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# Copyright in the blockchain era: Promises and challenges

Alexander Savelyev \*

International laboratory on IP and IT law, Higher School of Economics, Moscow, Russia

## A B S T R A C T

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The paper focuses on various legal-related aspects of the application of blockchain technologies in the copyright sphere. Specifically, it outlines the existing challenges for distribution of copyrighted works in the digital environment, how they can be solved with blockchain, and what associated issues need to be addressed in this regard. It is argued that blockchain can introduce long-awaited transparency in matters of copyright ownership chain; substantially mitigate risks of online piracy by enabling control over digital copy and creating a civilized market for “used” digital content. It also allows to combine the simplicity of application of creative commons/open source type of licenses with revenue streams, and thus facilitate fair compensation of authors by means of cryptocurrency payments and Smart contracts. However, these benefits do not come without a price: many new issues will need to be resolved to enable the potential of blockchain technologies. Among them are: where to store copyrighted content (on blockchain or “off-chain”) and the associated need to adjust the legal status of online intermediaries; how to find a right balance between immutable nature of blockchain records and the necessity to adjust them due to the very nature of copyright law, which assigns ownership based on a set of informal facts, not visible to the public. Blockchain as a kind of time stamping service cannot itself ensure the trustworthiness of facts, which originate “off-chain”. More work needs to be done on the legal side: special provisions aimed at facilitating user’s trust in blockchain records and their good faith usage of copyrighted works based on them need to be introduced and transactions with cryptocurrencies have to be legalized as well as the status of Smart contracts and their legal consequences. Finally, the economics of blockchain copyright management systems need to be carefully considered in order to ensure that they will have necessary network effects. If those issues are resolved in a satisfactory way, blockchain has the potential to rewrite how the copyright industry functions and digital content is distributed.

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## 1. Introduction

We become more and more immersed in the so-called networked information economy. It is displacing the industrial information economy that typified information production

from about the second half of the nineteenth century and throughout the twentieth century. What characterizes the networked information economy is that decentralized individual action – specifically, new and important cooperative and coordinate action carried out through radically distributed, nonmarket mechanisms —plays a much greater role

\* International laboratory on IP and IT law, Higher School of Economics. Moscow, Russia.

E-mail address: [garantus@rambler.ru](mailto:garantus@rambler.ru).

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than it did or could have, in the industrial information economy<sup>1</sup>.

One of the most promising technologies of the new economy is distributed ledger technology also known as “blockchain”. The World Economic Forum estimates that more than 25 countries are investing in blockchain technology, filing more than 2500 patents and investing \$1.3 billion<sup>2</sup>. Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, provides the following definition of this technology: “[i]n essence, the blockchain is a shared, programmable, cryptographically secure and therefore trusted ledger which no single user controls and which can be inspected by anyone.”<sup>3</sup>

Blockchain technology has been frequently analogized to the TCP/IP protocol, in which the Internet is based. Both of them enable application of a new layer of services on the top. Similar to how the Internet fundamentally changed the way we share information, blockchain is an open source-based innovation that promises to revolutionize the way how transactions among individuals, businesses, and even machines are performed. Some experts even argue that “*blockchain concept is even more: it is a new organizing paradigm for discovery, valuation, and transfer of all quanta (discrete units) of anything and potentially for the coordination of all human activity at a much larger scale than has been possible before*”<sup>4</sup>.

Blockchain is a type of distributed ledger in which value-exchange transactions are sequentially grouped into blocks. Each block is chained to the previous one and immutably recorded across a peer-to-peer network, using cryptographic trust and assurance mechanisms. It maintains a coherent state, as agreed upon by all participants, without requiring trust or a central authority.

Blockchain provides new paradigm for data storage security, based on the principle of decentralization. Its main features are:

- *Transparency*: all the data on blockchain is public, it cannot be arbitrarily tempered with and easily auditable.
- *Redundancy*: every user of the blockchain solution holds a copy of the data, thus it cannot be easily taken offline due to a system malfunction or malicious actions of third parties.
- *Immutability*: changing records in blockchain is prohibitively difficult and requires consensus provided in accordance with the protocol (e.g., by the majority of blockchain users). Thus, integrity of records is ensured by intrinsic properties of the underlying code rather than from the identities of system operators.
- *Disintermediation*: the removal of middlemen such as banks or collective societies from transactions decreases transaction costs and risks associated with presence of such intermediaries. It does not mean, however, that a new kind of intermediaries will not be created as a result of deeper

implementation of blockchain technologies in the social fabric.

Currently the best-known example of successful implementation of blockchain-based distributed ledger technology is Bitcoin. Some other cryptocurrencies, such as Ether or Litecoin are trying to replicate its success. But its potential far exceeds the sphere of payments. Among the most promising spheres of its application are managing ownership rights over various assets and automatization of contractual relationships via self-enforcing “Smart contracts”<sup>5</sup>.

Before turning to more specific issues related to application of blockchain to copyright, it is necessary to outline the important distinction of blockchain-based solutions on public/permissionless and private/permissioned blockchains.

Public blockchains grant read access and ability to create transactions to all blockchain users. Users can transfer value without the expressed consent of the blockchain platform operator. The core property of these blockchains is censorship resistance, i.e., any valid transaction broadcast over a permissionless blockchain network would be included into the blockchain. Such blockchains are by their nature free for entry or exit both for users and application developers. The most prominent example of public blockchain is Bitcoin – everyone is free to create a wallet, perform transactions with bitcoin units or become a miner (a nod, performing transaction verification functions for a fee in the form of newly created bitcoin units) by installing and using special publicly available software on its infrastructure.

Private blockchains limit access to the predefined list of known persons. Such persons should receive approval from a blockchain operator, thus the use of blockchain is restricted by end users and application developers. Such blockchains to a certain extent contradict decentralized nature of blockchain technology itself, but still resemble certain advantages of this technology: transparency and resilience to attacks<sup>6</sup>.

Among existing permissionless blockchain networks that could be used as a basis for overlay asset protocols, Bitcoin is considered to be more secure than existing alternatives in terms of attack costs<sup>7</sup>. But management of such blockchain is very difficult. Besides, it is hardly compatible with the legal framework. As it will be shown later, only permissioned blockchains can co-exist within the legal framework and augment it instead of competing with it. It can be explained with the matters of sovereignty. The powers of the government can co-exist with blockchain with its distributed nature where no central authority is presented only if it has the status of “super user”, through which the decisions of the courts and administrative

<sup>1</sup> Benkler Yochai, *The Wealth of Networks*. Yale University Press. 2006. P. 3.

<sup>2</sup> *Disruptive innovation in financial services: A Blueprint for Digital Identity*. World Economic Forum. (Aug. 12, 2016). Available from: [http://www3.weforum.org/docs/WEFA\\_BlueprintforDigitalIdentity.pdf](http://www3.weforum.org/docs/WEFA_BlueprintforDigitalIdentity.pdf).

<sup>3</sup> Klaus Schwab, *The Fourth Industrial Revolution*. NY. 2016. P. 19.

<sup>4</sup> Melanie Swan, *Blockchain: Blueprint for a New Economy*. O'Reilly. 2015. Preface.

<sup>5</sup> For more details on Smart-contracts see generally: Alexander Savelyev, Contract law 2.0: ‘Smart’ contracts as the beginning of the end of classic contract law // *Information and Communications Technology Law*. 2017. Vol. 26. No. 2;

<sup>6</sup> See generally: Tim Swanson, *Permissioned distributed ledgers*. 2015. Available from: <http://www.ofnumbers.com/wp-content/uploads/2015/04/Permissioned-distributedledgers.pdf>.

<sup>7</sup> BitFury Group (2015). Proof of stake versus proof of work URL: <http://bitfury.com/content/5-white-papers-research/pos-vs-pow-1.0.2.pdf>.

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