing – frequently asked questions’ MEMO 14/79 (2014) 4 February 2014, page 4.

<sup>229</sup> Ibid.

<sup>230</sup> Ibid.

<sup>231</sup> Aviv Gidron, ‘Beyond the Hype of Blockchain - A Scenario-Based Analysis of the Potential Applications in the Music Industry’ (Louvain School of Management, Université Catholique de Louvain, 2019), page 14.

<sup>232</sup> Muharem Kianieff, *Blockchain Technology and the Law: Opportunities and Risks* (1<sup>st</sup> edn, Taylor & Francis, 2019), page 48.

<sup>233</sup> Ibid.

<sup>234</sup> Ibid.

To conclude these parts, blockchain and smart contracts can have an important impact in the protection of copyright, especially in the music industry. They can be used as a tool for improving the existing system of CMO or can be the source of new models entirely managed by the artists. Thereby, if the digital revolution increased the difficulty for the rightsholder to exploit the benefits of their works, the introduction of the blockchain technology can facilitate the management of the works and the IP rights attached to it. However, as for all innovation, the application of smart contract for the management of IP rights raised some issues.

### **3.2.2.3 Legal issues raised by smart contracts for the IP protection**

In the IP sectors, smart contracts can be used for tracking the work developed by the authors and ensuring the payment of the licensee agreement attached to them. However, smart contract does not only opportunities, but also legal concerned, in regard of contractual law (i) and the protection of consumers when it comes to the payment mechanism (ii).

- **Smart contracts and contract law**

The first issue that might be outlined is that the enforcement of the contractual provisions depends not only on the contractual clauses itself, but also must take into account all the contractual steps made to sign the agreement (e.g. “pre-contractual negotiations, formation and performance of the contract, dispute resolution”)<sup>235</sup> and the entire legal norms applicable to the contract. Despite its advanced functions, smart contract does not have the possibility yet to process all this information into a computer program. To fully execute an entire agreement, it will require an advanced smart contract that can execute the contract and fully integrate advanced contractual terms and laws. The actual smart contracts are ‘simpler’ and cannot process this amount of data. They can only process “simple contract” or piece of the contract into a transaction. Therefore, smart contracts are often used as a tool, aside legal contracts, for executing only some specific clauses, and not as an automatic system for an entire agreement.<sup>236</sup>

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<sup>235</sup> Merit Koõlvart, Margus Poola, and Addi Rull, ‘Smart Contracts’ in Tanel Kerikmäe and Addi Rull, *The Future of Law and eTechnologies* (1<sup>st</sup> edn, Springer Cham, 2016), page 134.

<sup>236</sup> Merit Koõlvart, Margus Poola, and Addi Rull, ‘Smart Contracts’ in Tanel Kerikmäe and Addi Rull, *The Future of Law and eTechnologies* (1<sup>st</sup> edn, Springer Cham, 2016), page 145.



The second issue that will be outlined is more technical. If the smart contract is a transcription of the contract in the program, the question is who must be responsible of such coding? Several solutions are possible. The most natural answer will be to suggest that the contract should be coded by the person who understand the technology: the software developers. However, letting the responsibility of the entire translation of legal terms to developers questionable. The main argument being that they do not have the knowledge for fully understand the legal notions attached to the words. For this reason, some argues that lawyers should be responsible of the legal translation of the contract into a code and should ensure the proper transposition of the intentions of the parties in the code.<sup>237</sup> Code language can be understood only by the software developers. Therefore, it is difficult for the parties to attest that their intentions to sign a defined contract has been correctly transcript in the program, and for the developers to minimize potential conflict that may arise from the transcription of the contract.<sup>238</sup>

This lack of the guarantee on the proper transcription of the legal terms into the smart contract, and the respect of the intentions of the parties<sup>239</sup> are one of the factors that explained why smart contracts do not constitute a legally enforceable contract *per se*,<sup>240</sup> but rather are only use as an enforcement mechanism for some contracts.

- **Smart contract and consumer payment mechanism**

The third issues that will be developed in this part is linked to the system of retribution/payment in the IP smart contract. If smart contract can be used as a tool for collecting the payment of the royalties, the payment method raises many questions, particularly regarding the protection of the consumers.

In EU law, the rights of consumers in distance contracts,<sup>241</sup> which are defined as sales contracts signed for the delivery of digital contents (such as computer programs, music, videos or

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<sup>237</sup> Max Raskin, 'The Law and Legality of Smart Contracts' (2017) 1(2) Georgetown Law Technology Review, page 325.

<sup>238</sup> Ibid, page 324.

<sup>239</sup> Merit Kõlvart, Margus Poola, and Addi Rull, 'Smart Contracts' in Tanel Kerikmäe and Addi Rull, *The Future of Law and eTechnologies* (1<sup>st</sup> edn, Springer Cham, 2016), page 145.

<sup>240</sup> Max Raskin, 'The Law and Legality of Smart Contracts' (2017) 1(2) Georgetown Law Technology Review, page 321.

<sup>241</sup> Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council (2011) OJ L304/64, Article 2.

texts),<sup>242</sup> are protected by the Consumer Rights Directive.<sup>243</sup> Article 9 of this Directive guarantee to the consumers a right of withdrawal for distance and off-premises contracts.<sup>244</sup>

The right of withdrawal finds its origin from the principle *pacta sunt servanda* of contract law.<sup>245</sup> It has for main objective to give the opportunity to the consumer to fully access the obligations and benefits attached its contractual agreements.<sup>246</sup>

However, one of the specificities of the blockchain is that when the transaction has been validated by the network, it is almost impossible to modify or erase the block without affecting the entire blockchain. Due to its non-reversible payment mechanism, smart contract does not seem to provide the ability for the consumer to obtain any reimbursement,<sup>247</sup> to contest the contract (or code) executed in the blockchain, or to contest any violation of their rights<sup>248</sup> after 14 days, as required by the Consumer Rights Directive.<sup>249</sup>

Thus, if the payment of the licensee's fees with a crypto currency reinforce the rights of the authors,<sup>250</sup> this mechanism also reduced the protection granted to the consumers<sup>251</sup> under the EU legal framework. The possible risk of hindrance of the consumers rights has even been the expressed in 2012 by the European Central Bank in its report on Virtual Currency Schemes.<sup>252</sup>

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<sup>242</sup> Ibid, Recital 19.

<sup>243</sup> Ibid.

<sup>244</sup> Ibid, Recital 9 and Article 9.

<sup>245</sup> Euripides Rizos, 'The Consumer's Right of Withdrawal in case of Payment with Bitcoins' (2016) 3(1) Oslo Law Review, page 13.

<sup>246</sup> Ibid.

<sup>247</sup> Muharem Kianieff, *Blockchain Technology and the Law: Opportunities and Risks* (1<sup>st</sup> edn, Taylor & Francis, 2019), page 87.

<sup>248</sup> Hervé Jacquemin 'Consumers contracting with other consumers in the sharing economy: fill in the gaps in the legal framework or switch to the blockchain model?' (2019) 28 IDP Revista de Internet, Derecho y Política, page 54.

<sup>249</sup> Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council (2011) OJ L304/64, Article 9.

<sup>250</sup> Muharem Kianieff, *Blockchain Technology and the Law: Opportunities and Risks* (1<sup>st</sup> edn, Taylor & Francis, 2019), page 87.

<sup>251</sup> Ibid, page 89.

<sup>252</sup> European Central Bank, 'Virtual Currency Schemes' (*Ecb.europa*, October 2012) <<https://www.ecb.europa.eu/pub/pdf/other/virtualcurrencyschemes201210en.pdf>> accessed 27 May 2020, pages 6 to 7, and 11.

This conclusion must, however, be mitigated. If the Consumer Protection Directive refers to electronic commerce, it does not mention transactions performed in a blockchain platform. So, we can assume that the current legislative framework is only applicable to traditional payment systems.<sup>253</sup> Therefore, a new legislative framework, which also includes cryptocurrencies, seems necessary for removing the legal risks surrounding the protection of consumers in the blockchain services.<sup>254</sup>

### **3.2.3 Blockchain as an enforcement tool of IP rights in the fight against counterfeit**

#### **3.2.3.1 Blockchain for the fight against counterfeit**

The last, but not the least application of blockchain that will be developed in this thesis is related to the enforcement of the IP rights. The efficiency of the IP mechanism also depends on its capacity to enforce the rights of the authors/inventors in case of infringement.

Such as the other issues developed earlier, blockchain can be used to strengthen the enforcement of IP rights by fighting against counterfeit goods and contents. Blockchain can be used to store all the data related to a brand, a good or a service (such as the origin of the good, the history) and transfer this information to the owner, the buyer of the product or even the customs authorities in charge of the fight against imported counterfeit products. More than just a database, smart contracts can be used as a supply-chain management tool for ensuring the traceability of the goods, even after they have been sold by the owner. This application will help the different stakeholders to reduce the number of infringements of IP rights, and therefore contribute to the economic development of the EU.<sup>255</sup>

Besides the advantages that represent this technology for the fight against counterfeits, smart contracts raised several issues that deserved to be developed in this section.

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<sup>253</sup> Ibid, pages 44 and 45.

<sup>254</sup> Ibid.

<sup>255</sup> European Commission, 'Communication from the Commission to the European Parliament, the Council and the Economic and Social Committee: A balanced IP enforcement system responding to today's social challenges' COM (2017) 707 final, page 2.

### **3.2.3.2 Challenges linked to the application of blockchains for the fight against counterfeiting**

No one doubts about the potential of smart contracts for fight against counterfeit goods and contents. However, these advantages have been affected by several issues.

The first issue is related to the accessibility of the information send and received by the brand to the blockchain. There is no unique database which contains all the products, bar code, sales status of all the brands, which will allow the different stakeholders involved in the protection of IP rights to verify the authenticity and origin of the products. In fact, most of the brands do not share the information related to the product with the other companies. They only share the barre code of the product with the suppliers and distributors. However, the creation of a smart contract for identifying counterfeit will be compromised without an interoperability between all the databases of all the actors of the supply chain.<sup>256</sup>

The smart contract Arianee has taken into account this challenge during the construction of its blockchain for the fight against counterfeit. Arianee mitigates the lack of interoperability of the information by connecting “the asset with the brand, the owner, the retailer and insurance company, alongside any other stakeholders, thereby securing the network of stakeholders and closing the gap for counterfeiters”.<sup>257</sup> Although such initiative is welcomed, most of the companies prefer to keep their information confidential because they think that it is the best way to protect their creation against counterfeit.<sup>258</sup>

The other issue related to this application of smart contracts is linked to the difficulty to use the evidences collected in a blockchain for the enforcement of the rights infringed. As outlined earlier, blockchain can be used firstly to prove the ownership of the work, but also as a proof of violation of the IP rights. In the section 3.2.1 it has been argued that the admissibility of the evidences collected by individuals during a civil proceeding in a blockchain is arguable.

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<sup>256</sup> Gönenç Gürkaynak and others, ‘Intellectual Property law and practice in the blockchain realm’ (2018) 34(4) Computer Law & Security Review, page 860.

<sup>257</sup> European Patent Office ‘Talking about a new revolution: blockchain – Conference Report’ (Patenting Blockchain Conference, The Hague, 4 December 2018), page 6.

<sup>258</sup> Gönenç Gürkaynak and others, ‘Intellectual Property law and practice in the blockchain realm’ (2018) 34(4) Computer Law & Security Review, page 860.

Nevertheless, some offences, such as counterfeit infringements, are not subject to the same procedural regime.<sup>259</sup> In most cases, IP rights are enforced only by the rightsholders. However, certain infringements represent also a threat for the internal market.<sup>260</sup> To protect the internal market, the EU have also introduced an administrative procedure for the enforcement of IP rights. This procedure can be activated by public authorities (such as police officer, custom officers or standards authorities) when they suspect the good to be a counterfeit.<sup>261</sup>

The EU Regulation 608/2013 on customs enforcement of intellectual property rights<sup>262</sup> harmonized the procedural rules applicable to customs authorities “where [the] goods are suspected of infringing an IP rights”.<sup>263</sup> If a custom authority has sufficient grounds to suspect the infringement of IP rights, they have the power to retain the goods. The rightsholder is informed of the administrative measure taken by the custom authority<sup>264</sup>. Following this, he/she has the possibility to introduce an application for enforcing its rights.<sup>265</sup> The application form must contain sufficient information on the rights infringed, the good, and additional information for identifying it.<sup>266</sup> Additionally, the suspected goods may be destroyed by the authorities without the need to determine if an IP right has been infringed if the right holder confirmed that the good infringed its rights (a), that he wants the destruction of the good (b) or if he/she does not manifest his/her intention to the destruction of the goods within the period imposed by the Regulation (c).<sup>267</sup>

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<sup>259</sup> Alice Barbet-Massin and Véronique Dahan, ‘Les apports de la blockchain en matière de droits d’auteur’ (2018) 8 Bulletin Rapide Droit des Affaires, page 24.

<sup>260</sup> European Patent Office ‘Talking about a new revolution: blockchain – Conference Report’ (Patenting Blockchain Conference, The Hague, 4 December 2018), page 1 to 2.

<sup>261</sup> Justine Pila and Paul Torremans, *European Intellectual Property Law* (1<sup>st</sup> edn, Oxford University Press, 2016), pages 604 to 605.

<sup>262</sup> Regulation (EU) 608/2013 of the European Parliament and of the Council of 12 June 2013 concerning customs enforcement of intellectual property rights and repealing Council Regulation (EC) No 1383/2003 (2013) OJ L181/15.

<sup>263</sup> *Ibid*, Article 1(1).

<sup>264</sup> Justine Pila and Paul Torremans, *European Intellectual Property Law* (1<sup>st</sup> edn, Oxford University Press, 2016), pages 605 to 606.

<sup>265</sup> Regulation (EU) 608/2013 of the European Parliament and of the Council of 12 June 2013 concerning customs enforcement of intellectual property rights and repealing Council Regulation (EC) No 1383/2003 (2013) OJ L181/15, Article 6.

<sup>266</sup> *Ibid*.

<sup>267</sup> Regulation (EU) 608/2013 of the European Parliament and of the Council of 12 June 2013 concerning customs enforcement of intellectual property rights and repealing Council Regulation (EC) No 1383/2003 (2013) OJ L181/15, Article 23(1).

According to this description, the Regulation does not require an intangible evidence of the infringement for enforcing the IP rights of the authors/inventors. The only suspicion of an infringement is enough to engage the administrative procedure. Some evidence of an IP rights attached to an application form and the consent of the rightsholder are enough to destroy the good. The simplification of the procedure for counterfeit goods suggested that all type of evidences, included those collected in a blockchain, attached to the application form proving the infringement may be accepted by the authorities.<sup>268</sup> In addition, it must be added that the Regulation itself does not impose any specific requirements on the type of evidences that can be submitted in the application form. Therefore, we can conclude that blockchain's evidences can be accepted by the custom authorities in an administrative proceeding.

This statement must be mitigated. If the evidences collected in a blockchain are admissible in an administrative proceeding, the adoption of a smart contract by the custom authorities for the fight against counterfeit will require to train the agents to this technology, to obtain the resources to run the program, and to have the required data to aliment the blockchain.<sup>269</sup> So, if using the blockchain for the fight against counterfeit seems to be a solution for the protection of IP rights, the complexity of the technology, the expensive cost, and the amount of data that it is required make its application inaccessible to public authorities.

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<sup>268</sup> Alice Barbet-Massin and Véronique Dahan, 'Les apports de la blockchain en matière de droits d'auteur' (2018) 8 Bulletin Rapide Droit des Affaires, page 24.

<sup>269</sup> Gönenç Gürkaynak and others, 'Intellectual Property law and practice in the blockchain realm' (2018) 34(4) Computer Law & Security Review, pages 860 to 861.

## 4. Conclusion

With a far going protection of IP rights, the EU aim to protect the assets of companies who invested in innovative products. This protection mechanism promotes the economic growth within the EU and, therefore, comply with the objective of the EU to create an internal market by removing all the barrier to the development of the idea in the companies.

If the EU framework has for singularity to provide a protection in several territories, the complexity, the cost of this mechanism has been a barrier to the access to IP rights. In addition to these issues, when it comes to the enforcement of the rights, the digital evolution has also led to a digitalisation of the infringements. However, enforcing rights on internet raised additional problems. Firstly, it becomes difficult for the rightsholder to identify the author of the infringement. Secondly, with internet, the infringer can be located all around the world, even if IP law has a limited territorial application. Moreover, internet facilitates the transfer of data, therefore it can increase the number of infringers.

Blockchain can provide an innovative solution to these issues. The digital nature of the ledger, its accessibility to unlimited number of users, the security, tamper proof and incorruptibility of the data are some of the factors that have make this technology an advantage for the IP protection. Blockchain offered the possibility for the rightsholder to register an IP right to the relevant authorities, to prove the ownership of a right, to manage these rights and collect the licensee fees attached to them, and lastly, to fight against counterfeit goods and contents. Blockchain can also be used for the other stakeholders who can control the origin of the good, its authenticity, but also verify its own creation does not infringed any rights. Blockchain seems to be the perfect digital solution for extending the scope of protection of IP rights, in an environment where these rights are fragilized in the digital context.<sup>270</sup>

But each solution has a price. The impossibility of identifying the members of a public network in the event of infringement of a right, the high cost that this technology represents, the technical knowledge that it requires to be able to use such technology, and finally, the absence of a legal framework, are some of the factors that explain the lack of investment from public and private investors in this technology.

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<sup>270</sup> Greg McMullen and Florian Glatz, 'Blockchain & Law in 2017: Finally friends or still foes?' (*Medium*, 20 January 2017) <<https://medium.com/ipdb-blog/blockchain-and-law-in-2017-f535cb0e06c4#.96qcsc1mu>> accessed 24 May 2020.

Before concluding on the utility of the blockchain for the protection of IP, several points must highlight. Most of the issues in the blockchain are linked to the immaturity of the technology. Some companies have tried to mitigate such side effects by creating private blockchain which include some of the advantages of the blockchain, without including all its inconvenient. The development of technical answer to these legal issues depends on the research realized in the sector. For this reason, it is important, to give time to the technology to mature before introducing rules which prohibit blockchains totally.<sup>271</sup>

If the EU law has decided to adopt a cautious strategy for the regulation of blockchain, the lack of legal certainty on the legality of the blockchain does not encouraged companies to invest in the development the technology. If the legislator wants to promote business productivity, the adoption of a legislative framework which take into account the digital context,<sup>272</sup> is therefore inevitable.<sup>273</sup>

If the EU has to adopt laws for developing this technology and protecting its users, the question is which type of legislative framework is adapted to this technology? Blockchain has as unlimited scope of application. The EU can therefore choose to adopt a general approach for regulating activities in the blockchain in general, or to adopt a specific regulation adapted to its business applications. However, such legal framework should be in line with the international practice in IP law. Indeed, the cross-border nature of the blockchain makes it impossible for the MS to prove their jurisdiction in case of infringement.<sup>274</sup> A cooperation of the International Community seems to be necessarily to overcome this issue.<sup>275</sup>

To conclude this thesis, if blockchain can be used the protection of IP rights, a theoretical framework that provides a better understanding of the technology, and the potential applications

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<sup>271</sup> European Patent Office, ‘Talking about a new revolution: blockchain – Conference Report’ (Patenting Blockchain Conference, The Hague, 4 December 2018), pages 18 to 19.

<sup>272</sup> Ibid, pages 19 to 20.

<sup>273</sup> European Commission, ‘Evaluation accompanying the Communication from the Commission to the Institutions on Guidance on certain aspects of Directive 2004/48/EC of the European Parliament and of the Council on the enforcement of intellectual property rights’ SWD (2017) 431 final.

<sup>274</sup> European Patent Office ‘Talking about a new revolution: blockchain – Conference Report’ (Patenting Blockchain Conference, The Hague, 4 December 2018), pages 14 to 17.

<sup>275</sup> Ibid.



and challenged it can raise is necessary. A better understating understanding in the area will contribute to the creation of a new legislation, and therefore, to new innovative tools for the protection of IP rights.<sup>276</sup>

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<sup>276</sup> Jeanne Pia Mifsud Bonnici, Melania Tudorica and Joseph A Cannataci, ‘The European Legal Framework on Electronic Evidence: Complex and in Need of Reform’ in MA Biasiotti and others, *Handling and Exchanging Electronic Evidence across Europe* (1st edn, Springer 2018), 196

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