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Who Owns the Blockchain? How Copyright Law Allows Rights Holders to Control Blockchains

SEBASTIAN PECH*©

ABSTRACT

The lack of control by a single authority is an oft-described characteristic of blockchain technology. This article shows the extent to which US and EU copyright law protects information stored on a blockchain and the manner by which rights holders are able to control blockchains. While the two legal systems are almost identical in terms of protection of individual information stored on a blockchain, there are significant differences in the protection of the compilation of information. Because of the EU sui generis rights for non-original databases, both the operator of a blockchain and participants in the blockchain network can have rights in the compilation of information stored on the blockchain. Therefore, they can both prevent acts necessary for the operation of a blockchain. Since this impedes the development and use, this article argues for an exception for acts that are necessary for the normal use of a blockchain.

INTRODUCTION

During the 2008 global financial crisis, a “Satoshi Nakamoto” published a whitepaper describing the technical features of the cryptocurrency¹ Bitcoin.² While there is still speculation about the identity of the person or group of persons behind

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1. See generally Carol Goforth, *The Lawyer's Cryptionary: A Resource for Talking to Clients about Crypto-Transactions*, 41 CAMPBELL L. REV. 47, 52 (2019) (noting that cryptocurrency is a digital currency that relies on cryptography).

2. See Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, BITCOIN (last visited Jan. 15, 2021), <https://bitcoin.org/bitcoin.pdf>.

Who Owns the Blockchain?

the pseudonym,³ the underlying technology, blockchain, is said to revolutionize almost every part of our lives.⁴

Nakamoto's idea behind Bitcoin was to create a payment system that would function without any need for a trusted third party to supervise transactions.⁵ Based on this, the Bitcoin website states that “nobody owns or controls Bitcoin”⁶ and the lack of control by a single authority is an oft-described characteristic of blockchain technology.⁷

However, this general statement only applies to public⁸ blockchains like the one used by Bitcoin. In this case, everyone can access existing information and add new information.⁹ On the contrary, private¹⁰ blockchains have a supervising entity that grants only selected actors access and editing rights, thus offering more possibilities to control the blockchain.¹¹ Furthermore, if aspects of a blockchain are protected by intellectual property (IP) rights, especially copyright law, rights holders can use these rights to assert control. This applies to both private and public blockchains.

The question of copyright ownership has arisen only recently with respect to Bitcoin. In April 2019, Craig Wright, an Australian computer scientist and self-

3. See Billy Bambrough, *John McAfee Thinks He's Solved Bitcoin's Greatest Mystery – Who Is Satoshi Nakamoto?*, FORBES (May 5, 2020) 7:10 EDT, <https://www.forbes.com/sites/billybambrough/2020/05/05/john-mcafee-thinks-hes-solved-bitcoins-greatest-mystery-who-is-satoshi-nakamoto/>.

4. *Banking Is Only The Beginning: 58 Big Industries Blockchain Could Transform*, CB INSIGHTS (Apr. 2, 2020), <https://www.cbinsights.com/research/industries-disrupted-blockchain>. For a discussion on the opportunities of blockchain technology for copyright protected works, see Sebastian Pech, *Copyright Unchained: How Blockchain Technology Can Change the Administration and Distribution of Copyright Protected Works*, 18 NW. J. TECH. & INTELL. PROP. 1 (2020).

5. Nakamoto, *supra* note 2, at 1.

6. BITCOIN, <https://bitcoin.org/en/> (last visited Jan. 15, 2021).

7. See, e.g., Nolan Bauerle, *Blockchain 101*, COINDESK (Nov. 22, 2019), <https://www.coindesk.com/information/what-is-blockchain-technology> (noting that the blockchain system operates through the use of a “distributed, peer-to-peer network” that allows users to prove their identity that others on the network authorize, which omits the need for “a trusted third party”).

8. Public blockchains are often also referred to as permission-less blockchains. Marco Schurtenberger, *Public v. Private Blockchains: Why Public Blockchains are the Future*, BITCOIN SUSSIE (last visited Jan. 15, 2021), <https://www.bitcoinsuisse.com/outlook/why-public-blockchains-are-the-future> (“[A] synonym for private blockchains is ‘permissioned blockchains,’ whereas public blockchains are often called ‘permissionless blockchains.’”).

9. Don Tapscott & Alex Tapscott, *Blockchain Revolution – How the Technology Behind Bitcoin is Changing Money, Business, and the World* 67 (2d ed. 2018); Primavera De Filippi & Aaron Wright, *Blockchain and the Law – The Rule of Code* 2, 31 (2018); Shermin Voshmgir, *Token Economy: How the Web3 reinvents the Internet* 60 (2d ed. 2020).

10. Private blockchains are often also referred to as permissioned blockchains. Schurtenberger, *supra* note 8.

11. TAPSCOTT & TAPSCOTT, *supra* note 9, at 67; DE FILIPPI & WRIGHT, *supra* note 9, at 31; VOSHMGIR, *supra* note 9, at 60; KEVIN WERBACH, *THE BLOCKCHAIN AND THE NEW ARCHITECTURE OF TRUST* 59 (2018).

SEBASTIAN PECH

proclaimed Bitcoin inventor, registered Nakamoto's Bitcoin whitepaper¹² and the initial source code of the Bitcoin software¹³ with the US Copyright Office and claimed authorship.¹⁴ Wright's registration caused major turmoil in the blockchain scene and the US Copyright Office decided to issue a press release clarifying that it "does not investigate the truth of any statement made" in a registration and that, as a result, "[i]t is possible for multiple, adverse claims to be registered."¹⁵ In the context of Wright's registration, his motivation¹⁶ was discussed alongside the effects of the registration of the whitepaper and the software code on the Bitcoin blockchain.¹⁷

This article does not consider whether the underlying technology in the form of a whitepaper or software can be subject to IP rights. Rather, it examines whether the information stored on a blockchain can be protected by copyright law and, if so, what the potential consequences are. The assessment is based on US and EU law¹⁸ and uses Bitcoin as an example.

12. Wright registered Nakamoto's whitepaper with the registration number TXu002136996. Wai Choy, *Dueling Bitcoin White Paper Copyright Registrations – What Does it Mean?*, BLOCKCHAIN AND THE LAW (June 4, 2019), <https://www.blockchainandthelaw.com/2019/06/dueling-bitcoin-white-paper-copyright-registrations-what-does-it-mean/>.

13. White registered the initial source code of the Bitcoin software with the registration number TX0008708058. *Id.*

14. John Biggs, *Craig Wright Attempts to Copyright the Satoshi White Paper and Bitcoin Code*, COINDESK (updated May 30, 2019), <https://www.coindesk.com/craig-wright-attempts-to-copyright-the-satoshi-white-paper-and-original-bitcoin-code>.

15. Press Release, *Questions about Certain Bitcoin Registrations* (May 22, 2019) (on file with author), <https://www.copyright.gov/press-media-info/press-updates.html>.

16. E.g., Zachary Mashiach, *Craig Wright Registers a Copyright for Bitcoin's (BTC) White Paper and Code: the Implications of This Copyright and Why Bitcoin's Decentralization Will Save the Day*, CRYPTO.IQ (May 22, 2019), <https://cryptoiq.co/craig-wright-registers-a-copyright-for-bitcoins-btc-white-paper-and-code-the-implications-of-this-copyright-and-why-bitcoins-decentralization-will-save-the-day/> (noting that Wright's potential motivation in claiming authorship of the whitepaper and software code may have been to assert ownership over 1.1 million Bitcoins and that Wright's copyrights may be used as evidence of ownership in subsequent court proceedings, to charge a fee to individuals using Bitcoin, or to prevent others from interacting with Bitcoin altogether).

17. E.g., Michael Cohen, *Bitcoin Copyright*, COHEN IP LAW GROUP PC: COPYRIGHT (last visited Jan. 15, 2021), <https://patentlawip.com/blog/bitcoin-copyright/> (explaining that even with Wright's granting of a copyright, this is not determinative of ownership, and it will be challenging for Wright to legally exclude others from using Bitcoin because the underlying code was originally "released under an open source MIT license[.m]eaning that everyone is free to use, reuse, copy, and modify the original code").

18. It should be noted that public blockchains, in particular, operate worldwide and therefore other jurisdictions must also be considered. See generally DE FILIPPI & WRIGHT, *supra* note 9, at 35 (observing the "global" and "transnational" nature of blockchains).

Who Owns the Blockchain?

I. BRIEF INTRODUCTION TO BLOCKCHAIN TECHNOLOGY

Some technological background is necessary to set the stage for the legal analysis.¹⁹ In simple terms, a blockchain is a highly tamper-resistant and transparent database.

Datasets are bundled together into blocks, and each block is time-stamped and linked to the prior block by a hash value, which is an individual serial number that identifies the content of the previous block.²⁰ This results in a chain of blocks that gives the technology its name. As every block comprises the hash value of the previous block, the contents of an individual block in the chain cannot be changed without the alteration of every subsequent block.²¹

A new block is only added to the chain if there is a consensus among the members of the network (“nodes”) on its validity.²² An oft-used consensus mechanism is “proof of work,” which is based on the idea of making the generation of false blocks unattractive.²³ Specifically, certain nodes (“miners”) are given complex mathematical problems which they have to solve by spending computational power (“mining”).²⁴ The other nodes can check relatively easily whether the solution provided is correct.²⁵ The miner who first completes the task can add this block to the blockchain and is rewarded.²⁶

The database is not stored centrally, but is distributed over the network.²⁷ Every (full)²⁸ node maintains a complete copy of the database, which is permanently updated when new blocks are added.²⁹ This distribution creates resilience because there is no single point of failure.³⁰ Even in the event that the database kept by one or more network participants becomes corrupt, it will still be available on the

19. Portions of this section are adapted from Pech, *supra* note 4, at 10–11.

20. VOSHMIGIR, *supra* note 9, at 74–75; Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 327 (2017); WILLIAM MOUGAYAR, *THE BUSINESS BLOCKCHAIN: PROMISE, PRACTICE, AND APPLICATION OF THE NEXT INTERNET TECHNOLOGY* 25 (2016).

21. DE FILIPPI & WRIGHT, *supra* note 9, at 25; Werbach & Cornell, *supra* note 20, at 327.

22. DE FILIPPI & WRIGHT, *supra* note 9, at 41–42; Werbach & Cornell, *supra* note 20, at 327; MOUGAYAR, *supra* note 20, at 20.

23. VOSHMIGIR, *supra* note 9, at 46.

24. DE FILIPPI & WRIGHT, *supra* note 9, at 23–26, 40; Werbach & Cornell, *supra* note 20, at 328.

25. *Id.*

26. *Id.*

27. DE FILIPPI & WRIGHT, *supra* note 9, at 34; VOSHMIGIR, *supra* note 9, at 39; Werbach & Cornell, *supra* note 20, at 327; MOUGAYAR, *supra* note 20, at 21, 23.

28. Besides full nodes, there are also light (weight) nodes that store only small parts of the blockchain. VOSHMIGIR, *supra* note 9, at 46–48.

29. DE FILIPPI & WRIGHT, *supra* note 9, at 22, 35; VOSHMIGIR, *supra* note 9, at 39; WERBACH, *supra* note 11, at 96; Werbach & Cornell, *supra* note 20, at 327.

30. MOUGAYAR, *supra* note 20, at 46, 130.

SEBASTIAN PECH

network.³¹ The decentralized storage of information is an additional safeguard against tampering because the change in one or a few copies of the database would be ignored by other nodes.³² Data on a blockchain are stored chronologically and are visible to all participants, creating a high level of transparency.³³

Another feature of blockchain technology is pseudonymity. By using digital signatures and private-public key cryptography, users do not have to reveal their true identities when they store information on the blockchain or are involved in transactions.³⁴

II. BLOCKCHAIN OWNERSHIP AND ITS CONSEQUENCES

In this section, it is examined whether the information stored on a blockchain can be protected by copyright law and, if so, what the consequences are. In this context, a distinction can be drawn between (A) ownership of the individual information stored on a blockchain³⁵ and (B) ownership of the compilation of information.³⁶

A. Ownership of the Individual Information

The first question is whether the individual information stored on a blockchain can be protected under (1) US and (2) EU copyright law.

1. US Law

a. Subject Matter

US copyright law protects “original works of authorship fixed in any tangible medium of expression.”³⁷ A work is original if it “was independently created by the author (as opposed to copied from other works), and [...] possesses at least some minimal degree of creativity.”³⁸ “[T]he requisite level of creativity is extremely low” and “even a slight amount will suffice.”³⁹ However, a work lacks creativity when it

31. DE FILIPPI & WRIGHT, *supra* note 9, at 36; MOUGAYAR, *supra* note 20, at 130.

32. DE FILIPPI & WRIGHT, *supra* note 9, at 2, 36; WERBACH, *supra* note 11, at 101–02.

33. DE FILIPPI & WRIGHT, *supra* note 9, at 37–38; WERBACH, *supra* note 11, at 105; Werbach & Cornell, *supra* note 20, at 327.

34. DE FILIPPI & WRIGHT, *supra* note 9, at 2, 38; MOUGAYAR, *supra* note 20, at 46; WERBACH, *supra* note 11, at 105.

35. *See infra* Section II.A.

36. *See infra* Section II.B.

37. 17 U.S.C. § 102(a) (2018).

38. *Feist Publ'ns, Inc. v. Rural Tel. Serv. Co.*, 499 U.S. 340, 345 (1991).

39. *Id.*

Who Owns the Blockchain?

is solely dictated by functional considerations.⁴⁰ In addition, copyright protection does not extend to ideas and facts,⁴¹ but only to their individual expression.⁴²

Whether the individual information stored on the blockchain is protected by copyright law depends on the circumstances of the case in question. Details of financial transactions are, in general, uncopyrightable facts. Furthermore, in most cases, their expression lacks originality because financial details are expressed in a specific manner and are thus dictated by functional considerations. However, any kind of information, not only financial, can be stored on a blockchain.⁴³ For example, the first block in the Bitcoin blockchain, the so called “Genesis Block,” contains the words “The Times 03/Jan/2009 Chancellor on brink of second bailout for banks” which refers to the headline of a Financial Times article.⁴⁴ Short phrases such as headlines can enjoy copyright protection, but the shorter the phrase, the greater the degree of creativity necessary.⁴⁵ For example, the Financial Times headline comprising just eight words is not original enough to be protected. However, other information, such as articles or images, can satisfy the originality requirement for copyright protection.

b. Rights

A copyright grants the rights holder the exclusive right to reproduce⁴⁶ and publicly distribute⁴⁷ the work, among other rights.

The reproduction right is the right to “reproduce the copyrighted work in copies [. . .]”⁴⁸ while copies are defined as “material objects, other than phonorecords, in which a work is fixed by any method now known or later developed, and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device.”⁴⁹ This includes not only analog but also digital copies, such as those on a hard drive or other digital storage media.⁵⁰

40. CMM Cable Rep v. Ocean Coast Props., Inc., 97 F.3d 1504, 1519 (1st Cir. 1996).

41. 17 U.S.C. § 102(b) (2018).

42. Mazer v. Stein, 347 U.S. 201, 217 (1954); Holmes v. Hurst, 174 U.S. 82, 86 (1899); Baker v. Seldon, 101 U.S. 99, 102–04 (1879).

43. DE FILIPPI & WRIGHT, *supra* note 9, at 42.

44. Jamie Redman, *10 Years Ago Bitcoin's Genesis Block Changed the Course of History*, BITCOIN.COM (Jan. 3, 2019), <https://news.bitcoin.com/10-years-ago-bitcoins-genesis-block-changed-the-course-of-history/>.

45. 1 Paul Goldstein, Goldstein on Copyright § 2.7.3 (2020); 1 Melville B. Nimmer & David Nimmer, Nimmer on Copyright § 2.01[B][3] (2020).

46. 17 U.S.C. § 106(1) (2018).

47. *Id.* § 106(3).

48. *Id.* § 106(1).

49. *Id.* § 101.

50. A&M Records v. Napster, 239 F.3d 1004, 1014 (9th Cir. 2001); 2 PAUL GOLDSTEIN, GOLDSTEIN ON COPYRIGHT § 7.1 (2020).

SEBASTIAN PECH

The distribution right is the right to “distribute copies [. . .] of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending.”⁵¹ This encompasses not only the distribution of a work in tangible form, but also the transmission over computer networks such as the Internet.⁵² To infringe on the distribution right, actual dissemination of the work is not necessary; it is sufficient if the work is offered to the public.⁵³

In *A&M Records, Inc. v. Napster, Inc.*, the Ninth Circuit held that users who had offered music files on a peer-to-peer (P2P) filesharing network had violated the distribution right and those who had downloaded these files had violated the reproduction right.⁵⁴ The same applies for a blockchain which is also a P2P network. As noted above, one of the features of blockchain technology is distributing and updating the blockchain over the network.⁵⁵ This not only involves the transmission of the blockchain between the nodes, but also includes its storage on the hard drive or other storage medium of individual nodes.

Therefore, rights holders can enjoin nodes from transmitting and copying blocks that contain their works. Whether this is the case or not depends on the circumstances of the case in question. In this context, it should be noted that transmission and copying of the entire blockchain will happen only when a node connects for the first time to the network because subsequent synchronization acts involve only blocks that are newly added.⁵⁶

2. EU Law

a. Subject Matter

The legal framework for copyright protection in the EU is similar to that of the US. In the EU, apart from a few exceptions like computer programs and databases,⁵⁷ there is no general statutory provision specifying requirements for copyright

51. 17 U.S.C. § 106(3) (2018).

52. *New York Times Co. v. Tasini*, 533 U.S. 483, 498 (2001) (holding that an online news database violated authors’ distribution rights by selling electronic copies of their articles for download); *A&M Records, Inc.*, 239 F.3d at 1014; *contra* 4 WILLIAM F. PATRY, PATRY ON COPYRIGHT § 13:11 (2019) (arguing the distribution right only encompasses tangible forms of the copyrighted material).

53. *A&M Records, Inc.*, 239 F.3d at 1014; *Diversey v. Schmidly*, 738 F.3d 1196, 1202 (10th Cir. 2013); Peter S. Menell, *In Search of Copyright’s Lost Ark: Interpreting the Right to Distribute in the Internet Age*, 59 J. COPYRIGHT SOC’Y U.S.A. 201, 267 (2011); 2 MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 8.11[B][4][d] (2020); *contra* 4 PATRY, *supra* note 52, § 13:11:50 (arguing that the act of offering a work to the public is not sufficient to infringe on the distribution right).

54. *A&M Records, Inc.*, 239 F.3d at 1014.

55. See discussion *supra* Section I.

56. Nakamoto, *supra* note 2, at 3.

57. See discussion *infra* Section II.B.2.a.

Who Owns the Blockchain?

protection.⁵⁸ However, according to the case law of the Court of Justice of the European Union (ECJ), a work must be “original in the sense that it is its author’s own intellectual creation.”⁵⁹ This requires that the work “reflect[s] his personality and expressing his free and creative choices,”⁶⁰ which is not the case if the creation was determined by technical considerations, rules, or other constraints that have left no room for the exercise of artistic freedom.⁶¹ Like in US law, the threshold for protection is low. For example, in *Infopaq Int’l A/S v. Danske Dagblades Forening*, the ECJ held that a text comprising eleven consecutive words can be original.⁶² The Court also clarified that facts and ideas themselves are not protected.⁶³ Thus, similar to US law, information stored on a blockchain is protected by EU copyright law if it contains an original expression.

b. Rights

Except some specific works like computer programs and databases, the rights of a copyright holder are governed by the Information Society Directive⁶⁴ which grants the rights holder the exclusive right to reproduce, distribute, and communicate a work to the public, among other rights.

The reproduction right under Article 2 of the Information Society Directive is the right “to authorise or prohibit direct or indirect, temporary or permanent reproduction

58. Silke von Lewinski & Michel M. Walter, *European Copyright Law: A Commentary*, ¶ 11.1.5 (Michel Walter & Silke von Lewinski eds., 2010).

59. Case C-5/08, *Infopaq Int’l A/S v. Danske Dagblades Forening*, 2009 E.C.R. I-6642 ¶ 37; Case C-406/10, *SAS Institute Inc. v. World Programming Ltd*, ECLI:EU:C:2012:259, ¶ 65 (Nov. 29, 2011); Case C-310/17, *Levola Hengelo BV v. Smilde Foods BV*, ECLI:EU:C:2018:6181, ¶ 36 (July 25, 2018); Case C-469/17, *Funke Medien NRW GmbH v. Bundesrepublik Deutschland*, ECLI:EU:C:2018:870, ¶ 19 (Oct. 25, 2018); Case C-683/17, *Cofemel – Sociedade de Vestuário SA v. G-Star Raw CV*, ECLI:EU:C:2019:363, ¶ 29 (May 2, 2019); Case C-833/18, *SI v. Chedech/Get2Get*, ECLI:EU:C:2020:461, ¶ 22 (June 11, 2020).

60. Case C-145/10, *Eva-Maria Painer v. Standard VerlagsGmbH*, 2011 E.C.R. I-12622 ¶ 89; Case C-161/17, *Land Nordrhein-Westfalen v. Dirk Renckhoff*, ECLI:EU:C:2018:634, ¶ 14 (Aug. 7, 2018); *Cofemel – Sociedade de Vestuário SA*, ECLI:EU:C:2019:363, ¶ 30; *SI*, ECLI:EU:C:2020:461, ¶ 23.

61. *Funke Medien NRW GmbH*, ECLI:EU:C:2018:870, ¶¶ 23–24; *Cofemel – Sociedade de Vestuário SA*, ECLI:EU:C:2019:363, ¶ 3; *SI*, ECLI:EU:C:2020:461, ¶¶ 24, 26, 31.

62. *Infopaq Int’l A/S*, 2009 E.C.R. I-6644 ¶ 48.

63. *Id.* ¶ 37.

64. Directive 2001/29/EC of the European Parliament and of the Council of 22 May 2001 on the Harmonisation of Certain Aspects of Copyright and Related Rights in the Information Society, 2001 O.J. (L 167) [10 hereinafter Information Society Directive]. In this context, it should be noted that a directive is not a self-executing-law but rather, has to be transposed into national law by each EU member state. Nevertheless, the national law that implements the directive has to be interpreted in accordance with the directive.

SEBASTIAN PECH

by any means and in any form, in whole or in part.”⁶⁵ This includes both analog and digital copies, for example, on a hard drive or other storage medium.⁶⁶

While the distribution right⁶⁷ encompasses only the distribution of works in a tangible medium,⁶⁸ the communication to the public right, under Article 3(1) of the Information Society Directive, refers to “any communication to the public of their works, by wire or wireless means,”⁶⁹ which includes transmission over a computer network, like the Internet.⁷⁰ Here too, offering the work to the public is sufficient to constitute an infringement.⁷¹

Thus, similar to US law,⁷² rights holders can enjoin nodes from transmitting and copying blocks if these contain their works.

B. Ownership of the Compilation of Information

Independent of whether individual information stored on a blockchain enjoys protection, the question arises on whether the information in its entirety, for example, all financial transactions related to a cryptocurrency, can be protected by (1) US and (2) EU copyright law.

1. US Law

Section 103(a) of the Copyright Act provides that “the subject matter of copyright [...] includes compilations.”⁷³ A compilation is defined as “a work formed by the collection and assembling of preexisting materials or of data that are selected, coordinated, or arranged in such a way that the resulting work as a whole constitutes an original work of authorship.”⁷⁴

The elements forming the compilation do not have to be protected by copyright themselves, which means that a compilation can also include unprotected elements

65. Information Society Directive, *supra* note 64, at art. 2.

66. Joined cases C-403/08 and C-429/08, Football Association Premier League Ltd v. QC Leisure, 2011 E.C.R. I-9229 ¶ 157; VON LEWINSKI & WALTER, *supra* note 58, ¶ 11.2.19.

67. Information Society Directive, *supra* note 64, at art. 4(1).

68. Case C-263/18, Nederlands Uitgeversverbond v. Tom Kabinet Internet BV, ECLI:EU:C:2019:1111, ¶ 45 (Dec. 19, 2019); Information Society Directive, *supra* note 64, at recital 38.

69. Information Society Directive, *supra* note 64, at art. 3(1).

70. Case C-607/11, ITV Broadcasting Ltd v. TVCatchup Ltd, ECLI:EU:C:2013:147, ¶ 26 (Mar. 7, 2013).

71. Case C-466/12, Nils Svensson v. Retriever Sverige AB, ECLI:EU:C:2014:7, ¶ 19 (Feb. 13, 2014); Case C-314/12, UPC Telekabel Wien GmbH v. Constantin Film Verleih GmbH, ECLI:EU:C:2014:192, ¶ 39 (Mar. 27, 2014); Case C-527/15, Stichting Brein v. Jack Frederik Wullems, ECLI:EU:C:2017:30, ¶ 36 (Apr. 26, 2017); Case C-610/15, Stichting Brein v. Ziggo BV, ECLI:EU:C:2017:99, ¶ 31 (Feb. 8, 2017); *Nederlands Uitgeversverbond*, ECLI:EU:C:2019:1111, ¶ 63.

72. See discussion *supra* Section II.A.1.b.

73. 17 U.S.C. § 103(a) (2018).

74. *Id.* § 101.

Who Owns the Blockchain?

(e.g., facts).⁷⁵ Therefore, a blockchain can be protected as a compilation even if it comprises only factual information such as financial transactions.

In *Feist Publications v. Rural Tel. Serv. Co.*, the Supreme Court rejected the “sweat of the brow” theory and clarified that the criterion for the protection of a compilation is not the effort necessary for its creation but rather, its originality.⁷⁶ In connection with a compilation, originality “requires [...] that the author make the selection or arrangement independently [...] and that it display some minimal level of creativity.”⁷⁷ The threshold for originality is low but “the selection and arrangement [...] cannot be so mechanical or routine as to require no creativity whatsoever.”⁷⁸

With regard to selection, the creative effort is based on the decision of which elements are included in the compilation.⁷⁹ For example, courts have deemed a book that lists the best eating places⁸⁰ or a business directory that excluded businesses that the compiler did not think would remain open for very long⁸¹ as a protected compilation because of their original selection. Nonetheless, a selection is not original if all available data are enclosed.⁸² Whether a blockchain can be protected because of the selection of its content depends on the circumstances of the case in question. However, most current blockchain applications involve the storage of all available information in a specific area, which does not satisfy the requirements for an original selection. For example, in the case of cryptocurrencies, every valid transaction has to be recorded in order to prevent the situation that the same single digital token is spent more than once (“double spend problem”).⁸³

The content’s arrangement can still be original even when the selection is not. However, the way data are stored in electronic databases is determined by technical considerations, especially around efficiency concerns.⁸⁴ Thus, one could conclude that electronic databases are not capable of satisfying the originality requirement

75. *Feist Publ’ns v. Rural Tel. Serv. Co.*, 499 U.S. at 344–45 (1991); *Experian Info. Sols., Inc. v. Nationwide Mktg. Servs. Inc.*, 893 F.3d 1176, 1181, 1184 (9th Cir. 2018); *Schoolhouse, Inc. v. Anderson*, 275 F.3d 726, 728–29 (8th Cir. 2002); 1 NIMMER & NIMMER, *supra* note 45, § 3.02.

76. *Feist Publ’ns*, 499 U.S. at 357.

77. *Id.* at 358.

78. *Id.* at 362.

79. *Eckes v. Card Prices Update*, 736 F.2d 859, 863 (2d Cir. 1984); *Key Publ’ns, Inc. v. Chinatown Today Publ’g Enters., Inc.*, 945 F.2d 509, 513 (2d Cir. 1991); 2 WILLIAM F. PATRY, PATRY ON COPYRIGHT § 3:66 (2020).

80. *Adventures in Good Eating v. Best Places to Eat*, 131 F.2d 809 (7th Cir. 1942).

81. *Key Publ’ns, Inc.*, 945 F.2d at 513.

82. *Feist Publ’ns*, 499 U.S. at 362; *Warren Publ’g, Inc. v. Microdos Data Corp.*, 115 F.3d 1509, 1518 (11th Cir. 1997); 2 PATRY, *supra* note 79, § 3:66.

83. TAPSCOTT & TAPSCOTT, *supra* note 9, at 30.

84. 2 PATRY, *supra* note 79, § 3:69.

SEBASTIAN PECH

with respect to the arrangement of data.⁸⁵ On the other hand, an arrangement that increases efficiency could be creative.⁸⁶ However, information on a blockchain is stored chronologically,⁸⁷ which, similar to an alphabetical order,⁸⁸ excludes an original arrangement of the data.⁸⁹

As a result, both the selection and arrangement of information stored on a blockchain lack originality in most cases, and thus, the entire information is not protected as a compilation under US copyright law.

2. EU Law

In the EU, the protection of compilations is governed by the Database Directive.⁹⁰ Article 1(2) of the Database Directive defines a database as “a collection of independent works, data, or other materials arranged in a systematic or methodical way and individually accessible by electronic or other means.”⁹¹ According to the ECJ, the term database has to be interpreted in a broad way.⁹²

The wording of Article 1(2) of the Database Directive (“works, data, or other materials”) implies that the elements of a database do not need to be protected by a copyright themselves.⁹³ In addition, recital 17 of the Database Directive mentions “texts, sound, images, numbers, facts” as examples of elements.⁹⁴ Therefore, even a blockchain with uncopyrightable facts such as financial transactions can be protected as a database.

To be independent, the elements of a database have to “retain autonomous informative value”⁹⁵ after being separated from each other for any “interested third part[y].”⁹⁶ The requirement of independence is intended to prevent works (e.g., pictures, texts, and music) from being additionally protected as a database

85. See *id.* (“All of these problems, considered in light of Feist, will prove very problematic for electronic databases.”) (footnote omitted).

86. 1 GOLDSTEIN, *supra* note 45, § 2.16.11.

87. See discussion *supra* Section I.

88. Feist Publ'ns v. Rural Tel. Serv. Co., 499 U.S. 340, 362–63 (1991).

89. 2 PATRY, *supra* note 79, § 3:67.

90. Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the Legal Protection of Databases, 1996 O.J. (L 77) 20 [hereinafter Database Directive].

91. Database Directive, *supra* note 90, at art. 1(2).

92. Case C-444/02, Fixtures Mktg. Ltd. v. Organismos prognostikon agonon Podosfairou, 2004 E.C.R. I-10549, ¶ 20; Case C-30/14, Ryanair v. PR Aviation, ECLI:EU:C:2015:10, ¶ 33 (Jan. 15, 2015); Case C-490/14, Freistaat Bayern v. Verlag Esterbauer, ECLI:EU:C:2015:735, ¶ 12 (Oct. 29, 2015).

93. Case C-545/07, Apis-Hristovich EOOD v. Lakorda AD, 2009 E.C.R. I-1627, ¶ 70.

94. Database Directive, *supra* note 90, at recital 17(1).

95. *Freistaat Bayern*, ECLI:EU:C:2015:735, ¶¶ 23–24; *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 29, 32.

96. *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 34; *Freistaat Bayern*, ECLI:EU:C:2015:735, ¶ 27.

Who Owns the Blockchain?

comprising their individual parts (e.g. pixels, words, sounds).⁹⁷ Although information on a blockchain is grouped into blocks that are linked together, the individual information, like a financial transaction, still has autonomous information value. The fact that pseudonyms are used for transactions so that the true identity of the participants is not revealed does not lead to a different result, since at least the participants in the respective transaction have an interest in the transaction's details.

A systematic or methodical arrangement requires data to be arranged according to specific rules.⁹⁸ The standard is not very high and only accidental or arbitrary accumulations of data are excluded from protection as a database.⁹⁹ The systematic or methodical arrangement does not have to be physically apparent but requires that “the collection [is] contained in a fixed base, of some sort, and include technical means such as electronic, electromagnetic or electro-optical processes [...] to allow the retrieval of any independent material contained within it.”¹⁰⁰ Information on a blockchain is stored chronologically on the hard drives or other storage mediums of individual nodes and can be accessed.¹⁰¹

Elements are individually accessible if they can be retrieved.¹⁰² This also prevents works from being additionally protected as a database comprising their individual parts.¹⁰³ Information stored on a blockchain is individually retrievable—as every single transaction can be accessed using tools called “block explorers.”¹⁰⁴

As a result, a blockchain usually qualifies as a database in the sense of Article 1(2) of the Database Directive. In the following, the Database Directive distinguishes between the protection of databases by (a.) copyright and by (b.) sui generis right.

a. Copyright Protection

The copyright protection of databases under EU law is similar to the protection provided under US law. Article 3(1) of the Database Directive states that “databases which, by reason of the selection or arrangement of their contents, constitute the author's own intellectual creation shall be protected as such by copyright” and that “[n]o other criteria shall be applied to determine their eligibility for that protection.”¹⁰⁵

97. Silke von Lewinski, *European Copyright Law: A Commentary*, ¶ 9.1.18 (Michel Walter & Silke von Lewinski eds., 2010); Estelle Derclaye, *The Legal Protection of Databases: A Comparative Analysis*, 62 (2008); Database Directive, *supra* note 90, at recital 17(1).

98. VON LEWINSKI, *supra* note 97, ¶ 9.1.23; DERCLAYE, *supra* note 97, at 65.

99. VON LEWINSKI, *supra* note 97, ¶ 9.1.23; DERCLAYE, *supra* note 97, at 64.

100. *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 30; Database Directive, *supra* note 90, at recital 13.

101. See discussion *supra* Section I.

102. *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 30, 32.

103. VON LEWINSKI, *supra* note 97, ¶ 9.1.25; Database Directive, *supra* note 90, at recital 17.

104. VOSHMIR, *supra* note 9, at 42.

105. Database Directive, *supra* note 90, at art. 3(1).

SEBASTIAN PECH

Like the Supreme Court in *Feist Publications v. Rural Tel. Serv. Co.*, in *Football Dataco v. Yahoo! UK* the ECJ held that “[t]he fact that the setting up of the database required [...] significant labour and skill of its author [...] cannot as such justify the protection of it by copyright.”¹⁰⁶ Instead, the decisive criterion is originality, which “is satisfied when, through the selection or arrangement of the data which [the database] contains, its author expresses his creative ability in an original manner by making free and creative choices [...] and thus stamps his ‘personal touch.’”¹⁰⁷ The threshold for originality is low, but a selection or an arrangement lacks originality “when the setting up of the database is dictated by technical considerations, rules or constraints which leave no room for creative freedom.”¹⁰⁸

Similar to US law, a selection of all available information does not satisfy the originality requirement.¹⁰⁹ Moreover, in most cases, an original arrangement will not be found. As mentioned above, the way information is stored in an electronic database is determined by technical considerations.¹¹⁰ As this could preclude an original arrangement for any electronic database, it is suggested that the focus should not be on the originality of the physical arrangement but rather on the originality of the access and retrieval system.¹¹¹ However, if this system is based on mandatory or expedient methods, as is often the case, the originality requirement is not satisfied either. Therefore, similar to US law,¹¹² under EU law the compilation of information stored on a blockchain is not subject to copyright protection in most cases.

b. Sui Generis Right Protection

As described earlier, traditional copyright law requires an original selection or arrangement of information. The European legislature established an additional sui generis right,¹¹³ which is essentially, a “sweat of the brow” protection for non-original databases, in order to protect investments in the creation of databases and to incentivize the EU database industry.¹¹⁴

i. Subject Matter

Pursuant to Article 7(1) of the Database Directive, a database is protected by the sui generis right if it “shows that there has been qualitatively and/or quantitatively a

106. Case 604/10, *Football Dataco Ltd v. Yahoo! UK Ltd.*, ECLI:EU:C:2012:115, ¶ 42. (Mar. 1, 2012).

107. *Id.* ¶ 38.

108. *Id.* ¶ 39.

109. VON LEWINSKI, *supra* note 97, ¶ 9.3.4.

110. See discussion *supra* Section II.B.1.

111. VON LEWINSKI, *supra* note 97, ¶ 9.3.6.

112. See discussion *supra* Section II.B.1.

113. See DERCLAYE, *supra* note 97, at 51–54, for the nature of the right.

114. DERCLAYE, *supra* note 97, at 45; Mark Schneider, *The European Union Database Directive*, 13 BERKELEY TECH. L.J. 551, 554 (1998); Database Directive, *supra* note 90, at recitals 9, 10, 12.

Who Owns the Blockchain?

substantial investment in either the obtaining, verification or presentation of the contents.”¹¹⁵

The required investment can include “the deployment of human, financial or technical resources” while “[t]he quantitative assessment refers to quantifiable resources and the qualitative assessment to efforts which cannot be quantified, such as intellectual effort or energy.”¹¹⁶ The Database Directive does not define the threshold for a substantial investment. However, in order to achieve the purpose of the sui generis right, which is to provide incentives for the creation of databases, the threshold is low.¹¹⁷ For example, in *Directmedia Publishing GmbH v. Albert-Ludwigs-Universität Freiburg*, the ECJ held that a financial investment to the extent of € 34,900 (about \$ 47,700 at the time of the ruling) was sufficient to be substantial.¹¹⁸

Possible objects of the investment can either be the obtaining, verification, or presentation of the content.¹¹⁹ The term “obtaining” refers to the selection and collection of elements for the database.¹²⁰ The creation of elements is not encompassed here because “the purpose of the protection by the sui generis right [...] is to promote the establishment of storage and processing systems for existing information and not the creation of materials capable of being collected subsequently in a database.”¹²¹ Therefore, only investments in the obtaining of preexisting elements are relevant. For example, according to the ECJ, the setting up of lists of horses and riders participating in horse races¹²² or of fixtures for soccer games¹²³ by the event organizer is considered an irrelevant investment in the creation of data. “Verification” refers to “ensuring the reliability” and “monitori[ng] the accuracy” of the content during the creation and operation of the database.¹²⁴ Here too, verification

115. Database Directive, *supra* note 90, at art. 7(1).

116. *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 44; Database Directive, *supra* note 90, at recitals 7, 40.

117. DERCLAYE, *supra* note 97, at 87–91.

118. Case C-304/07, *Directmedia Publ'g GmbH v. Albert-Ludwigs-Universität Freiburg*, 2008 E.C.R. I-7565, ¶ 24.

119. Database Directive, *supra* note 90, at art. 7(1).

120. Case C-203/02, *The British Horseracing Bd. Ltd. v. William Hill Org. Ltd.*, 2004 E.C.R. I-10415, ¶ 31; Case C-338/02, *Fixtures Mktg. Ltd. v. Svenska Spel AB*, 2004 E.C.R. I-10497, ¶ 24; *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 40; VON LEWINSKI, *supra* note 97, ¶ 9.7.6.

121. *The British Horseracing Bd. Ltd.*, 2004 E.C.R. I-10415, ¶ 31; Case C-338/02, *Fixtures Mktg. Ltd. v. Svenska Spel AB*, 2004 E.C.R. I-10497, ¶ 24; *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 40; VON LEWINSKI, *supra* note 97, ¶ 9.7.7; DERCLAYE, *supra* note 97, at 93–97.

122. *The British Horseracing Bd. Ltd.*, 2004 E.C.R. I-10415, ¶ 38.

123. *Fixtures Mktg. Ltd. v. Svenska Spel AB*, 2004 E.C.R. I-10497, ¶ 31; *Fixtures Mktg. Ltd.*, 2004 E.C.R. I-10549, ¶ 47.

124. *The British Horseracing Bd. Ltd.*, 2004 E.C.R. I-10415, ¶ 34; *Fixtures Mktg. Ltd. v. Svenska Spel AB*, 2004 E.C.R. I-10497, ¶ 31; VON LEWINSKI, *supra* note 97, ¶ 9.7.10.

SEBASTIAN PECH

in the context of the creation of the content is not taken into consideration.¹²⁵ The term “presentation” refers to the “systematical or methodical arrangement” of the content and its “individual accessibility,”¹²⁶ which includes the structure of the database and how content is made accessible for users.¹²⁷

Depending on the individual blockchain application, the area of the investment can differ. Therefore, whether a specific blockchain requires a substantial investment or not must be decided on a case-by-case basis.

A crucial issue, especially in the case of cryptocurrencies, is the validation of transactions before they are written to the blockchain by miners. The question arises as to whether the transaction data are generated by the parties of the transaction or by the miners, because only in the first situation can the validation of the data be classified as verification of preexisting elements. Taking a closer look at the procedure, the participants in the transaction determine the parameter of the transaction, like the number of units of the cryptocurrency to be transferred. Miners cannot influence the details of transactions but rather validate already existing information and add it to the blockchain. As a result, the validation process can be qualified as verification of preexisting elements.

The subsequent question is whether this verification also requires a substantial investment. The extent of the investment depends on the consensus mechanism chosen for validation. The Bitcoin blockchain, for example, uses a proof of work consensus mechanism that requires special equipment and a large amount of computational power that results in incurring high costs for expensive hardware and energy consumption.¹²⁸ Energy costs alone are more than sufficient to qualify as a substantial investment. Indeed, Bitcoin’s annual electricity consumption is currently around 78 TWh, which is comparable to the annual electricity consumption in Chile.¹²⁹

Besides the verification of information, obtaining information or the implementation and maintenance of the blockchain itself can also involve a substantial investment. As a result, owing to the low threshold for a substantial investment, most blockchains will be protected by the sui generis right.

125. *The British Horseracing Bd. Ltd.*, 2004 E.C.R. I-10415, ¶ 34; VON LEWINSKI, *supra* note 97, ¶ 9.7.10; DERCLAYE, *supra* note 97, at 97.

126. *Fixtures Mktg. Ltd. v. Svenska Spel AB*, 2004 E.C.R. I-10497, ¶ 27; VON LEWINSKI, *supra* note 97, ¶ 9.7.11.

127. DERCLAYE, *supra* note 97, at 98.

128. DE FILIPPI & WRIGHT, *supra* note 9, at 40; TAPSCOTT & TAPSCOTT, *supra* note 9, at 259; WERBACH, *supra* note 11, at 57, 99.

129. DIGICONOMIST, *Bitcoin Energy Consumption Index*, <https://digiconomist.net/bitcoin-energy-consumption> (last visited Jan. 15, 2021).

Who Owns the Blockchain?

ii. Rights

Article 7(1) of the Database Directive provides that the rights holder of the sui generis right has the right “to prevent extraction and/or re-utilization of the whole or of a substantial part [...] of the contents of that database.”¹³⁰

The terms “extraction” and “reutilization” have to be interpreted in a broad sense.¹³¹ “Extraction” refers to “the permanent or temporary transfer of all or a substantial part of the contents of a database to another medium by any means or in any form.”¹³² This corresponds to the reproduction right for copyright-protected works under Article 2 of the Information Society Directive,¹³³ and includes, for example, copying the contents of a database to a hard drive or other storage medium.¹³⁴ Since the investment in the database is protected, and not the author’s creativity expressed in the selection or arrangement, it is irrelevant whether the contents of the database are arranged in the same or different way after extraction.¹³⁵ “Reutilization,” which corresponds to a communication to the public of copyright-protected works under Article 3(1) of the Information Society Directive,¹³⁶ encompasses “any form of making available to the public all or a substantial part of the contents of a database by the distribution of copies, by renting, by on-line or other forms of transmission.”¹³⁷

The extraction or reutilization has to involve the entire content of the database or at least substantial parts of it.¹³⁸ Under Article 7(1) of the Database Directive, the substantiality of parts is either determined by quantity or quality.¹³⁹ According to the ECJ, quantitative substantiality “refers to the volume of data extracted from the database and/or re-utilised, and must be assessed in relation to the volume of the contents of the whole of that database,”¹⁴⁰ while qualitative substantiality “refers to the scale of the investment in the obtaining, verification or presentation of the contents of the subject of the act of extraction and/or re-utilisation, regardless of whether that subject represents a quantitatively substantial part of the general

130. Database Directive, *supra* note 90, at art. 7(1).

131. Case C-203/02, *The British Horseracing Bd. Ltd. v. William Hill Org. Ltd.*, 2004 E.C.R. I-10415, ¶ 51; Case C-545/07, *Apis-Hristovich EOOD v. Lakorda AD*, 2009 E.C.R. I-1627, ¶ 40; VON LEWINSKI, *supra* note 97, ¶ 9.7.25, 9.7.37; DERCLAYE, *supra* note 97, at 97.

132. Database Directive, *supra* note 90, at art. 7(2).

133. See discussion *supra* Section II.A.2.b.

134. VON LEWINSKI, *supra* note 97, ¶ 9.7.27; DERCLAYE, *supra* note 97, at 104.

135. *Apis-Hristovich EOOD*, 2009 E.C.R. I-1627, ¶ 47; Case C-304/07, *Directmedia Publ’g GmbH v. Albert-Ludwigs-Universität Freiburg*, 2008 E.C.R. I-7565, ¶ 39.

136. See discussion *supra* Section II.A.2.b.

137. Database Directive, *supra* note 90, at art. 7(2)(b).

138. *Id.* at art. 7(1).

139. *Id.*

140. Case C-203/02, *The British Horseracing Bd. Ltd. v. William Hill Org. Ltd.*, 2004 E.C.R. I-10415, ¶ 70; Case C-545/07, *Apis-Hristovich EOOD*, 2009 E.C.R. I-1627, ¶ 59.

SEBASTIAN PECH

contents of the protected database.”¹⁴¹ Similar to the term “substantial investment,” the Database Directive does not define the threshold for a “substantial part.” Here too, the threshold is low in order to achieve the purpose of the sui generis right, which is to provide incentives for the creation of databases.¹⁴²

The dissemination of the blockchain over the network involves both transmission between the nodes and storage on the hard drive or any other storage medium of the nodes.¹⁴³ Transferring and copying the entire data stored on a blockchain falls clearly within the scope of Article 7(1) of the Database Directive. However, as mentioned above, the entire blockchain is only involved when a node connects for the first time to the network because subsequent acts of synchronization involve only newly added blocks.¹⁴⁴ Whether these are substantial parts depends on the circumstances of the individual case. Even if the threshold for a substantial part is low, in most cases newly added blocks will not be substantial from a quantitative perspective because of the overall number of blocks contained in the blockchain. For example, the Bitcoin blockchain currently comprises about 670,000 blocks,¹⁴⁵ and a new block is added about every nine to ten minutes.¹⁴⁶ The situation is different from a qualitative perspective. In this respect, even single blocks can be considered substantial due to the extent of the corresponding investment. For example, the electrical energy required for a single Bitcoin transaction is about 620 kWh, which is comparable to the consumption of an average household in the US over 21 days.¹⁴⁷ The average number of transactions per block fluctuates at the time of writing between about 1,600 and 2,600.¹⁴⁸ Therefore, the costs for verifying and adding a single block are most likely sufficient to qualify for a substantial investment.

As a result, the sui generis right can apply to the transmission and copying of even single parts of a blockchain.

141. *The British Horseracing Bd. Ltd.*, 2004 E.C.R. I-10415, ¶. 71; *Apis-Hristovich EOOD*, 2009 E.C.R. I-1627, ¶ 66.

142. VON LEWINSKI, *supra* note 97, ¶ 9.7.21.

143. *See* discussion *supra* Section II.A.1.b.

144. *See* discussion *supra* Section II.A.1.b.

145. *Bitcoin Explorer*, BLOCKCHAIN, <https://www.blockchain.com/en/explorer> (last updated Jan.15, 2021).

146. *Average time to mine a block in minutes*, BITCOINITY, https://data.bitcoinity.org/bitcoin/block_time/5y?f=m10&t=l (last visited Jan. 15, 2021).

147. *Bitcoin Energy Consumption Index*, DIGICONOMIST, <https://digiconomist.net/bitcoin-energy-consumption> (last visited Jan. 15, 2021).

148. *Average Transactions Per Block*, BLOCKCHAIN, <https://www.blockchain.com/en/charts/n-transactions-per-block> (last visited Jan. 15, 2021).

Who Owns the Blockchain?

iii. Rights Holder

Courts within the EU will apply the sui generis right protection in cases that have a connection to the territory of an EU member state.¹⁴⁹ Specifically, when extraction leads to storage on a storage medium located in the EU or when the reutilisation “discloses an intention on the part of its performer to target persons in [EU] territory.”¹⁵⁰ Because of the dissemination of the blockchain within the worldwide network, the sui generis right plays a role for almost every blockchain. Therefore, the question of ownership of the right is of great importance.

The initial owner of the sui generis right is “the maker of [the] database,”¹⁵¹ which is “the person who takes the initiative and the risk of investing.”¹⁵² This can be either an individual person or a legal entity.¹⁵³

With respect to a blockchain, the rights holder is the person or entity that develops and operates it. However, because joint ownership of the sui generis right is possible,¹⁵⁴ the question arises as to whether nodes can also be rights holders. This is especially relevant for public blockchains, where basically everyone can join the network. In this context, it should be noted that the database as a whole requires a substantial investment, which does not mean that every rights holder has to raise a substantial investment by himself or herself.

For example, with regard to the proof of work consensus mechanism, miners have to spend money for hardware and electricity. Even if a miner succeeds in verifying a transaction first and gets a fee or other reward for it, he or she still takes the risk of not being remunerated for the invested time and money. This distinguishes miners from subcontractors, who are paid for their effort in setting up or maintaining a database regardless of whether the goals pursued by the database are achieved or not and are therefore excluded from the definition of a rights holder.¹⁵⁵ Thus, every participant contributing to the blockchain can become a rights holder of the sui generis right. Especially in the case of a public blockchain, this can lead to a multitude of rights holders that are spread all over the world.

As the operator and the miners own the sui generis right to the information stored on the blockchain jointly, how do they decide on the exploitation of the right? Unfortunately, the Database Directive does not set rules for joint ownership, rather

149. For a list of the member states of the EU, see *Countries: The 27 member countries of the EU*, EUROPEAN UNION https://europa.eu/european-union/about-eu/countries_en#the-27-member-countries-of-the-eu (last visited Jan. 15, 2021).

150. Case C-173/11, *Football Dataco Ltd v. Sportradar GmbH*, ECLI:EU:C:2012:642, ¶ 39 (Oct. 18, 2012).

151. Database Directive, *supra* note 90, at art. 7(1).

152. *Id.* at recital 41.

153. VON LEWINSKI, *supra* note 97, ¶ 9.7.16.

154. *Id.* ¶ 9.7.16.

155. *Id.* ¶ 9.7.17; Database Directive, *supra* note 90, at recital 41.

SEBASTIAN PECH

it leaves the details to the national laws of the member states of the EU.¹⁵⁶ For example, under German law, it is still unclear as to whether, in the absence of a contractual provision, the exploitation of the sui generis right requires the consent of every rights holder.¹⁵⁷ However, it is agreed that at least the majority of rights holders must endorse exploitation.¹⁵⁸ It may, therefore, be possible for a single miner, or at least the majority of them, to withhold their consent with the effect that other nodes are no longer permitted to transmit or copy the entire blockchain or substantial parts of it, which may prevent the operation of the blockchain in question. To avert this situation, the operator of the blockchain can include a provision, for example, in the terms of use for the blockchain software, which requires miners to assign their rights to the operator. This is possible because the sui generis right can not only be licensed, but completely transferred.¹⁵⁹ The operator can then exclusively determine the exploitation of the sui generis right or, alternatively, establish rules that allow miners to participate in the decision.

It should also be noted that, pursuant to Article 11(1) of the Database Directive, “[t]he right provided for in Article 7 shall apply to database whose makers or rightholders are nationals of a Member State [of the EU] or who have their habitual residence in the territory of the [EU]”.¹⁶⁰ Article 11(2) of the Database Directive extends the protection to legal entities which are “formed in accordance with the law of a Member State [of the EU] and hav[e] their registered office, central administration or principal place of business within the [EU].”¹⁶¹ If an entity has only its registered office in a member state, “its operation must be genuinely linked on an ongoing basis with the economy of a Member State of the [EU].”¹⁶² If this is not the case, Article 11(3) of the Database Directive allows for the extension to individuals or entities from third countries by international agreements.¹⁶³ However, under recital 56 of the Database Directive, this is only possible if these countries “offer comparable protection” to persons or entities entitled under Article 11(1) and (3) of the Database Directive.¹⁶⁴ Despite several attempts in the US to establish protection for non-original compilations, no legislation has been enacted so far.¹⁶⁵

At first glance, it would seem that US-based individuals and entities could never be sui generis right’s holders. However, Article 11(1) of the Database Directive

156. VON LEWINSKI, *supra* note 97, ¶ 9.7.16.

157. Jan F. Krekel, *Die digitale Datenbank – aktuelle Probleme im Recht des Datenbankherstellers*, 57 WETTBEWERB IN RECHT UND PRAXIS [WRP], 436, 440–41 (2011).

158. *Id.*

159. Database Directive, *supra* note 90, at art. 7(3).

160. Database Directive, *supra* note 90, at art. 11(1).

161. Database Directive, *supra* note 90, at art. 11(2).

162. *Id.*

163. Database Directive, *supra* note 90, at art. 11(3).

164. Database Directive, *supra* note 90, at recital 56.

165. 2 NIMMER, *supra* note 45, § 3.04[B][3][c].

Who Owns the Blockchain?

makes it sufficient that either the “makers or the rightholders” meet the respective requirements.¹⁶⁶ In other words, the provision precludes individuals or entities from third-party countries from obtaining rights as initial rights holder, but does not prevent them from becoming rights holders through transfer from other rights holders that fall within the scope of Article 11 of the Database Directive.¹⁶⁷ For US individuals and entities that develop and operate a blockchain, this might be another reason for including a provision assigning them the rights of network participants.

iv. Term of Protection

According to Article 10(1) of the Database Directive, the sui generis right lasts for 15 years from the completion of the database.¹⁶⁸ However, most databases are not static, but dynamic in the way that information is changed, deleted, or added. Article 10(3) of the Database Directive provides that the term of protection is renewed for another 15 years if a “substantial change, evaluated qualitatively or quantitatively” has been made to the contents of the database, which “result[s] in the database being considered to be a substantial new investment, evaluated qualitatively or quantitatively.”¹⁶⁹

The changes that extend the term of protection can result from the “accumulation of successive additions, deletions or alterations” of the information contained in the database¹⁷⁰ and they have to be substantial either with respect to the content of the information (qualitative substantiality) or the quantity of the information affected (quantitative substantiality).¹⁷¹ The substantial change must also amount to a substantial investment that has to be interpreted in the same way as in Article 7(1) of the Database Directive.¹⁷²

A blockchain is an append-only database, which means that information is only added and never altered. Whether the addition of new information is substantial and requires a substantial investment must be decided on a case-by-case basis. With respect to the Bitcoin blockchain, newly added transactions are not necessarily more important than those that are already stored on the blockchain, because the latter are still required to prevent the double spending of Bitcoins. This may exclude a content change that is substantial from a qualitative perspective. However, a quantitatively substantial change occurs if a large number of new transactions are added, which also requires a substantial investment in hardware and electricity. As mentioned

166. Database Directive, *supra* note 90, at art. 11(1).

167. VON LEWINSKI, *supra* note 97, ¶ 9.11.13.

168. Database Directive, *supra* note 90, at art. 10(1).

169. Database Directive, *supra* note 90, at art. 10(3).

170. Database Directive, *supra* note 90, at art. 10(3).

171. VON LEWINSKI, *supra* note 97, ¶ 9.10.7.

172. *Id.* ¶ 9.10.6; DERCLAYE, *supra* note 97, at 139.

SEBASTIAN PECH

above,¹⁷³ a new block is added about once every nine to ten minutes. This means that the cost of the energy required for verifying and adding blocks is most likely sufficient to renew the term of protection.

In this context, it should be noted that Article 10(3) of the Database Directive does not make clear whether a substantial change extends the term of protection for the whole database or only for the parts of the database that required a substantial investment.¹⁷⁴ In the former case, every updated version of a database could be protected for another 15 years, leading to the protection of the whole database *ad infinitum*.¹⁷⁵ Therefore, it is argued that the term of protection should only be extended for the new parts of the database.¹⁷⁶ In practice, however, it can often be difficult to distinguish between the new and old parts.¹⁷⁷

For blockchains, which are append-only database, this problem does not arise. Therefore, there are good reasons to renew the term of protection only for newly added blocks—not for the whole blockchain.¹⁷⁸ However, as already mentioned, because synchronization acts involve only newly added blocks, the entire blockchain is only involved when a node connects for the first time to the network.¹⁷⁹ Since a large number of extractions and reutilizations affect only newly added blocks, the lack of extension of the term of protection for the entire blockchain is often not of much relevance.

v. Exceptions

Article 9 of the Database Directive contains exceptions¹⁸⁰ to the *sui generis* right for private purposes in connection with non-electronic databases, for purposes of illustration for teaching or scientific research, and for purposes of public security or an administrative or judicial procedure.¹⁸¹ However, none of these exceptions cover copying and transferring information stored on a blockchain within the network.

Because the rights arising from the *sui generis* protection can cause serious issues for the operation of a blockchain if its operator has not taken precautions through contractual arrangements, the question remains whether such a result is intended by

173. See discussion *supra* Section II.B.2.b.ii.

174. DERCLAYE, *supra* note 97, at 139–40.

175. *Id.* at 140.

176. *Id.* at 140–41.

177. *Id.* at 140.

178. In this case, one could also assume that the newly added blocks are a new, independent database within the blockchain, for which the term of protection starts to run for the first time.

179. See discussion *supra* Section II.A.1.b.

180. In this context, it should be noted that although Article 8 of the Database Directive has the heading “Rights [...] of lawful users,” it does not provide additional rights for the users of databases protected by the *sui generis* right. DERCLAYE, *supra* note 97, at 127.

181. Database Directive, *supra* note 90, at art. 9.

Who Owns the Blockchain?

the Database Directive at all. As already mentioned, the purpose of the sui generis right is to provide incentives for the creation of databases by establishing protection for non-original databases.¹⁸² In this context, it should be noted that blockchains are usually developed and operated for a specific purpose. For example, Nakamoto's motivation for the cryptocurrency Bitcoin was to create a payment system without a trusted third party.¹⁸³ An incentive by providing IP rights in the compilation of information is therefore not necessary in most cases. The same applies for miners, which generally do not employ their computational power for verifying transactions to acquire rights in the blockchain. Rather, their incentive is usually the reward offered by the blockchain network, for example in the case of the Bitcoin blockchain, the reward is a specific amount of Bitcoin.¹⁸⁴ Moreover, the protection provided by the sui generis right leads to additional barriers for developing and operating blockchains, especially transaction costs for contractual agreements between the operator and miners. This even contradicts the purpose of the sui generis right.

According to the ECJ, the rights resulting from the sui generis protection "must be interpreted in the light of the objective pursued by the sui generis right."¹⁸⁵ In this context Article 6(1) of the Database Directive should be mentioned which provides that

*[t]he performance by the lawful user of a database or of a copy thereof of any [reproduction, alteration, distribution to the public, or communication to the public] which is necessary for the purposes of access to the contents of the databases and normal use of the contents by the lawful user shall not require the authorization of the author of the database.*¹⁸⁶

The idea behind the provision is to ensure that acts that are technically required for the use of a database cannot be prevented by the rights holder as long as the database is used in the intended way.¹⁸⁷ However, Article 6(1) of the Database Directive applies only for original databases protected by a copyright and not for non-original databases covered by the sui generis right. Regardless of the question of whether the exception in Article 6(1) of the Database Directive could be applied to databases protected by the sui generis right in general, the underlying concept should be transferred to acts necessary for the operation of a blockchain, which are

182. DERCLAYE, *supra* note 97, at 45; Schneider, *supra* note 114, at 554; Database Directive, *supra* note 90, at recitals 9, 10, 12.

183. Nakamoto, *supra* note 2, at 1.

184. DE FILIPPI & WRIGHT, *supra* note 9, at 25.

185. Case C-203/02, The British Horseracing Bd. Ltd. v. William Hill Org. Ltd., 2004 E.C.R. I-10415, ¶ 45.

186. Database Directive, *supra* note 90, at art. 6(1).

187. VON LEWINSKI, *supra* note 97, ¶ 9.6.1; Database Directive, *supra* note 90, at recital 34.

SEBASTIAN PECH

copying and transmitting of the contents of a blockchain within the network. This ensures that the protection provided by the *sui generis* right does not hinder the development and operation of blockchains.

Here, too, a limitation to the intended purpose of the blockchain should be made to protect the interests of the blockchain operator and miners. The purpose of a blockchain can be defined through the terms of use for the blockchain software or any other announcements of the operator, for example, in a whitepaper. According to Nakamoto's whitepaper the purpose of the Bitcoin blockchain, for example, is to provide "an electronic payment system [...] allowing any two willing parties to transact directly with each other without the need for a trusted third party."¹⁸⁸ As long as the blockchain's intended purpose is pursued, no consent of the operator and miners is required for copying and transmitting the blockchain within the network.

To increase the legal certainty for blockchains, the proposed exception should be explicitly included in the Database Directive. A possible location could be Article 9 of the Database Directive, which already contains exceptions to the *sui generis* right.¹⁸⁹ A new paragraph 2 could be inserted, following Article 6(1) of the Database Directive, which could read as follows:

The performance of any of the acts listed in Article 7 which is necessary for the normal use of a database stored on a blockchain shall not require the authorization of the maker of the database.

Currently, as part of the "European data strategy," which aims to enable more data-driven innovation in the EU, the European Commission is proposing a revision of the Database Directive to provide incentives for data sharing.¹⁹⁰ This could be a good opportunity for the EU legislator to also implement the proposed changes regarding blockchains.

CONCLUSION

If information stored on a blockchain is original, rights holders can enjoin nodes under US and EU law from transmitting and copying blocks that contain such original information. In most cases, the compilation of information in its entirety is not protected by US and EU copyright law because the selection and arrangement of the information lack originality. However, a blockchain can be protected by the EU's *sui generis* right regime if the obtaining, verifying, or presenting of its contents require a substantial investment. Due to the significant energy consumption needed for proof of work, this will be the case for most blockchains relying on this consensus mechanism. As the creation of single blocks is already highly energy-intensive, the

188. Nakamoto, *supra* note 2, at 1.

189. Database Directive, *supra* note 90, at art. 9.

190. *A European strategy for data*, at 13, COM(2020) 66 final (Feb. 19, 2020).

Who Owns the Blockchain?

sui generis right allows rights holders to enjoin nodes from transmitting and copying even parts of the blockchain.

Unlike in the case of a “51% attack,” where a person or entity that has the majority of a blockchain’s computational power can change the information stored on the blockchain,¹⁹¹ copyright law only enables rights holders to prevent the transmission and copying of the blockchain or parts of it. However, these acts are crucial for the operation of a blockchain, and rights holders may thus (ab)use their rights to control the blockchain in question.

The sui generis protection is not only unnecessary to promote the development of blockchains, it even hinders it. Thus, it is suggested to limit the rights of rights holders to acts that are outside the initial purpose of the respective blockchain. However, as long as such an exception is not included in the Database Directive, the operators of blockchains are well advised to have the rights of the miners transferred to them by contractual provisions.

Another question is whether rights holders will be able to enforce their rights against individual participants of a blockchain that are spread all over the world. Owing to the decentralized structure, the removal of single nodes has no effect on the operability of a blockchain network. Therefore, the statement that no one controls the blockchain may ultimately prove true, at least for factual reasons.

191. WERBACH, *supra* note 11, at 119; Mike Orcutt, *Once hailed as unhackable, blockchains are now getting hacked*, MIT TECH. REV. (Feb. 19, 2019), <https://www.technologyreview.com/s/612974/once-hailed-as-unhackable-blockchains-are-now-getting-hacked/>.