COMPUTER LAW & SECURITY REVIEW 34 (2018) 847–862

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/CLSR

Computer Law & Security Review

# Intellectual property law and practice in the blockchain realm

*Gönenç Gürkaynak**, *İlay Yılmaz, Burak Yeşilaltay, Berk Bengi*

*ELIG Gürkaynak Attorneys-at-Law, Istanbul, Turkey*

ARTICLE INFO

*Article history:*

*Keywords:*
Blockchain
Intellectual property
Ledger
Electronic signature
Electronic record
Copyright management
Royalty
Registration

ABSTRACT

Blockchain technology is claimed to be and perceived as one of the revolutionary technologies that will have an enormous impact on our lives in the forthcoming years and decades. The legal questions surrounding blockchain appear to be among the most controversial issues surrounding this novel technology, which create uncertainties as to the scope and speed of its eventual adoption. Is it legal to use blockchain technology? Does or should any governmental authority or court take a record stored in blockchain into consideration in their decisions? Is blockchain reliable? Can the technology be used for the protection and enforcement of legal and property rights?

The technological advancements offered by blockchain promise wide ranges of use in a variety of sectors and legal areas, including intellectual property (IP) law. This paper will focus primarily on the possible opportunities that blockchain may offer with respect to the future of IP law and discuss its potential impact on the registration, management and enforcement of intellectual property rights. We will proceed to offer blockchain-based solutions to foster the operation of IP offices, reinforce customs procedures in detecting counterfeit products, and enhance the efficiency of IP rights management by the right holders. The paper concludes by providing some suggestions to pave the way for the advancement of blockchain technology and to increase the number of people that this technology reaches, as well as its successful integration into the various services and registration/transaction channels that we use today.



## 1. Introduction

Blockchain may simply be described as a decentralized method of recording any data, including but not limited to financial transactions, dispositions concerning value or assets, in a continuously encrypted and irreversible ledger.[1]

The first major use of blockchain technology occurred with the creation of Bitcoin, which is the digital crypto-currency that was introduced in 2009.[2] It has now been followed by more than 700 other digital and virtual crypto-currencies created using similar technology. Following the widespread realization that the Bitcoin currency was built on an immutable

* Corresponding author: ELIG Gürkaynak Attorneys-at-Law, Citlenbik Sok. No:12, Besiktas, Istanbul, Turkey.
*E-mail address:* gonenc.gurkaynak@elig.com (G. Gürkaynak).

[1] Mougayar, William, *The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology* (1st Edition, 2016) p. 4.

[2] Gupta, Vinay, *A Brief History of Blockchain*(February 28, 2018, Harvard Business Review) https://hbr.org/2017/02/a-brief-history-of-blockchain, last accessed on March 25, 2018.

https://doi.org/10.1016/j.clsr.2018.05.027

and secure technology,[3] the first discussions on how to utilize blockchain technology in fields other than digital payments arose in 2012, hinting at the subsequent emergence of projects such as Ethereum.[4] In the light of these discussions, the potential applications of blockchain technology in sectors other than cryptocurrencies (such as insurance, healthcare, shipping and intellectual property) began to be envisioned, conceived and developed by various interested parties.

As indicated above, the main discussions surrounding blockchain nowadays focus on the question of how to utilize this technology in other potential areas of use (i.e., beyond digital currencies) from a commercial and technological perspective. This paper aims to explore blockchain technology from a different angle and examine the implications of this technology from a legal perspective, particularly with respect to Intellectual Property ("IP") law.

Blockchain technology is highly promising in its potential applications in various IP-related fields. From the initial establishment of an intellectual property right, along its legal journey to registries, licensing and enforcement, blockchain technology can be used to achieve various worthy goals. Despite the social, legal, regulatory and technological challenges faced by this novel technology, the promise of an automated, trustworthy, effective and efficient IP protection and management system provides a significant incentive to overcome such challenges and make the integration of blockchain technology into these fields a reality.

## 2. What is blockchain?

Blockchain technology was introduced to the world by a 9-page paper by "Satoshi Nakamoto" (a pseudonym used by the author whose identity is still unknown), titled "Bitcoin: A Peer-to-Peer Electronic Cash System."[5] In this seminal paper, Satoshi Nakamoto set forth a new method of executing transfers of value between peers in a traceable and reliable manner. This method has two primary features that differentiate blockchain technology from other methods of value transfers between peers and thus makes blockchain prominent among such value transfer systems. These differentiating factors will be discussed below.

Even though the aforementioned definition is a useful starting point for our discussion, it is also worth noting at this point that the term "blockchain" is, in fact, self-explanatory. While attempting to conceptualize and understand what "blockchain" is, one can imagine a literal chain of blocks. Every block in the chain contains the information related to a different number of transactions. After every transaction in Block 1 is verified, it is added to the blockchain system and can no longer be changed or modified in any way. Block 2, which will contain different transactions, will also include a reference to Block 1, which makes Block 2 bounded with Block 1. In general, "every time a consensus is reached, a transaction is recorded on a "block" which is a storage space."[6]

The most distinctive feature of blockchain technology is that it does not require the involvement of a third party (e.g., banks, public registries, etc.) for transfers of value, whilst providing the parties involved in the transaction with absolute confidence in the validity and security of the transaction. Such transacting parties can be assured of the validity and security of the transaction due to the cryptographic proof of authenticity provided by the blockchain technology. Whereas a transaction needs to be verified by the central server in traditional databases, with blockchain technology, every node in the system has the ability to cryptographically check and verify any transaction. Instead of having to trust the central server (and the central authority maintaining such a server), peers using blockchain technology are able to create and maintain trust by relying on cryptographical proof in a consensus method. This feature obviates the need for the involvement of a third party in such transactions and is the main differentiator from (and improvement on) systems using traditional databases or ledgers. In other words, blockchain has no central server. The system consists of a large number of "nodes" that are continuously checking and confirming the validity of all transactions, instead of just a few such nodes. This distinguishing facet of blockchain technology eliminates (or, at least, seriously mitigates) the security vulnerabilities associated with traditional central databases.

Along with being a distributed ledger with no intermediary, blockchain's functions can be described in three different ways, depending on three separate aspects:

"**Technical:** Back-end database that maintains a distributed ledger, openly.

**Business:** Exchange network for moving value between peers.

**Legal:** A transaction validation mechanism, not requiring intermediary assistance."[7]

Furthermore, there is another interesting aspect with respect to the development of various blockchain products from a legal point of view. Most of the blockchain products in existence were created by software developers in an open-source environment. For instance, the development of the code underlying the Bitcoin blockchain (and its subsequent alterations and enhancements) were carried out by several individuals, but relied mainly on the contributions of the "Bitcoin community." The code on which the Bitcoin blockchain[8] runs is provided under an MIT license[9] (as an open-source license) for the use of any individual free of charge. While the continued operation of the system depends on the participation of its users, the development of the underlying code also evinces the same participatory logic at its core.

Today, there are several blockchains that have been created for different purposes and every one of them contains distinctive features. For example, while Bitcoin was designed for use

[3] Tapscott, Don, Tapscott, Alex, *Realizing the Potential of Blockchain*, (June 2017, World Economic Forum,).

[4] Ethereum Foundation, https://www.ethereum.org/foundation, last accessed on May 6, 2018.

[5] Nakamoto, Satoshi, *Bitcoin: A Peer-to-Peer Electronic Cash System*, www.bitcoin.org, 2009, last accessed on May 8, 2018.

[6] Mougayar. (n 1) 20.

[7] *Ibid*., p. 4.

[8] *See* https://bitcoin.org/en/, last accessed on March 27, 2018.

[9] *See* https://opensource.org/licenses/mit-license.php, last accessed on March 27, 2018.

as a cryptocurrency, the Ethereum blockchain[10] is a "turing complete blockchain,"[11] [12] which incorporates the ability to run smart contracts (allow writing programs) that can solve all sorts of reasonable computational problems, as will further be explained in Section 2.1 below. (Smart contracts are self-executing contracts with the terms of the agreement between buyer and seller being directly written into lines of code.)

Another important blockchain classification concerns the distinction between public and "permissioned" ones. A blockchain can be configured in such a way that it allows everyone to become a node and verify/reject transactions. Such blockchains are available to anyone with an internet connection. Once the application running on the blockchain is downloaded to a smartphone or computer, participation in the verification system occurs automatically and takes place in the background. Therefore, while the system is highly secure, every piece of data produced from the moment that the blockchain begins operating is shared amongst every node (although they are cryptographically anonymized). On the other hand, blockchains can also be configured in a permission-based manner. These blockchains operate based on private networks. To become a node in such a blockchain, one needs to obtain permission from the system. For instance, in the (public) Bitcoin blockchain, one only needs to download a "Bitcoin wallet" from the internet to start participating in the verification system. However, for a permissioned blockchain, one needs to get permission from the administrator of the blockchain to create a blockchain wallet and possibly obtain another authorization to become a node in the verification system. Blockchains also might be configured in a combined way in terms of public and private by granting such authorizations to specified accounts while anyone can have an account and perform certain actions.

### 2.1. *Smart contracts*

Smart contracts are a crucial feature of certain blockchains, especially from the perspective of a legal practitioner. Smart contracts are pieces of software into which contractual clauses can be embedded. In other words, the terms of the agreement between the buyer and the seller are written directly into lines of code and such contracts are self-executing.

Nick Szabo first introduced the concept of smart contracts in 1997. Szabo stated that:

> *many kinds of contractual clauses (such as collateral, bonding, delineation of property rights, etc.) can be embedded in the hardware and software we deal with, in such a way as to make breach of contract expensive (if desired, sometimes prohibitively so) for the breacher*.[13]

After the idea was first presented, the technology and platforms that could enable and enforce smart contracts were created through blockchain technology, with the creation of Ethereum.[14] Ethereum is an example of a turing complete blockchain due to its programming language called Solidity. With Solidity, it is theoretically possible to execute a wide range of complex processes.[15] As an example of turing complete systems, vending machines may be considered as the simplest one and with Solidity; Ethereum enables more complex processes to be handled. These include asset transactions involving more than just one party with involvement of several type of assets (e.g. money, land, rights etc.) through smart contracts.

The primary function of smart contracts is to automate the execution of contracts. The software incorporates the obligations of the parties, and if certain requirements defined by the parties are met (e.g., time of execution, specific currency rate, registration of an IP right, etc.), then a smart contract performs the ensuing obligation, such as the licensing of an IP right or the transfer of property, money or any other asset. By creating a smart contract, the parties to the contract no longer have to trust the other party not to breach their obligations under the terms of the contract. Nor do they have to depend on an intermediary party, such as a bank or a governmental body, to create trust or enforce the rules of the contract. With smart contracts, parties can trust the smart contract itself and rely on the immutability and verifiability of the underlying blockchain technology. Once the terms of the contract are agreed upon, the parties express their mutual understanding in the form of a smart contract code, which is triggered by digitally signed, blockchain-based transactions. Once the code in the smart contract is triggered and execution of the contract begins, it cannot be stopped unless the parties have previously agreed on a mechanism in the smart contract concerning this function.[16] For example, in the near future, one might have to pay a fee (in accordance with the smart contract located on the blockchain) to play a song on a device prior to playing it. In that scenario, the smart contract would check the balance of the account of the licensee before each play, and if the account balance is not sufficient to pay for the price of a single play, the smart contract would automatically choose not to execute the license obligation. It would thus prevent the user from playing the song (otherwise, it would deduct the amount of the fee from the licensee's account and then play the song). An example of such a blockchain system already exists: it is called Choon and is a music streaming service and digital payments

[10] Hildenbrandt, Everett, Saxena, Manasvi, Zhu, Xiaoran, Rodrigues, Nishant, Daian, Philip, Guth, Dwight, and Roşu, Grigore, *KEVM: A Complete Semantics of the Ethereum Virtual Machine* (August 17, 2017) *see* https://www.ideals.illinois.edu/bitstream/handle/2142/97207/hildenbrandt-saxena-zhu-rodrigues-guth-daian-rosu-2017-tr_0818.pdf, last accessed on April 12, 2018.

[11] Sergey, Ilya, Kumar, Amrit, Hobor, Aquinas, *Scilla: A Smart Contract Intermediate-Level Language Automata for Smart Contract Implementation and Verification*, January 2, 2018, https://arxiv.org/pdf/1801.00687.pdf, last accessed on April 12, 2018.

[12] Harm, Julianne, Obregon, Josh, Stubbendick, Josh, *Ethereum vs. Bitcoin*, (Creighton University), *see* https://www.economist.com/sites/default/files/creighton_university_kraken_case_study.pdf, last accessed on May 6, 2018.

[13] Szabo, Nick, *The Idea of Smart Contracts*., *see* http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/idea.html, last accessed on May 9, 2018.

[14] Mougayar, (n 1) 41.

[15] De Flippi, Primavera, Wright, Aaron, *Blockchain and the Law The Rule of Code* (Harvard University Press, London, 2018) 28.

[16] Ibid 74-75.

ecosystem that aims (more or less) to provide the aforementioned services.[17]

It should be noted that blockchains may also differ from each other in other aspects, including the utilization of different types of cryptography, different consensus algorithms and eligibility for smart contract execution or side chains. However, this paper will set aside these interesting technical issues and focus and elaborate instead on the possible use of blockchain technology in the field of IP Law.

## 3. Challenges and obstacles ahead

Blockchain technology has existed for less than a decade and can be considered still to be in its infancy. Therefore, talking about blockchain's future at this very early stage is almost like speculating about the future of the internet back in 1980s. Just as one wouldn't be able to conceive of or talk about Facebook, Airbnb or even internet banking in their current forms back in the Reagan era, it is not very easy to predict where blockchain technology might take us in the next 20 or 30 years. However, we can already foresee that blockchain technology will face various challenges from at least four different aspects, namely: (i) technical, (ii) marketing/business, (iii) behavioral/educational, and (iv) legal/regulatory.[18] For the purposes of this paper, our main focus will be the potential legal and regulatory challenges to this emerging technology.

One of the most significant challenges currently facing blockchain technology, which should be of crucial interest to any legal practitioner, arises from the use of blockchain as a transaction platform. This is because "[a] blockchain network can validate a variety of value-related transactions relating to digital money or assets that have been digitized."[19] Value-related transactions encompass, besides monetary transactions, transactions relating to land, debt, or intellectual property.

The fundamental problem currently facing blockchain concerns the speed with which these transactions can be processed through blockchain technology. Compared to traditional transaction platforms, such as VISA or PayPal, blockchain is significantly slower at this time. For example, if we examine the transaction processing capacity of the Bitcoin blockchain (which is the most widely adopted and heavily used blockchain), we observe that it can handle 2–5 transactions-per-second ("TPS"), whereas VISA can handle 56,000 TPS and PayPal can process 155 TPS.[20] However, it is worth noting that "some other blockchains are faster than Bitcoin's. For example, Ethereum started with 10 TPS in 2015, edging towards 50–100 TPS in 2017, and targeting 50,000–100,000 TPS by 2019."[21] In addition, it should be noted that numerous alternatives have been introduced to overcome this challenge through second-layer technologies.[22] The second layer technologies are built on the technologies constructing the base-layer blockchains such as Bitcoin or Ethereum blockchains. As an example of a second-layer technology, SegWit update to Bitcoin can be mentioned as an improvement on the block size and thus on the cost and speed of Bitcoin blockchain.[23] Further, the upcoming update about the Lightning Network also aims to speed up the transactions in Bitcoin blockchain.[24]

As to the legal challenges ahead, the primary obstacle worth discussing is clearly the lack of adequate regulations and the absence of a proper legal framework with regard to blockchains. In recent years, blockchain technology has emerged and developed much more quickly than anticipated and we observe numerous applications of this technology that are creating new grey areas in light of the existing and inadequate regulations. For instance, the use of various cryptocurrencies to carry out illegal transactions on the Darknet[25] markets was the first regulatory challenge posed by blockchain technology. Such unlawful behavior forced regulators swiftly to implement certain regulations in this field in order to combat money laundering.[26] Furthermore, a second wave of regulatory uncertainty arose from Initial Coin Offerings ("ICO"), which were adopted as a crowdfunding method using cryptocurrencies. While countless scams have unfortunately occurred in recent years regarding ICOs,[27] the declarations from regulatory authorities (such as the Securities and Exchange Commission in the United States (SEC))[28] have also played a significant role in a market that has reached a market cap of

[17] Choon - A Music and Digital Content Ecosystem Utilizing Smart Record Contracts, Choon White Paper, *see* https://www.choon.co/public/pdf/choon_whitepaper_v1_07.pdf, last accessed on May 6, 2018.

[18] Mougayar, (n 1) 66.

[19] *Ibid*., 19.

[20] Transaction rate of Bitcoin is given based on the foregoing years statistics. *see* https://blockchain.info/en/charts/transactions-per-second?daysAverageString=7&timespan=1year, last accessed on May 11, 2018

[21] Mougayar, (n 1) 20.

[22] Van Wirdum, Aaron, *Segregated Witness Activates on Bitcoin: This Is What to Expect*, *see* https://bitcoinmagazine.com/articles/segregated-witness-activates-bitcoin-what-expect/, last accessed on April 12, 2018.

[23] Milano, Annaliese, "*Bitcoin Core Releases Software Upgrade with Full SegWit Support*", *see* https://www.coindesk.com/bitcoin-core-releases-software-upgrade-full-segwit-support/, last accessed on April 12, 2018.

[24] Poon, Joseph, Dryja, Thaddeus, "*The Bitcoin Lightning Network: Scalable Off-Chain Instant Payments*" (January 14, 2016), *see* https://lightning.network/lightning-network-paper.pdf, last accessed on May 9, 2018.

[25] Darknet is a portion of the internet that is intentionally hidden and made inaccessible to search engine crawlers. *see* https://turbofuture.com/internet/A-Beginners-Guide-to-Exploring-the-Darknet, last accessed on May 8, 2018.

[26] Novak, Nejc, "*EU Introduces Crypto Anti–Money Laundering Regulation*", *see* https://medium.com/@nejcnovaklaw/eu-introduces-crypto-anti-money-laundering-regulation-d6ab0ddedd3, last accessed on May 6, 2018.

[27] Kean, Brian, "*Don't Believe the Hype. Five Largest ICO "Exit Scams": Expert Take*", *see* https://cointelegraph.com/news/dont-believe-the-hype-the-five-largest-ico-exit-scams-expert-take, last accessed on May 6, 2018.

[28] US Securities and Exchange Commission, "*SEC Issues Investigative Report Concluding DAO tokens, a Digital Asset, Were Securities*"(July 25, 2017 Press Release), *see* https://www.sec.gov/news/press-release/2017-131, last accessed on May 6, 2018.

around 58 billion USD.[29] The involvement of regulatory authorities (especially securities authorities) aimed to clarify the situation surrounding ICOs and try to protect the investors from the scams, but yet in a timid way. Since the underlying technology is still young and rapidly evolving (and has not been completely understood by the regulatory bodies), it is difficult and risky to impose regulations without fully understanding the consequences of such regulation. However, as could be expected, the lack of comprehensive regulation creates uncertainty regarding the future of blockchain technology and slows down the rate of adoption of this promising technology by global companies in their daily operations.

Another important legal challenge is the lack of planning concerning the legal requirements in the early blockchain platforms. Most of these platforms were focused on transactions and not nearly as much on their reporting obligations.[30] This lack of foresight has now forced these platforms conducting value transfers to devise new solutions with respect to the reporting problem. Even though the lack of smooth and efficient reporting processes now may seem likely to cause problems in terms of taxation, it should be remembered that blockchain technology also holds great promise in terms of alleviating today's reporting problems and significantly improving current reporting processes, since such transactions are traceable and irreversible.

## 4. The potential legal status of blockchain

As blockchain is still a relatively new technology that has not (yet) been subject to a legal definition or standardization, the question of its legal status remains unanswered. This section discusses various potential legal definitions that blockchain could fall under and includes a general overview of the possible uses of blockchain as a legal tool in legal disputes or other law-related transactions.

### 4.1. *Could blockchain be considered as an asset?*

Blockchain emerged as an open-source technology that does not belong to any single individual, corporation or entity. Therefore, one cannot assert a legal claim or title on blockchain technology itself and may only claim a right on a patentable invention or copyrightable work that is created through, based on or derived from blockchain, and only if the work or invention fulfills the applicable legal prerequisites.

However, it is crucial to note that applications running on blockchain technology have gained increased significance in recent years, and they are likely to be even more important in the future. Thus, we are currently witnessing an intense battle over patents relating to innovations running on blockchain technology.[31] According to World Intellectual Property Organization ("WIPO") databases, there were 406 applications for blockchain patents in 2017.[32] When we examine the recent fillings regarding blockchain technology, it is seen that tech giants like Qualcomm, IBM, MasterCard and Microsoft are among the top ten of all applicants.[33]

### 4.2. *Could blockchain be considered as a payment system?*

As mentioned above, the first use of blockchain was in the realm of cryptocurrencies. These cryptocurrencies have been at the forefront of the public discussion surrounding blockchain technology since at least 2009, when two pizzas were sold for 10,000 BTC (Bitcoins),[34] which would be worth about 100 million USD today. The total value of the cryptocurrency market currently fluctuates around 155 billion USD,[35] which makes cryptocurrencies a significant asset class and partly explains why these platforms have garnered most of the attention since the emergence of blockchain technology. Bitcoins, Ethers (the cryptocurrency of the Ethereum blockchain) and numerous "altcoins" (short for alternative coins) have been transferred between cryptocurrency accounts countless times using blockchain technology. Some of these cryptocurrency transfers were made in exchange for goods and services. Thus, we observe that Bitcoin and other cryptocurrencies have been accepted and used as payment methods in several markets for almost a decade. From a legal perspective, this brings up the fundamental question of whether the use of cryptocurrencies in payments constitutes a legal payment system.

The first issue to be dealt with here is to clarify whether or not a cryptocurrency may be classified as "money." Today, debates concerning this complicated issue are still ongoing in various different legislative bodies, as well as among scholars and other experts, and there are diverging views on the fundamental question of whether cryptocurrencies constitute money. For instance, while Japan has already regulated cryptocurrencies as a payment method,[36] the Turkish Banking Regulation and Supervision Agency ("BDDK") has stated that Bitcoin is not "money."[37] Therefore, a payment made through blockchain-based cryptocurrencies does not currently fall under any payment system in Turkish Law. As a result, a payment made using Bitcoins in Turkish law would not be considered as

[29] *see* https://coinmarketcap.com/tokens/, last accessed on May 11, 2018.

[30] Mougayar, (n 1) 79.

[31] "*China leads blockchain patent applications*", (March 25, 2018, Financial Times, ), *see* https://www.ft.com/content/197db4c8-2e92-11e8-9b4b-bc4b9f08f381, last accessed on March 27, 2018.

[32] *Ibid.*

[33] "*An Overview of the Blockchain Patent Landscape*", *see* https://clarivate.com/blog/overview-blockchain-patent-landscape, last accessed on March 27, 2018.

[34] "*Someone in 2010 bought 2 pizzas with 10,000 bitcoins — which today would be worth $100 million*", *see* http://uk.businessinsider.com/bitcoin-pizza-10000-100-million-2017-11, last accessed on May 6, 2018.

[35] *see* https://blockchain.info/en/charts/market-cap?timespan=30days, last accessed on May 11, 2018.

[36] Yagam, Ken, "*Japan: A Forward Thinking Bitcoin Nation*" *see* https://www.forbes.com/sites/outofasia/2017/11/02/japan-a-forward-thinking-bitcoin-nation/#721e4fd833a3, last accessed on May 6, 2018.

[37] Turkish Banking Regulation and Supervision Agency Press Release in Turkish, https://www.bddk.org.tr/websitesi/turkce/Duyurular/Basin_Aciklamalari/12574bitcoin_hk_basin_aciklamasi.pdf, last accessed on May 6, 2018.

a payment made through "a payment system" in legal terms, which would have fallen under the supervision of the BDDK.

Another factor that should be taken account is that, since blockchain technology enables different kinds of assets to be exchanged on the blockchain system, regulations might have to be implemented or renewed in such a way as to allow such asset exchanges to qualify as "payments" in return for "transfers of ownership or a right to use." In the current legal environment, the exchange/transfer of an ownership over a piece of land or a car or a patent in an electronic environment is not covered by any traditional electronic storage/record keeping system (i.e. databases of the IP Offices). These records do not have the ability to react automatically in cases such as the payment of the price of the land. The traditional systems "change" the title of the owner when it is required, instead of a direct "transfer" of the ownership to the purchaser. However, since blockchain technology is able to process such transactions, it provides "exchange" of the title in return of the payment instead of "change" of the title in case of payment information provided. Therefore, blockchains should be regulated in such a way to ensure that not only money but also the transfer of other assets on the blockchain are also covered. In that case, transactions related to intellectual property rights ("IPR") and the transfer of IPR assets might be carried out in an electronic environment using blockchain technology.

### 4.3. *Could blockchain be considered an "Intermediary Service" in terms of E-commerce?*

Blockchain has been built to facilitate the exchange of assets between peers. As such, platforms that rely on blockchain technology might also fall under the definition of "intermediary service providers."

Intermediary service providers have been defined and regulated in the European Union under EU Directive 2000/31/EC.[38] To understand whether the use of blockchain can fall under the scope of Directive 2000/31/EC, one must first assess whether the services provided (or likely to be provided) by the platform are in line with the definition of these services in the Directive. Article 3(a) of the aforementioned Directive, which provides a definition for "*information society services*," refers back to Article 1 of the Directive 98/34/EC,[39] which defines a service as:

> *any Information Society service, that is to say, any service normally provided for remuneration, at a distance, by electronic means and at the individual request of a recipient of services.*
>
> *For the purposes of this definition:*
>
> - *'at a distance' means that the service is provided without the parties being simultaneously present,*
> - *'by electronic means' means that the service is sent initially and received at its destination by means of electronic equipment for the processing (including digital compression) and storage of data, and entirely transmitted, conveyed and received by wire, by radio, by optical means or by other electromagnetic means,*
> - *'at the individual request of a recipient of services' means that the service is provided through the transmission of data on individual request.*

In line with the foregoing definition, the services that are already provided through blockchain technology (e.g., asset transfers, smart contract executions, storage services, etc.) or will be provided in the future (e.g., license agreements, voting services, management of the ownership of property, etc.) might be considered as "information society services." Since blockchain technology may very well fall under the scope of this definition (considering the current and potential services provided via this technology), we will now proceed to an assessment of whether anyone could be legally liable for the services provided through such blockchain platforms and, if so, who the liable party might be.

According to Article 3 of the Directive 2000/31/EC, a service provider is defined as "*any natural or legal person providing an information society service*." Therefore, it can easily be observed that any natural or legal person providing such services on a blockchain platform would fall within the scope of this definition, and thus would be considered and treated as a service provider. However, as to the assessment of liability, such assessment must be made according to Section 4 of the Directive 2000/31/EC, where the liability of intermediary service providers is regulated. Article 12 of the Directive 2000/31/EC states that:

> *Member states shall ensure that the service provider is not liable for the information transmitted, on condition that the provider: (a) does not initiate the transmission; (b) does not select the receiver of the transmission; and (c) does not select or modify the information contained in the transmission.*

In light of this rule, although there may be exceptions in specific circumstances, service providers of the services delivered by means of blockchain technology generally qualify as "intermediary service providers," and thus they should not be held liable for the information transmitted through the nodes involved in the blockchain, since they act as "mere conduits" for such information.

The relevant Turkish laws on this matter are in line with the existing rules in the European Union, and thus, a similar conclusion may be reached with respect to the treatment of this issue in Turkey. According to the Law No. 6563 on the Regulation of Electronic Trade, services relating to asset transfers, smart contract executions, storage, license agreements, voting or management of the ownership of property, which are provided to users by employing blockchain technology, may fall under the scope of this regulation. Article 2 of the Law No. 6563 defines an "electronic trade" as "any and all kinds of commercial activity processed on an online electronic platform without any physical interference." Therefore, it is clear that the services mentioned in this definition, particularly IP services,

[38] Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on Certain Legal Aspects of Information Society Services, in Particular Electronic Commerce, in the Internal Market (Directive on Electronic Commerce), http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000L0031&from=EN, last accessed on May 6, 2018.

[39] Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society Services; http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1998L0034:20070101:EN:PDF, last accessed on May 6, 2018.

will fall within its scope, and thus the providers of such services will be deemed as "*service providers*" according to the Law No. 6563.

In light of this assessment, there is no ambiguity as to whether these service providers (such as the Ethereum Foundation) would be liable for the information they have transmitted while performing these services. According to Article 9 of the Law No. 6563, since such service providers will most likely be treated as "*intermediary service providers,*" they will not be legally liable for the information transmitted.

However, under Turkish Law, they are not totally exempt from liability either. The liability of intermediary service providers is also regulated through bylaws. According to the Bylaw Regarding Service Providers and Intermediary Service Providers in Electronic Trade, an intermediary service provider has certain obligations and liabilities with respect to the "record keeping," "orders," "order confirmations" and "protection of personal data," the details of which are beyond the scope of this paper.

### 4.4. *Possible use of blockchain as a legal tool in legal disputes or other law-related transactions*

Certain distinctive features of blockchain technology, particularly data integrity, verification and public transparency of transactions, may either prevent or contribute to the resolution of some legal disputes, since this technology can be used for the purposes of proof, confirmation or validation of legal transactions.

As explained above, blockchain records are time-stamped, immutable, and traceable. These unique characteristics of blockchain records are frequently brought up in discussions of blockchain technology because these are the core features that establish and indicate the trustworthiness of such records.

From a legal perspective, this is perhaps the most crucial aspect of blockchain technology, since it is extremely important for legal practitioners to be in possession of trustworthy records when making an argument or a decision in legal proceedings. Blockchain technology may have a substantial effect on legal practice in this respect. It is possible that, in the coming years, blockchain records will frequently be submitted to the courts as evidence and provide a novel and reliable method of proof.

As to the current EU law, the interpretation of Regulation No. 910/2014[40] on "*electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC*" concerning blockchain technology is thought provoking. According to Article 3 of the Regulation No. 910/2014:

- '***electronic time stamp***' *means data in electronic form which binds other data in electronic form to a particular time*;
- '***electronic registered delivery service***' *means a service that makes it possible to transmit data between third parties by electronic means and provides evidence relating to the handling of the transmitted data, including proof of sending and receiving the data, and that protects transmitted data against the risk of loss, theft, damage or any unauthorized alterations; establishing evidence that the latter data existed at that time;*
- '***trust service***' *means an electronic service normally provided for remuneration which consists of: (a) the creation, verification, and validation of electronic signatures, electronic seals or electronic time stamps, electronic registered delivery services and certificates related to those services, or (b) the creation, verification and validation of certificates for website authentication; or (c) the preservation of electronic signatures, seals or certificates related to those services;*
- '***electronic signature***' *means data in electronic form which is attached to or logically associated with other data in electronic form and which is used by the signatory to sign.*

In light of the aforementioned definitions, it may easily be argued that blockchain records fall within the scope of all of these definitions. Although there is no court decision at hand, it may nevertheless be contended that, under the current regulations, a blockchain record would be considered as an "electronic signature" and thus have the same/equivalent legal effect as a handwritten signature. Furthermore, the time stamp contained in a blockchain record may be deemed as an "electronic time stamp" under the scope of the Regulation No. 910/2014.

### 4.5. *Smart contracts*

One should not judge "smart contracts" merely by their name and erroneously conclude that they are contracts from a legal perspective simply because they are colloquially referred to as "contracts." The actual legal status conferred on a smart contract can vary from one jurisdiction to another depending on the relevant legislation, and it may differ on a case-by-case basis depending on the subject matter of the contract. In the Turkish legal system, a written and signed paper contract is, in principle, not required to enter into a valid contractual agreement. According to Article 12 of the Turkish Code of Obligations, the "validity of a contract is not dependent on any form, unless stated otherwise by law." As per the provisions of Article 12 regarding contracts in matters that do not have any form requirement by law, a Turkish Court may very well deem a smart contract to be a binding contract. Furthermore, it may also be very appealing (from a legal point of view) to have a verifiable and immutable record of a blockchain transaction, which can be used to establish or prove the existence of such contracts.

Similar to Turkish Law, there is also (in principle) no specific form requirement for the validity of a contractual agreement in EU Law. In Article 11 of the United Nations Convention on Contracts for the International Sale of Goods ("CISG"), it is stated that "a contract of sale need not be concluded in or evidenced by writing and is not subject to any other requirement as to form. It may be proved by any means, including witnesses." Moreover, in the Principles of European Contract Law ("PECL"), which is a set of model rules drawn up by leading contract law scholars in Europe, it is stipulated in Article 2:101 that "a contract need not to be concluded or evidenced in writing nor is it subject to any other requirement as to form."

In light of these two provisions, it can be said that, for contracts relating to matters that are not subject to any form re-

[40] *See* https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0910&from=EN, last accessed on May 6, 2018.

quirement, the mere existence of a smart contract is binding and effective for the parties to that contract. Furthermore, the record of the smart contract on the blockchain can and should be deemed as sufficient proof of the existence of such a contract by the courts or other judicial authorities.

Another effective application of smart contracts might occur in the area of dispute resolution. Since it is easier than ever before to authenticate a record with blockchain technology and since such records are immutable, parties who are faced with a blockchain-related dispute might transmit the facts of their case in a simple and verifiable way to a disinterested third party within the blockchain, and then make their arguments to that neutral arbiter.[41] At a minimum, such a dispute resolution system would lower the costs for consumer disputes concerning small amounts, compared to submitting their disputes to arbitration specialists or applying to the courts for a legal resolution. Furthermore, since the resolution of such a dispute would also be recorded on the blockchain, it would preserve the option of appealing to the courts or otherwise challenging the order later.

Today, there are several technologies that are being used in legal procedures that allow parties as well as judges to create or assess different types of proofs (i.e., electronic signatures, electronic time stamps, watermarking etc.). As technology advances and as judicial authorities become better acquainted with blockchain technology, it seems likely that it will be just a matter of time before a blockchain record is recognized and treated as valid evidence/proof by a court. Since blockchain records are immutable and cryptographically secure, there is no reason for any court or other judicial/governmental authority to disallow or reject a blockchain record as proof, except in cases where one country, authority, or person owns 51% of the mining capacity. This would otherwise give this party the power to manipulate the records by influencing the consensus reached by the addition of each record.

However, while making such an assessment, the unfavorable reputation of blockchain technology and the public relations challenges that are facing blockchains must also be taken into account. Blockchain technology was first introduced to the public via cryptocurrencies, which were frequently used in illegal trades in their early years. It is no secret that some of these cryptocurrencies are still commonly used in Darknet[42] markets. In light of this negative publicity, it will be a difficult challenge for blockchain technology to gain widespread acceptance or adoption by consumers or the public at large.

Moreover, since blockchain technology is still in the early stages of development, this creates certain difficulties with respect to implementing regulations in the blockchain realm. Some features of the technology have not yet emerged and others will function differently in the coming years. Therefore, it is quite normal and predictable that even governments who view blockchain technology favorably will continue to approach it cautiously for the time being.

[41] Abramowicz, Michael, *Cryptocurrency-Based Law*, Arizona Law Review 58 (2016), p. 359.

[42] *Monero to Replace Bitcoin for Darknet Ransomware, Experts Predict*, https://darkwebnews.com/deep-web/ransomware-monero-bitcoin/, last accessed on May 6, 2018.

## 5. Blockchain's potential areas of use in IP law

Blockchain platforms are decentralized and immutable by the very nature of the underlying technology. Furthermore, as discussed in the previous section, there is a substantial possibility that blockchain records may gain widespread recognition and achieve legal status in the eyes of judicial authorities, intellectual property offices and other governmental institutions in the future. Therefore, the combination of these two factors provides IP Offices, governmental organizations and courts with an opportunity to improve their operations and procedures, by employing blockchain technology to achieve faster and more cost-effective recordkeeping in a more secure environment.

In fact, some blockchain platforms are already showing their prospects and proving their potential with respect to the management of intellectual property rights. Companies such as UJO,[43] which is an open platform that uses blockchain technology to create a transparent and decentralized database of rights and rights owners, and automates royalty payments using smart contracts and cryptocurrency, have already begun to emerge. These companies enable their users to use blockchain technology to demonstrate the existence and uniqueness of their creations, along with giving them the opportunity to create smart contracts to license these creations.

Furthermore, blockchain technology is capable of and well suited to solving a number of problems with respect to the enforcement of IP rights. Since the technology in question provides an easy way to demonstrate and prove the existence and uniqueness of a product, it also enables enforcement authorities easily to detect counterfeit products. In fact, various IP Offices have already started to work on this matter. For example, the EUIPO (European Union Intellectual Property Office) has launched a "blockchain hackathon" aimed at proof-of-concept projects in order to discover how blockchain technology might be used by enforcement authorities to create the next level of anti-counterfeiting infrastructure.[44]

It is also worth noting that blockchain technology can be employed in cooperation with another promising technology, artificial intelligence ("AI"), particularly domain-specific artificial intelligence. In the realm of IP rights, such cooperation may allow the registration process to be completed by the system itself, with almost no human involvement or input. For instance, the patent registration process and opposing to designs and trademarks might be handled exclusively by the cooperation of AI and blockchain technology. In the future, if the CAD files[45] of patents, designs and trademarks are required to be uploaded to a public or private blockchain, the data stored in such a blockchain will be available to be used by the relevant

[43] *See* https://ujomusic.com/, last accessed on April 3, 2018.

[44] *See* https://euipo.europa.eu/ohimportal/web/observatory/blockathon, EUIPO Blockathon, anti-counterfeiting blockchain competition, last accessed on May 7, 2018.

[45] "CAD is an image file format used by AutoCAD. AutoCAD was created by AutoDesk, and creates 2-D and 3-D designs. CAD files hold information for these images, as well as drafting information. CAD stands for Computer Aided Design." *See* http://whatis.techtarget.com/fileformat/CAD-AutoCAD-drawing-database-file, last accessed on May 7, 2018.

AI program. Certain IP assessments, such as the "likelihood of confusion" evaluation in trademark cases or the "existence of an inventive step" assessment in a patent application might be performed by AI-based software. As explained above, with all the CAD files of the registered IPR at hand and available for use on the blockchain, the aforementioned software will have all the information necessary to make such an assessment with speed and accuracy.

### 5.1. *Registration of IP rights through blockchain*

Although copyright is automatically granted with the creation of a work in civil law, other IP rights such as patents, trademarks or designs, can only be established pursuant to a registration process. The process of registration for an IP right is often complicated and costly. Furthermore, in most cases, registration only enables the right holder to enforce his/her IP rights in the country in which the intellectual property right is registered. Considering the global nature of commerce, this limitation is not suitable or adequate to the needs of right holders, particularly in light of the rapid pace of commercial life in the modern economic system. Blockchain technology might once again be the key that could unlock IP rights by making the registration process much easier, faster and cost-effective, and thus alleviating the procedural and enforcement-related burdens faced by IP right holders.

#### 5.1.1. *Mobile applications replacing large institutions*

Both in civil- and common-law countries, industrial property rights are subject to registration. Although the procedures and requirements for registering an intellectual property right differ among jurisdictions, these differences would not affect blockchain's disruption of the traditional registration process. In the following section, the issue of whether blockchain technology will be able to succeed in changing the traditional method of registration will be addressed.

As touched upon in previous sections, the registration process for industrial property rights can be carried out autonomously with the help of blockchain technology. However, it should be noted that this innovative approach works differently depending on the particular type of IP right that is being registered.

In the European Union, there are three main requisites for an invention to be patentable. These are (i) *being new*, (ii) *involving an inventive step*, and (iii) *being susceptible of industrial application*.[46] Blockchain technology holds significant promise as to making the process of assessing these requirements much more autonomous, and perhaps even obviating the need for human involvement completely. If the databases that are used or consulted by patent offices during the assessment process are kept in a secure blockchain to which all such authorities have access, the assessment of whether an invention fulfills the novelty requirement might be accomplished through the cooperation of an AI-based software and blockchain technology.

For yet another example of the applicability and usefulness of blockchain technology in registering and enforcing IP rights, consider the use of Computer Aided Designs ("CAD"). Taking a photograph of a design from three different angles is sufficient to create a CAD. Such a CAD could be uploaded to a blockchain-based app that could search the entire database (which might very well comprise all designs registered in the history of the trademark regime) for similar designs and the design right could be granted or denied using an AI-based assessment tool. Moreover, if patent records were also stored as CADs, the AI-based software could search the entire database and reach an assessment with respect to patent applications as well. Although we would not expect such a fully automated system (based on the collaborative use of blockchain technology and AI-based software) to gain widespread adoption in the next 10–15 years, it would not surprise us to see blockchains and AI-based software being employed to facilitate this assessment procedure for humans. If all the patents that have already been granted were stored in the blockchain as CAD files, a tool in the form of an AI-based software would have all the information it might need to demonstrate to the patent officer (making the patentability assessment) how similar the invention is to all other patented products in the relevant field.

As for designs and trademark, the use of blockchain technology might be even more advantageous and beneficial in those cases. Considering that designs today are mostly created and refined by using computers, the assessment of whether the design in a trademark application is similar or identical to an already registered one might be carried out by computers. In the same vein, the assessment of the "likelihood of confusion" regarding trademarks might also be handled without any human involvement or input. In most of the civil-law countries including the members of EU and Turkey, there is no *ex officio* assessment in the registration process as to whether a design is identical or similar to any other registered design or whether a trademark would create a likelihood of confusion. For applicants who take advantage of the Fast Track Application Process of the European Union Intellectual Property Office, the application process is online and autonomous and a software-based tool called "eSearch" only checks to see if the procedural elements have been fulfilled.[47] Furthermore, it is possible to register a trademark or a design with a CAD file presented to the IP Registries since EUIPO's Design View tool allows applicants to upload CAD files of the designs.[48] Thus, there is no need to examine the design hands on.

All of these innovations are one step closer and possible with blockchain technology. Apart from the ease of the registration process itself, not having to involve or interact with any institution or representative to protect one's IP rights seems like an enormous benefit for creative minds. Once an objection or challenge is raised to a patent or trademark (i.e., when

[46] Article 52 regarding "*Patentable inventions*" of the European Patent Convention reads as follows: "*(1) European patents shall be granted for any inventions, in all fields of technology, provided that they are new, involve an inventive step and are susceptible of industrial application.*"

[47] Fast Track Application Process, European Union Intellectual Property Office, *see* https://euipo.europa.eu/ohimportal/rcd-apply-now, last accessed on May 7, 2018.

[48] The Four-step form for Design View, https://euipo.europa.eu/ohimportal/the-four-step-form

an opposition is made), the evaluation procedure would start. There are already some existing tools and databases that are available to intellectual property offices to be used when evaluating the similarity of a particular patent/trademark to an existing one. For instance, the EUIPO provides the DesignView and TMview applications to check the databases of the EU Member States and the EUIPO.[49] For example, TMview can be used to check the availability of a trademark name, find out the goods and services protected by competitors' trademarks and receive updates on selected trademarks for change of status, change of name and end of opposition period. Similarly, WIPO provides a database for designs.[50] However, this database only includes the designs that have Hague registrations and information provided by the participating national offices, and thus, it cannot be deemed as complete. Since there are different databases in various informational "silos," blockchain technology can help bridge the gap and provide a single, unified database for designs. Such a database would also foster and facilitate the processing of oppositions. The CAD files contained within the database could be searched by software (similar to the one discussed in the patent section above), and the opposition process might thereby be handled autonomously and much more efficiently.

5.1.1.1. *Advantages* The possible future adoption and implementation of blockchain technology by IPR registries might bring with it significant advantages. First of all, the biggest potential (and the most beneficial scenario) for the adoption of blockchain is the development of a fully automated IPR registration process that would make it possible to assert one's IP rights without human intervention or even requiring an institution. However, we must admit that it is very unlikely such implementation will be finalized within the next 5–10 years, even in countries like USA, China, Germany and Japan that are viewed as pioneers of blockchain technology. But, once again, we must emphasize that blockchain technology is capable of providing great benefits even on the way to final implementation, which it can achieve by facilitating the registration process (i.e., making it faster and lowering the costs of registration). Finally, as discussed above, blockchain can help legal practitioners and right holders to protect and enforce their rights by offering an easier method of providing proof to the IP courts.

### 5.1.2. *Registration without a middle man*

Today, intellectual property systems in all jurisdictions are highly dependent on the IP offices and limited by the capabilities of those offices. These institutions keep and safeguard the records pertaining to such rights, and they try to handle a huge amount of very sensitive data (e.g., statistics from the EUIPO, European Patent Office, United States Patent and Trademark Office, United Kingdom Intellectual Property Office and Turkish Patent Office). As to the operational part of these institutions, the costs of maintaining and updating such systems are considerable. For instance, the EUIPO requires an annual budget of more than 11 million Euros just for the maintenance of patent applications.[51] Along with these substantial costs, a patent registration application (or opposition) often necessitates the presence of a representative or lawyer, entails complicated procedures, and requires sophisticated "earlier use" research. It is self-evident that most of these activities and requirements do not advance the main goal or primary mission of intellectual property law, which is fostering innovation and creativity. The cost of registering and renewing an IP right is dependent on the aforementioned factors, and these costs rise as the procedures become more complicated and time-consuming. It is undeniable that if the costs associated with these activities were lowered by implementing a much simpler and quicker registration process, the goal of fostering innovation and creativity through IP laws could be realized much more easily and effectively.

As mentioned above, the registration and renewal of an IP right is expensive. This is the main reason that right holders usually choose to register their IP rights with only one or perhaps a couple of registries. This, in turn, results in the right holder's IP rights not being protected in the countries where those rights have not been registered. In such a scenario, the right holder is often forced to lodge and pursue an "unfair competition" claim in case of an IP infringement. The parameters of an unfair competition claim are of a different nature and can often be more complex than an IP infringement claim, which imposes additional legal and financial burdens on the person who is trying to protect his/her IP rights.

This unfortunate situation mainly arises due to the complexity and significant cost burdens of different registration proceedings. However, with blockchain technology, the question of whether the intellectual property system must be dependent on an IP registry could be answered differently than it has been up to now. With blockchain technology, the functions performed by large institutions could be carried out by simple smartphone applications. In that scenario, the cost of registering an IP right would fall considerably, thereby enabling IP right holders to register their patents and trademarks in numerous different countries via easy-to-use, blockchain-based mobile or web applications.

5.1.1.2. *Challenges* Even though blockchain technology holds great promise and might provide many benefits, there are still some challenges facing the system. The first one is a generalized concern stemming from the negative publicity surrounding existing blockchains (i.e., cryptocurrencies) and affecting the adoption rate of the underlying technology in almost every sector. Furthermore, since blockchain technology is advancing rapidly and bringing immense changes to many sectors, it is

[49] DesignView, European Union Intellectual Property Office, https://www.tmdn.org/tmdsview-web/welcome, last accessed on May 7, 2018. ("Designview is a centralized access point to view the registered design information held by any of the participating National Offices, in a unique presentation format, independently of which office the data is coming from.")

[50] Global Design Database, World Intellectual Property Office, http://www.wipo.int/designdb/en/index.jsp, last accessed on May 7, 2018.

[51] Budget Of The European Union Intellectual Property Office for 2018, 16 and 17, *see* https://euipo.europa.eu/tunnel-web/secure/webdav/guest/document_library/contentPdfs/about_euipo/the_office/budget_office/budget2018.pdf, last accessed on May 8, 2018.

viewed with suspicion and concern, as with earlier technological revolutions that promised to change the world. Finally, we should keep in mind that technology, in general, is quite complex and often hard to understand in technical terms, which exacerbates the general public suspicion and resistance that such technologies often encounter.

Additionally, as we have noted before, blockchain is constantly evolving and, a decade after its invention, it is still in the early stages of development. Due to the nature of the underlying technology, a blockchain's rules are always predefined. For example, the rules for Bitcoin specify that there will be only 21 million Bitcoins ever mined. These types of limiting rules also make the timing of moving such transactions from a traditional database to the blockchain a very tricky matter. These shifts certainly shouldn't be delayed too much, but they cannot be implemented too quickly either, since blockchain technology is still besieged by a number of unsolved problems as explained in Section 3 above.

### 5.2. *Management of IP rights*

Blockchain technology has significant implications for some aspects of the management of IP rights as well. In the modern IP system, certain activities involving the management of IP rights (such as licensing, the identification of a right holder, IPR infringement investigations, among others) are mostly conducted by third parties. Blockchain technology can once again be useful in this context by removing the need for such third parties and lowering the costs of the management of IP rights. Now, the most beneficial effect of blockchain technology concerns the management of copyright, as blockchains create and open up completely new markets for the right holders while also enabling them to collect their royalties directly from the users as explained in the following section.

#### 5.2.1. *Copyright management by right holders–licensing via smart contracts*

One of the possible applications of blockchain technology is related to the management of copyrights. Once a creation or work that is subject to copyright (such as a piece of music or writing) comes into existence, a bundle of IP rights is automatically created as well, and these rights can be owned by different legal identities. After the creation (and throughout the years of existence) of these rights, the difficulty of identifying their rightful owners and the calculation of the different amounts of payments due to each right holder when the creation/work is used constitutes a serious challenge for the right holders and the licensees of the copyrighted work.

The relevant records today are held by either governmental bodies, private companies or right holder organizations. However, these databases are mostly not interoperable and are not always public either. The cost of maintaining a public and interoperable database can exceed the available resources of some of these organizations as well. The security of these records is also in question and the IP rights are mostly managed by outside parties (i.e., not by the right holders themselves). As a result, the management of these rights is costly, complicated and time-consuming.

A solution to the aforementioned problems might be possible with the adoption of a blockchain registration system, where the rights related to the copyrighted work would constitute a block in the chain. Creating such a system from scratch would be cheaper and easier (in terms of overcoming its technical challenges) compared to transforming the current system into a public, interoperable one. Additionally, the information located in the blockchain would be available for everyone. In other words, every person possessing the blockchain application would become a node and, while being able to see the whole chain, would also contribute to the security of the system by acting as a node (and a server) without incurring any server costs. Therefore, the costs associated with identifying the right holders would be reduced considerably, since the time required for processing this information might only be a couple of minutes as all the records would be stored in, for instance, a smart phone or desktop application and the security of the system could be maintained at a significantly lower cost as well.

Another vital benefit of this system is that the IP rights would be managed by their owners themselves rather than by outside parties. In addition to the creation of the work and its IP rights, the right holders would also be able to produce the smart contracts that would be used in possible future transactions concerning the copyrighted creation. By having such contracts running on a blockchain, the processing of such transactions would be much simpler and, through this system, the right owners would be able to increase their earnings considerably, as transaction costs would be substantially reduced.

As an example, consider someone using an online video platform such as Vimeo who might want to use a copyrighted song or a scene from a movie in their own video creation. Now, either they would be prevented from using someone else's copyrighted work by the platform or they would be given notice to take the video down when it is detected by the right owner. However, a blockchain system that included a smart contract in one of its blocks would enable Vimeo or the right holder to ask the Vimeo content creator whether they would like to sign the smart contract and be able legally to use the song/movie scene in their work. In such a scenario, the content creator would be able to use the copyrighted work in a matter of seconds and Vimeo (or any other online platform) and the right holder(s) would both receive compensation for their parts as well. Vimeo would be paid for its services as the online platform enabling this transaction, and the right holder(s) would be paid for the use of their original, copyrighted work.

For licensing and transfer of the registered IP rights, the registration of the licensing/transfer agreement itself is also an issue whose rules vary among jurisdictions depending on the applicable legislation. For instance, in the European Union, this issue is regulated under Chapter III of the European Patent Convention for patents.[52] According to this section, the European Patent Office, upon a request from an interested party, will register a transfer or a license of a patent. For the license

[52] European Patent Convention, 16th Edition, Chapter III, Articles 21, 22 and 23, *see*http://documents.epo.org/projects/babylon/eponet.nsf/0/029F2DA107DD667FC125825F005311DA/$File/EPC_16th_edition_2016_en.pdf, last accessed on May 6, 2018.

agreements regarding designs, Article 32/4 of the Regulation (EC) No. 6/2002 has put a similar regulation forth.[53]

In Turkish Law, however, approval by a notary public is mandatory for transfer agreements regarding patents and designs. According to Article 148/4 of the Law No. 6769 on Industrial Property Rights ("Law No. 6769"):

> *Legal transactions shall be made in a written form. The validity of transfer agreements is subject to being approved by a notary public.*

In light of this article, every transfer of a patent or design in Turkey must be approved by a notary public to create a record of the transfer. Furthermore, Article 61/2-g of the "By-law on the Application of the Industrial Property Law" ("By-law") states that the registrar records include the records of the license and transfer information. This scheme is once again fit for disruption by blockchain technology, which could allow blockchains to replace notary publics and IP Offices, who are the intermediaries in this scenario. By doing so, the costs of these transactions might be reduced considerably and records could be kept in a more secure environment, while also removing the need for paperwork and thus allowing a faster operation process.

Another aspect of licensing through smart contracts that merits our attention is the assessment with regard to "distance contracts." This issue will come up in cases where consumers license music or similar copyrighted works through smart contacts. In EU legislation, distance contracts are regulated under Directive No. 97/7/EC[54] on the Protection of Consumers in Respect of Distance Contracts ("DC Directive"). As per Article 2/1 of the DC Directive:

> *'distance contract' means any contract concerning goods or services concluded between a supplier and a consumer under an organized distance sales or service-provision scheme run by the supplier, who, for the purpose of the contract, makes exclusive use of one or more means of distance communication up to and including the moment at which the contract is concluded.*

In light of this definition, a smart contract concluded between a supplier and a consumer would be subject to the DC Directive, since smart contracts "*work by changing the state of a distributed ledger on every node on the network*."[55] In that case, the blockchain running the smart contract might also fall within the scope of the definition in Article 2/5 of the DC Directive as the "*operator of a means of communication*." However, in such a case, the regulators must address the question of who can be held responsible for the operation or functioning of a blockchain. For example, in the case of the Hyperledger[56] blockchain, since it is run by the Linux Foundation, the answer to the foregoing question might indeed be the Linux Foundation,[57] which will bear the obligations put forth by the DC Directive as an "operator of a means of communication."

With regard to the qualifications a smart consumer contract must possess, Article 4 to the DC Directive indicates that the consumer must be provided with the prior information stated in the Article, including:

(i) the identity of the supplier (along with its address in cases of payment);
(ii) main characteristics of the goods and services;
(iii) the price including all taxes (which may be tricky in the case of blockchains, where contracts are concluded in various jurisdictions within seconds);
(iv) delivery costs;
(v) the arrangements for payment, delivery or performance; and
(vi) the existence of a right to withdrawal, among others.

In the future, these requirements will probably be managed by smartphone applications that will be built on blockchains. In such cases, it is more likely that the entities behind these applications (i.e., their owners/creators) will be subject to these obligations, but not the operators of the blockchains. Particularly for the requirements set forth in the DC Directive concerning the right of withdrawal, a blockchain system where a transaction can easily be undone will have to be created. Due to immutable nature of Blockchain, there might be the need of a blockchain, based on and designed with different principles in a way both ensuring the trust to the records and the ability to withdrawal when needed. In other words, a record in a blockchain, intended to be used in IP, should provide the options to edit, rewrite and/or remove blocks of information without harming the immutable nature of the Blockchain. The issue is taken into consideration by the developers and solutions in that regard might be provided in the coming years, although there is no solution offered until this time.[58]

As for the Turkish legislation on the matter, the "Regulation on Distance Contracts"[59] ("DC Regulation") is a verbatim adoption of the EU Directive No 97/7/EC discussed above. As per Article 4/e of the DC Regulation, distance contracts are defined as:

> *Contracts which are concluded between the seller or provider and the consumer without being physically at the same place at the*

[53] COUNCIL REGULATION (EC) No. 6/2002 of 12 December 2001 on Community designs (OJ EC No L 3 of 5.1.2002, p. 1), *see* https://euipo.europa.eu/tunnel-web/secure/webdav/guest/document_library/contentPdfs/law_and_practice/cdr_legal_basis/62002_cv_en.pdf, last accessed on May 6, 2018.

[54] Directive 97/7/EC of The European Parliament and of the Council of 20 May 1997 on the Protection of Consumers in Respect of Distance Contracts, http://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:31997L0007, last accessed on May 7, 2018.

[55] Dewey, Josias N., Amuial, Shawn S., Seul, Jeffrey R., *The Blockchain: A Guide for Legal and Business Professionals* (Thomson Reuters, 2016) 49.

[56] Hyperledger Project, https://www.hyperledger.org/, last accessed on May 6, 2018.

[57] Linux Foundation, https://www.linuxfoundation.org, last accessed on May 7, 2018.

[58] Conway, Sean K., Wozniak, Lara, HUssain Efran, *Accenture Debuts Prototype of 'Editable' Blockchain for Enterprise and Permissioned Systems, see* https://newsroom.accenture.com/news/accenture-debuts-prototype-of-editable-blockchain-for-enterprise-and-permissioned-systems.htm

[59] Turkish Regulation on Distance Contracts, published in the Official Gazette dated November 27, 2014, with number 29188, http://www.resmigazete.gov.tr/eskiler/2014/11/20141127-6.htm, last accessed on May 6, 2018.

*same time, with respect to a system for distance marketing of the goods and services, with the usage of the distance communication tools until and at the time of the conclusion of the contract.*

According to this definition, a smart contract regarding the licensing of an IP right would be subject to the DC Regulation in Turkey. In addition, again similarly to the DC Directive, blockchain technology would be considered as a tool for distant communication within the scope of the DC Regulation, as per Article 4/h. In that regard, we observe that the same requirements that are set forth by the DC Directive are also applicable in terms of Turkish Law.

Because of the foregoing discussions and explanations, we conclude that a smart contract must have at least the following features to be compliant with the distance contract regulations in the EU and in Turkey:

- The interface conveying the smart contract to the consumer must also provide the prior information set forth in Article 4 of the DC Directive and Article 5 of the DC Regulation to the consumer.
- The smart contract must include an option to allow consumers to withdraw from the contract within the time specified in the applicable regulation.
- The seller or provider must keep the data regarding the fulfillment of the foregoing obligations for the period stated in the applicable regulation. (i.e., 3 years for the DC Regulation).

#### 5.2.2. *Examples from the marketplace*

There are already a number of initiatives that have been launched in this regard. An important project that deserves attention is the Open Music Initiative ("OMI"), which was announced by the Berklee College of Music in Boston, Massachusetts. This incentive aims to:

*build an open sourced platform with a shared protocol, centered on cryptography, distributed consensus, and interoperability with future and existing systems. Instead of constructing a simple repository of ownership and attribution, OMI seeks to create a self-sufficient system that works with both open and proprietary sourced data.*[60]

In other words, OMI aims to build a database in the form of a blockchain. The problem that OMI seeks to solve is the proper identification of the right holders. The underlying belief (and principle) of this project is that blockchain technology might make it possible to create a repository, which can then be used in the identification of the right holders. OMI also plans to build its own Application Programming Interface (API) in order to allow other products and services to use the repository. This would facilitate the use of the repository in IP transactions and enforcement activities as well.

Another novel business worth discussing is the Ujo Creators Portal.[61] Ujo is a platform running on the Ethereum blockchain and its stated goal is to enable artists to be paid directly by consumers. In the application, users can download music by paying with their Ethers, which is the cryptocurrency for the Ethereum blockchain. The platform describes itself as follows:

*when fully realized, Ujo has the ability to rewire the music industry, better serving the needs of artist and fans while also enabling entrepreneurs and engineers, through our decentralized technical foundation, to build products and services. We are putting power back in the hands of the people, not the industry bigwigs.*[62]

Although the promise is lofty and inspiring, the questions of how to delete music and how to recover lost accounts on the service remain unanswered.

From a legal perspective, another issue, which remains unresolved, is the choice of law that will be applicable to smart contracts. For traditional databases, jurisdictional matters are much clearer, since such databases are usually located in a single country. However, with blockchains, this issue becomes more complicated because, once a smart contract is executed, the status of every node in the system is changed regardless of where those nodes are located. This necessitates a carefully designed choice-of-law clause for smart contracts and obliges the parties to a smart contract to ensure that any court likely to hear a dispute arising out of a smart contract will honor the choice of law rules chosen and implemented by the parties.[63]

### 5.3. *Enforcement issues and the fight against counterfeits*

The last (and perhaps most important) feature of an IP right is its enforceability. For IP rights to have any legal meaning, the right holders should be able to enforce their rights effectively in coordination with the police and customs officers. However, from the perspective of an enforcement authority, one particular issue, namely counterfeiting, produces very high costs for the IP world. Customs and police officers do not have all the necessary tools or means to detect whether a good is authentic or not. Blockchain technology can once again be very helpful by serving as a trusted ledger in this area. Using blockchains for the storage of information about goods would enable interested parties to check authenticity instantaneously and in real-time, and this would be true not only for customs and police officers, but for the end-users as well.

In the modern globalized economy, the identification of counterfeit goods is a significant issue, and a considerable (and growing) portion of fake goods is transported to the EU via small parcels. According to the Report on EU Customs Enforcement of Intellectual Property Rights, published by the European Commission in 2016, postal and courier traffic accounted for 77% of all detentions in the enforcement of intellectual property rights.[64] According to the same report, in 2015, customs authorities made over 81,000 detentions, consisting of a total of 43.7 million articles. Since such counter-

[60] Lahr, John, *Berklee's Open Music Initiative,* September 2016, http://www.thembj.org/2016/08/berklees-open-music-initiative/, last accessed on May 6, 2018.

[61] Ujo Music Platform, https://ujomusic.com, last accessed on May 7, 2018.

[62] Ujo Music Platform, https://ujomusic.com/faq, last accessed on May 7, 2018.

[63] Dewey et al, *supra* note 52, p. 50, para. 1.

[64] Report on EU Customs Enforcement of Intellectual Property Rights, https://publications.europa.eu/en/publication-detail/-/publication/5d6eb531-6b63-11e7-b2f2-01aa75ed71a1, last accessed on May 7, 2018.

feit products are increasingly transported in small parcels, these procedures are becoming even more arduous and time-consuming.

A solution might be possible with the integration of the supply-chain information received from brands to a blockchain. Supply-chain management is one of the most crucial aspects of domestic and international trade. Most firms in the production sector already employ sophisticated systems aiming to control their supply chains. Throughout the years, these systems have become more and more advanced and increased in complexity. However, there are still some problems that cannot be easily addressed, let alone solved, by the current systems. Current supply-chain systems are usually not interoperable with retailers' databases. In most cases, the retailer has to constantly check and control its stock, and when it is out (or about to run out) of the goods, it must send a request for a new shipment.

Today, many goods contain unique barcodes, banderoles, QR codes or RFIDs (Radio Frequency ID). In the future, it is conceivable that installing a QR code on every product and registering them all in a public blockchain (or several interoperable blockchains) would enable each interested party to trace and track the products even after they have been sold. It is easy to see that this would accelerate the speed of supply-chain management. Information regarding the number of goods sold or in stock would be available in real time to the supplier and to the retailer, as well as any other interested parties. This would enable the supplier, who would be able to track the inventory for all of its retailers, to structure its production capacity more accurately and gain much-needed flexibility with respect to market demand. It would also be considerably easier and cost-effective in this scenario to conduct market research for each party. The adoption of such a system would also be relatively easy for a new retailer, since the adoption of the system would simply consist of opening a new wallet in the relevant blockchain. Additionally, the ability to track the goods even after they are sold would quickly provide information to the suppliers or retailers about the possible need for spare parts.

The reason why we do not currently have such a unified database system in place is that brands prefer to keep their proprietary data to themselves and maintain them in informational "silos" rather than sharing them with each other or the public. Therefore, there is no interoperability between different inventory databases, which is why consumers cannot simply open an app on their smartphones and scan the barcode on a product to check whether the merchandise is authentic or not. In fact, this lack of interoperability also causes brands to suffer from the proliferation of counterfeits, since it is very difficult for customs officers to identify counterfeit products. As blockchain technology provides brands and right holders with the ability securely to place their data in a public ledger, this issue might become obsolete in the coming years, which would benefit both retailers and consumers.

Furthermore, blockchain technology should be analyzed in the context of other technologies. Today, various tagging technologies are rapidly developing as well. For instance, RFID technology might be employed in conjunction with a blockchain. In that scenario, if goods/merchandise are tagged with RFID and such tagging information is then placed in a blockchain, the detection and seizure of counterfeit products might become almost automated. The same technology that we use for toll collection can be used for detecting counterfeits as well. If the scanner of the RFID on a highway is connected to a blockchain, it can instantly check whether the goods inside a container passing through that highway are counterfeits or not.

## 6. Challenges

The main challenge facing the widespread adoption of blockchains for the enforcement of IP rights is the difficulty of explaining and understanding the complexities of the underlying technology. Today, in most countries, even the challenges and intricacies of online counterfeiting have not yet been adequately examined or comprehended by the enforcement authorities. In light of this fact, it is not difficult to guess that getting enforcement authorities to use a cutting-edge technology such as blockchain to protect IP rights will require a vast amount of persuasion and training. The application(s) must be constructed in a way that is relatively simple and easy to use. This is a crucial attribute that such applications must have, considering the wide range of possible users and their varying levels of technological adeptness. Not everybody has the will, talent or desire to learn how to code in order to create a smart contract. Therefore, applications with simple and easy-to-use interfaces will be essential in this field.

Another significant challenge could arise out of the nature of blockchain technology. The critics of the use of this technology in the field of intellectual property are mostly on the same page regarding this issue.[65] These critics agree that the size of the data created would be enormous if this vision was realized and copyright management was carried out by using blockchain technology. Since the users of the system are also the nodes of the system in a blockchain, each one of them would need to store quite massive amounts of data. The solution to this problem may lie in the rapid development and improvement of the existing blockchain technology. In this context, looking at past technological developments could provide us with a sense of hope, once we realize how the meaning of "massive amounts of data" has changed in recent years. A USB flash drive with 64 MB storage capacity was first introduced in 2003, merely 15 years ago.[66] Today, Kingston offers USB flash drives that can store up to two TB of data, which corresponds to a storage capacity that is more than 30,000 times bigger than the capacity offered by the most advanced USB flash drives just 15 years ago. Considering this exponential growth in storage capacity in the past 15 years, it would not be unreasonable to predict that the question of "storage space" for global music data will one day become obsolete.

[65] Gerard, David, *Why You Can't Put the Music Industry on Blockchain,* (August 2017) *see* http://www.hypebot.com/hypebot/2017/08/why-you-cant-put-the-music-industry-on-a-blockchain-excerpt.html, last accessed on April 5, 2018.

[66] Thumb Drive History, *Flash Drive History and Evolution,* (February 28, 2017) *see* http://usbthumbdrive.com.my/flash-drive-history-and-evolution/, last accessed on May 6, 2018.

Nevertheless, at least for the time being, it is up to the software developers to address and resolve this issue.

From a legal perspective, the most difficult challenge to the adoption of blockchain technology for IP practice and enforcement appears to be the regulation of this technology. Since blockchain technology has been adopted quite rapidly and promises to bring about many changes, there are certain areas in which it must be regulated before it is too late. However, effectively regulating the technology in its early years is a significant challenge because the future of blockchain remains unknown. Therefore, apart from the social and technical challenges blockchain will face, the legal challenges will also provide a considerable obstacle to its development and widespread adoption.

## 7. Conclusion

The ultimate aim of the intellectual property law is to foster innovation and creativity, through providing protection for intellectual property. The motivation to create something useful or beautiful lies within the lines of the law, giving individuals certain rights to benefit from their creation while allowing them to provide the humanity with something new or better. The underlying question of this paper is whether blockchain technology can contribute to that target and if yes, how such contribution should be made.

Complex processes of registration, the requirement to register in different jurisdictions, the expertise required in the registration and opposition processes, the fees attached to these procedures and the hardship to manage the rights create impediments in the protection of IP rights and accordingly impairs creation and invention. Blockchain technology promises to overcome or at least minimize these challenges to a certain extent. The process of registration may be eased significantly by the adoption and recognition of the blockchain technology as a registry. Blockchain could be used as a unified database that enable anyone to reach out to the immutable, reliable information stored in there. These could support different applications running on these blockchains to provide the ability to register without involvement of an authority and an application process. The global nature of blockchain may also help overcoming the issue of the requirement to register in different legislations and to deal with different procedures of these. Since the process would be carried out in relatively automated way, fees and expenses that could be incurred would significantly increase. Finally, building a system, where the right-holders can control how they manage their IP in terms of contracting and collecting royalties may foster significantly the motivation behind creation and inventions and may play an important role in directing consumers from the counterfeit products to the original products through enhancing accessibility of original IP to consumers.

Whilst the foregoing advantages and benefits of blockchain are remarkable, there are still various challenges ahead from a technical and legal aspect. Awareness and understanding of blockchain is low among the lawmakers, IP offices or lawyers yet and the society is hesitant on relying on this new technology. This seems to be the first obstacle to tackle. It is undeniable that the technology gained much attention in recent years but the characteristic of the attention is also important considering the number of the news popping out day by day about an ICO scam or usage of crypto-currencies in the black markets. Once the barrier of social acceptance is broken, it is no surprise that blockchain will gain attention not only as a source of quick return investment but also as a technology that may cause considerable benefit to many areas. At that point, regulations could be aiming at the best use of this technology rather than attempting to restrict or prohibit the technology or the products and services associated with the technology.

Some of the challenges discussed above can indeed only be solved by software developers and businesses and maybe it is even dangerous to involve legal minds to it too much. However, we can make certain proposals for possible solutions to the legal challenges that are currently facing blockchains or that they might encounter in the future.

The first action that could be taken by regulators is to grant legal status to blockchains and to define the standards that blockchains will have to meet in order to receive such legal status. The standardization work has already been commenced by the International Organization for Standardization (ISO). For example, ISO is currently working on its ICO/TC 307 standards for blockchain and distributed ledger technologies.[67] Once the framework and rules of standardization are established and are available for use by the developers, the ball will then be in the regulators' court to bestow blockchain with certain legal status.

The standardization is also needed for the users (i.e. public, in most of the cases) since there are already variety of blockchains to be used in the market. The user must have the reliable information to choose the blockchain with the standards defined by the authorities. In a way, authorities should help the users with their choice of applications and blockchain usage by creating widely accepted standards. That would lead users to proper application and blockchain for their use and motivate the developers to the end that they develop projects meeting the requirements of the standards.

As explained above in the discussion of the legal status that can be attributed to blockchain, there is no precedent on this issue provided by any court or IP office at this time. Nevertheless, the law already enables individuals to present blockchain records as time-stamped evidence under both EU and Turkish law. From the perspective of IP law, the next logical step may be to start accepting blockchain records (that meet the criteria mentioned above) as evidence with respect to prior art claims. Once such claims are approved by the courts, right holders would be incentivized to start using blockchain in creating/preserving evidence for their IP claims. This would possibly lead to the creation of a blockchain (or blockchains) where a huge amount of data could be stored and these would constitute a unified database, which would be easily accessible and could be managed with the cooperation of right holders, IP offices and enforcement authorities. Subsequently, a legislative change that would allow certain blockchain registrations to be deemed as registrations by IP offices should be

[67] ISO/TC 307, Blockchain and Distributed Ledger Technologies, https://www.iso.org/committee/6266604.html, last accessed on May 6, 2018.

implemented, and by doing so, blockchain may finally be allowed to operate in the way that it should in the context of intellectual property law, and serve the goals of IP law effectively, as explained above.

It is also essential to consider the position of the blockchains with respect to existing regulations. There are numerous laws regulating the fields of communication and the internet. Sadly, most of these laws have been drafted and passed without considering the next layer of the internet or to future technologies. Therefore, some areas that are affected by blockchain technology are blank spots, legislatively speaking, and require effective regulation. However, the bigger problem may arise with respect to the areas that are already regulated. Such regulations may slow down the adoption or development of blockchain technology; therefore, the first step that must be taken is accurately mapping blockchain's potential effects and determining whether they fall under existing laws and, if so, how they are covered by such laws.

Ultimately, it is obvious that blockchain technology can be highly useful in terms of protecting IP rights. The long-term promise of the technology (i.e., to build a unified intellectual property system) is quite appealing and this opportunity should be given serious consideration by the authorities. However, dramatic changes and numerous obstacles await IP practitioners on the way to that promised land, and considering the hardship of adopting the legal system with every tiny bit of it to the considerable effect of blockchain, getting there might need massive work and years full of discussions.