Examining the application of blockchain technology as a solution to and the enabler of end user online copyright infringement

Thesis submitted in accordance with the requirements of the University of Liverpool for the Degree of Doctor in Philosophy by

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Abstract

Copyright incentivises the production of creative material known as 'works', such as books, films, music by granting rightsholders a set of exclusive rights in their creation. Exclusive rights enable rightsholders to control the market exploitation of their works. A user wishing to engage with creative works in a manner that is covered by exclusive rights and not exempted, needs to obtain rightsholder authorisation by paying for a licence fee. On the internet, works are expressed as information. Control over the exploitation of works is lost because digital technologies enable the unlimited diffusion of information by anyone, at any time and anonymously. Enforcement efforts cannot contain the scale of the phenomenon especially as it is intrusive to enforce in the private sphere.

Blockchain is a very new addition to the copyright discussion and there are limited, and conflicting hypothesis advanced over its viability and role in relation to end user copyright infringement. This thesis analyses whether blockchain technologies can help to enhance the protection of copyright holders' rights or if it may have the potential to aggravate end user copyright infringement. Blockchain refers to a type of an append only peer-2-peer database that is synchronised across the participants computers and records and verifies transactions submitted by participants securely and automatically. Blockchain is special because its specific architecture generates order and control over the information exchanged in a peer-2-peer network.

The thesis explores the different facets of blockchain technology application in a number of contexts related to end user online infringement such as technical enforcement of rights, licencing, including legal licences for Peer-2-Peer use, and blockchain facilitation of end user infringement. By looking at both sides of blockchain application the thesis provides a comprehensive assessment of the role of this technology and end user infringement. The research focuses on the EU copyright *acquis communautaire*. The enquiry considers the balance between the interests of both rightsholders and end users. The thesis finds that there is a case for blockchain technology application both to solve copyright infringement as well as to facilitate end user infringement.

Acknowledgements

List of Abbreviations

AG	Avocate General
ALAI	Association Littéraire et Artistique Internationale (International Literary and Artistic Association)
BC	Berne Convention for the Protection of Artistic and Literary Works
BGH	Bundesgerichtshof (the German Federal Court of Justice)
CDS	Content Delivery System
Charter	Charter of Fundamental Rights of the EU
CMO	Collective Rights Management Organisation
CJEU	Court of Justice of the European Union
DRM	Digital Rights Management
E&Ls	Exceptions and Limitations
ECL	Extended Collective Licence
EP	European Parliament
ISS	Internet Society Service
ISP	Internet Service Provider
MCM	Mandatory Collective Management
OCSSP	Online Content Sharing Service Provider
RMI	Rights Management Information
TPM	Technological Protection Measure
TRIPS	Agreement on Trade-Related Aspects of Intellectual Property Law
UGC	User Generated Content
UDHR	Universal Declaration of Human Rights
VCM	Voluntary Collective Management
WCT	WIPO Copyright Treaty
WIPO	World Intellectual Property Organization
WIPO Treaties	WCT and WPPT
WPPT	WIPO Performances and Phonograms Treaty

Case 160/15 *GS Media* EU:C:2016:644

Case 527/15 *Stichting Brein v Wullems* EU:C:2017:300

Case 138/16 *AKM* ECLI:EU:C:2017:218

Case 265/16 *VCAST* ECLI:EU:C:2017:913

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Merger

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National

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Bourgoin SA v Minister of Agriculture [1986] 1 QB 716

Twentieth Century Fox Film Corpn and others v Newzbin Ltd [2010] EWHC 608

Media CAT v Adams [2011] EWPCC 6

Media CAT v Adams No, 4 [2011] EPC 10

Golden Eye (International) Ltd and Another v Telefonica UK Ltd [2012] EWHC 723

Golden Eye (International) Ltd v Telefónica UK Ltd [2012] EWCA Civ 1740

Dramatico Entertainment Ltd & Ors v British Sky Broadcasting Ltd & Ors [2012] EWHC 268

EMI Records Ltd v British Sky Broadcasting Ltd [2013] EWHC 379

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FAPL v BT [2017] EWHC 480

Germany

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Cybersky BGH (15 January 2009) I ZR 57/07

CT-Paradies BGH (18 September 2014) I ZR 76/13

The Reality BGH (9 July 2015) I ZR 46/12

Storerhaftung des Access-Providers BGH (26 November 2015) I ZR 174/14

Thumbnails III BGH (21 September 2017) I ZR 11/16

Cordoba BGH (23 February 2017) I ZR 267/15

Sharehosting BGH (20 September 2018) I ZR 53/17

YouTube BGH (pending) I ZR 140/15

Lower courts

LG Hamburg (3 September 2010) 308 O 27/09

LG Düsseldorf (24 October 2012) 23 S 66/12

LG Hamburg (19 December 2013) 310 O 460/13

LG Koln (24 January 2014) 209 O 188/13

LG Berlin (29 January 2016) 16 O 522/14

LG Hamburg (13 June 2017) 310 O 117/17

France

M Perquin, UFC Que Choisir v Soc Universal Pictures Vidéo France et al Court of Cassation, Civil 1 (19 June 2008)

The Pirate Bay Court of Cassation, Third Criminal Chamber (29 September 2009) 49437

Court of Cassation, Criminal Chamber (25 September 2012)

SA Télévision Française 1 (TF1) v Société YouTube LLC Tribunal de Grande Instance de Paris (29 May 2012)

TF1 et autres v YouTube Tribunal de Grande Instance de Paris (29 May 2012)

Belgium

VRT, Medialaan and SBS Belgium v Right Brain Interface Antwerp Commercial Court (4 November 2014) A/14/1067

Etat Belge v SABAM Tribunal de première instance francophone de Bruxelles (13 March 2015) IEFbe 1259

SABAM v Etat Belge Cour d'appel Bruxelles (3 June 2016) IEFbe 1881

Sweeden

Hans Fredrik Lennart Neij Stockholm District Court, Division 5 Unit 52 (17 April 2009) B 13301-06 <http://www.ifpi.org/content/library/Pirate-Bay-verdict-English-translation.pdf> accessed 29 March 2019

Lithuania

Linkomanija Vilnius District Court, Civil Case No 2-742-262/2012

Spain

Provincial Court of Madrid - Section 28 (Commercial) (31 March 2014) Sentencia 103/2014

United States

MGM Studios Inc v Grokster 545 US 913 (S Ct 2764, 2005)

Universal City Studios, Inc v Reimerdes 111 F Supp 2d 294, 304 (SDNY 2000)

Capitol Records, LLC v ReDigi Inc 934 F Supp 2d 640 (USDC NY, 2013)

hiQ Labs, Inc v LinkedIn Corp 273 F Supp 3d 1099 (ND Cal 2017)

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Berne Convention for the Protection of Literary and Artistic Works (as amended 28 September 1979)

Agreement on Trade-Related Aspects of Intellectual Property (15 April 1994) 1869 UNTS 299

WIPO Copyright Treaty (adopted 20 December 1996, entered into force 6 March 2002)

WIPO Performances and Phonograms Treaty (adopted 20 December 1996, entered into force 20 May 2002)

EU Directives

Council 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 [2000] OJ L178/1

Council 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] OJ L167/10

Council Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights ('Corrigendum to') [2004] OJ L195/16

Council Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights [2006) OJ L372/12

Council Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs [2009] OJ L111/16

Council Directive 2012/28/EU of the European Parliament and of the Council of 25 October 2012 on certain permitted uses of orphan works [2012] OJ L299/5

Council Directive 2014/26/EU of 26 February 2014 on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market [2014] OJ L 84/72

Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC

Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs [1991] OJ L122/42

Council Directive 92/100/EEC of 19 November 2002 on rental right and lending right and on certain rights related to copyright in the field of intellectual property [1992] OJ L346/61

Council Directive 93/83/EEC of 27 September 1993 on the coordination of certain rules concerning copyright and rights related to copyright applicable to satellite broadcasting and cable retransmission [1993] OJ L248/15

Council 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 [1998] OJ L204/37, as amended by Directive 98/48/EC [1998] OJ L217/18

Council Directive 98/84/EC of the European Parliament and of the Council of 20 November 1998 on the legal protection of services based on, or consisting of, conditional access [1998] OJ L320/54

EU Regulation

Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data [2016] OJ L119/1

National legislation

United Kingdom

Copyright, Designs and Patents Act 1988

Belgium

Belgian Code of Economic Law

France

French Intellectual Property Code

Loi No 2012-287 du 1er mars 2012, relative à l'exploitation numérique des livres indisponibles du XXème siècle' (Law No 2012-287 of 1 March 2012 on the digital exploitation of out-of-print 20th century books) (JORF No 53 of 2 March 2012, 3986)

Loi No 2015-195 du 20 février 2015, portant diverses dispositions d'adaptation au droit de l'Union européenne dans les domaines de la propriété littéraire et artistique et du patrimoine culturel (Law No 2015-195 of 20 February 2015 containing various provisions implementing EU law in the fields of literary and artistic property and cultural heritage) (JORF No 45 of 22 February 2015)

United States legislation

Digital Millennium Copyright Act 1998

1   Chapter 1 Introduction and research problem

1.1   Setting the scene: online infringement and enforcement

Copyright law incentivises the creation of creative material referred to as 'works and other subject matter'[1] (works), including music, images, audio-visual materials, recordings, software, for the benefit of society as a whole.[2] In theory, copyright encourages the expression of ideas and their dissemination.[3] To achieve this incentive function, copyright bestows on creators and other rightholders a bundle of economic rights.[4] Economic rights can be exclusionary in that the activities which fall under the scope of the rights require the consent of the owner.[5] Rightholders, such as those in the music and film industry, depend on the economic incentive provided by exclusive rights in order to continue and maintain the production of new creative works.[6]

On the internet, creative works are expressed in units of information, which can be infinitely copied. Technologies such as file-sharing, whereby information stored on users' computers can be made available and copied by other users almost instantaneously, work like a supercharged and unmetered photocopying and fax global machine.[7] When the information exchanged comprises protected works, file-sharing without rightholder consent infringes the exclusive rights of the owner. For example,

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[1] 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] OJ L167/10, Recital 12.

[2] The incentive function of copyright is rooted in the law and economics of copyright, which is dominated by the work of Landes and Posner who argue that '[s]triking the correct balance between access and incentives is the central problem in copyright law'. William M Landes and Richard A Posner, 'An Economic Analysis of Copyright Law' (1989) 18 J Legal Stud 325, 326; Lunney calls this the 'incentive access paradigm' GS Lunney, 'Reexamining Copyright's Incentives-Access Paradigm' (1996) 49(3) Vanderbilt Law Review 483.

[3] Ruth Towse, 'Copyright and Economic Incentives: An Application to Performers' Rights in the Music Industry' (1999) 52 Kyklos 369, 371. She also makes the point that this is an oversimplification based on the assumption that 'incentives to authors and publishers work harmoniously and somehow produce the socially desired outcome'.

[4] Moral rights are not harmonised but are also available for creators at national level. These are excluded from the scope of the thesis as explained in section 1.5

[5] Lionel Bently and Brad Sherman, *Intellectual Property Law* (3rd edn, Oxford University Press 2009) 135. Exceptionally, economic rights can also be remuneration rights where consent is not needed but owners have a right to equitable remuneration, see Byungil Kim, 'Distribution Among Right Holders' in Kung-Chung Liu and Reto M Hilty, *Remuneration of Copyright Owners: Regulatory Challenges of New Business Models* (EE 2017) 145c.

[6] InfoSoc Directive (n 1) Recital 4.

[7] Techopedia, 'File Sharing' <https://www.techopedia.com/definition/16256/file-sharing> accessed 30 March 2019.

the reproduction right granted in Article 2 InfoSoc Directive, which harmonises certain aspects of EU copyright. Article 2 is infringed via downloading and communication to the public in Article 3 InfoSoc Directive is infringed by uploading.[8]

Infringement of such rights reduces the incentives to invest in the creation and production of works.[9] Studies have traditionally shown the significant negative impact of online infringement by end user file-sharing on rightholders' revenues.[10] This is aggravated by the high number of infringing end users.[11] In addition to file-sharing, other technologies that infringe and incentivise end user infringement are becoming popular, such as TV set top boxes that enable streaming from illegal sources – a type of 'pirate Netflix'.[12] The situation is becoming more nuanced as in recent years the online copyright infringement landscape is evolving. A boon in content creation is

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[8] InfoSoc Directive (n 1).

[9] Recording Industry Association of America, 'The Scope of the Problem' (*RIAA*, 7 February 2015) <http://www.riaa.com/physicalpiracy.php?content_selector=piracy-online-scope-of-the-problem> accessed 31 March 2019. This point is contested in copyright literature on the lack of evidence between a potential reduction of incentives and the supply of digital content. Christian Handke, 'Digital Copying and the Supply of Sound Recordings' (2012) 24(1) Information Economics and Policy 15.

[10] In an econometric study based on actual sales of albums, Liebowitz finds that the impact of file-sharing has been significant on the record industry. See Stan J Liebowitz, 'Testing File-Sharing's Impact by Examining Record Sales in Cities' (2006) 54(4) Management Science 852; Rob and Waldfogel find that file-sharing significantly reduces cinema attendance as well as DVD purchases and rentals, see Rafael Rob and Joel Waldfogel, 'Piracy on the Silver Screen' (2007) 55(3) Journal of Industrial Economics 379; Adermon and Liang find that 80% of the drop in music sales between 2000 and 2008 can be attributed to piracy, see Adrian Adermon and Che-Yuan Liang, 'Piracy and Music Sales: The Effects of an Anti-Piracy Law' (2014) 105(C) Journal of Economic Behavior and Organization 90. However, these results can be contrasted with studies that find the limited impact of end user infringement on legal sales, for example, Oberholzer-Gee and Strumpf's study based on observations of actual file-sharing behaviour of a large population finds that file-sharing has only limited impact on record sales, see Felix Oberholzer-Gee and Koleman Strumpf, 'The Effect of File Sharing on Record Sales: An Empirical Analysis' (2007) 115 Journal of Political Economy 1; Andersen and Frenz's study was based on survey data from Decima Research on the file-sharing and purchasing habits of over 2000 Canadians and found no negative effect of file-sharing on CD sales, see Birgitte Andersen and Marion Frenz, 'Don't Blame the P2P File-sharers: The Impact of Free Music Downloads on the Purchase of Music CDs in Canada' (2010) 20(5) Journal of Evolutionary Economics 715.

[11] One study found that 40% of the Dutch population with internet access downloaded music at least once a year, followed by films at 13% and games at 9%. This amounts to 4.3 million music sharers, 1.4 million film sharers and 1 million game downloaders. Annelies Huygen and others, 'Ups and Downs; Economic and Cultural Effects of File Sharing on Music, Film and Games' (TNO Information and Communication Technology Series 3, 18 February 2009); The Netnames report found that the worldwide total of unique visitors to infringing sites in November 2011 was 417.8 million, which amounts to 29.04% of total internet audience content', David Price, 'NetNames Piracy Analysis: Sizing the Piracy Universe' (*NetNames*, September 2013) 10 Appendix B <https://illusionofmore.com/wp-content/uploads/2013/09/NetNames-Sizing_Piracy_Universe-Report-2.5.pdf> accessed 21 September 2015.

[12] Joost Poort and others, 'Global Online Piracy Study' (Amsterdam Law School Research Paper No 2018-21) 19.

generated by the advent of streaming services such as Netflix that produce own content and enable affordable access to vast catalogues of existing popular content. Overall, the perception is that streaming technologies in the context of legal services reduce the incentive to infringe.[13] So, although online infringement is still representing a problem, its negative effects upon the content industry may be to an extent offset by the arrival of innovative streaming business models.

Technology also does the heavy lifting in the context of responses to the infringement problem. In the EU and elsewhere, the practical implementation of enforcement-based responses to infringement based on both regulatory and private initiatives require technical tools.[14] On the regulatory side, the European Commission states that '[r]ights that cannot be effectively enforced have little economic value'.[15] To address this, the legal framework in the *acquis communautaire* provides a combination of vertical and horizontal enforcement measures. A vertical measure is the protection against circumvention of technological protection measures (TPMs) in Article 6 of the InfoSoc Directive. TPMs are software that provide copy and access controls applied to a work to enable a technical enforcement of exclusive rights.[16] For example, Apple Fair Play stops users from making copies of content that is downloaded from the Apple Store.

Horizontally, the Enforcement Directive,[17] which applies to all intellectual property rights (IPRs), provides a series of remedies for rightholders, including provisional and

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[13] Ibid 23.

[14] Regarding technical tools applied privately, Google's Content ID is a database that filters users' uploads on YouTube for infringing content. YouTube, 'How Content ID Works' <https://support.google.com/youtube/answer/2797370?hl=en> accessed 17 March 2018.

[15] European Commission, 'Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards a Modern, More European Copyright Framework' COM (2015) 626 final, 10.

[16] For an overview of TPMs, see Eric Schlachter, 'The Intellectual Property Renaissance in Cyberspace: Why Copyright Law Could Be Unimportant on the Internet' (1997) 12(1) Berkeley Tech Law J 15, 39-42.

[17] Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights ('Corrigendum to') [2004] OJ L195/16.

permanent injunctions,[18] legal proceedings and damages,[19] and right to information.[20] In this context, the implementation of injunctions to stop copyright infringement, for example, requires the use of technical measures to block end user access to illegal websites. Technology enables internet service providers (ISPs) to block or unblock infringing IP addresses for certain periods of time and sometimes automatically.[21] Other intermediaries provide on their own account technical solutions to copyright owners to protect their content from digital copyright infringement. For instance, Google provides copyright owners with the option to submit their works onto the Content ID database. This system filters users' uploads on YouTube for infringing content. [22] The Content ID software is succesfull in identifying and removing suspected infringing content found on the YouTube platform.[23] As such, Content ID is considered the contender to become an industry standard for the implementation of the filtering obligations in Article 17(4)(b) and (c) (former known as Article 13) of the New Copyright Directive.[24]

Technology also underpins market solutions to end user infringement by providing an appealing legal offering. The availability of licenced content complements enforcement and focuses on the development of new content business models to 'make consumers turn their back to illegal sources'.[25] The connection between the availability of licensed content as a countermeasure for online infringement was made in the preparatory work of the Collective Rights Management (CRM) Directive[26]

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[18] For permanent injunctions, see first sentence of Article 11 Enforcement Directive; for provisional injunctions, see sentence three of Article 11 Enforcement Directive; Article 8(3) InfoSoc Directive (n 1); Recital 45 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 (E-Commerce Directive) [2000] OJ L178/1.

[19] Enforcement Directive (n 16) art 13.

[20] ibid art 8.

[21] *FAPL v BT* [2017] EWHC 480, para 24 i) and ii).

[22] YouTube (n 13).

[23] Lauren D. Shinn, 'Youtube's Content ID as a Case Study of Private Copyright Enforcement Systems' (2015) 43 AIPLA Q. J. 359, 375.

[24] Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC, OJ L 130. Gian Volpiceli, 'Don't believe the hype: Article 13 is great news for YouTube' (*Wired*, 28 March 2019) < https://www.wired.co.uk/article/article-13-youtube-what-next> accessed 01 September 2019.

[25] Joost Poort and Jarst Weda, 'Elvis is Returning to the Building: Understanding a Decline in Unauthorized File Sharing' (2015) 28(2) Journal of Media Economics 68, 81.

[26] Directive 2014/26/EU of the European Parliament and of the Council of 26 February 2014 on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market [2014] OJ L84/72.

which modernised collective rights management in the EU.[27] One emerging model which is linked with reductions in end user infringement are content streaming subscription services. As stated by the IPFI, '[s]treaming services have also, along with copyright enforcement strategies, helped migrate consumers to licensed services by offering a convenient alternative to piracy'.[28] This is supported by empirical evidence which supports the negative effects of legal streaming services on illegal consumption by end users.[29]

Technology plays an important role, by creating the digital walls of licensed content business models. TPMs and rights management information (RMI) are technologies that confirm the authenticity of a work or track its use. RMIs generate what is known as digital rights management (DRM). These can be stacked to form the technical carcass of online business models involved in the legal distribution of works. TPMs and RMIs can be intertwined to create a secure distribution system for content.[30]

An alternative perspective on licensing and end user infringement is the provision of an end user non-commercial and non-exclusive licence that covers their peer-2-peer file-sharing in the private sphere.[31] The idea has been advanced in a number of policy proposals.[32] Payment of the licence signifies that internet users are not liable for the file-sharing they engage in online. The concept works on the presumption that enforcement efforts against acts that take place in users' homes is difficult and

[27] European Parliament, 'Draft European Parliament Legislative Resolution on the proposal for a directive of the European Parliament and of the Council on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online uses in the internal market (COM(2012)0372 – C7-0183/2012 – 2012/0180(COD))' (29 June 2018) A80245/2018, 27, Recital 24.
[28] See, IPFI, 'Digital Music Report 2015: Charting the Path to Sustainable Growth' (*IPFI*, 2015) 15 <http://www.ifpi.org/downloads/Digital-Music-Report-2015.pdf> accessed 15 September 2015.
[29] Poort and Weda (n 22) 81.
[30] Stefan Bechtold, 'From Copyright to Information Law – Implications of Digital Rights Management' [2002] Security and Privacy in Digital Rights Management 213, 215.
[31] Volker Ralf Grassmuck, 'A Copyright Exception for Monetizing File-Sharing: A Proposal for Balancing User Freedom and Author Remuneration in the Brazilian Copyright Law Reform' (18 January 2010) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1852463> accessed 28 February 2018.
[32] For example, Benoît Hellings and Freya Piryns, 'Proposition de Loi Visant à Adapter la Perception du Droit d'Auteur à l'Evolution Technologique tout en Préservant le Droit à la Vie Privée des Usagers d'Internet' (Senat de Belgique, Session de 2009-2010, January 2010) <http://desguin.net/spip/spip.php?article191> accessed 26 March 2019; Vgrass, 'Compartilhamento Legal! - Brazil is Putting an End to the "War on Sharing" at R$ 3,00 Per Month' <https://www.vgrass.de/?p=382> accessed 27 March 2019.

intrusive. Furthermore, the licence works in the interest of both parties – end users benefit from maximum access and rightholders can make a profit from activities that would otherwise amount to infringement. The implementation of such a licence requires technical support, for example, to help calculate end user consumption levels.[33]

Yet, the use of technology in response to online infringement is not without criticism. One such argument signals the potential encroachment on end user fundamental rights, for example, when TPMs are applied overzealously and stop lawful uses.[34] Furthermore, when the tracking of user consumption is involved, the privacy of users may be infringed.[35] Another important criticism is that technology has limited effectiveness.[36] Technology is circumventable; the impact is limited to the period it takes infringers to work around it.[37] Amid this technical cat-and-mouse game, new technology is piquing the curiosity of stakeholders and academics.[38]

1.2   Blockchain technology: the new kid on the block – the essentials notions and relevant distinctions

Before explaining the debates over the role of blockchain in copyright, an explanation of blockchain technology is in order.

A blockchain is an append-only peer-2-peer database which enables trust parties who are anonymous or have conflicting interests to agree over the integrity of the information recorded on the blockchain. To achieve this functionality, blockchain layers different technologies: the shared distributed architecture layer, ie the peer-2-peer database, an encryption layer and a 'consensus mechanism'. The consensus

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[33] Grassmuck (n 30) 11-12.

[34] Kamiel J Koelman, 'A Hard Nut to Crack: The Protection of Technological Measures' (2000) 22(6) EIPR 272, 288.

[35] With examples, Pamela Samuelson and Jason Schultz, 'Should Copyright Owners Have to Give Notice of their Use of Technical Protection Measures' (2007) 6 J Telecomm & High Tech L 41, 50-51.

[36] Poort and others (n 12) 8.

[37] 'The possibility of circumvention, which always exists due to the technical conditions of the Internet does not contradict the reasonableness of a blocking.' *Storerhaftung des Access-Providers* BGH (26 November 2015) I ZR 174/14.

[38] For example, the Blockchain & Society Policy Research Lab is dedicated to research related to blockchain, including copyright <https://blockchain-society.science/> accessed 29 March 2019.

mechanism is an algorithm that validates the transactions between the parties. The consensus mechanism removes the need for central oversight as the transaction is verified algorithmically in the peer-2-peer network. The database is broadcast globally, stored on the computers of the participant(nodes), and is synchronised incrementally and in real time so that everyone has the same copy (state).[39]

The name blockchain describes the manner in which data validated by the consensus mechanism is stored on the system. A blockchain consists of a series of chronologically linked blocks which contain a very precise collection of transaction records. A transaction represents an action taken by a blockchain user in data format. Blocks are a collection of transaction data. As Cachin and Vukolić state, '[e]ach block contains a cryptographic hash [hashing is analogous to a barcode as it compresses data into a set of letters and numbers[40]] of the previous block, which fixes all existing blocks and embeds a secure representation of the complete chain history into every block'[41]. This data structure is useful because it arranges data in a change sensitive manner to make it visible if the record has been tampered with.[42] If a transaction is tampered with, the hash of the block changes, and so does the hash of the subsequent blocks, which makes it possible to reveal malicious activity.[43] Each block supports approximately 1 MB of data. The blockchain is a continuously growing system as blocks are added on a continuous basis. In theory, blockchains can record almost any type of data that may be expressed in a computer readable manner.

The main application of blockchains is cryptocurrency, a form of digital currency that can be generated and managed via blockchains. The original cryptocurrency is Bitcoin

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[39] Kaiwen Zhang and Hans-Arno Jacobsen, 'Towards Dependable, Scalable, and Pervasive Distributed Ledgers with Blockchains' (IEEE 38th International Conference on Distributed Computing Systems, 2018) 1341.

[40] Hashing 'transforms'/codifies data of various sizes into a specific size output row (usually aprox 64 bitz). There are various ways of building hash functions, such as Merkle-Damgård construction or sponge construction. For an in-depth review of hash functions, see Abdulaziz Ali Alkandari, Imad Fakhri Al-shaikhli and Mohammad A Alahmad, 'Cryptographic Hash Function: A High Level View' (International Conference on Informatics and Creative Multimedia, 2013) 128.

[41] Christian Cachin and Marko Vukolić, 'Blockchain Consensus Protocols in the Wild' (2017) 1:3 <http://drops.dagstuhl.de/opus/volltexte/2017/8016/pdf/LIPIcs-DISC-2017-1.pdf> accessed 27 March 2019.

[42] Daniel Drescher, *Blockchain Basics, A Non-Technical Introduction in 25 Steps* (Apress 2017) 34, in further detail 108-122; Cachin and Vukolic (n 38).

[43] Haseeb Rabani, 'What is Hashing & Digital Signature in The Blockchain?' (*BlockGeeks*, 10 December 2017) <https://blockgeeks.com/what-is-hashing-digital-signature-in-the-blockchain/> accessed 18 March 2018.

which is a technical breakthrough because it makes 'digital cash' viable for the first time without the need of a central intermediary to oversee transactions via a quasi-anonymous peer-2-peer payment system. Before Bitcoin, all digital cash systems failed because of a problem known as 'double spending' which refers to the spending of the same funds twice.[44] The double spending problem bears similarities to the online copyright infringement problem: 'digital currency tokens can be easily copied and double spent if security mechanisms are not correctly applied'.[45] Blockchain architecture and its algorithm solves the problem as the movement of each cryptocurrency token in the peer-2-peer network is recorded.

While Bitcoin's functionality is limited to cryptocurrency transactions, newer blockchains have expanded the type of functions which can be executed on the blockchain. This can be achieved via smart contracts which are mini-computer programs that automatically enforce agreements.[46] For example, the Ethereum blockchain, in addition to cryptocurrency (Ether), runs code written in the Solidity computer language (which is similar to Java Script).[47] With Solidity, smart contracts may be written. Various assets can be represented in a smart contract and tracked on a blockchain such as other cryptocurrencies, securities, certificates, notary documents, as well as copyright works.[48] Smart contract tokens may also be used to deploy initial coin offering– a form of crowdfunding.[49] The process of representing value in a smart contract is known as tokenisation, whereby smart contracts enable tokens to be easily recognized and understood in the Ethereum ecosystem.[50] Tokens correlate the underlying asset with a blockchain-based token which can then be exchanged on the

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[44] Melanie Swan, *Blockchain: Blueprint for a New Economy* (O'Reilly 2015) 2.
[45] Cristina Pérez-Solà and others, 'Double-spending Prevention for Bitcoin Zero-confirmation Transactions' [2018] International Journal of Information Security 1, 1.
[46] Jake Goldenfein and Andrea Leiter, 'Legal Engineering on the Blockchain: "Smart Contracts" as Legal Conduct' (2018) 29 Law and Critique 142.
[47] The term 'smart contract' was invented by Nick Szabo in 1997. He envisaged smart contracts as a more functional language alternative to normal contractual relationships. Nick Szabo, 'Formalizing and Securing Relationships on Public Networks' (*First Monday*, 1997) <http://ojphi.org/ojs/index.php/fm/article/view/548> accessed 6 June 2018.
[48] Yan Chen, 'Blockchain Tokens and the Potential Democratization of Entrepreneurship and Innovation' (2018) 61(4) Business Horizons 567, 568.
[49] Jiasun Li and William Man, 'Initial Coin Offerings and Platform Building' (1 October 2018) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3088726> accessed 7 February 2019. Cryptocurrencies are used also as a speculative investment, which makes them volatile, Mathew Wall, 'Bitcoin Buster? The Search for a More Stable Cryptocurrency' (*BBC*, 21 August 2018)<https://www.bbc.co.uk/news/business-45245149> accessed 1 September 2018.
[50] ibid 569.

blockchain.[51] Many of the potentially copyright-relevant blockchain uses discussed in this thesis use Ethereum smart contracts.[52]

In addition to Bitcoin and Ethereum, there are many types of blockchain with different architectural styles, like the different types of engines in a car.[53] A relevant distinction can be made between public and permission-less and private and permissioned blockchains. Examples of public blockchains are Bitcoin and Ethereum.[54] Public and permission-less blockchains allow anyone to engage in transactions. The development and maintenance of the system is also done in an open manner as any developer can contribute via GitHub. Bitcoin or Ethereum development is then overseen by foundations that manage the blockchains.[55] Interestingly, public blockchains can be put to private business uses. For example, a private company can build services on top of the structure of a public blockchain, such as decentralised applications which are applications whose source code runs on top of a blockchain smart contract.[56]

A separate category of blockchains are private permissioned blockchains where participation is limited and conditioned. These blockchains are architecturally decentralised but politically centralized blockchains where companies harness the governance and technical aspects of public blockchains to intermediate new relationships between companies. For example, the R3 CORDA blockchain runs various banking applications. The latest is a know your customer app which reduces duplication on know your customer records between different banking institutions.[57] Another example is the Hyperledger-Fabric blockchain that provides companies access to blockchain technologies and tools which can be tailored to a specific

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[51] Jonathan Rohr and Aaron Wright, 'Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Markets' (University of Tennessee Legal Studies, Research Paper No 338) 13.

[52] For example, but not limited to, the ERC-721 CryptoKitties smart contract; the ERC-20 fungible cryptocurrency smart contract; and the ERC-1155 non-fungible token contract.

[53] Drescher (n 39) 16.

[54] Cachin and Vukolic (n 38) 2.

[55] The Bitcoin and Ehereum blockchains are maintained by foundations and promote and support the development of the blockchains. See the 'Ethereum Foundation' (*Ethhub*) <https://docs.ethhub.io/ethereum-basics/ethereum-foundation/> accessed 02 September 2019; 'Bitcoin Foundation/ About' (*Bitcoin Foundation*) < https://bitcoinfoundation.org/about/ > accessed 02 September 2019.

[56] See Chapter 5, Section 5.2.

[57] See R3 <https://www.r3.com/> accessed 31 March 2019.

company's needs.58 Private blockchains rely less on complex consensus mechanisms, which are important hallmarks of public blockchains like Bitcoin and Ethereum, given that in private and permissioned blockchains participation is controlled and users are known. Instead, private blockchains experiment with tailormade consensus mechanisms. In addition, transactions, or other data regarding transactions managed through private blockchains such as Hyperledger-Fabric, can be maintained private and accessed only by authorised parties.59 Publishers and collecting societies in Europe are working to develop a joint RMI system via the Hyperledger blockchain to improve royalty distribution.60

In spite of the innovation brought about by this technology, important reservations are geared towards blockchains in general and cryptocurrencies specifically. Some of the criticism will be outlined here. One line of argument advances that blockhains, outside the case of cryptocurrency, 'are a solution in search for a problem'61. While it is noticeable that the majority of blockchain based projects outside the major cryptocurrencies tend to have a short life expectancy, this may be symptomatic of the relative young age of the technology. Other objections have to do with the sustainability of public blockchains like Bitcoin and Ethereum. To produce cryptocurrency these blockchains take up large amounts of electricity.62 For example, Bitcoin servers are thought to consume the same amount of energy as Ireland.63 Furthermore, the electricity demands of Bitcoin increase yearly.64 This can be considered a limitation to the desirability of public blockchain use in general,

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58 However empirical research shows a degree of confusion regarding the implementation capacities of blockchains in real life situations. Advait Deshpande and others, 'Understanding the Landscape of Distributed Ledger Technologies/Blockchain Challenges, Opportunities, and the Prospects for Standards' (BSI, 2017) 13 <https://www.rand.org/content/dam/rand/pubs/research_reports/RR2200/RR2223/RAND_RR2223.pdf> accessed 1 December 2018.
59 Hyperledger, 'Private Data' (*Hyperledger-Fabric*) <https://hyperledger-fabric.readthedocs.io/en/release-1.4/private-data/private-data.html> accessed 31 March 2019.
60 Ian Allison, 'Major Music Rights Societies Join up for Blockchain Copyright Using IBM and Hyperledger' (*IBTimes*, 24 April 2017) <https://www.ibtimes.co.uk/major-music-rights-societies-join-blockchain-copyrights-using-ibm-hyperledger-1615942> accessed 3 June 2018.
61 Jason Bloomberg, 'Eight Reasons To Be Skeptical About Blockchain' (Forbes, 2017) <https://www.forbes.com/sites/jasonbloomberg/2017/05/31/eight-reasons-to-be-skeptical-about-blockchain/#1bdf5605eb19> accessed 02 August 2019;
62 'Why bitcoin uses so much energy' (*The Economist*, 2018) <https://www.economist.com/the-economist-explains/2018/07/09/why-bitcoin-uses-so-much-energy> accessed 02 August 2019
63 ibid
64 ibid

including copyright related uses. Private blockchains on the other hand are not electricity intensive. However, these are touted by skeptics as simply rebranded centralised databases.[65] This is because private blockchains do not achieve the same degree of descentralisation, as public ones as private blockchains are owned or controlled by a signle entity.[66] The blockchain name is simply retained as a marketing tool. Finally, cryptocuurency itself raises many objections, ranging from thir's libertarian original raison d'etre of to cryptocurrencies vulnerability to attacks.[67] Indeed the vulnerability of cryptocurrencies is likely to increase should quantum computing take off commercially. This is because quantum computing resolves quicly and more efficiently exsisting puzzles.[68] Given that consensus mechanisms consist of mathematical puzzles, with the advanced power of quantum computing, consensus mechanisms may become corrupted.[69] This thesis acknowledges these concers and potential limitations and takes a neutral stance towards blockchain technology and crypocurrency.

1.3 Blockchain and end user copyright infringement

The advent of blockchain technology has left commentators intrigued over its potential application in relation to copyright.[70] In this context, a debate is starting over blockchain technology and copyright infringement. Perceptions are contrasting: blockchain is seen as an enforcer, a licensing tool and an enabler of infringement. Under one hypothesis, blockchain is a means for technical copyright protection: via 'a blockchain, content owners have full control and visibility of the consumption and number of uses of individual songs and/or movies. Therefore, piracy and copyright

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[65] Andres Guadamuz, 'Is the blockchain hype over?' (*Technollama*, 2018) <https://www.technollama.co.uk/is-the-blockchain-hype-over> accessed 02 August 2019
[66] ibid
[67] Jose Antonio Lanz, 'Crypto industry is already preparing for Google's "quantum supremacy"' (*Decrypt*, 27 September 2019) < https://decrypt.co/9745/crypto-industry-already-preparing-for-google-quantum-supremacy> accessed 28 September 2019.
[68] Eleanor G. Rieffel, Wolfgang H. Polak, William Gropp, and Ewing Lusk, *Quantum Computing : A Gentle Introduction* (MIT, 2011) 3.
[69] Andres Guadamuz, 'All watched over by machines of loving grace: A critical look at smart contracts' (2019) Computer Law & Security Report (forthcoming).
[70] Birgit Clark, 'Blockchain and IP Law: A Match Made in Crypto Heaven?' (2018) 1 WIPO Magazine <https://www.wipo.int/wipo_magazine/en/2018/01/article_0005.html> accessed 31 March 2019.

infringements are nearly impossible'.[71] In essence, the system described is a blockchain-based DRM. In contrast, another view dismisses the potential for technical enforcement of copyright via blockchain and focuses on its potential use for copyright licensing.[72]

Another hypothesis considers blockchain as a more balanced model than existing content distribution alternatives. Boucher et al argue that 'no distribution model, until perhaps blockchain, has managed to respond effectively to the realities of the illegal trade in digital content in the internet age, while balancing the interests of the original author, the customer and the various intermediaries'.[73]

Nevertheless, blockchain technology can be a double-edged sword. An expectation exists that blockchain smart contracts could be applied to facilitate end user infringement.[74] One view foresees the dawn of 'autonomous' software launched on the blockchain which enables users to exchange works.[75] The 'autonomous' nature of the set-up has implications regarding liability as it is expected that the software will be controlled by no one just like, for example, Bitcoin runs cryptocurrency without the need of central control: '[o]nce software programmers have a network like Ethereum to upload their programs to, there will be no one left upon which to pin the liability'.[76] In a similar manner, another view envisages the exchange of infringing works with the help of blockchain by tokenising works on the system, ie digitally representing a copy of a work on a smart contract.[77]

This thesis addresses this debate by analysing the application of blockchain technology in the context of end user infringement. The overarching theme that

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[71] Monitor Deloitte, 'Blockchain @ Media: A New Game Changer for the Media Industry?' (Monitor Deloitte and Blockchain Institute, 2017) 16 <https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/technology-media-telecommunications/deloitte-PoV-blockchain-media.pdf> accessed 21 January 2018.
[72] Balázs Bodó, Daniel Gervais and João Pedro Quintais, 'Blockchain and Smart Contracts: The Missing Link in Copyright Licensing?' (2018) 26 IJLIT 311, 328.
[73] Philip Boucher, Susana Nascimento and Mihalis Kritikos, 'How Blockchain Technology could Change our Lives, In-depth Analysis' (European Parliament Research Service, February 2017) 8.
[74] Michèle Finck and Valentina Moscon, 'Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0' (2019) 50(1) IIC 77, 98; Vogel (n 2) 147.
[75] ibid Vogel 147.
[76] ibid.
[77] See Chapter 5.

connects the research questions is the duality in blockchain usage in the area of online copyright infringement by end users.

The main research question is: **What are the specific blockchain uses that support solutions to online infringement and what blockchain uses promote infringement?**

The first of the sub-questions is: a) How can blockchain technology be applied as a technical protection measure and what are the effects on the interests of rightholders and end users? This invites an examination over the manner in which blockchain enables technological enforcement solutions to end user infringement and their effect on stakeholder interests. The impact of such an application of blockchain technology needs to be addressed also from the perspective of the user because past experience regarding the application of technology as an enforcer may have negative effects on lawful uses.

As technology need not be used only to enforce but also to implement licences and legal structures for content delivery, the next sub-question addresses the various ways in which blockchain technology may lend a helping hand to the provision of licensed content: b) How can blockchain contribute to the technical implementation of licensing solutions that transform end user infringers into paying customers?

To address the enabling effect of blockchain on end user infringement requires the identification and evaluation of blockchain applications that may facilitate end user infringement. This is done by reviewing the status quo of blockchain technology application which may be seen to incentivise end user infringement. Therefore, a third sub-question is necessary: c) How can blockchain technology enable infringement by end users? Since the autonomous functioning of the technology may obscure the application of liability, a final sub-question needs to be asked: d) Who is liable when blockchain technology facilitates end user infringement?

1.4   Overview of the thesis

Chapter 2 analyses the application of blockchain technology as a technical protection measure (TPM) which are software that protect works via encryption and the consequences of such use for rightholders and end users. The chapter first explains the rationale for the use of technical measures with reference to the preparatory work for the InfoSoc Directive and the debates surrounding the introduction of anti-circumvention legislation in Europe. The chapter sets blockchain technology against Article 6 of the InfoSoc Directive which provides for protection against the circumvention of effective protection measures. The chapter shows that aspects of blockchain technology may be applied in the same way as existing TPMs. In addition, blockchain may lead to the emergence of new forms of TPMs. One avenue is the use of blockchain micropayments and their application as an access control to individual works on the internet. Another avenue explores the emergence and application of Ethereum smart contracts in the emerging collectible games market and the potential extension of their application to the protection of broader categories of works.

The second part of the chapter focuses on the consequences of treating blockchain technology as a TPM according to the definition in Article 6(3) Infosoc Directive from the perspective of end user interests. Specifically, it focuses on the public interest and the manner in which blockchain as a TPM may have a negative effect on access to content in the public domain and availability of exceptions and limitations (E&Ls).

Chapter 3 continues the enquiry into the technical application of blockchain as a solution to end user infringement by exploring the manner in which blockchain may be used to innovate aspects of legal content licencing. This aims to contribute and enrich the legal marketplace. The first part of the chapter analyses a number of novel proposals which may be applicable at the various levels of creative content supply chain: blockchain solutions that apply at CMO level, such as the creation of a unified RMI database for royalty distribution, new smart contract payment and direct content distribution channels. It argues that the innovation brought about by blockchain technology has the potential to bring added value to the marketplace, yet it is still unclear which projects will be successful in the marketplace.

The second part of the chapter narrows down the discussion to a business model that advertises blockchain as part of a broader licensing and enforcement effort in photography rights. The proposal is one of the most pre-eminent and publicised uses of blockchain in the area as it is implemented by respected players such as Kodak. The chapter shows that the application of blockchain technology in this case is symbolic and may lead to a potential repackaging of an existing and potentially controversial business model in copyright licensing and enforcement.

Chapter 4 takes the licensing thread further to examine the conceptual application of blockchain technology in the management of existing private, non-exclusive and non-commercial legalisation proposals for end user file-sharing. The chapter, for the first time in copyright literature, makes the connection between blockchain technology and end user peer-2-peer legalisation. It does so by advancing two unconventional uses of blockchain. The first part of the chapter advances a private blockchain use as a distributed record of end user peer-2-peer consumption accessible by CMOs or other institutions. The purpose of blockchain here is to inform the distribution of revenues to the relevant rightholders in a legalisation scheme. Naturally, the chapter matches this use of blockchain with the various possible licensing configurations.

The second part of the chapter focuses on blockchain's cryptocurrency angle to outline an alternative payment scheme for end users for file-sharing in the context of a peer-2-peer legalisation scheme. In this situation, end users are envisaged to pool idle computer resources and mine cryptocurrency on behalf of rightholders. The chapter uses the Monero coin as a test case as Monero is one of the cryptocurrencies that can be mined with a PC. The chapter shows that the proposal may be financially viable. However, there are barriers to its adoption. Internet user willingness to participate may be a concern. Also, given the specialist and volatile nature of cryptocurrencies, CMOs trusted with revenue distribution may be apprehensive about engaging with such a payment system.

Chapter 5 continues the peer-2-peer and cryptocurrency thread to examine the other side of the debate – the manner in which blockchain may be used to facilitate infringement of copyright. The chapter examines selection of blockchain use models for this chapter was straightforward as the only current and workable blockchain use

that can incentivise end user infringement comes in the form of dApps. In this case, dApps are decentralised applications that run on a blockchain which uses cryptocurrency micropayments to incentivise file-sharing. In essence dApps may be seen as newer versions of torrent clients. The review of the status quo shows that dApps incentivise infringement to various degrees, with some clearly set for infringement purposes, while others are experimenting with new models of content distribution and taking steps to limit the availability of illegal content on the network (but may still be infringing).

After reviewing the various models of dApps that may be seen to incentivise end user infringement, the chapter sets the dApps against the test for copyright infringement facilitation developed in recent CJEU jurisprudence in the context of Article 3(1) InfoSoc Directive. The purpose of the enquiry is to see if the existing doctrine of liability can be applied to such novel services. When the dApp facilitated mixed-infringing and non-infringing- use, the chapter tested the application of exemption liability in Article 14 of the E-Commerce Directive[78] and Article 17 of the proposed Copyright Directive[79]. Finally, the liability of end users for using such services is considered.

The thesis is original as it weaves for the first time in a substantive manner blockchain technology into the narrative of online copyright enforcement. The work enables the discovery of new facts, for example, it engages with some new forms of blockchains services previously never analysed in copyright literature such as, but not limited to, Cryptokitties in Chapter 2 and YouTube alternatives like Lbry in Chapter 5. In addition, the thesis shows throughout the exercise of independent thinking. For example, Chapter 3 makes for the first time the connection and analyses the similarity between the business model of blockchain image licencing services and the 'speculative invoicing model' which longstanding in copyright. Then, Chapter 4 uncovers new ways of approaching the old issue of Peer-2-Peer legalisation as it

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[78] E-Commerce Directive (n 17).
[79] European Commission, 'Proposal for a Directive of the European Parliament and of the Council on Copyright in the Digital Single Market' COM (2016) 593 final, art 13. Currently, Article 13 has moved to Article 17. European Parliament, 'Amendments by the European Parliament to the Commission Proposal' (A8-0245/271, 20 March 2019) <http://www.europarl.europa.eu/doceo/document/A-8-2018-0245-AM-271-271_EN.pdf> accessed 29 March 2019.

advances in that context two completely new potential uses of blockchain technology to advance the discussion on the filesharing levy. Finally, Chapter 5 analyses for the first time and in detail the manner in which the liability of operators of services (dApps) that use blockchain to incentivise infringement by end users may be worked out. Taken these aspects together, the thesis enages with blockchain and copyright infringement by end users in a thorough and out of the box manner.

1.5   Methodology and scope of research

To answer the questions it poses, the thesis groups blockchain application in four vertical interlinked categories. The categories are bundled according to themes related to copyright infringement by end users. The thesis covers aspects related to the application of blockchain as a TPM in the enforcement of rights and licensing of content as well as a tool to facilitate end user infringement. Any discussion on developers of blockchain technology that facilitates infringement is done with consideration of the effect of that technology on user infringement.

The discussed blockchain applications are selected according to certain criteria. One criterion is that blockchain uses selected for review are either in beta stage or fully operational. Another criterion is to select projects advanced by reputable providers, such as collecting societies and known companies. This is to ensure the durability of the research as the more respectable providers are more likely to deliver on their promise. This is supplemented by proposals advanced in the available literature. Finally, in Chapter 4 the author proposes her own conceptual use of blockchain.

The thesis approaches blockchain not as a stand-alone technology but one that is in fact layered with other technologies. It is advanced that 'it is still economically and efficiency impossible to use smart contract-enabled blockchains, like Ethereum, as the only logic layer'.[80] In addition, the thesis splits blockchain into its component parts, including the distributed ledgers, consensus mechanisms, wallets, cryptographical

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[80] Bokang Jia, Chenhao Xu and Mateusz Mach, 'Opus, Decentralized Music Distribution Using InterPlanetary File Systems (IPFS) on the Blockchain' (*Opus*, 2018) 11 <https://opus.audio/whitepaper.pdf> accessed 09 February 2018.

aspects, etc. This is to ensure the maximum spread of the research over blockchain uses.

The thesis employs doctrinal legal analysis which is informed by elements of computer science and economics. The geographical scope of the research is the EU copyright *acquis communautaire*.[81] EU copyright *acquis* includes primary and secondary legislation and CJEU case law.[82] The legal sources used in this thesis consist of secondary legislation, case law and legal literature in the field of copyright.

By the notion of end user infringement, the thesis envisages the making of reproductions. The reproduction right is introduced by the InfoSoc Directive in Article 2 is tailored to cover most aspects of the new digital reproductions as it 'provides for the exclusive right to authorise or prohibit direct or indirect, temporary or permanent reproduction in any means and in any form, in whole or in part'. As stated in the 1997 Green Paper, direct reproduction means 'reproducing a work or other protected subject matter directly onto the same or a different medium'.[83] Regarding reproduction, the acts covered are downloading from unlawful sources[84] and streaming from unlawful sources[85].

End user infringement also covers the right of communication to the public. Article 3(1) of InfoSoc Directive provides that:

> Member states shall provide authors with the exclusive right to authorise or prohibit any communication to the public of their works, by wire or wireless means, including the making available to the public of their works in such a way that members of the public may access them from a place and at a time individually chosen by them.

End users infringe the communication to the public right when a hyperlink circumvents access restrictions to content made available online with consent,[86] when they hyperlink to illegal content knowingly or for profit;[87] when they reupload without

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[81] The EU copyright *acquis* includes primary and secondary legislation, CJEU case law. See generally, EurLex, 'Acquis' <https://eur-lex.europa.eu/summary/glossary/acquis.html> accessed 3 February 2019.

[82] ibid.

[83] European Commission, 'Green Paper on Copyright and the Challenge of Technology' COM (88) 172 final 24.

[84] Case 435/12 *ACI Adam and others* EU:C:2014:254, para 58.

[85] Case 527/15 *Stichting Brein v Wullems (t/a Filmspeler)* EU:C:2017:300, [2017] 3 CMLR 30, para 69.

[86] Case 466/12 *Svensson v Retriever Sverige AB* EU:C:2014:76, paras 27 and 31.

[87] Case 160/15 *GS Media* EU:C:2016:644, paras 49 and 51.

consent a work available online freely and for free with rightholder permission;[88] and when they upload torrent files on a torrent index site.[89] End users refer to natural persons. The thesis discusses both commercial and non-commercial infringement by end users.

The thesis does not elaborate on specific legal issues raised by reproductions done by internet users that alter the 'composition or form of expression of a work'.[90] This excludes considerations raised by transformative uses such as parodies or remixes. These invite discussions over the scope of the parody exception in the digital environment. Although interesting, such aspects are secondary to the problems raised by mass online use of works by end users.[91]

The application of moral rights is outside the scope of the thesis, which concerns the economic and harmonised rights of the rightholders. Moral rights are not harmonised at EU level and generate discrepancies in their application between *droit d'auteur* copyright traditions and common law. Furthermore, moral rights in the digital age are a vast field of study.[92]

Finally, the thesis does not discuss in any depth the application of data protection aspects to this scenario. The main reason for this is that the application of the General Data Protection Regulation (GDPR)[93] to blockchain technology is currently unclear and an area that is in itself under development. Although it is assumed that private blockchains have more chances of being GDPR-compliant than public ones, the details under which blockchains can be made compatible are not yet known.[94] The

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[88] Case 161/17 *Land Nordrhein-Westfalen v Renckhoff* EU:C:2018:634, para 47.
[89] Case 610/15 *Stichting Brein v Ziggo BV, XS4ALL Internet BV* (*TPB*) EU:C:2017:456.
[90] Bernt P Hugenholtz, 'Adapting Copyright to the Information Superhighway' in Bernt P Hugenholtz and Egbert Dommering (eds), *The Future of Copyright in a Digital Environment* (Kluwer Law International 1996) 87.
[91] Most recently, see Sabine Jacques, *The Parody Exception in Copyright Law* (Cambridge University Press 2019).
[92] Mira T Sundara Rajan, *Moral Rights: Principles, Practice and New Technology* (Oxford University Press 2011) 29.
[93] Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data [2016] OJ L119/1.
[94] Michèle Finck, 'Blockchains and Data Protection in the European Union' (Max Planck Institute for Innovation & Competition Research Paper No 18-01, 30 November 2017) 26.

application of GDPR-related issues to blockchain copyright application remains a future avenue for research, as discussed in the conclusion.

2 Chapter 2 The answer to the (old) machine is the (new) machine: blockchain technology as technical protection measures and their effects on rightsholders' and users' interests

2.1 Introduction

'The answer to the machine is the machine' refers to the application of technical protection measures (TPMs) in copyright infringement prevention.[1] TPMs refer to 'any technology, device or component that, in the normal course of its operation, is designed to prevent or restrict acts, in respect of works or other subject-matter, which are not authorised by the rightholder of any copyright or any right related to copyright'.[2] TPMs are software that are applied to protected works and provide solutions such as access control, restrictions on the making of copies or the number of copies which can be made from a master copy, and other usage restrictions or the safe transfer of a work in a network.[3] In principle, TPMs have the role of protecting works against acts not authorised by the rightholder.[4] As explained by Samuelson, such technologies are a mechanism for copyright enforcement.[5] In the copyright literature, TPMs are often covered by the term 'digital rights management systems' (DRMs), a non-official term which does not appear in the InfoSoc Directive, but which refers to the combination of TPMs and 'rights management information' (RMI).[6] In the

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[1] Dean S Marks and Bruce H Turnbull, 'Technical Protection Measures: The Intersection of Technology, Law and Commercial Licenses' (Workshop on Implementation Issues of the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty, Geneva, 6-7 December 1999) 3. The phrase was initially coined by Charles Clark, 'Answer to the Machine is the Machine' in P Bernt Hugenholtz, *The Future of Copyright in the Digital Environment* (Kluwer Law 1996) 139. However, it is advanced he used the phrase for the first time earlier, see Paul Goldstein, *Copyright's Highway* (Stanford University Press 2003) 184.

[2] 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] OJ L167/10, art 6(3).

[3] Giuseppe Mazziotti, *EU Digital Copyright Law and the End-User* (Springer 2008) 180. Moreover, Ottolia states that such technologies are designed to both protect and distribute creative content, see Andrea Ottolia, 'Preserving Users' Rights in DRM: Dealing with "Juridical Particularism" in the Information Society' (2004) 35 IIC 492; Dan L Burk and Julie E Cohen, 'Fair Use Infrastructure for Copyright Management Systems' (Georgetown Public Law Research Paper No 239731, 2010) 48.

[4] Infosoc Directive (n 2) art 6(3).

[5] Pamela Samuelson, 'DRM {and, or, vs.} the Law' (2003) 46(4) Communications of the ACM - Digital Rights Management 41.

[6] Mihaly Ficsor, 'Protection of "DRM" under the WIPO "Internet Treaties": Interpretation, Implementation and Application' in Irini A Stamatoudi (ed), *Copyright Enforcement and the Internet* (Kluwer Law International 2010) 299-300 for the point in the context of the WIPO 'Internet Treaties'. At an international level, the WCT provides for TPM provisions in Article 11, whilst the WPPT for related rights in Article 18. For the overlap in the context of blockchain and copyright, see Michèle

InfoSoc Directive, TPMs and RMI appear in distinct but adjacent provisions, where both technologies are protected against their circumvention.[7] This chapter maintains the separation between TPMs and RMI, only focusing on the TPMs aspect of DRMs, while Chapter 3 will incorporate the RMI aspects of blockchain. The rationale for this split is to ensure the discussion focuses on the enforcement aspects of blockchain in the form of TPMs. Therefore, any mention of DRMs in this chapter emphasises their TPM function. Yet a distinction between TPMs and RMI is not always possible when these are used in the same system. An example of overlap appears when RMI triggers TPMs. The removal of a digital watermark that carries the RMI of a work, including the number of copies allowed, will also trigger the TPM because removing the watermark also removes the copy-control.[8] In the presence of any such overlap, the chapter emphasises the TPM angle of the discussion even though RMI aspects may still be present.

This chapter addresses the application of blockchain technology as a TPM, which is an aspect that has already courted controversy. Commentators argue that blockchain in copyright is evolving towards fully automated digital governance to the extent that it 'may materialize itself as a utopia or a (crypto-)libertarian dream, but it might also

Finck and Valentina Moscon, 'Copyright Law on Blockchains: Between New Forms of Rights Administration and Digital Rights Management 2.0' (2019) 50(1) IIC 77, 80.

[7] In the InfoSoc Directive, TPMs appear in Article 6, whereas RMIs appear in Article 7. These apply to all works but computer programmes. In Europe, anti-circumvention provisions are available in other Directives related to copyright subject matter. Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs [Computer Programs Directive] [2009] OJ L111/16, art 7(1)(c) prohibits the 'putting into circulation or possession for commercial purposes of, any means the sole intended purpose of which is to facilitate the unauthorised removal or circumvention of any technical device which may have been applied to protect a computer program'. It appears that the 'sole intended purpose' makes Article 7(1)(c) narrower than Article 6 Infosoc Directive which applies to devices which may have other functionalities besides circumvention. The relationship between Article 7(1)(c) and Article 6 is 'unclear and often inconsistent'. Stefan Bechtold, 'Directive 2001/29/EC – On the Harmonization of Certain Aspects of Copyright and Related Rights in the Information Society (Information Society Directive)' in Thomas Dreier and Bernt P Hugenholtz (eds), *Concise European Copyright Law* (2nd edn, Kluwer Law International 2016) 384. To round up the provisions on anti-circumvention, Directive 98/84/EC of the European Parliament and of the Council of 20 November 1998 on the legal protection of services based on, or consisting of, conditional access [Conditional Access Directive] [1998] OJ L320/54 at Article 4 prohibits 'the manufacture, import, distribution, sale, rental or possession for commercial purposes of illicit devices' that give access to a protected service. This Directive, however, applies not only specifically to protectable subject matter but to a service which may be a TV broadcast, radio broadcast or internet service where access is conditioned upon authorisation (Article 2(a) and (b)). Article 4 of The Conditional Access Directive appears complementary to Article 6 InfoSoc Directive.

[8] Bechtold (n 7) 386.

lead to a dystopian society featuring a strong and decentralized panopticon'.[9] Although the technology remains largely untested, the argument relies on infallibility and irreversibility of blockchain technology. On this basis, some believe that, via 'a blockchain, content owners have full control and visibility of the consumption and number of uses of individual songs and/or movies. Therefore piracy and copyright infringements are nearly impossible.'[10] Similarly, another view is that 'illegal copying of digital music files can be stopped altogether because everything is recorded in a transparent manner on the blockchain. Under this view, blockchain may be seen to render perfect control over the use of works.'[11]

Such arguments over blockchain as TPMs are perceived to have the cache of 'old wine in new bottles' in that, 'a decade ago, in the DRM discussion, new technology was wrongly presented as an efficient enforcement tool: the answer to the machine was in the machine. This time, technology is presented not as the enforcer but rather as possible replacement for copyright.'[12] In view of these, other questions should be asked in relation to the role of blockchain in copyright.[13]

At the opposite end of the spectrum, others underline the limitations of blockchain TPMs since these cannot:

> … prevent anyone from recording the actual sound data coming out from a speaker (or, more likely, the digital sound data itself) and saving it to an unrestricted format. Or rather, the only way to do so would involve total and complete access to every computer system on the planet for a third party, which seems unlikely to be acceptable.[14]

In this chapter it is argued that blockchain technology may contribute in the technical enforcement of copyright. As it will be shown, blockchain technology may add new

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[9] Primavera de Filippi and Samer Hassan, 'Blockchain Technology as a Regulatory Technology: From Code is Law to Law is Code' (2016) 21(12) First Monday <https://firstmonday.org/article/view/7113/5657> accessed 9 February 2018.
[10] Monitor Deloitte, 'Blockchain @ Media: A New Game Changer for the Media Industry?' (Monitor Deloitte and Blockchain Institute, 2017) 16 <https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/technology-media-telecommunications/deloitte-PoV-blockchain-media.pdf> accessed 21 January 2018.
[11] Imran Bashir, *Mastering Blockchain - Second Edition: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained* (2nd edn, Packt 2018) 559.
[12] Balázs Bodó, Daniel Gervais and João Pedro Quintais, 'Blockchain and Smart Contracts: The Missing Link in Copyright Licensing?' (2018) 26 IJLIT 311, 335.
[13] ibid 313, the discussion largely envisages the role of blockchain in licensing via smart contracts.
[14] Petter Ericson and others, '#MTFLabs: Blockchain' (MTFLabs Berlin, Version 1.0, 23 August 2016) 7-8 <https://musictechfest.net/wp-content/uploads/2016/08/Blockchain-Whitepaper.pdf> accessed 21 January 2018.

features to existing TPM methods, provide alternatives to these or generate new forms of TPMs. This chapter is informed by the manner in which blockchain technology is currently being applied in the emerging or proposed projects. The chapter addresses the research questions by analysing the various modalities in which blockchains can be worked into copyright's technical enforcement. In analysing the blockchain uses that may be considered a TPM, these are compared with existing TPMs for any benefits or indeed disadvantages. This is informative as it may determine the medium-term incentives to adopt the technology. The chapter seeks to dispel the myths surrounding blockchain technology as a 'super TPM' and provide a more nuanced view of the status quo. In this way the chapter explores the manner in which blockchain may interfere with the public domain and existing exceptions and limitations (E&Ls) that reflect users' fundamental rights and are reflected in the idea of public interest.

The chapter begins by outlining the historical reasons for technological enforcement in the InfoSoc Directive. This is followed by an outline of the debates generated by the introduction of the technical protection and anti-circumvention provisions in the InfoSoc Directive. The discussion further narrows down to the application of Article 6 InfoSoc Directive to blockchain technologies to explore how it may manifest as a TPM, the specific issues raised by blockchain TPMs and the impact these may have in protecting exclusive rights. To maintain the balance of the discussion, the final part of the chapter addresses the relationship between blockchain TPMs, the interests of users and the legal framework.

2.2 The historical purpose of TPMs in the eyes of the EU legislator

The practice of technological application for the purpose of copyright enforcement dates back to the 1950s.[15] However, it was not until the late 1980s-early 1990s that the role of TPMs in copyright enforcement was entertained internationally and at EU level as a response to advancements in technology which enabled the copying or transmission of works.[16] Technical solutions began their life in EU copyright policy

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[15] Stefan Bechtold, 'Digital Rights Management in the United States and Europe' (2004) 52(2) The American Journal of Comparative Law 323, fn 9.

[16] At an international level, the discussion on TPMs started in the late 1980s during negotiations for the Internet Copyright Treaties. See Sam Ricketson and Jane C Ginsburg, *International Copyright and Neighbouring Rights* (Oxford University Press 2005) 976. At an EU level, see the European

as an additional solution to private copying done by users in light of the emerging digital copying possibilities. As presented by the Commission in the 1988 Green Paper, technical solutions could allow rightholders to set a limit on the number of copies made by a user from a lawfully purchased 'master' copy of the work; enable the rightholder to control 'which sources could be copied' (suggesting that private copies would not be allowed from all sources);[17] and generally allow rightholders 'a measure of control' over unauthorised reproductions whilst allowing consumers to engage in fair use of the works they paid for.[18] A prominent point is that technical measures cannot guarantee complete protection over acts of circumvention. Instead, 'if a reasonable degree of security can be achieved together with no deterioration in the quality of product offered to the consumer, and a reduction in the level of sales lost through home copying, then a technical protection system offers a solution which is worthy of consideration'.[19] To achieve maximum impact, an appropriate legal instrument would oblige Member States to prohibit acts of circumvention such as the commercialisation or importation of machines for digital tape copying.[20]

Years later, the introduction of TPMs was still on the legislative agenda. The 1995 Green Paper refers to systems like the Serial Copyright Management System which prevents the user from making a second copy.[21] The Commission also funded a programme called 'CITED' intended to create a general standard of protection for works stored or transmitted digitally.[22] Ideally, such a system if devised would be introduced across the board, with the potential effect that the selling or importation of technical equipment that had not implemented the system would be forbidden.[23] TPMs

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Commission, 'Green Paper on Copyright and the Challenge of Technology' COM (88) 172 final, 128 and following which looks at the application of technology to prevent the copying of recordings and software.

[17] ibid Commission 129. For the list of technical measures envisaged at the time, see Appendix 139-141. In the US, the 1998 Digital Millennium Copyright Act (DMCA) §1201-1205 distinguishes between 'control access to a work' and 'protect rights of the copyright owner' known as 'usage control'. The Act also distinguishes between actual circumvention and preparatory activities. It prohibits the actual circumvention and preparatory activities for access control technologies, and targets preparatory activities in relation to 'usage control', see 17 US Code § 1201(a)(1)(A) and (a)(2) (2004) and 17 US Code § 1201(b)(1) (2004). Bechtold (n 15) 332-333.

[18] Commission (n 16) 131.

[19] ibid.

[20] ibid 130.

[21] European Commission, 'Green Paper Copyright and Related Rights in the Information Society' COM (95) 382 final, 80.

[22] ibid 81-82.

[23] ibid Section IX, point 5.

would protect against 'piracy' as technology could protect the integrity of the work and the origin of the works could be identified.[24] This view resembles blockchain uses that are currently being advanced: 'A music file, for example, can be stored with owner information and timestamp which can be traced through the blockchain network.'[25] The 1997 Proposal for a Directive states that technology can be designed to prevent unauthorised exploitation yet these devices need to comply with data protection.[26] In addition, the Proposal claims that a market for devices will develop to enable the circumvention of protection devices.[27] In line with the EU's international obligations, the Proposal advanced the introduction of legal provisions that penalise enabling or facilitating the circumvention of technical protections.[28]

2.3   The complex role of TPMs in digital copyright and background debates for the discussion on blockchain

This section outlines the existing debates over the role of TPMs and their circumvention prohibition in Article 6(3) to provide background for the discussion on blockchain as TPMs. This section advances that the effects of TPMs and anticircumvention provisions are bittersweet. The architecture of business models that offer licensed content online consists of TPMs. They are the software form of 'bricks and mortar' content business models. For example, without any barriers to copying and access, the business model content service Netflix or Spotify would be impossible to implement. As section 2.6.7 will indicate, aspects of blockchain technologies are becoming part of the bricks and mortar of online content services which take advantage of the distinctive features of blockchains to provide new TPM features.

The availability of TPM technologies may inspire rightholder and investor confidence in digital exploitation of works. Braun states that: '[b]usiness models that benefit both

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[24] ibid.

[25] Bashir (n 11) 559.

[26] European Commission, 'Proposal for a European Parliament and Council Directive on the Harmonization of Certain Aspects of Copyright and Related Rights in the Information Society' COM (97) 628 final, 10, 19-20: 'Since technological identification and protection schemes may, depending on their design, process personal data about the consumption patterns of protected subject matter by individual consumers and thus may allow for tracing of on-line behaviour, it has to be ensured that the right of privacy of individuals is respected. Therefore, 19 such technological measures must incorporate in their technical functions privacy safeguards in accordance with the Data Protection Directive.'

[27] ibid 20.

[28] ibid.

the consumers and the rightholders can only work effectively when the latter are granted rights that guarantee the integrity of the protected content and the viability of such business models'.[29] As explained by Jutte, TPMs remove the fear of rightholders that their works will be violated, thus giving them the confidence to market their works online.[30]

Dusollier argues that in an environment where copying is easy, and the conscience of the copier has disappeared, technical measures are nothing more than the delegation of the 'lost morality' of users.[31] TPM functionality reunites users with their lost morality as it reinstates a degree of rightholder control over the distribution and usage of the work.[32] Fundamentally, TPMs ensure that copyright holders receive payment for content that is delivered or accessed by the user.[33]

The TPM anticircumvention provision in Article 6(1) which offers protection against the circumvention with knowledge of effective technological measures is perceived as an important enhancement to authors' rights. Van Eechoud et al argue that, '[i]n practice, the grant of protection against the circumvention of TPMs that control the use of a work through access control mechanisms is akin to recognising a de facto "right of access" to the rights owner'.[34] In fact, technical protections and anti-circumvention provisions add two new layers of protection: one layer is the factual technical protection that wraps the work, and the other is of a legal nature generated by the anti-circumvention provisions.[35] Given that these two technical regimes are layered on top of traditional codified copyright laws, the provision of technical

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[29] Nora Brown, 'The Interface Between the Protection of Technological Measures and the Exercise of Exceptions to Copyright and Related Rights: Comparing the Situation in the United States and the European Community' (2003) 25(11) EIPR 496, 503. On the economic theory of TPMs, see John A Rothchild, 'Economic Analysis of Technological Protection Measures' (2005) 84 Oregon Law Review 489, 562.

[30] Bernd Justin Jütte, *Reconstructing European Copyright Law for the Digital Single Market: Between Old Paradigms and Digital Challenges* (Hart 2017) 362. Similarly, see *Universal City Studios, Inc v Reimerdes* 111 F Supp 2d 294, 304 (SDNY 2000).

[31] Séverine Dusollier, *Droit d'Auteur et Protection des Oeuvres dans l'Univers Numérique* (Larcier 2005) point 14.

[32] Bechtold (n 15) 324.

[33] ibid.

[34] Mireille MM van Eechoud and others, *Harmonizing European Copyright Law: The Challenges of Better Lawmaking* (Kluwer Law International 2009).

[35] Séverine Dusollier, 'The Role of the Lawmaker and of the Judge in the Conflict between Copyright Exceptions, Freedom of Expression and Technological Measures' in ALAI, *Copyright and Freedom of Expression, Proceeding of the ALAI Study Days* (Huygens Editorial 2008) 569.

measures results in 'paracopyright'.[36] The term relates to the 'extended protection towards the control of access to and use of the work'.[37] The discussion of TPMs raises issues of enclosure. Hughenholtz uses a metaphor of the commons to emphasise how, faced with rampant copyright infringement, rightholders decided to erect fences around digital works in a similar manner in which American landowners in the Wild West used poles and barbed wire. He says that 'digital barb wire is called encryption: the encoding of information'.[38] Dusollier sees the protection from circumvention of TPMs as 'electrifying the fence'.[39]

Samuelson argues that TPMs can do far more than enforce rights as they can also manage down consumer expectations regarding what they are entitled to do with a work.[40] The Infosoc Directive prohibits the circumvention of TPMs in Article 6(1), but no provision is made for TPMs that encroach upon non-protected material.[41] Furthermore, unlike traditional enforcement via courts which applies ex post, the application of TPMs appears ex ante and by default. When enforcement is done ex post, a judge will ensure that legal tests are applied, some of which include subjective elements or flexible interpretation that raise an unclear legal point or apply exemptions.[42] In some situations, there will be an infringement, in others not. Applying TPMs ex ante means that such considerations never have the chance to be brought into the open as technology applies indiscriminately before any act of

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[36] Dusollier identifies the origins of the term 'paracopyright' in the preparatory work of the US Digital Millennium Copyright Act of 1998. See, Séverine Dusollier, 'The Protection of Technological Measures: Much Ado about Nothing or Silent Remodeling of Copyright?' in Rochelle Cooper Dreyfuss and Jane C Ginsburg (eds), *Intellectual Property at the Edge: The Contested Contours of IP* (Cambridge University Press 2014) 253, fn 1.
[37] ibid 254.
[38] Bernt P Hugenholtz, 'Copyright, Contract and Code: What Will Remain of the Public Domain' (2000) 26(1) Brooklyn Journal of International Law 77, 84.
[39] Séverine Dusollier, 'Electrifying the Fence: The Legal Protection of Technological Measures for Protecting Copyright' (1999) 21(6) EIPR 285.
[40] Samuelson (n 5) 42.
[41] Paul Goldstein, 'Copyright and its Substitutes' (1997) 45 Journal of the Copyright Society USA 151, 155. His comment was made in the context of Article 11 WCT but since the provisions are similar it can also be extended to Article 6(3) Infosoc Directive.
[42] For example, the relationship between TPMs and non-commercial and private making of a copy from a lawfully acquired source but locked up by technology is not fully clear. In the *Mulholland Drive* case saga in France, this culminated with the decision of the French Supreme Court that, in a conflict between TPMs and the private copy exception, the TPM must prevail. *M Perquin, UFC Que Choisir v Soc Universal Pictures Vidéo France et al* Court of cassation, Civil 1 (19 June 2008) as cited in and with comment, Paul Torremans and Valerie-Laure Benabou, 'Letter from France' (2008) 30(11) EIPR 463, 468. In the case of the making of a private copy from work delivered on demand, this is not allowed. See InfoSoc Directive (n 2) art 6(4)4.

infringement takes place. TPMs thus generate concerns of private ordering, which is the situation where a private person, and not the legislator, unilaterally decides to expand his rights over a property and over the correlative obligations of third parties.[43]

The literature reflects the concerns about technical protection usurping legally codified copyright law as the main means of protection.[44] Each use of a digital work could be perfectly controlled and licensed by automated systems such as to render enforcement rules not applicable. This vision is summarised by Samuelson in the following way: 'There may be nothing for copyright to do, except perhaps to serve as a kind of deus ex machina justifying the use of technological and contractual means for protecting works in digital form.'[45] Cohen adds more generally that 'the evolving publisher-consumer struggle over copy-protection and pay-per-use technologies has been one long contested exchange concerning institutional choice, the outcome of which is still uncertain'.[46] On this, the EC noted that 'DRM systems are not in themselves an alternative to copyright policy in setting the parameters either in respect of copyright protection or the E&Ls that are traditionally applied by the legislature'.[47] This is due to the difficulty of balancing user and rightholder interests via technology.

In the blockchain field, some authors already echo existing TPM debates: '[i]n the context of smart contracts, since the enforcement is done through the technological framework itself, it becomes possible for private parties to bypass these legal safeguards (just like DRM systems commonly bypass copyright fair use provisions)'.[48] If normal TPMs are perceived as electrifying the fences, blockchains are brick-walling those fences. For example, de Filippi and Hassan state that:

> … when used in combination with blockchain-based payment systems, smart contracts make it possible for anyone to send micro-transactions to the relevant right holders in order to automatically obtain a license that will 'unlock' certain functionalities of the work (e.g., they

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[43] Dusollier (n 31) point 269.

[44] EC Legal Advisory Board, 'Reply to the Green Paper on Copyright and Related Rights in the Information Society' (2016) 12(3) Computer Law & Security Report 143, 148.

[45] Pamela Samuelson, 'Will the Copyright Office Be Obsolete in the Twenty-First Century' (1994) 13 Cardozo Arts & Entertainment Law Journal 55, 60.

[46] Julie Cohen, 'Lochner in Cyberspace: The New Economic Orthodoxy of "Rights Management"' (1997) 97 Michigan Law Review 462, 532.

[47] European Commission, 'Communication from the Commission to the Council, the European Parliament and the European Economic and Social - Committee The Management of Copyright and Related Rights in the Internal Market' COM (2004) 261 final, 10.

[48] de Filippi and Hassan (n 9) 16.

might acquire the right to access, reproduce, or perhaps even remix a digital copy of the work), regardless of whether these functionalities are actually protected under the copyright regime.[49]

Section 2.8. will consider whether these observations materialise.

2.4 Blockchain technologies as a copyright TPM as per Article 6(3) InfoSoc Directive

Technology need not be 'purpose-built' to qualify as a TPM. Indeed, any technology which fulfils a copyright protection function may be considered a TPM.[50] This section analyses the manner in which blockchain technologies can act as copyright TPMs with reference to existing and proposed applications of the technology. Blockchain technology can be considered a copyright relevant TPM if it fits the definition of TPMs in the InfoSoc Directive. According to Article 6(3) of that Directive, a TPM is defined as:

> … any technology, device or component that, in the normal course of its operation, is designed to prevent or restrict acts, in respect of works or other subject-matter, which are not authorised by the rightholder of any copyright or any right related to copyright as provided for by law or the sui generis right provided for in Chapter III of Directive 96/9/EC.[51]

The definition is broad as it refers to 'any technologies', which is intended to accommodate changing TPM technologies.[52] However, a measure is considered a TPM for copyright purposes only if its application is designed to protect rights.[53] In other words, blockchain technology applicable in the medical field does not qualify as a TPM under the InfoSoc Directive.

Article 6(3) is further broadened by the reference to 'acts not authorised by the rightholder'. This could mean that TPMs can be applied not only to acts which infringe exclusive rights but also to non-infringing acts that do not have rightholder authorisation.[54] In theory, this may mean that uses that are unauthorised by the

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[49] ibid.

[50] InfoSoc Directive (n 2) art 6(3).

[51] ibid.

[52] Kamiel J Koelman and Natali Helberger, 'Protection of Technological Measures' in Bernt P Hughenholtz (eds), *Copyright and Electronic Commerce: Legal Aspects of Electronic Copyright Management* (Kluwer Law International 2000) 171.

[53] ibid 173. TPMs are defined by their purpose, which is to prevent acts not authorised by the rightholder, see Jaques de Werra, 'The Legal System of Technological Protection under the WIPO Treaties, the Digital Millennium Copyright Act, the European Union Directives and other National Laws (Japan, Australia)' in Jane C Ginsburg (ed), *Adjuncts and Alternatives to Copyright: ALAI Congress June 13-17, 2001, New York, USA* (ALAI-USA 2002) 27.

[54] Grasser finds that some Member States such as Hungary have implemented the provision only with reference to 'acts that infringe copyright'. Urs Grasser, 'Legal Frameworks and Technological

rightholder but covered by exceptions and limitations could be prevented by TPMs. However, 'acts not authorised' by the rightholder was interpreted restrictively in the *Nintendo* decision to mean reproduction and communication to the public, including making available, as well as distribution.55 Overall, blockchain-based measures are therefore only caught by Article 6(3) when they achieve the protection function against uses that infringe exclusive rights.

2.5 Taxonomy of blockchain measures as TPMs

In order to benefit from blockchain-like protection, rightholders do not necessarily have to have works recorded in the blockchain but simply apply blockchain features to copyright work protection such as similar levels of encryption. Such a spillover is already observable in some music services that apply blockchains as a payment system.56

Article 6(3) InfoSoc Directive qualifies a TPM as an 'access control or protection process, such as encryption, scrambling or other transformation of the work or other subject-matter or a copy control mechanism, which achieves the protection objective'.57 In line with the InfoSoc Directive's suggestion, a distinction between categories of access controls and copy controls will be maintained in this section.58 According to Karapapa, access controls prevent passive use whereas copy controls

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Protection of Digital Content: Moving Forward Towards a Best Practice Model' (2006) 17(1) Fordham Intellectual Property, Media & Entertainment Law Journal 39, 75.

55 Case 355/12 *Nintendo Co Ltd and Others v PC Box Srl and 9Net Srl* EU:C:2014:25, [2013] ECDR 16, paras 24-25.

56 For example, the OPUS music service which describes itself as an 'open-source decentralized music sharing platform with demo based on Ethereum and IPFS'. In OPUS, Opus files are encrypted with AES 256-bit (advanced encryption standards) which is a lightweight private key encryption model to restrict access, Bokang Jia, Chenhao Xu, Mateusz Mach, 'Opus, Decentralized Music Distribution Using InterPlanetary File Systems (IPFS) on the Blockchain' (*Opus*, 2018) 13 <https://opus.audio/whitepaper.pdf> accessed 9 February 2018

57 ibid.

58 From an international perspective, the WIPO guide also states that protection against circumvention of TPMs applies for measures that regulate 'access control' and 'copy control'. Mihály Ficsor, 'Guide to the Copyright and Related Rights Treaties Administered by WIPO and Glossary of Copyright and Related Rights Terms' (World Intellectual Property Organisation, 2004) 218 <https://www.wipo.int/edocs/pubdocs/en/copyright/891/wipo_pub_891.pdf> accessed 2 June 2019. However, this distinction is controversial in the literature. For example, as explained by Grasser, the wording of the Berne Treaty leaves open the issue whether TPMs that regulate the access to a work fall under the scope of the provision, Grasser (n 53) 47. In Europe, Koelman notes that: 'Access control has never been explicitly discussed in relation to the Copyright Directive. Nevertheless, the Commission apparently feels it is necessary to protect technological measures which control access.' Kamiel J Koelman, 'A Hard Nut to Crack: The Protection of Technological Measures' (2000) 22(6) EIPR 272, 275.

prevent permissible dynamic uses.[59] However, what actually fits into these categories is difficult to determine as any classification may ultimately be subject to the caprices of technology.[60] Categories also sometimes overlap.[61] This section will link existing blockchain technologies within specific and existing TPM categories to show how blockchain technologies are applied and determine whether they provide any added value.

2.5.1   Access controls

Access controls are a category of TPMs where the name is self-explanatory: they prevent the access to the work. Measures that control access have been described via an analogy: 'protecting the access to a digital work can be compared to locking up the door of a room in which a work (a book) is located'.[62] Digital technology enables more targeted types of access control measures, for example, according to the type of access provided and their placement, such as front end access, timed access or legal user access controls. Examples of access controls include the use of encryption which scrambles digital content so that only authorised users can play the content, whether that is satellite channels, subscription channels or digital box smart card systems.[63] Access controls therefore regulate the circumstances in which the user can access the work. This section will show that blockchain technology may be applied as 'front end' access controls as well as a 'micropayment' access controls.

One typology is 'front end' access controls. These 'traditional' measures largely consist of access restrictions placed on a page of a website that leads to a catalogue of works, for example, the user name/password requirement placed on Netflix. This amounts to a digital gate which can be unlocked by a known user with a username, together with the necessary key in the form of a password. The system requires a publicly known web address and a privately known password. As explained by Koelman, this access restriction protects the service as well as the content therein.[64]

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[59] Stavroula Karapapa, *Private Copying* (Routledge 2014) 158.
[60] For a classification of techniques applied by rightholders, see Dusollier (n 31) 44; Koelman and Helberger (n 52) 166-169.
[61] Ficsor (n 6) 265; Grasser (n 54) fn 114.
[62] de Werra (n 53) 4.
[63] ibid 4-5.
[64] Kamiel J Koelman, 'Protection of Technological Measures' (Institute for Information Law, 1998) 2, on record with the author.

A number of content distribution services that enable cryptocurrency payments in direct transactions between creators and users condition access to the service on the input of a cryptocurrency wallet and wallet address in addition to a password.[65] In this scenario, the use of blockchain as a payment system dictates aspects of a service's governance. Wallets are software programmes, independent of the blockchain itself, that allow users to buy/sell cryptocurrencies, in this case pay for content.[66] Furthermore, the wallets themselves are reinforced with strong cryptography.[67] Wallet addresses are public keys for the blockchain cryptographical set-up and consist of a row of numbers and letters.[68] Blockchain technology applies asymmetric cryptography, which requires two keys: one that encrypts, the other that decrypts.[69] Overall, this system is much more secure then traditional password based access restrictions.

The downside of this type of access restriction is that, at the moment, they require more effort and expertise to use.[70] For example, a user would have to download the wallet, acquire a wallet address all aspects which are not yet mainstream. However, user friendliness is gaining momentum. For example, Metamask is a multicurrency wallet which turns Google Chrome into an Ethereum browser that lets websites retrieve data from the blockchain and lets users securely manage identities and sign transactions.[71] Metamask can be used to easily access content distribution services that use blockchain as a payment system.

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[65] For example, Tokit <https://tokit.io/guides> accessed 13 February 2019; Breaker (now rebranded from Singular DTV) <https://www.breaker.io/> accessed 13 February 2019. A wallet example: 0x6599dc23a8803d6dc8f4bff1baf270780b8e5aba.

[66] There are at least two types of cryptocurrency wallets: one is a cold wallet which stores cryptocurrencies and private keys and another is a hot wallet which enables transactions to take place Prypto, *Bitcoin for Dummies* (Wiley 2016) 45.

[67] However, there have been instances when accounts were broken such as the 'Dao Hack' where a hacker exploited a vulnerable piece of code in the DAO fundraiser smart contract to withdraw $50 million dollars. For an explanation of the 'Dao Hack', see Mayukh Mukhopadhyay, *Ethereum Smart Contract Development: Build Blockchain-based Decentralized Applications Using Solidity* (Packt 2018) 121.

[68] Daniel Drescher, *Blockchain Basics, A Non-Technical Introduction in 25 Steps* (Apress 2017) 162.

[69] Alex Tapscott and Don Tapscott, *Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World* (Penguin 2016) 39.

[70] Luka Kapetanic, 'Are Blockchain Software Solutions User-Friendly?' (*BlockchainLand*, 16 November 2018) <https://theblockchainland.com/2018/11/16/are-blockchain-software-solutions-user-friendly/> accessed 13 February 2019.

[71] Metamask <https://metamask.io/> accessed 13 February 2019.

2.5.2 Cryptocurrency (micro)payments as access controls

Cryptocurrency payments or micropayments condition access to a piece of content on a pay per use means.[72] Micropayments are transactions of small units of currencies such as pences or fractions of pences.[73] Prior to blockchain technology, such small level payments were not technically feasible. Using the financial system (including purely online financial services such as PayPal) for micropayments is expensive as it adds additional transaction costs to the extent that the transaction costs are higher than the micropayment.[74] Blockchain are beginning to address the problem when as a system is put in place to minimise transaction costs in high volume transaction environments.[75] This system is currently embedded by cryptocurrency blockchain services, for example, creators can set a crypto price for access the streamed and/or downloaded work.[76]

In another model, a cryptocurrency paywall is added as a browser plug-in. For instance, Slate wishes to implement 'a payment gateway called "Binge" that will allow consumers to pay for and access Premium Content via WebRTC with SLATE

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[72] Suggesting a system of cryptocurrency micropayments Qi Xia and others, Secure Payment Routing Protocol for Economic Systems Based on Blockchain' (IEEE International Conference on Computing, Networking and Communications, 5-8 March 2018) 177-181. In the marketplace, small processing fee cryptocurrencies are considered best suited for micropayments, see Dmytro Spilka, 'Micropayments: Bringing Cryptocurrencies into Everyday Life' (*News.Bitcoin*, 12 October 2018) <https://news.bitcoin.com/micropayments-bringing-cryptocurrencies-into-everyday-life/> accessed 27 February 2019.

[73] Rafael Pass and Abhi Shelat, 'Micropayments for Decentralized Currencies' (Proceedings of the 22nd ACM SIGSAC, Conference on Computer and Communications Security, 2015) 207 <https://www.initc3.org/files/micropay2.pdf> accessed 29 March 2019.

[74] Historically, micropayments proposals require participation of the bank, see Lei Tang, 'A Set of Protocols for Micropayments in Distributed Systems' (Proceedings of the First USENIX Workshop on Electronic Commerce, 1995). They propose a micropayment model where the transaction between the buyer and the seller is intermediated by the bank. Most subsequent proposals follow this structure and propose various ways to minimise the transaction fee barrier. See Ronald L Rivest and Adi Shamir, 'PayWord and MicroMint: Two Simple Micropayment Schemes' in *Security Protocols* (Springer 1997). They proposed PayWorld which aggregated a number of micropayments in a single transaction. However, the system was unworkable as bundling payments from various buyers was not possible. Charanjit Jutla and Moti Yung, 'PayTree: Amortized-signature for flexible micropayments' (Proceedings of the Second USENIX Workshop on Electronic Commerce, 1996). They proposed the use of PayWorld to bundle micropayments payments from different buyers. Ronald L Rivest, 'Electronic Lottery Tickets as Micropayments' in *Financial Cryptography* (Springer 1997). He proposed a gambling method to minimise the involvement of the bank.

[75] Corey Savard, 'Are Cryptocurrency Micropayments the Future of Content?' (*Maropost,* 10 February 2017) <https://www.maropost.com/blog/are-cryptocurrency-micropayments-the-future-of-content/> accessed 15 November 2018.

[76] Finck and Moscon (n 6) 95.

tokens'.[77] This essentially means that users would be able to use their browsers to stream content if they pay. Web RTC is a free open framework for the web that enables real time communication through browsers via a peer-2-peer connection.[78] It turns browsers into encoders for video streaming which can connect to each other for playback. The Slate team then aims to connect this to a token payment system so that users can pay-per-stream in real time.[79]

Some authors foresee that cryptocurrency micropayments may become the internet norm for accessing content online in general, for example, a small payment can be seamlessly extracted from an internet user's account when accessing webpages, newspaper articles or videogames.[80] Micropayments for content are both an exciting and worrying development. On one hand, micropayment 'pay-per-view' may allow fairer pricing structures for digital content. For example, instead of paying for a whole e-book, one could pay only for the pages one has read. The system may also be tailored so that the micropayment already paid allows unlimited access to those pages by the paying user.[81] The current model of bundled content distribution based on streaming subscription services is shown to generate overlap.[82] A user may end up paying twice or thrice for the exact same content. Equally, the subscription model based on all you can view/listen to means one may never watch the content one has paid for, especially in the situation of multiple subscriptions. Furthermore, should a user wish to have access to the most popular content, she would have to apply to a number of content

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[77] Slate, 'The Entertainment Currency' (Slate Entertainment Group, White Paper 2018) <https://slate.io/Slate_Whitepaper.pdf> accessed 1 December 2018.
[78] Browsers do this by signalling to each other.
[79] See Slate (n 77) 12-13. It is not clear from the White Paper how this will be done, but it is suggested that blockchain technology will protect the content itself: 'technology protecting content on the Binge BVOD platform is a distributed ledger that creates an immutable record of transactions on any asset, idea, or creative work. These can be tracked throughout their lifetime, even following any sale, transfer or assignment, including assignments to other industries such as music or television.' (ibid 14).
[80] Primavera De Filippi and others, 'How Blockchains can Support, Complement, or Supplement Intellectual Property' (Working Draft, Coalition of Automated Legal Applications, 2016) 4 <https://github.com/COALAIP/specs/blob/master/presentations/COALA%20IP%20Report%20-%20May%202016.pdf> accessed 2 February 2019.
[81] However, it is unclear how a return would be made.
[82] For the movie sector, see Reelgood, 'Movies and Shows that Overlap on Netflix, Hulu, and Amazon Prime' (*Reelgood,* 12 December 2018) <https://blog.reelgood.com/movies-and-shows-that-overlap-on-netflix-hulu-and-amazon-prime> accessed 1 February 2019; Ofcom also shows overlaps between Subscription Video on Demand and Netflix and Amazon Prime offerings, see Ofcom, 'Media Nation Report' (18 July 2018) 16 <https://www.ofcom.org.uk/__data/assets/pdf_file/0014/116006/media-nations-2018-uk.pdf> accessed 20 September 2018.

subscription services at once. A micropayment pay-per-view model might lead to more proportionality between offer, price and consumption, with a potential overall reduction in prices for users (although it is unclear how sustainable this model would be for content suppliers), as users could pay exactly for the bits they 'consume'.

On the other hand, widespread and indiscriminate implementation of the micropayment model has the potential to turn the whole internet into a pay-per-view service. Whereas currently silos of content are freely available online as providers can gain revenue from advertisements (or not gain revenue at all), charging a micropayment at every step of the way means that only paying users can fully enjoy the internet. Although the system could be implemented in such a way that it seems seamless for users, it would undeniably change the ethos of the internet. Such systemic unfairness would adversely affect freedom of expression and information provided for in Article 11 of the Charter of Fundamental Rights and safeguarded by the internet. The general application of micropayments would de facto extend copyright protection in the works charged for right beyond the scope of exclusive rights as viewing works online is not an infringement of exclusive rights. For example, in *Meltwater*, the CJEU stated that browsing is exempted by the temporary copy exception in Article 5(1).[83] The large scale application of micropayments on access to material online may overlap that exempted use.

Broad micropayments implementation may affect the way the internet works, for example, search engines use bots to scrape free internet content to deliver results for a user's search query.[84] It is not clear if such scraping is technically possible in a micropayment world as bots would somehow have to pay for each webpage accessed for the purpose of scraping. Even if that were technically possible, it would certainly be very costly, unless an exception from payment could be legally enacted and technically put in place. However, cryptocurrency micropayments may not necessarily transform into rightholders' dream. Depending on the application of the technology, and taking into account that pirates have been much faster to adapt to technical

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[83]Case C-360/13 *Public Relations Consultants Association Ltd v Newspaper Licensing Agency Ltd and Others* ECLI:EU:C:2014:1195 paras 25-63.
[84] Bianca Hanuz, 'Liability Implications of Extending the Communication to the Public Right to Third-Party Re-Posting of Images Already Freely Available Online with Right Holder Permission' (2019) 41(3) EIPR 190, 194.

innovation, micropayments may in fact become rightholders' worst nightmare, which is something which will be considered in Chapter 5.

2.5.3   Copy controls

Copy controls enable rightsholders to regulate the way the work is used as they 'surround' the work in technical control mechanisms.[85] They are a very popular species of TPMs and are widely used in copyright protection, including in operating systems, mobile devices and e-book reading software.[86] Essentially, DVD DRM such as 'Copy Generation Management Systems' control the number of copies a user can make.[87] In some situations, TPMs even prevent the user from making a single copy of the work. In other situations, the TPM controls the full work experience, for example, the Google Books TPM technology surrounds the work to control the entire viewing of the book only on a PC screen. Another category of TPMs can deteriorate the quality of the copy by distorting the work.[88] TPMs can also dictate the digital format of the work. iTunes Fair Play, the TPM system used to enforce Apple's end user licence agreement, counts the number of authorised copies made by the user, for example, by downloading iTunes and the user's own catalogue on various computers. The content bought on iTunes is in a format that cannot be played on another player and the TPM does not permit the sampling, editing or other creative use of the work.[89] The serial copy management system works in a similar manner as it stops the making of digital copies from a 'master' copy.

In the current state of the art, the application of blockchain technologies as a copy control TPM, at least in the ways envisaged above, is limited. One of the main initial appeals of blockchain technology in copyright stems from its application of very powerful cryptography to ensure the integrity of the system and the data transacted

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[85] Grasser notes that the distinction between access controls and copy controls is in practice increasingly difficult to make. Grasser (n 54) fn 114.
[86] Bechtold (n 15) 324.
[87] June Jamrich Parsons and Dan Oja, *New Perspectives on Computer Concepts 2012: Introductory* (Course Technology 2012) 467.
[88] This type of measure has been provided in the US 1998 Digital Millennium Copyright Act (DMCA) at 1201(k)(4)(c)(ii).
[89] Hector Postigo, *The Digital Rights Movement: The Role of Technology in Subverting Digital Copyright* (Cambridge MIT Press 2012) 128.

therein.[90] The two main types of cryptography used in blockchains are 'heavyweight': the Secure Hash Algorithm (SHA-20 which was developed by the National Security Agency (NSA) and considered tamper proof), and Zero-Knowledge-Succinct Non-interactive Argument of Knowledge (ZK-SNARK) which is a newer and more anonymizing technology.[91] Unlike blockchain encryption, TPM encryption is 'lightweight', such as the Content Scramble System that prevents DVD content from being copied. This is a low-level encryption method easily broken via so-called 'brute force' attacks (trial and error), which is something almost impossible with blockchains.[92] Brown explains in the context of blockchain that '[b]ack calculating a private key from a public is either impossible or prohibitively expensive'.[93]

In an ideal blockchain copy control system, copyright works would be tokenised on a blockchain and traded in the same manner as cryptocurrency, with the blockchain architecture both preventing works from being copied and keeping track of the transfer of works. It is not feasible to store large copyrighted works 'in the blockchain's

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[90] The cryptography element of a blockchain revolves around public-private key cryptography (also known as asymmetric cryptography) which was invented in 1979 to secure communications between computers in a network. As an analogy, this type of cryptography can be compared with a vault with two keys. The public key is known to everyone and is used to deposit documents in the vault, the private key is known only to the owner of the vault and can be used only to take documents out. The keys are linked in a mathematical way but despite the fact that everyone knows the public key this does not help in any way to unlock the information which is only done with the private key. Nigel P Smart, *Cryptography Made Simple* (Springer 2016) 202; Public/private key cryptography was invented by Whitfield Diffie and Martin E Hellman who found a mathematical means to secure messages over insecure channels such as computer networks. Prior to this innovation, sending private messages over such networks was cumbersome as it required prior sharing by ordinary mail or other means between communicators of a secret key. This was also prone to corruption. Diffie and Hellman's innovation consisted in a model whereby messaging required a combination of a public key and the private keys of the users. In a two-user model, the public key is visible for everyone, and each user has a private key only known to them. Each user mixes his private key with the public key and then the two publicly exchange the two resulting combinations. Then each user mixes his received combination with his own private key to reveal a combination identical to the other user's combination. This results in a complex scrambling which obfuscates the real message shared between the two users. See Whitfield Diffie and Martin E Hellman, 'New Directions in Cryptography' (1976) 22(6) IEEE Transactions on Information Theory 644, 644-654.
[91] Paolo Tasca, Thayabaran Thanabalasingham and Claudio J Tessone, 'Ontology of Blockchain Technologies. Principles of Identification and Classification' (2018) ArXiv 42 <https://arxiv.org/abs/1708.04872> accessed 1 May 2018.
[92] For the history of CSS, see Lea Troels Møller Pedersen, Carsten Valdemar Munk and Lisbet Møller Andersen, 'Cryptography – The Rise and Fall of DVD Encryption' (2007) <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.118.6103&rep=rep1&type=pdf> accessed 1 May 2018. Discussing the weaknesses of CSS, Matthew Becker and Ahmed Desoky, 'A Study of the DVD Content Scrambling System (CSS)' (Proceedings of the Fourth IEEE International Symposium on Signal Processing and Information Technology, 2004) 355.
[93] Dan Brown, 'The Blockchain: The Future of Business Information Systems' (2016) 10(2) Journal of the Academic Business World 33, 34.

blocks' as such. The data computed by blockchains is only in the size which is required by this functionality such as the transfer cryptocurrency/record transactions all of which consist of small data and operations. The bigger the data stored on the blockchain, the heavier the blockchain is and the slower it works, and so the more resources are required to process transactions. With second-generation blockchains like Ethereum, the processing data costs 'Gas', which is a payment or the fuel required to process a transaction. The larger the data, the more fuel is required. To put this in context, it is calculated that the cost of placing a high-quality image on the Ethereum blockchain costs the Gas equivalent of approximately $11,000 whereas plain text costs approximately $4-5 a page.[94] Furthermore, Ethereum blocks have limited the amount of Gas assigned per block so it is unclear whether such large files could be deposited in a block. Given such current technical and financial constraints, copyright works as such cannot be wrapped around blockchain cryptography. It is not, however, impossible to store very small copyright works on the blockchain. This refers to works which can be expressed in 'plain text'. Recent research shows that a minimal number of text files is available on the Bitcoin blockchain.[95] Indeed, another blockchain called Steem can also store small text files.[96]

2.5.4 Content delivery systems

A content delivery system (CDS) provides the technical infrastructure to bundle the technologies described above as well as rights management systems for the delivery of copyrighted works online and the enforceability of rights. The aggregation of various technologies that form a content service, such as Netflix, Spotify, etc are CDS. A CDS controls the copy. For example, it can limit the number of streams or downloads and it also works as a rights management solution as it collects data regarding usage for licensing audits. For example, music streaming services (such as Spotify) may limit the number of free streams available per song as well as record data of work streams.

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[94] Blockmason, 'Storing Medical Records on the Ethereum Blockchain' (*Healthcare America*, 19 July 2017) <https://healthcareinamerica.us/storing-medical-records-on-the-ethereum-blockchain-e088f19c9fca> accessed 15 June 2018.
[95] Roman Matzutt and others, 'A Quantitative Analysis of the Impact of Arbitrary Blockchain Content on Bitcoin' (26 February 2018) 4.3 <https://fc18.ifca.ai/preproceedings/6.pdf> accessed 15 June 2018.
[96] Steemit, 'Storing Files on the Steem Blockchain' (*Steemit*) <https://steemit.com/utopian-io/@howo/storing-files-on-the-steem-blockchain> accessed 15 June 2018.

Blockchain technology may be embedded in CDS. For example, the OPUS platform advertises the use of Ethereum smart contracts as the payment layer of the system.[97] The smart contract can also record the consumption of consumption data for revenue distribution.[98] The smart contract is necessary to generate the platforms' internal cryptocurrency which can be used to stream music. In this context, the use of blockchain is ancillary to any protection given to works or any control over their distribution.[99] So far, the use of blockchain as such a content delivery system appears limited.

2.5.5   Evaluation

Blockchain technologies in the various configurations above of access controls could achieve a higher degree of protection than is available either as a standalone or in combination with existing technologies. For example, the combination of passwords and wallet access restrictions enables a higher degree of security against unauthorised access than password and regular usernames alone. This is because these use a higher level of encryption than regular TPMs. For example hacking private keys is more difficult to hack than regular passwords because private keys are more complex systems.

Furthermore, the use of micropayments may be a fundamental advancement to online content distribution and access. If the payment is reasonable and implemented in a manner sensitive to E&Ls and the public domain, the micropayment system may be a positive development to online use of content.[100] While it remains to be seen how these will be implemented, any broad implementation of micropayments as access controls that may stifle E&L may not be countered by users. There is no limitation available on the application of TPMs.[101] In practice, it is rightholders who decide the application

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[97] Bokang Jia, Chenhao Xu and Mateusz Mach, 'Opus, Decentralized Music Distribution Using InterPlanetary File Systems (IPFS) on the Blockchain' (Opus, 2018) 10- 11 <https://opus.audio/whitepaper.pdf> accessed 09 February 2018; similarly see Voise <https://www.voise.com/>09 February 2018

[98] ibid

[99] ibid

[100] This is what Gervais calls 'positive licencing' which is adaptable to the expectations and needs of users. Daniel J Gervais, 'E-Commerce and Intellectual Property: Lock-it Up or License?' (2001) 6 Int'l Intell Prop L & Pol'y 87-1, 87-5-6.

[101] Dusollier (n 35) 574.

of E&Ls by the manner in which they apply TPMs.[102] Therefore rightholders will also decide on the extent they may wish to apply any emerging blockchain TPMs.

On the other hand, there is limited use for copy control blockchain applications, largely because of the current expense and technical challenges to moving large files such as works wrapped into blockchain cryptography. Yet technology may adapt in the future. For example rightholders may wish to create their own purpose built blockchain used for copy protection, for example to create new business models that make available content is a distributed but secure manner. The incentive for this to happen will depend on the market demand for such a system and the added value it may bring compared to other forms of copy controls. At the moment, no such system appears proposed by rightholders. Technically it would appear a difficult task as the blockchain would not only have to host entire catalogues of works but also process transactions from millions of users.

There are other options as companies may invest systems which could 'borrow' elements blockchains, such as smart contracts, and apply them beyond a payment logic above. For example, smart contracts may be used to condition the release of the work from a traditional copy control TPM. For example, to approve the delivery of a work to a user according to a set of self-enforceable conditions. This could lead to the creation of a new content delivery systems. Essentially, blockchains may open up new functionalities for TPMs which further maximise rightholders' potential to exploit protected works. Yet these need not, be the only way to use blockchains.

2.6   Smart contract TPMs – the bearers of digital scarcity

Two emerging standards of Ethereum smart contracts, the ERC-721 and the ERC-1155, have generated a new type of TPM which enables a form of so-called 'digital ownership'.[103] These are not copy control strictu sensu but rather a move into a new avenue of digital content exploitation. The current implementation of these emerging

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[102] See Dusollier who argues that copyright owners should be placed under an obligation to make sure that the application of TPMs is in compliance with exceptions and fundamental rights. See Dusollier (n 35) 574.

[103] William Entriken and others, 'ERC-721 Non-Fungible Token Standard' <https://github.com/ethereum/EIPs/blob/master/EIPS/eip-721.md> accessed 6 June 2018; Witek Radomski and others, 'ERC: Multi Token Standard #1155' <https://github.com/ethereum/eips/issues/1155> accessed 6 June 2018.

standards rebalances the relationship between the rightholder and the user: the rightholder can allow the user more liberties in relation to the use of the work as the rightholder can track the economically relevant use via a smart contract. These new standards are uncharted territory in copyright law.[104] Therefore, the section will explain in detail how these standards work and are applied and explores ways in which these solutions might be expanded the protection of other categories of works in the marketplace.

These new smart contract standards have appeared in the niche yet booming blockchain gaming market. Players can now 'own', in game smart contracts, virtual items purchased by them such as coins, swords and characters, which they can sell, trade or give away to their friends. This solves a pervasive problem of the existing gaming market whereby player investment in in-game or in-app purchases is lost if the user account is suspended or the game is closed down.[105] For example, in the aftermath of the closing down of the very popular shooter game Fortnite, users will lose all of their in-game purchases.[106] In other situations, the user account can be hacked and the items can be 'stolen'.[107] The blockchain smart contract solution for in-game purchases is therefore challenging the status quo in the gaming industry.[108] This is achieved by inextricably connecting the image which represents an in-game item with an entry in the blockchain smart contract. Bundling the two (including some licensing provisions stored off-chain) enables the creation of a so-called digital asset which gives its controller a 'digital ownership'. It is necessary to clarify that the denomination of 'digital ownership' is misleading. Instead, the game developer gives

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[104] With the possible exception of a paper by Evans, yet the version available online is only in the early drafting stages, see Tonya M Evans, 'Cryptokitties, Cryptography and Copyright, Non-Fungible Digital Creativity on the Blockchain' (BYU Copyright Symposium, Utah, 2018) <https://copyrightsymposium.copyright.byu.edu/papers/CryptoKitties_Cryptography_and_Copyright.pdf> accessed 29 December 2018.

[105] For the various rationales for in-game purchases, see Juho Hamari and others, 'Why Do Players Buy In-Game Content? An Empirical Study on Concrete Purchase Motivations' (2017) 68 Computers in Human Behaviour 538.

[106] Research shows that 69% of Fortnite users have made in-game purchases. Mike Brown, 'The Finances of Fortnite: How Much Are People Spending on This Game?' (*Lendedu*, 26 June 2018) <https://lendedu.com/blog/finances-of-fortnite/> accessed 17 September 2018.

[107] For example, Cecilia D'Anastasio, 'Watch Out For World of Warcraft's Newest Thieving Scam' (*Rotaku*, 7 June 2016) <https://kotaku.com/watch-out-for-world-of-warcrafts-newest-gold-stealing-s-1783299905> accessed 17 September 2018.

[108] It is expected that by 2020 in-game consumer spending will reach $32 billion dollars. Statista, 'In-Game Consumer Spending Worldwide in 2015 and 2020 (in Billion U.S. Dollars)' (*Statista*, 2019) <https://www.statista.com/statistics/558952/in-game-consumer-spending-worldwide/> accessed 17 September 2018.

the end user a licence to sell, trade, rent and exchange the work tied to the blockchain smart contract. Another necessary clarification is related to the use of blockchain in this situation because smart contract standards are only the baseline; smart contracts must be combined with other technology to achieve the desired functionality – just as iTunes layers various technologies in addition to Fairplay TPM to deliver the work to the user and manage it. The next subsections will explore the baseline use of blockchain smart contracts, followed by a discussion of ERC-721 and ERC-1155 and their idiosyncrasies before exploring their potential use beyond the gaming market.

2.6.1   ERC-20 and the beginning of digital scarcity

To understand the protocols offered in the content of videogame items, a brief primer on ERC-20 smart contracts and tokens is necessary. The ERC-20 is the first and most popular smart contract standard. It is written in Solidity and runs on Ethereum.[109] The ERC-20 consists of certain functions and when a transaction calls for a function in the smart contract the Virtual Machine of Ethereum charges an amount of Gas.[110] On the Ethereum blockchain, the ERC-20 smart contract can represent tokens, which are entries that can represent a wide range of digital assets.[111] Indeed, this is what separates Bitcoin tokens which can only represent cryptocurrency from Ethereum tokens which can represent a wider array of items that can be represented in a token form.[112] A token is represented in a 265 bit value. A characteristic of ERC-20 tokens is that they are 'fungible' in the sense that they are interchangeable, like pieces of rice. In copyright, the ERC-20 contract has largely been applied in licencing as part of a payment mechanism.[113]

2.6.2   ERC-721 – digital scarcity and Crypokitties

A new use of Ethereum smart contracts is the creation and management of individualised computer-assembled artworks. This section will explain the ERC-721

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[109] The ERC-20 is linked to the initial coin offering (ICO) hype. See, Gianni Fenu and others, 'The ICO Phenomenon and its Relationships with Ethereum Smart Contract Environment' (International Workshop on Blockchain Oriented Software Engineering, 2018).
[110] For a summary of ERC-20 functions, see Vruddhi Mehta and Sakshi More, 'Smart Contracts: Automated Stipulations on Blockchain' (International Conference on Computer Communication and Informatics, Coimbatore, India, 2018).
[111] ibid.
[112] Sean Au and Thomas Power, *Tokenomics: The Crypto Shift of Blockchains, ICOs, and Tokens* (Packt 2018) 107
[113] See Chapter 3 sub-section 3.3.3.

with reference to its only current implementation in 'CryptoKitties'. This is a popular game built on the Ethereum blockchain that allows people to build, breed and trade in digital cartoon cats which can be sold at 'cat auctions' for Ether.[114] The game appears to have been inspired by the Pokemon trading card game. CryptoKitties is ground-breaking because the underlying smart contract structure enables the management and deployment of non-fungible assets on a blockchain, meaning that the contracts are unique. The blockchain smart contract is essential to the operation of the game as it enables the peer-2-peer governance of the game and embeds the algorithm that dispenses the kitties and manages their exchange. CryptoKitties has also opened the gates for ownership-tracked and decentralised trade in creative works. The section will first explain how the system works and then it will test whether it can be extrapolated to other types of works.The game layers various technologies, which will be considered in the following paragraphs.

a) The genetic algorithm

One main element of the CryptoKitties game is the 'genetic algorithm' which generates a mathematical and computer readable blueprint of the kitties. The genetic algorithm is essentially a digital version of an organic genome as it expresses the physical characteristics of a kitty's image in DNA shape.[115] Genetic representation is the process of expressing functions and attributes functions in code.[116] Kitty DNA contains data on colour, fur type, facial expressions, clothes and other items that constitute the kitty image. The DNA consists of a 256 bit number which encodes the kitty's attributes.[117] Each kitty has a distinct DNA which includes the appearance (phenotype) and immutable genes (genotype) which are stored in a smart contract. A

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[114] See CryptoKitties <https://www.cryptokitties.co/> accessed 1 February 2018. See also CryptoKitties, 'White Pa-Purr, CryptoKitties: Collectible and Breedable Cats Empowered by Blockchain Technology' (CryptoKitties White Paper, 2017) <http://upyun-assets.ethfans.org/uploads/doc/file/25583a966d374e30a24262dc5b4c45cd.pdf?_upd=CryptoKitties_WhitePapurr_V2.pdf> accessed 1 February 2018.
[115] The technology is not new, see Elco den Heijer and Agoston Endre Eiben, 'Evolving Pop Art Using Scalable Vector Graphics' in Puenousal Machado, Juan Romero and Adrian Carballal (eds), *Evolutionary and Biologically Inspired Music, Sound, Art and Design* (Springer 2012) 48-59.
[116] The process is not entirely new. For example, Pandora, the internet radio streaming service, uses the Music Genome Project to aid music discovery for its users. For a description of the gene representation in the Music Genome, see Marian Zsuzsanna and Christian Sacarea, 'Using Conceptual Graphs to Represent Modern Music' (IEEE 7th International Conference on Intelligent Computer Communication and Processing Intelligent Computer Communication and Processing, 2011) 138.
[117] CryptoKitties, 'Technical Glossary' <https://guide.cryptokitties.co/guide/glossary/technical-glossary> accessed 6 June 2018.

new kitty smart contract is born by the combination of the smart contracts of a mother and a father. The Genescience.mixGenes is the secret algorithm that combines the elements with a certain element of 'surprise', which makes the genes a lottery.[118]

b) ERC-721 smart contract

The smart contract standard enables the management and effective machine execution of the genetic algorithm in a manner not dissimilar to breeding in nature: the genes of parent A combine with the genes of parent B to generate baby C consisting of the mixed genes of the parents as well as other factors.[119] In other words, the smart contract supports the addition of a computer readable representation of a kitty's genetic algorithm and enables gene crossover via the so-called 'gene mix function'.[120] This is done via a new open source Ethereum smart contract, the ERC-721, which stands for 'Ethereum Request for Comment for standard 721' written in Solidity.[121] The ERC-721 is defined as 'a free, open standard that describes how to build non-fungible or unique tokens on the Ethereum blockchain.'[122] Each ERC-721 smart contract represents a unique token identifier of the kitty (consisting of a hash of the kitty, which is a unique identifier) and other metadata, such as its genome, which distinguishes each kitty. The birth of a kitty is logged as a 'transaction' on the blockchain.

The ERC-721 smart contract is not only a standard but also an ecosystem as the contracts are interoperable. For example, in CryptoKitties there is a Core Contract, which can be seen as the management of the kitties as it tracks the genotype of the cats; keeps a ledger of ownership and transfer of ownership; includes a break clause

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[118] For a visualisation, see JonJon Clark, 'CryptoKitties Genome Mapping' (*Medium*, 4 May 2018) <https://medium.com/newtown-partners/cryptokitties-genome-mapping-6412136c0ae4> accessed 6 June 2018. For a detailed breakdown of the kitty smart contracts, see James Martin Duffy, 'How to Code your Own CryptoKitties-Style Game on Ethereum' (*Medium*, 4 December 2017) <https://medium.com/loom-network/how-to-code-your-own-cryptokitties-style-game-on-ethereum-7c8ac86a4eb3> accessed 6 June 2018.
[119] This is called 'the secret recipe'. CryptoKitties Team, 'How to Breed Purrstige Traits' (*CryptoKitties Blog*) <https://www.cryptokitties.co/blog/post/how-to-breed-purrstige-traits/> accessed 6 June 2018. The first CryptoKitty ERC-721 was launched at the 2017 ETHWaterloo Ethereum hackathon by Axiom Zen. Axiom Zen, 'Cats Invade World's Largest Ethereum Hackathon' (*PR Newswire*, 17 October 2017) <https://www.prnewswire.com/news-releases/cats-invade-worlds-largest-ethereum-hackathon-651263323.html> accessed 6 June 2018.
[120] Clark (n 118).
[121] ERC721 <http://erc721.org/> 6 June 2018.
[122] ibid.

which enables these data to be stored in a future Core Contract should the current one become faulty; and maintains links to the library contracts.[123] These contracts govern the kitties automatically, for example, they track the genes of kitties, introduce genes to the Core Contract, combine phenotypes of the kitties to determine the genotype of a new one, and run kitty auctions.[124]

The smart contract also assigns a kitty token to its 'owner'. This is the person who bought or bred it. The smart contract limits the use of the kitty as it is impossible to transfer the token without permission or duplicate the contract, so that only the person who controls the wallet to which the individual kitty token is assigned can breed the cat with another cat. On the other hand, the image of the kitty may be copied. However, even if a third party can copy the resulting image of the kitty, the standalone image cannot be used for playing the game, ie breeding and selling. This makes it valueless in the game, thus limiting its monetary value.[125] The game splits the value between the smart contract and the image which are inextricably linked to play the game. Seen like this, the ERC-720 is the software that is behind a computer-generated image, which is the norm in computer games as all graphics are powered by software at the back end. The ERC-720 is a new way of managing the algorithm and the graphic involved in the computer game.

c) The kitty 'reader'

A new kitty image is assembled via a Scalable Vector Graphics (SVG) generator which is operated by Axiom Zen, the creator of CryptoKitties. A SVG is a graphics format used for two-dimensional applications and images.[126] Essentially, the programme reads the DNA from the smart contract to 'assemble' a kitty according to the 'catributes' assigned in the DNA in the smart contract.

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[123] CryptoKitties, 'Key Information' (*Cryptokitties*) <https://www.cryptokitties.co/Technical-details> accessed 6 June 2018. The Core contract allows for safety checks at certain steps of the process, see Etherscan, 'Contract Source Code' (*Etherscan*) lines 613-615, 'Contract 0x06012c8cf97BEaD5deAe237070F9587f8E7A266d' <https://etherscan.io/address/0x06012c8cf97bead5deae237070f9587f8e7a266d#code> accessed 6 June 2018.

[124] ibid CryptoKitties.

[125] For example, the image of the Kitty could be posted online or printed on t-shirts.

[126] W3, 'Scalable Vector Graphics' (*W3*) <https://www.w3.org/Graphics/SVG/> accessed 6 June 2018.

d) The licence

Once the kitty is generated, the user controls the smart contract which represents the kitty code. This can be stored in the user's wallet and traded. The image itself is owned by Axiom Zen and the owner of a kitty is given a worldwide, non-exclusive, non-transferable, royalty-free licence to use, copy and display the kitty for non-commercial as well some limited commercial objectives, such as selling the token and associated image, as well as selling merchandise based on the image associated with the token.[127] Interestingly, this licence in the kitty image is not stored or computed by the smart contract. Instead, it is made available on a third party website as well as the CryptoKitty blog.[128] It is likely this was decided for pragmatic and economic reasons as repeating the same text in each contract would cost Gas.

Genesis   Flutterbee

Figure 1 – CryptoKitties examples

2.6.3 Extrapolating the CryptoKitty model to other categories of works

The ERC-721 standard is developed and applied in the particular technological context of a niche business model: online collectables. In these contexts, the application of the smart contract standards brings additional benefits to users who can enjoy further permissions than traditionally given to users: end users can sell, trade, donate etc their in-game purchases. It is unclear if similar applications can be translated across to the classical online market for works. The internet crypto community has welcomed the

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[127] NFT License, 'Help Define what Ownership Means in Blockchain' (*NFT License*, 5 November 2018) <https://www.nftlicense.org/> accessed 18 January 2018.
[128] CryptoKitties Team, 'What Can I Do with my CryptoKitty' (*Cryptokitty Blog*) <https://www.cryptokitties.co/blog/post/when-you-purchase-a-cryptokitty-you-get-both-the-kitty-and-its-art/> accessed 18 January 2018.

CryptoKitty game as a new breed of scarcity in the digital environment. Indeed, the ERC-721 is fascinating from a copyright perspective as it may raise issues of subsistence, application of exclusive rights, infringement, exhaustion (exhaustion is discussed in the context of blockchain secondary markets in sub-section 3.3.2), etc.[129] For the purposes of this discussion, it can be observed that the TPM character of the ERC-721 smart contract is limited to what is necessary to game functionality. There is, however, at first sight, nothing inherent in the system which prevents the copying of the kitty images as such, which suggests that the system may have limited value in stopping infringement of the simple image work. This is not a problem for CryptoKitties as the images themselves are largely valueless. However, for the broader internet use of copyright works, where the value is present only in the work as such, this makes prevention of such copying necessary.

On the other hand, it may be possible to sketch an alternative view by taking a broader perspective of the application of this standard. For example, the CryptoKitty licence allows players to use the image of the kitty in other games developed by third parties on the condition that it is cryptographically checked if the uploaded kitty is actually lawfully controlled by the player. An increasing number of third party CryptoKitty-based games have been developed that generate further enjoyment for kitty owners. For example, Kitty Race allows owners of CryptoKitties to engage in races between their kitties. These games check if the user's blockchain wallet contains the token associated with the kitty.[130] If a user has no kitties associated with the account, then that user cannot play the game. This indicates that the smart contract is an effective permission authentication method.

Extrapolating this model to the broader spectrum of copyright works, an Ethereum smart contract standard could be developed to manage the process of making a work

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[129] For example, it is unclear which parts of the CryptoKitties game are protected by copyright and under which regime. In the *Nintendo* decision (n 55), the CJEU said that video games are part of complex multimedia works and therefore fall under the InfoSoc Directive see AG Sharpson paras 24-5, decision para 23. In addition, the Computer Programs Directive is seen as lex specialis therefore it applies to subject matter outside of InfoSoc Directive. For criticism of *Nintendo*, see Tito Rendas, 'Lex Specialis(sima): Videogames and Technological Protection Measures in EU Copyright Law' (2015) 37(1) EIPR 39. However, it is unclear if CryptoKitties would be treated in the same manner as centralized games, for example, a court could be split between the smart contract and the rights in the image.

[130] For example, the KittyRace game, see <https://kittyrace.com/> accessed 21 March 2019.

available online (with the help from some other intermediaries). For example, user 'A' goes to rightsholder 'B' to purchase a licence for a work 'C'.[131] The purchase of the licence for 'C' is tokenised by 'B' in a blockchain smart contract.[132] The token is sent to the purchaser's wallet. 'A' can only subsequently re-upload the work (for example, onto a website or platform) if it can be checked at the time of upload via the user's wallet and referenced to the smart contract that 'A' has the token to upload the work–much like Kitty Race checks if the uploader has the right to upload the kitty image by checking the user's wallet for the kitty token. The system would need additional technology for example a system that automatically rejects a copy of the work from being uploaded when it cannot be referenced back to the smart contract token. It would be interesting if such a system could be developed further so that some parameters of the licence, can be embedded in the token, such as commercial/non-commercial nature of the licence.

 In addition, such a system would require the collaboration of other entities and implementation of blockchain technologies at various layers of the internet, for example, WordPress could install a blockchain extension to automatically prevent the upload of copies of images the licence for which cannot be automatically cleared with reference to the smart contract. YouTube could also adopt such a system to add another layer to its Content ID system. Overall, with the help of additional infrastructure, Ethereum smart contracts may in the future, lead to an internet-wide authentication mechanism for licences in works. This is conditioned on whether Ethereum becomes further scalable. Indeed, rightholders could build their own purpose-built blockchain for this use.

However, the implementation of such a system would be undesirable for the broader public interest and would likely generate little public and institutional support outside rightholder lobby groups interested in the idea. This would create a high degree of control over the use of the work which may interfere with users fundamental rights,

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[131] This works on the assumption that rightholder B issuing the licence is the lawful owner of the work and has not cheated.

[132] For another proposal to use blockchain hashing as a watermark in copyright management, see Zhaoxiong Meng and others, 'Design Scheme of Copyright Management System Based on Digital Watermarking and Blockchain' (IEEE 42nd Annual Computer Software and Applications Conference, Tokyo, 2018) 359.

as it ex ante stops end users from uploading works online, which they may have a right to do under exceptions and limitations or if the work is in the public domain, as discussed further below in sub-section 2.8. Furthermore, the system could lead to the creation of registers of rightsholders which could fail foul of the prohibition of formalities on the exercise of rights in Article 5(2) of the Berne Convention, unless rightsholders voluntarily set up such as system.

2.6.4   ERC-1155: Management of a large number of tokens in a single smart contract

The ERC-1155 builds on the ERC-720 as it is a 'next generation' smart contract standard on the Ethereum blockchain. This standard has increasing real world adoption.[133] The ERC-1155 allows the incorporation of a blockchain token into a pre-existing digital item, for example, a picture or a character or other item in a computer game. The standard largely works for 'sand box' video games, such as World of Warcraft or Minecraft, which allow users to build their own gaming experience, including creating or buying in-game items.[134] Indeed, one main usage of this smart contract is in-game purchases such as weapons, characters and skins that are branded with ownership details and contain crypto value. The ERC-1155 enables these items to be branded with the details of their purchaser or assigned crypto value and be rendered exchangeable. Essentially, they can be traded, loaned and sold via the blockchain smart contract. In addition, the incorporated blockchain token may enable inter-game use (as long as the game has accepted a blockchain plug-in, which can be done with a service called Unity).[135] The process of adding the blockchain value to the work is called 'minting', which is defined as: 'Infusing gaming items with ENJ [the

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[133] Enjin, 'Build Blockchain Games' (*Enjin*) <https://enjincoin.io/> accessed 18 January 2018. For example, Enjin has developed a Minecraft plug-in which means that all game elements will be itemized. Beany Studios also adopted the ERC-1155 standard. James McQuillan, 'Beany Studio Becomes the Latest to Adopt the Enjin Platform' (*Blockchain Gamer*, 24 January 2019) <https://www.blockchaingamer.biz/news/8575/beany-studio-becomes-the-latest-to-adopt-the-enjin-platform/> accessed 18 January 2018; Jason Lee, 'Update: Samsung and Enjin to Partner on S10' (*Asia Crypto Today,* 8 March 2019) <https://www.asiacryptotoday.com/confirmed-samsung-and-enjin-to-partner-on-s10/> accessed 2 April 2019.

[134] For example, Minecraft says that: 'There's no one way to play Minecraft. It's an open-ended game where players decide what they want to do by themselves! We do offer several modes, though: Creative Mode, where players are given limitless resources to build whatever they can imagine; and Survival Mode, where players must explore the world and mine its resources to feed, house and defend themselves.' Minecraft, 'What is Minecraft? How to Play' (*Minecraft*) <https://minecraft.net/en-us/what-is-minecraft/> accessed 18 January 2018.

[135] For further details, see Enjin, 'Economics of a Gaming Cryptocurrency' (*Enjin*, 21 September 2017) <https://blog.enjincoin.io/economics-of-a-gaming-cryptocurrency-part-1-9e32a7842076> accessed 20 March 2019.

currency] and turning them into ERC-1155 tokens.'[136] A user can then sign the token which adds additional metadata. It appears that minting works as a QR code; it can be read by the blockchain to confirm value and authenticity or to confirm interoperability. The latter is known as multiverse which means that the token can be used by servers in different games. The process of 'minting' appears similar in rationale to existing processes of watermarking the image; the difference is that the blockchain mint adds additional functionalities to the work by introducing the hash value to the item, as well as other metadata or a cryptocurrency value which can then be used to enable the tracked and controlled transfer of the work across various platforms that support the smart contract. Essentially, the ERC-1155 smart contract enables the creation of a new reuse/resale economy of already purchased in-game items. Currently, this is supported by Enjin which is actively building a dApp (an app built on top of the blockchain) ecosystem around the ERC-1155 to provide various solutions for the proper functioning of such a marketplace.[137] Indeed, virtual reality game developers are interested in integrating ERC-1155 in their games.[138] Once more details emerge as to how the minting process takes place, an assessment can be made about whether it can be applied to other interactive works.

2.6.4.1 Technical aspects of the ERC-1155

Earlier contracts such as the ERC-721 can only support one token whereas the ERC-1155 can hold an unlimited number of tokens as it uses a common code for all which is stored in a central smart contract. This can be referred back to, thus avoiding repetition of the code. In the ERC-1155, the transaction can take place between accounts linked to one single main contract. In addition, the contract permits the creation and management of multiple classes of fungible tokens (MCFTs) within a

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[136] Enjin, 'How Does Enjin Coin Work' (*Enjin*, 21 September 2017) <https://blog.enjincoin.io/how-does-enjin-coin-work-c305a7aa600e> accessed 20 March 2019.

[137] CrushCrypto, 'ICO Review: Enjin Coin (ENJ)' (28 September 2017) <https://crushcrypto.com/wp-content/uploads/2017/09/CrushCrypto-ICO-Review-Enjin-Coin.pdf> accessed 21 March 2019. Minting requests a developer to upload the image which is to be minted for a fee. The developer receives an image encrypted with the token which represents a cryptovalue value of the item, and certifies its authenticity is blockchain compatible. At the moment, only static images appear to be mintable, which amounts to an important limitation to the system. It will be seen if interactive items, like digital characters, music or video items become part of the ecosystem. The creators of the ERC-1155 remain hopeful.

[138] CryptoCollectors, 'VR Development Studio to Implement Blockchain-based Assets Using Enjin Coin Platform' (18 September 2018) <https://thecryptocollectors.com/vr-development-studio-to-implement-blockchain-based-assets-using-enjin-coin-platform/> accessed 21 March 2019.

single smart contract. Unlike the ERC-20, which works for fungible tokens, and the ERC-721, which only applies to non-fungible tokens, the ERC-1155 manages different classes of tokens within a single smart contract. This means that a user can use the standard to trade both excludable and non-excludable items.[139] For example, a user can mint excludable items the likes of which may be many in a game, such as gold or weapons, or unique custom-made items. Furthermore, the user can mix various types of tokens into a bundle token which can then be branded into a collectable item. Therefore, a smart contract can support a full range of transactions of various types of works. The distinction between tokens is done via the lowest common denominator. The advantage of this set-up is the dramatic reduction in Ethereum transaction fees as selling, trading, renting tokens does not involve transactions between multiple smart contracts which cost Gas, as would be the case with the ERC-721.[140]

2.6.5   Extrapolating the ERC-1155 to broader categories of works

It would be interesting if the ERC-1155 could be adapted and expanded to ensure new ways of protection for other categories of works that were outside the context of sandbox computer games. The key characteristics of the ERC-1155 are that a single blockchain smart contract can track the movements and transactions of a large number of tokens, and that in-game items can be 'minted' with a value. In light of these elements, a hypothetical scenario may be advanced where the ERC-1155 or similar contract could be used in the context of a digital 'vending machine' like CDS. An entity may enter metadata and rights in the works available in their catalogue as a token in an ERC-1155. Then works are branded with metadata and private use permission written in simple computer readable terms when a user requests a copy of a work for private use.[141]

As above in sub-section 2.6.3, should the user wish to make the work further available, an additional system incorporated in websites could be designed so that it prevents the upload of works made and branded with private use data. Again, this would carry

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[139] Witek Radomski, 'ERC-1155: The Crypto Item Standard' (*Enjin*, 24 June 2018) <https://blog.enjincoin.io/erc-1155-the-crypto-item-standard-ac9cf1c5a226> accessed 21 March 2019.
[140] GitHub, 'ERC: Multi Token Standard' (*GitHub*, 17 June 2018) <https://github.com/ethereum/EIPs/issues/1155> accessed 21 March 2019.
[141] However, this use may play into the RMI nature of the technology.

limitations as not all technical intermediaries would wish to incorporate such systems. There is also certainly nothing in the system to stop the users from sharing the private use copies in peer-2-peer networks. Furthermore, it is not yet known how easily blockchain 'branding' can be removed, and whether it raises any additional technical challenges to circumventors than other watermarks. Therefore, although these systems may have some TPM role, it might be very easy to circumvent them.

2.7 Legal consequences of considering blockchain technologies as TPMs

When blockchain technologies work as a copyright TPM, then they might qualify for protection against circumvention in Article 6(1) Infosoc Directive which implements Article 11 of the WIPO Copyright Treaty (WCT) and Article 18 of the WIPO Performances and Phonograms Treaty (WPPT). Article 6(1) places Member States under the obligation to provide 'adequate legal protection against the circumvention of any effective technological measures, which the person concerned carries out in the knowledge, or with reasonable grounds to know, that he or she is pursuing that objective'.[142] Protection is given against the 'manufacture, import, distribution, sale, rental, advertisement for sale or rental, or possession for commercial purposes of devices, products or components or the provision of services'.[143] These have to be 'promoted, advertised or marketed for the purpose of circumvention'[144] or 'have only a limited commercially significant purpose or use other than to circumvent'[145] or 'are primarily designed, produced, adapted or performed for the purpose of enabling or facilitating the circumvention of any effective measures'.[146] Given that acts of circumvention require specialist tools, the proliferation of such tools would have a damaging effect on rightholder interests.[147]

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[142] Although prior to the WIPO internet treaties, no international copyright convention contained provisions on technical measures. The idea of technical protections on works can be dated back to the WIPO Committee of Experts on Model Provisions for Legislation in the Field of Copyright, 'Draft Model Provisions for Legislation in the Field of Copyright' (20 October 1988); Mihály Ficsor, *The Law of Copyright and the Internet* (Oxford University Press 2002) points 6.01-6.07.
[143] InfoSoc Directive (n 2) art 6(2).
[144] ibid art 6(2)(a).
[145] ibid art 6(2)(b).
[146] ibid art 6(2)(c).
[147] ibid, for similar views see, Mihály Ficsor, *Guide to the Copyright and Related Rights Treaties Administered by WIPO and Glossary of Copyright and Related Rights Terms* (WIPO 2003) 217; Jorg Reinbothe and Silke von Lewinsky, *The WIPO Treaties on Copyright: A Commentary on the WCT, the WPPT and the BTAP* (Oxford University Press 2015) 144.

To enjoy protection against such acts, a blockchain-based DRM would have to be 'effective'. Recital 4 InfoSoc Directive states that protection against circumvention should be provided only in respect of TPMs that 'effectively restrict acts not authorised by the rightholder of any copyright, [and] rights related to copyright of the sui generis right in databases, but must not a) prevent the normal operation or technological development of electronic equipment' and 'b) prohibit devices or activities which have a commercially significant purpose' other than circumvention. In the *Nintendo* case, referred by the Milan District Court, the CJEU interpreted the concept of 'effective technological measures'.[148] Nintendo had installed on its consoles a TPM to prevent infringing games being played on the console.[149] The CJEU defines the concept of 'effective technological measures' broadly and in light of the 'high level of protection' objective stipulated in the InfoSoc Directive to include the application of access control or protection measures, such as encryption, scrambling or other transformation of the work or copy control mechanism, 'if their objective is to prevent or to limit acts adversely affecting the rights of the holder protected by them'.[150] While the definition of the concept appears rather circular, the benchmark of effectiveness is revealing as 'effectiveness does not have to be absolute'.[151] Therefore, the measures that are less than objectively effective will still be protected. Furthermore, the CJEU applied a cost-benefit analysis as account should be taken of the costs of TPMs, their implementation, and comparison with other effective measures.[152] This is to give effect to the principle of proportionality so that measures that are less intrusive could have achieved the same function.[153] The application of the notion of effectiveness should not raise many issues for blockchain technologies

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[148] In a similar fashion, see AG Sharpson who states that effective may mean, 'if not preventing at least reducing unauthorised reproduction'. The AG differentiates between an 'indirect effect' consisting in restricting access as opposed to 'direct effect' consisting in the immediate prevention of unauthorised copies on Nintendo consoles but stating that Article 6 Infosoc Directive does not make reference to the directness of effect. As long as 'unauthorised copies are unusable (at least on Nintendo consoles), that is likely to have a significant restrictive effect on their production and thus their subsequent distribution.' *Nintendo* (n 55) para 47.

[149] ibid para 10.

[150] ibid paras 27-28.

[151] ibid para 33. This standard was applied subsequently in the content of blocking measures, although the reference on effectiveness linked to the Enforcement Directive. Directive 2004/48/EC of the European Parliament and of the Council of 29 April 2004 on the enforcement of intellectual property rights ('Corrigendum to') [2004] OJ L195/16.

[152] ibid.

[153] ibid paras 31-32. On proportionality, see Herman Cohen Jehoram, 'European Copyright Law – Ever More Horizontal' (2001) IIC 32(5) 544. European Commission, 'Follow-up to the Green Paper on Copyright and Related Rights in the Information Society' COM (96) 568 final, 17.

applied to the protection of works as these are already of a higher grade than regular TPMs.

An alternative and potentially overlapping protection comes from Article 7(1)(c) of the Software Directive if blockchain software can be seen as a literary work. The Software Directive contains a narrower anti-circumvention provision than the Infosoc Directive as it prevents 'any acts of putting into circulation or possession for commercial purposes any means the sole intended purpose of which is to facilitate the unauthorised removal or circumvention of any technical device which may have been applied to protect a computer program'.[154]

However, given the open source construction of smart contracts, the anti-circumvention provisions may not apply at all on first impression as the technology was originally made available under the GNU General Public License (GPL) version 3. The ERC standards built into Ethereum's Solidity programming language fall under this.[155] It is known that the consequence of creating other work from GNU/GPL licensed software is that the entire resulting work is licensed under the GNU/GPL licence.[156] That specific licence negatively affects the application of an anti-circumvention provision:

> No covered work shall be deemed part of an effective technological measure under any applicable law fulfilling obligations under article 11 of the WIPO copyright treaty adopted on 20 December 1996, or similar laws prohibiting or restricting circumvention of such measures.

The licence continues by stating that:

> When you convey a covered work, you waive any legal power to forbid circumvention of technological measures to the extent such circumvention is effected by exercising rights under this License with respect to the covered work, and you disclaim any intention to limit operation or modification of the work as a means of enforcing, against the work's users, your or third parties' legal rights to forbid circumvention of technological measures.[157]

Although the text does not prohibit the application of TPMs as such, it may allow the circumvention of such measures. As explained by Eckersley, the effect of this clause may have important effects on TPM developers that apply GPL/GNU version 3

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[154] Council Directive 91/250/EEC of 14 May 1991 on the legal protection of computer programs [1991] OJ L122/42, art 7(1)(c).
[155] GitHub, 'Solidity: The Contract-Oriented Programming Language' (*GitHub*) <https://github.com/ethereum/solidity> accessed 21 March 2019.
[156] GitHub, 'GNU: General Public License v3.0' (*GitHub*) sections 4 and 5 <https://github.com/ethereum/solidity/blob/develop/LICENSE.txt> accessed 21 March 2019.
[157] ibid 3.

licensed components: 'Those whose businesses depend on the strength of their DRM will certainly have to take evasive measures — either migrating away from GPLv3-licensed platforms, or forking projects to maintain their own GPLv2-only versions.'[158]

There are a number of issues with this point. When TPMs may be generated from a smart contract standard via Solidity programming language, the resulting TPM may be released under any type of liance. Indeed, the majority of the outputs using Solidity are released under more permissive languages, therefore the GPL v3 issue may never arise. For example, the Enjin smart contract discussed above is released under the Apache open licence.[159] Furthermore, should any blockchain TPM be released under GPL v3 in the future, Eckersley's predictions never transpired to the exent that there has been any dispute between providers of software under GPL v3 and rightholders. Therefore, any conflict between blochain TPMs and anti-circumvention legislation may remain only theoretical.

In a surprising twist, ERC smart contracts may themselves fall foul of others' anticircumvention protection. Although the developers of the ERC-1155 say that the smart contract limits fraud in game purchases, for example, if implemented in a game only 'minted' in-game items could be traded, the standard may also generate instances of infringement, which may be seen as a limit to its adoption. The issue is whether minting of existing in-game items from a pre-existing game can be seen to actually circumvent protection measures as it adds an additional element to a digital piece of content, hence generating more infringement. For example, Minecraft protects in-game content which is made by the game developers while content made by the user independently for the game is owned by the user. Yet differentiating between the two is not always easy, for example, when the user makes in-game content which includes parts of the code of the game. So, for example, should a sword be 'minted' in an ERC-1155 smart contract, and traded with another user for cryptocurrency, the addition of the hash required to link the in-game item with the blockchain measures may

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[158] Peter Eckersley, 'C—lefting the DMCA: An Analysis of DRM and Version 3 of the GP' (Draft for WEIS 2006 submission) 14
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.113.7648&rep=rep1&type=pdf> accessed 21 March 2019.
[159] GitHub, 'Enjin/Contracts' (*GitHub*) <https://github.com/enjin/contracts> accessed 22 August 2019.

circumvent the TPMs installed by the game developers. The consent of the computer game developer for in-game integration of smart contract plug-ins appears paramount.

2.7.1 Evaluation

It is uncontroversial that blockchain TPMs should satisfy the thresholds for the application of anti-circumvention provisions, thus further reinforcing protection. Yet if these technologies are developed open source and under the GNU/GPL version 3, this may undermine the anti-circumvention provision, thus rendering these devoid of protection. This is not limited to ERC contracts as described above but extends to any type of blockchain technology developed that way. Whether GNU/GPL version 3 can bypass anti-circumvention legislation is still an open issue. Yet if blockchain technologies are applied to works protection, and the circumvention of these measures is legal, a strange situation may result as the application of blockchain measures as TPM may generate stronger protection effects, but that protection will be taken away by the lack of circumvention protection. However, this scenario remains only theoretical as in the existing market software elements are implemented in TPMs but no one has claimed that these TPMs can be circumvented on the basis of GNU/GPL version 3 where applicable. In this context, it may well be that blockchain TPMs will be treated as covered by anti-circumvention provisions.

2.8 Exploring the relationship between blockchain TPMs and the 'public interest'

This section will explore the potential intersection between blockchain TPMs (assuming that these may be protected by anti-circumvention provisions and they take off) and the public interest, which is seen in this chapter as the 'public domain' and exceptions and limitations (E&Ls) as per Article 5 Infosoc.[160] It is not overlooked that the existence of copyright law in itself is justified partly by a public interest rationale.[161] Instead, the public domain and E&Ls narrow down as aspect of 'public

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[160] On the structure of the public domain, see Guido Westkamp, 'Code, Copying, Competition: The Subversive Force of Para-Copyright and the Need for an Unfair Competition-based Reassessment of DRM Laws after Infopaq' (2010) 58 J Copyright Socy USA 665, 677; Valérie-Laure Benabou and Séverine Dusollier, 'Draw me a Public Domain' in Paul Torremans (ed), *Copyright Law: A Handbook of Contemporary Research* (Edward Elgar 2009) 161-184.

[161] In the UK, the Statute of Anne, the first copyright act, vested a right in the author for the advancement of learning. In France, the right provided by the 1791-1793 French Decrees were understood as: 'une droit exclusive ... [c]e droit est temporaire … l'intérêt public exige aussi, au nom de la diffusion des oeuvres, que le monopole ne soit pas éternel, et que l'oeuvre puisse rentrer dans le

interest' which could be negatively affected by the application of blockchain TPMs. This flags up the potentially negative side effects of blockchain TPMs which may affect the 'fair balance' between the interests of rightholders and users expressed in Recital 31 of the InfoSoc Directive. Moreover, it is not unreasonable to advance that the application of TPMs should also respect the principle of proportionality between the interests of rightholders and users' fundamental rights.[162] Thus, signposting if and which blockchain TPMs might interfere with public interest goals may have the effect of informing the sustainable development of these technologies before the proverbial cat is out of the bag. Indeed, given the novelty and complexity of blockchain as a TPM, it is yet unknown how palatable it may be to users. It is important to flag up potential areas of misuse. First, the notions of public domain and E&Ls will be explained to give a background understanding of the stakes involved. Second, the interaction between blockchain TPMs and public domain and E&Ls will be considered. Regarding the latter, the legal safeguards available to users in Article 6(4) will be discussed. Recommendations ensue in the conclusions.

The public domain, defined narrowly, largely consists of un-copyrightable material and of works for which copyright has expired, both of which can be used without rightholder permission.[163] Also known as 'the commons', this space has important cultural-economic functions. The public domain fosters creativity through the free (re)use of elements from the public domain such as ideas, principles and works out of

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domaine public'. See Latournerie cited in Rosemary Peters, *Stealing Things: Theft and the Author in Nineteenth-Century France* (Lexington Books 2013) 151.

[162] Advocating proportionality in the application of TPMs, Ole-Andreas Rognstad and Joost Port, 'The Right to Reasonable Exploitation Concretized: An Incentive-based Approach' in P Bernt Hugenholtz (ed), *Copyright Reconstructed: Rethinking Copyright's Economic Rights in a Time of Highly Dynamic Technological and Economic Change* (Kluwer 2018) point 5.4.2.5. Indeed, the Information Society Directive has created the strange situation where Recital 48 InfoSoc Directive refers to proportionality in the legal protection of TPMs yet no mention appears on proportionality in the initial application of TPMs. On the balance between property rights, fundamental rights and TPMs, see Jütte (n 30) 395-399.

[163] Europeana Foundation, 'Public Domain Charter' <http://www.europeana.eu/portal/rights/public-domain-charter.html> accessed 6 March 2014. The original source of the public domain concept is David Lange, 'Recognizing the Public Domain' (1981) 44 Law and Contemporary Problems 147. Cohen states that the expression 'public domain' is inappropriate because it 'creates a misleading impression of geographic discreteness that muddies thinking about the practical accessibility of the common elements in culture'. Julie E Cohen, 'The Place of the User in Copyright Law' (2005) 74 Fordham Law Review 347, 367. Instead, she offers the metaphor of 'cultural landscape' to reflect the cultural importance of the commons. See Julie E Cohen, 'Copyright, Commodification, and Culture: Locating the Public Domain' in L Guibault and PB Hugenholtz (eds), *The Future of the Public Domain* (Kluwer 2006) 121; Séverine Dusollier, 'A Positive Status for the Public Domain' in Dana Beldiman (ed), *Innovation, Competition and Collaboration* (EE 2015) 135.

protection. At the same time, the public domain serves as a low-cost educational resource. Furthermore, social value can be drawn from the simple enjoyment of artistic and literary material that has fallen into the public domain. Some of this material has important and universal creative value. Therefore, the public domain is a key element in the preservation of cultural heritage. From an economic perspective, the public domain aids innovation and economic growth as business models can be built upon fabric from the public domain.[164] It has long been argued that proliferation of TPMs may lead to the creation of de facto information monopolies to the detriment of public domain materials.[165] For example, TPMs could protect access to works for which copyright has expired.

A broader definition of the public domain is permission-less uses of works still under protection such as E&L and other uses not covered by exclusive rights such as rights to access the work.[166] E&Ls provide users, in certain circumstances, narrow freedoms to non-commercially use copyright protected works without the permission of the rightholder.[167] They facilitate the dissemination of cultural products and the creation of new works.[168] In the InfoSoc Directive, the rationale for E&Ls varies according to the nature of the specific exception or limitation, to include user's fundamental rights considerations, such as freedom of expression, or economic aspects such as market failure.[169] Furthermore, some E&Ls appeared as a response to technological change,

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[164] Examples from WIPO, Committee on Development and Intellectual Property, 'Scoping Study on Copyright and Related Rights and the Public Domain' (7 May 2010) WIPO Doc CDIP/4/3/REV/STUDY/INF/1, 14. For in depth assessment of the economic impact of the public domain, see Kris Erickson and others, 'Copyright and the Value of the Public Domain: An Empirical Assessment' (IPO, 20 January 2015) <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/561543/Copyright-and-the-public-domain.pdf> accessed 21 March 2019. For the public domain in a historic perspective, Jane Ginsburg, '"Une Chose Publique"? The Author's Domain and the Public Domain in Early British, French and US Copyright Law' in Torremans (n 159).
[165] EC Legal Advisory Board (n 44) 148.
[166] Benabou and Dusollier (n 159) 173.
[167] Dreier classifies E&Ls in three categories: E&Ls for 'very strong' pubic good grounds such as the safeguard of fundamental freedoms like the freedom of information and the freedom of expression, examples are exceptions for news reporting and reposting or exceptions for caricature and pastiche; E&Ls that serve other national public interests, such as research and private study; E&Ls in response to market failure, such as the private copy exception. See Thomas Dreier, 'Regulating Competition by Limitations and Exceptions' in Torremans (n 159) 235.
[168] Lucie Gibault, 'Evaluating Directive 2001/29/EC in the Light of the Digital Public Domain' in Melanie Dulong de Rosnay and Juan Carlos de Martin (eds), *The Digital Public Domain: Foundations for an Open Culture* (Open Book Publishers 2012) 63.
[169] Thomas Dreier, 'Limitations: The Centrepiece of Copyright in Distress - An Introduction' (2010) JIPITEC 1, 50.

such as the temporary copy exception.[170] E&Ls can be split into two further categories according to the effects they have on exclusive rights. The first is exceptions such as citation, parody and reporting of current events which are exceptions in the strict sense where the exclusive right is fully erased to the extent that the creator cannot oppose the use or claim any form of compensation for the use.[171] The second category covers the private copy exception where the rightholder retains some exclusivity to the effect that while the author cannot prohibit the use, he or she can receive fair compensation for it.[172]

An E&L catalogue of exceptions reflects the interests of the user public as they help achieve a fair balance between competing interests of rightholders and users.[173] However, E&Ls are under attack. Structurally, the catalogue of E&Ls is closed and harmonised which means that Member States may not introduce further freedoms, in spite of rapid technological change and changing social practices.[174] Interpretatively, while exclusive rights are given expansive meaning, many CJEU decisions interpret E&L narrowly and bar the application of the exception to the three-step test, further reducing their application.[175] Technically, the application of TPMs (including anticircumvention provisions) may strip the enjoyment of the work by the user on the basis of E&L ex ante.[176] Classic examples are when copy controls prevent the application of the private copy exception in Article 5(2) Infosoc Directive, which means that even if the user can make a further copy from a copy legally downloaded, TPMs de facto prevent that functionality.

The issue is whether the application of blockchain technologies to copyright works may have negative effects on users' rights. On one hand, given that the application of

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[170] Such a mix of justifications lacks the constitutional cache of exclusive rights as a form of property.
[171] Dusollier (n 31) point 542.
[172] ibid.
[173] Recital 31. However, priority is given to the rights of authors: 'first of all, it is to be noted that the principal objective of Directive 2001/29 is to establish a high level of protection of authors' see Case 325/14 *SBS Belgium v SABAM* EU:C:2015:764, para 14.
[174] The closed model of exceptions has been intensely criticised in the literature as inflexible. This was confirmed in *GS Media* (n 83).
[175] Jütte (n 30) 247.
[176] TPMs can control the use of the works to levels beyond those provided by law either by applying TPMs in ways that supersede permissioned uses (exceptions) or by enforcing contracts that provide for additional rights, see Thomas Dreier, 'Contracting Out of Copyright in the Information Society: The Impact on Freedom of Expression' in Jonathan Griffiths and Uma Suthersanen (eds), *Copyright and Free Speech Comparative and International Analyses* (Oxford University Press 2005) 389.

blockchain does not cover the whole range of TPMs, as copy controls are limited, the adverse impact of blockchain will be negligent to certain scenarios. However, in other situations, blockchain may have an adverse impact. Blockchain reinforced access controls can have a negative impact on preventing access to works into the public domain if access to these works is conditioned upon the payment of cryptocurrency. For example, should in the future, blockchain micropayment extensions be added to browsers, digital works in which copyright has expired would be automatically charged for. On the other hand, blockchain can also be applied to foster the public domain. As explained by Goldenfein and Hunter blockchain could be used to create a registry of orphaned works or 'of gray status works and clarified conditions for their use'.[177] The authors advance that a system of smart contracts that would transfer the status of a work between registries once the work falls into the public domain.[178] While the idea seems appealing, it remains to be seen how the smart contract system could be realised.

The application of blockchain technology as reviewed so far in this chapter may also have negative consequences in relation to certain exceptions. For example, should access to news articles move to a micropayment model, this could also interfere with the exception in Article 3(c) Infosoc on criticism and review.[179] These problems are most stark for example when cryptocurrency micropayments as access restrictions prevent access to breaking news stories unless payment is made.

To remedy such side effects, standards could be created and implemented into technology that prevent the over-broad application of blockchain micropayments. However, technology is a blunt instrument, best suited to an 'all or nothing' application. The issue here is what these standards should look like so that, for example, the blockchain micropayment may discriminate between content that is exempt under exceptions or in the public domain. So far, both in the context of existing TPMs as well as filtering technologies, the safeguard of these user freedoms is difficult because technology cannot differentiate between uses. This trajectory is likely to be

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[177] Jake Goldenfein and Dan Hunter, 'Blockchains, Orphan Works, and the Public Domain' (2017) 41(1) Columbia Journal of Law & the Arts 1, 5.
[178] ibid 24-25.
[179] InfoSoc Directive (n 2) art 5(3)(d).

followed by blockchain TPMs should they take off. An alternative approach may be to change the law on anti-circumvention and permit users to bypass blockchain measures that infringe the public domain or their liberties. This in essence would remove the decision-making from the machine ex ante to the internet user level. It is foreseeable that rightholders would vehemently oppose such a switch by arguing that internet users abuse the system and that users can already benefit from the safeguard in Article 6(4) InfoSoc Directive to safeguard their liberties.

2.8.1 Article 6(4): no relief for users

Article 6(4) of the InfoSoc Directive provides for a solution to the tension between the application of TPMs and copyright exceptions. However, as it will be shown below, the wording of Article 6(4) does not apply to exceptions that may be affected by the future application of blockchain TPMs. Article 6(4) provision appears as a compromise between Articles 5 and 6 by counterbalancing the expansive application of technical measures.[180] Dusollier describes Article 6(4) as a 'a delicate compromise between the friends and the foes of an absolute legal protection',[181] and as 'the most important and perhaps revolutionary part of the directive'.[182] This is because the provision is 'implying the exceptions are given a positive meaning, not only a defensive posture'.[183] Guibault, more forcefully, states that the provision is 'extremely complex, vague and prone to interpretation',[184] while Schack states that '[t]he rather lengthy provision of Art. 6(4) of the Directive leaves the impression that the EU did not know exactly what to do'.[185]

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[180] European Commission, 'Opinion Pursuant to Article 251(2)(c) of the EC Treaty, on the European Parliament's Amendments to the Council's Common Position Regarding the Proposal for a Directive of the European Parliament and of the Council on the Harmonisation of Certain Aspects of Copyright and Related Rights in the Information Society Amending the Proposal of the Commission Pursuant to Article 250(2) of the EC Treaty' COM (2001) 170 final.

[181] Severine Dusollier, 'Tipping the Scale in Favor of the Right Holders: The European Anti–Circumvention Provisions' in E Becker and others (eds), *Digital Rights Management* (Springer 2003) 462.

[182] ibid 464.

[183] Severine Dusollier, 'Fair Use by Design in the European Copyright Directive of 2001' (2003) 46(4) Communications of the ACM 51.

[184] Lucie Guibault, 'Evaluating Directive 2001/29/EC in the Light of the Digital Public Domain' (International Conference on the Public Domain in the Digital Age 2008) 10 <https://communia-project.eu/communiafiles/conf2008p_Evaluation_of_the_directive_2001-29-EC.pdf> accessed 21 March 2019.

[185] Haimo Schack, 'Anti-Circumvention Measures and Restrictions in Licensing Contracts as Instruments for Preventing Competition and Fair Use' (2002) University of Illinois Journal of Law Technology and Policy 325.

Article 6(4) safeguards the legitimate interests of users in (some) exceptions by placing a limitation on the application of TPM in order to allow users the exercise of such E&Ls when they have legal access to the work. Therefore, in theory this provision should then help safeguard the interests of users from the application of TPMs, including new blockchain ones, should these develop to negatively affect existing liberties. Unfortunately, Article 6(4) includes only seven of the twenty exceptions available in the Infosoc Directive. Looking at the list of exceptions covered by Article 6(4), paragraph one, very few will be relevant to acts of regular internet users as many apply to legal persons.[186] For example, should micropayments be charged for newspaper access, this may affect the application of the exception on criticism and review.[187] Furthermore, Article 6(4) does not contain any provisions that safeguard the public domain. Indeed, most of the provisions relevant to online use, such as criticism and review, are not included in the provision. The relevance of the provision to the daily access by internet users to content blocked by potentially overzealous TPMs such as access micropayments is limited. Although Article 6(4) does include the private copy exception, as blockchain's function as a copy control is limited, this also limits any potential future unsavoury side effects upon making copies for private use.

2.9   Conclusions

The theme of the chapter was the manner in which blockchain technology may have a role in the technical enforcement of copyright and the impact it has on the public interest which largely reflects the end users interests. The chapter opened by explaining the role of TPMs in rights protection followed by an outline of the opposing views surrounding the use of blockchain in this manner.   To address the debate the chapter showed how blockchain might fulfil the definition a TPM from the perspective of article 6(3) InfoSoc with reference to various forms of access controls and copy controls.

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[186] Exceptions covered are InfoSoc Directive (n 2) arts 5(2)(a), (2)(c), (2)(d), (2)(e), (3)(a), (3)(b) or (3)(e).
[187] InfoSoc Directive (n 2) art 5(3)(d).

The discussion revealed that blockchain is a TPM in certain situations, but it may have limited application as a copy control. This is largely unproblematic as there is no one TPM that may fulfil all functions. However, blockchain as access controls appears promising, for the reason that it may offer superior technological protection when applied as traditional access restrictions such as passwords. A more intriguing use is blockchain as micropayments access restrictions, should these become readily available and applied in an interoperable manner to be included in various internet technologies such as websites and browsers.

From the perspective of public interest, specifically in this chapter as the public domain and exceptions and limitations, broad application of micropayment access restrictions may be problematic. For example, it was argued that micropayments could be charged for what is otherwise be in the public domain. If applied extensively, micropayment access controls may have a negative effect on the application of the exception, for example in 5(3)(d) on criticism and review as they would not be able to access sources but for a fee. End users would not be able to legally circumvent micropayment access restrictions thanks to Article 6(1) InfoSoc. Furthermore, conditioning access to the majority of content online on micropayments, this may impair end user's freedom to access and impair information as per Article 11 of the Charter of Fundamental Rights. Furthermore, the application of an access restriction in this manner would not reduce end users infringement as viewing works online is not an infringement.

Another finding is that blockchain TPMs may also enable new forms of content usage as shown with reference to examples from the blockchain online collectible end in game purchases market. There, Ethereum smart contracts enable users to enjoy further benefits from the use of the work than they are permitted with other types of works, such as films. Furthermore, third parties can benefit from the liberty enabled therein as users can multitask their blockchain collective purchases. A number of third party games have developed for example on the back of the Cryptokitty game. Blockchain in that context, as it can perfectly track the ownership of the in game item/ collectible enables all parties to win, the original game developers, the users, and other game developers. If the model could be taken up in the distribution of other categories of

works in other to provide further liberties to users, this may reduce end user incentive to infringe, an aspect is discussed at length however in the next chapter.

3 Chapter 3 More carrot and less stick: the role of blockchain technology in increasing end user consumption of licenced content

3.1 Introduction

Improvements in the legal market, either facilitated by legal intervention or by innovation initiated by players in the market, can be seen as a 'carrot' response to online infringement.[1] A major premise of the chapter is that increased efficiency by offering users licensed creative works reduces levels of infringement.[2] This chapter critically analyses several proposals which harness blockchain technology with a view to improving the offering of licensed content to the end user. This feeds into the research question as it presents yet another avenue for blockchain to contribute to solutions for online infringement, in addition to direct enforcement of exclusive rights.

The link between a rich market for legal content and a reduction in infringement by users is recognised both at national and at EU level. In the UK, the Hargreaves Review stated that when enforcement and education failed, businesses that responded by making available services at a lower price and in an attractive format experienced success.[3] This suggests content such as music is price elastic and that users are sensitive to changes in price and availability in the legal market.[4] At EU level, an early

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[1] Rajiv K Sinha and Naomi Mandel, 'Preventing Digital Music Piracy: The Carrot or the Stick?' (2008) 72 Journal of Marketing 1, 12. They find that a rich legal offering reduces incentives to infringe digital works.

[2] Petteri Günther, 'The Plan for a Digital Single Market in Europe and Reforming EU Copyright Rules to Develop a Market-oriented Approach to Reduce Infringement on the Internet' (2016) 38(1) EIPR 43. He states that enforcement measures should be supplemented by improving the functionality of the legal market to increase legitimate sales. Similarly, Evi Werkers, 'Intermediaries in the Eye of the Copyright Storm' (15 August 2011) 12. She states that the problems of the legal market should be addressed in addition to enforcement.

[3] Ian Hargreaves, 'Digital Opportunity: A Review of Intellectual Property and Growth' (May 2011) 79 <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/32563/ipreview-finalreport.pdf> accessed 24 March 2019.

[4] For evidence of price elasticity of demand, see Christian Handke, Bodo Balazs and Joan-Josep Vallbe, 'Going Means Trouble and Staying Makes it Double: The Value of Licensing Recorded Music Online' (2016) 40(3) Journal of Cultural Economics 227, 235-236; Dietmar Harhoff and others, 'Nutzung Urheberrechtlich Geschützter Inhalte im Internet durch Deutsche Verbraucher Ergebnisübersicht einer Repräsentativen Quantitativen Erhebung' (Max Planck Institute for Innovation and Competition, 22 January 2018) 3 <https://www.ip.mpg.de/fileadmin/ipmpg/content/projekte/Nutzerverhalten_Kurzbericht.pdf accessed 24 March 2018> accessed 24 March 2019.

draft of the Collective Rights Management Directive (CRM Directive hereinafter)[5] stated that '[t]he development of legal online music services across the Union should also contribute to the fight against piracy'.[6] However, the point did not feature in the adopted Directive's text. Instead, the Directive takes a more nuanced approach as it refers to the fragmentation of the European market for online music services which is 'in stark contrast to the rapidly growing demand on the part of consumers for access to digital content and associated innovative services, including across national borders'.[7] A number of empirical studies suggest a correlation between availability of content, lower content prices and reduction in levels of infringement, especially in relationship to musical works.[8] Although correlation does not mean there is a causal relationship, a link between the two may be established.

This chapter analyses the application of blockchain for the creation of licensing solutions across a number of categories of works, such as music, films and images. The first part of the chapter examines the historical role of RMI in EU copyright licencing, then proceeds to discuss the use of blockchain technology as a RMI applicable at different levels of the content supply chain: such as direct individual licensing, CMO level solutions and other intermediaries.[9] The chapter argues that

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[5] Directive 2014/26/EU of the European Parliament and of the Council of 26 February 2014 on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market [Collective Rights Management Directive] [2014] OJ L84/72.

[6] Marielle Gallo, 'Report on the Proposal for a Directive on Collective Management of Copyright and Related Rights and Multi-territorial Licensing of Rights in Musical Works for Online Uses in the Internal Market' (European Parliament, A7-0281/2013, 4 October 2013) Recital 24 <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+REPORT+A7-2013-0281+0+DOC+XML+V0//EN> accessed 24 March 2019.

[7] Directive 2014/26/EU of the European Parliament and of the Council of 26 February 2014 on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal market [2014] OJ L84/72, Recital 38.

[8] Joost Poort and Jarst Weda, 'Elvis is Returning to the Building: Understanding a Decline in Unauthorized File Sharing' (2015) 28 Journal of Media Economics 63, 79. This finds empirically a gradual shift in music towards legal sources; Joost Poort and João Pedro Quintais, 'Global Online Piracy Study' (Ivir and Ecorys, 2018) 8 <https://www.ivir.nl/publicaties/download/Global-Online-Piracy-Study.pdf> accessed 24 March 2019. This argues for a connection between piracy by end users and availability and affordability of content; YouGov, 'YouGov's Music Report' (*YouGov*, 2018) <https://yougov.co.uk/topics/arts/articles-reports/2018/08/02/number-britons-illegally-downloading-music-falls> accessed 24 March 2019. One survey respondent stated it is now easier to stream music than to pirate it and the cost is not prohibitive.

[9] For example, Licence.rocks proposes a blockchain solution for the resale of software. <https://license.rocks/service> accessed 24 March 2019; Sarah Peres, 'Spotify Acquires Blockchain Startup Mediachain to Solve Music's Attribution Problem' (*TechCrunch*, 2017) <https://techcrunch.com/2017/04/26/spotify-acquires-blockchain-startup-mediachain-to-solve-musics-attribution-problem/> accessed 24 March 2019.

although some proposals are innovative and have the potential to contribute value to content licensing, the nuts and bolts of the projects mean that it will be some time until they are fully rolled out. The second part of the chapter reveals how in some situations the application of blockchain is symbolic. As it will be discussed in greater detail in sub-section 3.4.3, some projects may not only 'free ride' the blockchain popularity but also become linked to a controversial licensing business model. This is the opposite of the legal market-enhancing objective sought in this chapter. Instead, the application of blockchain in a negative context may further adversely affect the credibility of the technology, which already suffers from an image problem.[10]

3.2   Part 1. Blockchain technology as a basis for licencing systems

This section will analyse the application of blockchain technology as a rights managements information system and licencing tool and how this may enable new forms of licencing of digital content. The section will argue that blockchain inspires innovative proposals which may streamline aspects related to digital revenue distribution solutions or generate new forms of direct licencing between end users and consumers via the use of smart contracts. The section will also argue that the success of these proposals is still unclear by taking into account their potential for failure, unclear market acceptance and sometimes legal barriers to their feasibility.

3.2.1   The role of RMI in EU copyright management

The role of RMI in copyright management, as part of a technical set-up including other DRM, is key in both individual and collective management of copyright. Technology can serve a function in the licensing of works by providing a technical infrastructure for the individual and collective management of copyright and related rights. This can be done by developing technical solutions to clear rights and secure payments, track user preferences and enforce rights. As already noted in the previous chapter, an overlap between enforcement and licensing can thus be inferred. As mentioned by the EU Commission, DRMs are essential in the development of 'new high volume, low

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[10] For example, cryptocurrency is linked with illegal activity, such as money laundering, see Robert Stokes, 'Virtual Money Laundering: The Case of Bitcoin and the Linden Dollar' (2012) 21(3) Information and Communications Technology Law 221; Robert Stokes, 'Anti-money Laundering Regulation and Emerging Payment Technologies' (2013) 32(5) Banking & Financial Services Policy Report 1, 7 in which he argues that laundering opportunities may be more perceived than real.

transactional value business models such as models that charge for access, usage, subscription, advertising revenue, etc.[11] The choice of the applying technology and the appropriateness of such technology is left to the stakeholders with the goal to ensure interoperability.[12] The enthusiasm of the EU Commission over DRM prompts the classification of DRM as the important tool for rights management in the Internal Market for new digital services.[13]

Article 7(2) of the InfoSoc Directive defines RMI as:

> Any information provided by rightholders which identifies the work or other subject-matter referred to in this Directive or covered by the sui generis right provided for in Chapter III of Directive 96/9/EC, the author or any other rightholder, or information about the terms and conditions of use of the work or other subject-matter, and any numbers or codes that represent such information.[14]

Blockchain technology will thus qualify as a RMI once it is used to identify the work, author or rightsholder, terms and conditions and 'any number of codes that represent such information'. Then, Article 7(1) of the InfoSoc Directive places Member States under the obligation to provide legal protection against persons who knowingly remove or alter RMIs, who distribute, broadcast, communicate or make available to the public works whose RMIs have been removed or altered.

3.2.2   Blockchain technology as a RMI database

Blockchain technology is advanced as a solution to the RMI problem in music, which relates to the absence of a single database which contains data of the ownership of rights in a song as these rights are split between various rightholders. This leads to barriers in licensing music online, for example, due to conflicting claims regarding the rights in the same work. It is advanced that blockchain may be used as an interoperable and open public database for merged records between various stakeholders such as

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[11] European Commission, 'Communication from the Commission to the Council, the European Parliament and the European Economic and Social - Committee The Management of Copyright and Related Rights in the Internal Market' COM (2004) 261 final 10.

[12] ibid 11.

[13] ibid 10.

[14] At the international level, see WIPO Copyright Treaty (adopted 20 December 1996, entered into force 6 March 2002) art 12; WIPO Performances and Phonograms Treaty (adopted 20 December 1996, entered into force 20 May 2002) art 19. For commentary, see Mihaly Ficsor, 'Protection of "DRM" under the WIPO "Internet Treaties": Interpretation, Implementation and Application' in Irini A Stamatoudi (ed), *Copyright Enforcement and the Internet* (Kluwer Law International 2010) 297-298.

government bodies, collecting societies, publishers and online platforms.[15] The blockchain record would make available important information privately collected over the assignment of various rights in the work, their use, and to avoid duplication, enhance transparency and reduce costs. Currently, such data are locked away in private databases of, for example, collecting societies. In addition, use data are held by online platforms. The perceived advantage of blockchain technology is that anyone can access the data. Furthermore, a blockchain is seen as a superior means of accurate, immutable and transparent record-keeping of who owns the right, the contributor stake in the work, etc. As explained by the Blockchain for Creative Industries report, 'the blockchain functions as both database and network, allowing information to sit on a distributed ledger rather than in silos'.[16]

In this context, some envisage that blockchain technology may revive the appetite for the (re-)creation of the Global Repertoire Database (GRD).[17] The initiative appeared in 2008 as a result of an EC-launched dialogue on solutions to dismantle legal and administrative barriers to the online licensing of musical works on a multi-territorial level.[18] The database would be used for management and dissemination, data access and reporting, and counterclaim resolution support.[19] In addition to the creation of a single database of ownership of music rights to enable digital licensing, the GRD sought to provide more transparency in data management and enable royalties to be sent to the correct stakeholder.[20] In 2014, the GRD project was closed, largely because

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[15] Gonenc Gurkaynak, 'Intellectual Property Law and Practice in the Blockchain Realm' (2018) 34(4) Computer Law & Security Report 847, 857.
[16] Blockchain for Creative Industries Research Cluster, Middlesex University, 'Music on the Blockchain' (Report No 1, 2016) 8-9 <https://www.mdx.ac.uk/__data/assets/pdf_file/0026/230696/Music-On-The-Blockchain.pdf> accessed 24 March 2019.
[17] Jeremy Silver, 'Blockchain or the Chaingang? Challenges, Opportunities and Hype: The Music Industry and Blockchain Technologies' (CREATe Working Paper, 2016/05) <https://www.create.ac.uk/publications/blockchain-or-the-chaingang-challenges-opportunities-and-hype-the-music-industry-and-blockchain-technologies/> accessed 24 March 2019.
[18] WIPO, 'Global Repertoire Database, Copyright Documentation and Infrastructure' (WIPO, 13 October 2011) <http://www.wipo.int/export/sites/www/meetings/en/2011/wipo_cr_doc_ge_11/pdf/isherwood_grd.pdf> accessed 24 March 2019; Leigh Smith and Catherine O'Connell, 'Copyright Licensing Steering Group Publishes Progress Report' (2014) 25(2) Entertainment Law Review 44, 46.
[19] Copyright Licensing Steering Group, 'Streamlining Copyright Licensing for the Digital Age: A Report by the Creative Industries' (September 2013) 138 <https://www.focalint.org/assets/files/2013_09_streamlining_copyright_for_the_digital_age.pdf> accessed 24 March 2019.
[20] WIPO, 'Global Repertoire Database, Copyright Documentation and Infrastructure' (WIPO, 13 October 2011) 2

of a lack of support from collecting societies and major record labels.21 Today, collective management organizations – PRS, ASCAP and SACEM – have joined forces to create a blockchain project to improve royalty matching capabilities and transparency for copyright holders. Essentially, blockchain would be used to link the International Standard Recording Code (ISRC) and International Standard Musical Work Code (ISWC). The ISRC is a watermark that uniquely identifies recordings with a twelve-digit number used to track usage.22 ISWCs are identification numbers for musical works which record metadata such as authors, composers, etc.23 Blockchain would work here by uniting the two sets of data. It could also work out conflicting data and the correct royalty distribution and streamline services to reduce operation costs.24 In addition, it would minimise uncertainty over the correct data entries as identified above and facilitate milti-teritorial licencing. The project is still in pilot mode and it remains to be seen if it will suffer the same fate as the GRD.

The recent PRS, ASCAP and SACEM project plans to use the Linux Hyperledger Fabric, which is a private and permissioned blockchain technology led by IBM. Unlike Bitcoin and Ethereum which may be used by anyone, participants need to be pre-vetted. Blockchains such as Hyperledger are necessary if the participating organisations do not unconditionally trust each other.25 From a technical perspective, some argue that is unclear why blockchain technology is a prerequisite to the creation of a RMI database.26 For example, a normal shared database could be used.

<http://www.wipo.int/export/sites/www/meetings/en/2011/wipo_cr_doc_ge_11/pdf/isherwood_grd.pdf> accessed 24 March 2019.
21 Alexander Savelyev, 'Copyright in the Blockchain Era: Promises and Challenges' (Higher School of Economics Research Paper, No WP BRP 77/LAW/2017) 559.
22 See ISRC <http://isrc.ifpi.org/en/> accessed 24 March 2019. This is the music equivalent of the well-known International Standard Book Number (ISBN). See Juergen Seitz and Timo Janke, 'Digital Watermarking: An Introduction' in Hamid Nemati (ed), *Information Security and Ethics: Concepts, Methodologies, Tools, and Applications* (Information Science Reference 2008) 261.
23 ISWC, 'FAQ' <http://www.iswc.org/en/faq.html> accessed 24 March 2019.
24 SACEM, 'ASCAP, SACEM and PRS for Music Initiate Joint Blockchain Project to Improve Data Accuracy for Rightsholders' <https://societe.sacem.fr/en/press-resources/per-publication/press-releases/ascap-sacem-and-prs-for-music-initiate-joint-blockchain-project-to-improve-data-accuracy-for-rightsholders> accessed 24 March 2019.
25 Ankur Sharma and others, 'How to Databasify a Blockchain: The Case of Hyperledger Fabric' (Saarland Informatics Campus, 1 November 2018) 1-2 <https://arxiv.org/pdf/1810.13177.pdf> accessed 24 March 2019.
26 Silver (n 17).

3.2.3 Integrity monitoring and usage measuring

Some blockchain applications are designed to monitor the integrity of the work as well as provide a system of authentication. Deepayan and Feng propose a 'blockchain media transaction framework' which involves image watermarking to track image transactions and image modification.[27] The role of blockchain in this set-up is to record the image hash generated by the original image as well as a hash of transaction histories. The authors have used the Ethereum blockchain as proof of concept. The blockchain would become a public record of 'transaction information of the image/media, for example, transaction and modification history, ownership and blockchain transaction ID, and the information of CS samples which can be used to reconstruct the original image/media'.[28] The resulting registry could be used to show if an image had been modified or edited. In theory, this system could be useful as a source of evidence in infringement proceedings.

Yet, the proposal suffers from an important shortcoming. The system as proposed is unfeasible because of Ethereum scalability issues. Recording the hash of images taken would overload and slow down the Ethereum blockchain.[29] Instead, the model could perhaps be put into practice via a purpose-built blockchain designed to tolerate the high number of entries. Counterintuitively, this proposal of tracking image changes is currently being contemplated by the JPEG committee.[30]

3.2.4 Secondary markets for content

A number of blockchain proposals envisage the creation of workable secondary markets for digital works, such as music and audio-visual works.[31] These are

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[27] Deepayan Bhowmi and Tian Feng, 'The Multimedia Blockchain: A Distributed and Tamper-Proof Media Transaction Framework' (22nd IEEE International Conference on Digital Signal Processing, London, 2017) <http://shura.shu.ac.uk/16224/8/Bhowmik%20-%20multimedia%20blockchain%20%28AM%29.pdf> accessed 24 March 2019.

[28] ibid 4.

[29] It is estimated that people take 1.8 billion images per day. If only a fraction of those images were recorded, this would overtake the daily number of Ethereum transactions estimated at 1 million a day. For statistics on the number of images taken, see Mary Meeker, 'Internet Trends 2014: Code Conference Report' (KPCB, 31 May 2014) Slide 62 <https://cryptome.org/2014/05/internet-trends-2014.pdf> accessed 24 March 2019. On Ethereum transaction statistics, see Ufuoma Ogono, 'Ethereum Finally Records 1 Million Transactions Per Day (*Smartereum*, 1 May 2018) <https://smartereum.com/13605/ethereum-finally-records-1-million-transactions-per-day/> accessed 24 March 2019.

[30] JPEG, 'JPEG White Paper: Towards a Standardized Framework for Media Blockchain' (ISO/IEC JTC 1/SC29/WG1, 9-13 July 2018) 15-16.

[31] For example, Asobimo, 'Distributed Secondary Content Trading Platform on the Blockchain Create Value and New Revenue Stream for Publisher on the Second-hand Digital Content Distribution

implemented by the combination of smart contracts and blockchains which enable users to re-sell copies of works they have lawfully purchased to other users.[32] For the purpose of the thesis, secondary markets are interesting as the resale potential of a work may have an impact on the end user's incentive to buy a legal copy. This argument is similar to an economic concept called 'indirect appropriability' which means that if a purchaser of a licensed copy has the possibility to re-sell the copy for a profit, his willingness to pay for that copy increases.[33] Rightholders receive a return from the 'used' copy, for example, by pricing it into the initial selling price.[34] Users have an additional incentive to purchase a licensed copy when there is an expectation that the 'used' digital copy can be then sold off. However, a specific combination of technology and law is required for secondary markets to work.

From a technical perspective, proponents of the idea argue that the unique set-up of blockchain makes it a candidate for the creation of such a service. This is because works can be 'tokenised' which means that a copy of a work can be represented on a smart contract.[35] De Filippi and Wright explain that:

> Authors can then associate these tokens with a particular set of rights to their digital works and trade them in the same way as they would trade digital tokens. Blockchain technology can thus be used to implement "artificial scarcity" at the level of each individual file—thus potentially allowing for the reintroduction of the first sale doctrine [EU exhaustion equivalent] in the digital realm, without the need to rely on any contractual or legal means.[36]

Market' (*Asobimo*, 26 April 2018) <https://asobimo.io/en/news?page=2> accessed 24 March 2019. This advertises the creation of a secondary market for game items, software, e-books, music, videos, etc; Péter Mezei, *Copyright Exhaustion: Law and Policy in the United States and the European Union* (Cambridge University Press 2018) 160; Blockchain for Creative Industries (n 16) 21.

[32] Potentially, this set-up may be placed under the TPM heading as RMI largely covers information supplied by rightholders and such as system would go much beyond that to tracking and copy protection. See Séverine Dusollier, 'Electrifying the Fence: The Legal Protection of Technological Measures for Protecting Copyright' (1999) 21(6) EIPR 285, 296.

[33] The concept was introduced by Stan J Liebowitz, 'Copying and Indirect Appropriability: Photocopying of Journals' (1985) 93(5) Journal of Political Economy 945. For the application of the concept in the digital environment, see Stan Leibowitz, 'Back to the Future: Can Copyright Owners Appropriate Revenues in the Face of New Copying Technologies?' in Wendy J Gordon and Richard Watt (eds), *Economics of Copyright: Developments in Research and Analysis* (EE 2003) 6. For the application of the concept in the context of file-sharing: Stan Liebowitz, 'Economists Topsy-Turvy View of Piracy' (2005) 2(1) Review of Economic Research on Copyright Issues 9; Michael Waldman, 'What Limits Indirect Appropriability?' (MPRA Paper No 44690, 2013).

[34] The 'pricing-in' argument was presented as support for the now struck out narrow private copy exception without the payment of fair compensation in the UK Intellectual Property Office, 'Copyright Exception for Private Copying: Impact Assessment' (IA No BIS1055, 2012) 15-16 <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/308743/ia-exception-privatecopy.pdf> accessed 24 March 2019.

[35] See Chapter 1.

[36] Primavera de Filippi and Samer Hassan, 'Blockchain Technology as a Regulatory Technology: From Code is Law to Law is Code' (2016) 21(12) First Monday

Mezei, who argues for a watermarking technique, states that:

> [t]he combination of a unique ID number and the forward-and-delete or blockchain technologies … could effectively guarantee that the copies of works are resold in a visible and controlled way, that, at the same time forecloses the unlawful duplication of contents.[37]

A unique ID number refers to the process of watermarking the work with such a number, while forward-and-delete refers to the technology where the creation of a new copy ensures the simultaneous deletion of the existing copy.[38] In Mezei's view, blockchain could ensure such a set-up via the use of smart contracts and by maintaining a chronologically accurate and detailed log of transactions.[39] The proposal suggests that the blockchain would also have to delete the file, unlike the De Filippi model above which suggests that the same file could be moved between users via blockchain.

It is unclear why blockchain-enabled secondary markets are a more desirable alternative than the existing technologies which enable the sale of pre-owned digital products. For example, in the US, the ReDigi platform enabled internet users to sell their legally purchased iTunes tracks for a share of the revenue.[40] An internet user was required to download the ReDigi software on their computer and assign files they wanted to sell which were subsequently checked for authenticity by ReDigi software which then moved the files from the user's computer to cloud storage whilst deleting the files from the user's computer. Once a file was repurchased, the software amended the record of ownership and either the purchaser streamed the file from the cloud or downloaded it.[41] No blockchain was necessary.

There are also important legal challenges to the re-sale of digital copies of works outside software.[42] In the EU, the legality of secondary markets for works that fall

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<https://firstmonday.org/article/view/7113/5657> accessed 9 February 2018. See also Savelyev (n 21) 555.

[37] Mezei (n 31) 160.

[38] ibid 159.

[39] ibid.

[40] The ReDigi platform was the defendant in the high profile *Capitol Records, LLC v ReDigi* Inc 934 F Supp 2d 640 (USDC New York, 2013).

[41] For a summary of the technology and arguments of the parties, see Pamela Samuelson, 'Legally Speaking: A Copyright Challenge to Resales of Digital Music' (2013) 56(3) Communications of the ACM 24.

[42] Case 128/11 *Usedsoft v Oracle International* EU:C:2012:407, [2012] 3 CMLR 44, paras 50-51. This is where the CJEU said that online exhaustion is available for computer programs.

under the scope of the InfoSoc Directive, such as music, audio-visual works and e-books, is not *acte clair.* This is because such works communicated over the internet might not be covered by the doctrine of exhaustion in Recital 29. An infringing act may occur via the sale (or facilitation of sale) of a legally purchased copy of a work from the categories of the InfoSoc Directive, in a controlled environment, if this triggers the communication to the public in Article 3 Infosoc Directive, a right which, according to Article 3(3) is non-exhaustible. Exhaustion, known also as the first sale doctrine, is the doctrine that allows a lawful owner to distribute her copy of the work if the rightholder receive remuneration for the initial distribution.[43] The pending *Tom Kabinet*[44] referral which concerns the legality of a business model which enabled the resale of legally purchased e-books will provide further insight. The latest version of the Tom Kabinet business model enabled the sale of e-books to members of the service; these were e-books acquired from certain retailers and donated by (other) members.[45] The sale price was 2 euro, with a 0.50 euro donation going to the rightholders.[46] Members were allowed to re-sell Tom Kabinet e-books in exchange for credits.[47] The referring court framed the question in such a way that the model may fall under the distribution right in Article 4(1) which is exhaustible.[48] The court's issue also concerned whether the exhaustion doctrine in Article 4(2) was applicable to digital copies.[49] *Art & Allposters*[50] was a case under the InfoSoc Directive. The CJEU reasoned that the rules on exhaustion of the distribution right only apply to works recorded in a tangible form and advanced an argument which avoided an analysis of

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[43] Péter Mezei, 'Meet the Unavoidable - The Challenges of Digital Second-hand Marketplaces to the Doctrine of Exhaustion' (2014) 1 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3208026> accessed 31 March 2019.

[44] Request for a preliminary ruling from the Rechtbank Den Haag (Netherlands) lodged on 16 April 2018 — Case 263/18 *Nederlands Uitgeversverbond, Groep Algemene Uitgevers v Tom Kabinet Internet BV, Tom Kabinet Holding BV, Tom Kabinet Uitgeverij BV* Question 1.

[45] Caterina Sganga, 'A Plea for Digital Exhaustion in EU Copyright Law' (2018) 9(3) JIPITEC 211, 215.

[46] ibid.

[47] ibid.

[48] ALAI contest the construction of the refereed questions under Article 4 InfoSoc Directive and attribute it to a misunderstanding by the District Court of The Hague on the notion of communication to the public in Article 3. See ALAI, 'Opinion on Case C-263/18, NUV/GAU v Tom Kabinet, Brussels, 12 September 2018' (*ALAI*, 12 October 2018) 2-3 <http://www.alai.org/en/assets/files/resolutions/181012-opinion-tom-kabinet-case-en.pdf> accessed 24 March 2019.

[49] Case 263/18 (n 44) Question 2.

[50] Case 419/13 *Art & Allposters v Pictoright* EU:C:2015:27, [2015] ECDR 7.

the application of exhaustion to digital copies of works.[51] While it remains to be seen what the CJEU will decide in *Tom Kabinet*, the case will have an impact on the development of blockchain solutions in resale content markets of works under the InfoSoc Directive if the market interest in such use persists.

3.2.5 'Smart contracts' multiparty payments and direct licensing to users

A number of emerging music services advertise new content distribution strategies via blockchain 'smart contracts'.[52] This section argues that smart contracts may help generate better models of content production and distribution than those that exist in the current environment. These enable a closer relationship between users and their favourite artists as users can become stakeholders in the creation of works.[53] First, the role and application of the smart contracts will the explained. Then we will look at the manner in which these generates novel forms of interaction between users and creators. Finally, barriers to their adoption will be outlined.

Current applications run an ERC-20 Ethereum token contract as outlined in the previous chapter. A musical work is linked to an ERC-20 contract which is programmed so that all participants in the creation of a musical work can be remunerated (cryptocurrency) according to their contribution. In other words, the ERC-20 is a both a record of the rightholders that contribute in a work's wallets and a payment system. When a song is downloaded or played on the platforms that implement these standards, each stakeholder recorded in the contract can receive his share of the user's payment in real time. In this way, all the players in the production process who may be otherwise overlooked in the existing royalty distribution framework can be remunerated.

The song 'Tiny Human' by Imogen Heap was the first released on the blockchain platform Ujo Music. A smart contract was used to automatically distribute payments to everyone involved in the creation of the song and record in the following way: 'the

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[51] Maša Savič, 'The Legality of Resale of Digital Content after UsedSoft in Subsequent German and CJEU Case Law' (2015) 37(7) EIPR 414, 428.

[52] Such as Choon <https://choon.co/> and Ujo Music <https://www.ujomusic.com/> accessed 24 March 2019.

[53] Choon, 'White Paper' <https://www.choon.co/public/pdf/choon_white_paper.pdf> accessed 24 March 2019.

contract set out that x% of monies should be paid to this person, x% to this person'.[54] Other platforms implement this model in a more advanced way. Choon is a streaming platform which uses a system of ERC-20 smart contracts to allow rightholders to gain higher revenues than from existing platforms and split the revenues according to the parties in a song as explained above.[55] The set-up of the smart contract enables parties beyond the traditional stakeholders in a work to participate. For example, an artist may use the platform to crowdfund their album and give all funders a profit split from the work as all funders' wallets can be accommodated in the same smart contract.[56] In this way, internet users can in fact become 'patrons' of their favourite artists and ask them to produce works on demand.[57]

There are perceived benefits to smart contracts in this application. For example, they enable a more immediate stream of money to participants. For the rightholders wishing to participate in such set-ups, smart contracts may potentially minimize the need for collective management of their works.[58] Furthermore, smart contracts reduce the number of intermediaries who take a piece of the pie from creators in the exploitation of works.[59] Via smart contracts, creators themselves are able to hold important data regarding the use of their works, such as the number of plays and the targeted audience, which is all valuable information for online distribution.[60]

Bodo et al, by taking an international perspective of copyright, argue that blockchain smart contract licensing is difficult to achieve in practice due to the fragmentation of rights between contributors in a work. Therefore, it may be more suitable for rightholders who own the full rights in a work.[61] Furthermore, the complexity of the

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[54] Imogen Heap, 'Smart Contracts for the Music Industry' (*Medium*, 15 March 2018) 5 <https://medium.com/humanizing-the-singularity/smart-contracts-for-the-music-industry-3e641f87cc7> accessed 24 March 2019; Silver (n 17) 28.
[55] Choon (n 53) 11. For an example of a smart contract, see <https://github.com/choonhq/choon/blob/master/contracts/Song.sol> accessed 24 March 2019.
[56] ibid.
[57] Customer input into the creative process of a product, for example, with the help of social media, is a very effective and cheap means of targeting outputs to a fan base. For example, the skincare company Deciem frequently customises and even creates skincare products according to customer input via Facebook/Instagram.
[58] Balázs Bodó, Daniel Gervais and João Pedro Quintais, 'Blockchain and Smart Contracts: The Missing Link in Copyright Licensing? (2018) 26 ULIT 331.
[59] Heap (n 54).
[60] ibid.
[61] Bodó and others (n 58) 320-321.

legal framework where rights are split territorially, and the complexity of the exhaustion doctrine, further complicates such licensing. Moreover, the global licensing of works with blockchain requires coordination between on-chain–off-chain records so that there is no collision between licences.[62]

In addition, for the smart contract to work, it is paramount that the blockchain represents a real record of who is involved in production and the quantum of each individual contribution.[63] This information will likely have to be provided by rightholders and the challenge here is that nobody will be able to easily independently check that the information provided is correct. There can be various reasons why the audit trail is incorrect, for example, a record-keeping error at the time of creation of the work. The problem is that when the programmer builds the smart contract and inputs the wrong data, to the extent that there is a conflict between what an individuals' perception of their contribution and the payment received, this can also lead to disagreements over the payment delivered by smart contracts. The limitations of such a system are thus easily revealed on close inspection; blockchain smart contract solutions for the distribution of royalties depend on correct data. There may be ways to mitigate this; an ex post solution may be the development and application of dispute resolution systems, while ex ante systems could be put in place which require all involved parties to pre-approve their share in the creation of the work to be recorded on the blockchain.

3.2.6 Evaluation

All of these proposals have the potential to incrementally improve the legal market, and should more than one be taken up then the benefits would add up. However, it is impossible to anticipate the level of impact these may have over end use infringement levels as that is an empirical question. The creation of a universal blockchain RMI database may revolutionize music licences by making licensing more transparent, including the accuracy in tracking ownership and distribution of usage. The potential effect of this manoeuvre is that works may be licensed more swiftly, and further become available on the legal marketplace and in more territories. The project may never crystalize. The major collecting societies involved in the creation since 2017 of

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[62] ibid 322-323.

[63] A similar argument is made by Bodó and others (n 58).

the unified RMI register are currently silent on any progress regarding the implementation of the project. This, of course, may not mean that the project has been abandoned, but it raises concerns over the outcome of the endeavour.

Then, blockchain smart contract licensing could become part of an alternative means to bring content to the consumer. However, it is unlikely that it will put an end to copyright collectives (this issue will be explored further in the next chapter). Furthermore, existing smart contracts still appear to be rather simplistic in the sense that these cannot be used to reflect licensing language in computer terms.[64] As stated above, the simple smart contract sets out that: 'x% of monies should be paid to this person, x% to this person'. In addition, the application of the smart contract as a tool to ensure the payment of stakeholders in the creation of the work might not be a commercial success due to the limited adoption of cryptocurrency.[65] Potentially, if the smart contracts were used in the context of a fiat setting, these may become a more feasible proposition.

3.3   Part 2 :Photography rights management and enforcement model

This section narrows down the discussion to analyse services where blockchain is included in copyright licensing and enforcement of rights in a photographic work (BLS hereinafter).[66] The blockchain works as a registry of the images and most services produce 'certificates of ownership' for works to confirm ownership.[67] The blockchain register is combined with other technologies to find online infringement with a view to offering settlements. Therefore, it is important to clarify that blockchain technology here is part of a larger set-up of online licensing and enforcement of

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[64] However, commentators expect this to happen: 'blockchain-based DRM systems enable authors, artists and other copyright owners to enter into a direct relationship with the public, using smart contracts to establish the terms and conditions for accessing their works.' De Filippi and Hassan (n 36) 15.

[65] The total sales of the 'Tiny Human' song via Ethereum smart contracts was the Ether equivalent of $133.20 dollars; David Gerard, *Attack of the 50 Foot Blockchain* (Kindle Edition, 2017) location 2339

[66] The companies discussed in this chapter are Copytrack, now rebranded as Concensum, Kodak and Binded. Concensum suggests in its White Paper that the blockchain may be extended to become a 'global register' of images, musical works and video copyright, see Copytrack, 'Global Copyright Register White Paper' (*Copytrack*, 2017) 12
<https://icorating.com/upload/whitepaper/tuhAylZLGb6RWISsjoIT9txTPagGwYJQ2pHnxz6z.pdf> accessed 24 March 2019.

[67] KodakOne, 'White Paper' (24 April 2018) 12-13
<https://kodakone.com/fileadmin/white_paper/180424_kodakone_wp.pdf> accessed 24 March 2019.

exclusive rights in images. The expectation is that the identification of potential infringement in photographic works and the agreement of (post)-licences means that instances of infringement can be settled privately.[68] By registering the work on a blockchain, the BLS then detects copies of images used elsewhere on the internet by third parties without authorisation which, upon an infringement alert, the service quasi-automatically sends a 'settlement' letter to the potential infringer, with the consequence being that non-payment may lead to legal proceedings.[69] The BLS advertise themselves as a solution for photographers for whom individual licensing and enforcement of the rights in each image online is not feasible.[70]

There is controversy surrounding these services. Some is related to the ICO practice, which is the funding for the model.[71] Focusing on the blockchain and copyright aspects, the section will argue that this form of commodified management of rights in images is economically efficient. However, aspects related to the relevance and application of blockchain technology may conflate the role of technology in this context. Furthermore, the BLS business model can elicit unwelcome comparison with known forms of 'copyright trolling', given that the phenomenon shares a number of hallmarks.[72] The concern raised here is that application of blockchain in a disputable setting may affect the public perception of the technology, which may reduce trust in blockchain functionality and integrity in copyright.[73] The section will first explain the BLS model and then evaluate why and how the model may be applied in a potentially over-broad manner before issuing recommendations.

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[68] The Concensum website states that 'Concensum connects the copyright of digital content with its authors based on blockchain technology to protect their assets worldwide; Concensum, 'About' <https://concensum.org/en/about#concensum> accessed 24 March 2019; see also KodakOne, 'Protecting the Storytellers of the Image Economy' (*KodakOne*) <https://kodakone.com/> accessed 24 March 2019.

[69] KodakOne (n 67) 13; Copytrack (n 66) 3.

[70] KodakOne (n 67) 10.

[71] See sub-section 3.4.4 below.

[72] For example, it refers to a business model that extracts settlements from users when E&Ls apply and when these businesses have a lack of standing to bring infringement claims, see Constance Boutsikaris, 'The Rise of Copyright Trolls in a Digital Information Economy: New Litigation Business Strategies and their Impact on Innovation' (2012) 20(2) Journal of Communications Law and Policy 391, 392.

[73] The relationship between trust and technology reflects beliefs about 'the technology's functionality (capacity to complete a task), helpfulness (providing "adequate and responsive help") and reliability (predictable and consistent correct operation), which are paralleled to the social trust factors of ability, benevolence and integrity'. See Vanessa Bracamonte and Hitoshi Okada, 'The Issue of User Trust in Decentralized Applications Running on Blockchain Platforms' (IEEE International Symposium on Technology and Society, 1-4 August 2017) 2.

3.3.1 Blockchain technology in the context of a licensing and enforcement business model

The BLS offers the rightholder a private online copyright licensing and enforcement service whereby rightholder information is recorded on a blockchain and potential infringers are identified and asked to pay for a licence or taken to court in case of non-payment. To participate in the BLS, the rightholder has his metadata, including ownership data of each individual image file, bundled and assigned a unique number as a hash on the blockchain.[74] To identify infringements, these services deploy robots to continually search internet websites and social media for matches. Robots, known as bots, web crawlers and scrapers, are small pieces of software that scan hundreds of websites per minute and identify, copy and index information of interest.[75] Results yielded by the bots are compared to the register of subscribed pictures, and a positive result will generate a 'notice of infringement' to the rightholder.[76] As KodakOne, one of the first BLS, promises: 'The platform will function as a "police officer," enabling any infringements to be quickly monetized.'[77] In some situations, the rightholder assesses the notice of infringement and decides whether the use is an infringement of their right, in others the service makes the assessment.[78]

Once the rightholder/platform decides to enforce, a letter before action is automatically sent by the service on behalf of the rightholder to the alleged infringer. The letter gives the user the possibility to pay for a post-licence as a settlement or, if the letter is ignored, he is informed that legal proceedings will ensue. The rates for the post-licence are not always disclosed, for example, KodakOne provides no information on the matter. In contrast, Copytrack/Concensum sets the licence rate

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[74] Some services record this hash on public blockchains, for example, Binded uses the Bitcoin blockchain; Copytrack, now rebranded as Concensum, aims to develop a private blockchain which is QTUM-based to set up the 'Global Copyright Register'. Bitcoin Forum, 'Copytrack: The First Blockchain-based Image Copyright Register' (forum posts) <https://bitcointalk.to/index.php?topic=2613681.100> accessed 31 July 2018. However, in Copytrack White Paper (n 66) 17 reference is made to the Ethereum Blockchain.

[75] Sean O'Reilly, 'Nominative Fair Use and Internet Aggregators: Copyright and Trademark Challenges Posed by Bots, Web Crawlers and Screen-Scraping Technologies' (2007) 19 Loyola Consumer Law Review 273, 274.

[76] Copytrack (n 66) 9; KodakOne (n 67) 13.

[77] KodakOne <https://kodakone.com/kodakcoin.html> accessed 18 June 2018.

[78] With Copytrack, the rightholder assesses the infringement (n 66) 9. In the case of KodakOne, it relies on automated and human processes to enforce KodakOne (n 67) 6; for Binded, see <https://binded.com/faq> accessed 3 April 2019.

according to the German *Mittelstandsgemeinschaft Foto-Marketing* (MFM) rates, which publishes a catalogue of rates every year.[79] The scope of enforcement appears international, for example, Copytrack/Concensum has created a national enforcement network over 140 countries.[80]

The ownership in the image is validated by the BLS prior to adding it to the blockchain.[81] To participate, a rightholder needs to subscribe and provide data that suggest they are the rightholder. Checks are put in place by Concensum/Copytrack; it states that all subscribers have to pass through the validation procedure and all verified subscribers have a 1000 image upload limit.[82] The validation process requires the rightholder to identify himself by submitting an ID copy and video identification. The ownership of the images submitted is assessed in two ways. One requires the recording of the camera serial number that matches the images.[83] The other requires the photographer to validate 'some of the images' by RAW image verification. A RAW file is an image format which represents the original image taken by the camera without any adjustments and it can be considered the digital equivalent of the negative. Finally, the camera serial number has to be validated by the manufacturer.[84] These types of checks mitigate fraudulent claims. The of information required appears to exceed collecting society participation. For example, to mandate the UK 'Picture Industry Collecting Society for Effective Licensing' (PIXEL) collecting society requires the details of the rightholder and two references, and this confirms that the applicant is indeed the photographer.[85]

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[79] Jonathan Appleby, 'How to Calculate Image Licence Fees Using Copytrack' (*Copytrack*, 8 March 2018) <https://www.copytrack.com/calculate-price/> accessed 30 June 2018.
[80] Copytrack (n 66) 11.
[81] ibid 13. Other services such as Binded require the rightholder to tick a box to confirm ownership.
[82] Concensum Tires information - on file with the author.
[83] Concensum Tires Information - on file with the author. There may be a possibility that a person with a fake ID can circumvent the first option by changing the camera serial number in the EXIF data of the image so that it matches another camera owned by a person who wishes to impersonate the rightholder. Furthermore, it is unclear whether EXIF can amount to evidence of authorship as the data can be easily changed with freely available internet programmes, see *CT-Paradies* BGH (18 September 2014) I ZR 76/13.
[84] Concensum Tires Information - on file with the author.
[85] Picsel, 'Application for Picsel Membership' <http://www.picsel.org.uk/wp-content/uploads/2016/03/Application-for-PICSEL-membership_electronic-Final.pdf> accessed 24 March 2019.

3.3.2 Rightholder incentives for joining a BLS

The EU copyright framework affords rightholders a high degree of control over the use of their works as each use requires the express prior consent of the rightholder.[86] The reproduction right in Article 2 InfoSoc Directive is triggered when an image is downloaded and stored on the copier's hard drive, and the communication to the public right in Article 3 InfoSoc Directive applies when the copy stored on the hard drive is placed online for other internet users to see. This is also the case when the image is copied onto a hard drive from the website where it is posted with the consent of the rightholder and without restrictions and the copied image is uploaded online on another site.[87] Copying and re-uploading online a picture made available in a password protected environment would also lead to infringement. In the same manner, copying and re-uploading an image taken from an unlicensed source, for example Pirate Bay, would also be an infringing act. The rightholder can also act against the initial publication of their works online, for example, when a copy of the image is leaked online.[88]

In addition to the download/upload scenario, internet users may infringe by embedding images on their websites. Embedding, also known as inline linking, refers to the process where content from a target site is displayed in full on the site which embeds it without having to copy the image.[89] Embedding does not infringe Article 3(1) InfoSoc Directive when the image embedded is made available freely and for free with rightholder consent.[90] On the basis of *GS Media*, a case on linking to content made available without rightholder consent, when an unlicensed copy of a work freely available online is embedded on another site, then Article 3(1) liability may be incurred when the embedder acts with knowledge or if the embedder is acting 'for profit' and does not fulfil her duties of care.[91] This complex legal situation, which

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[86] Case C-301/15 *Marc Soulier, Sara Doke v Ministre de la Culture* EU:C:2016:878, para 35.
[87] In the situation of an image that was copied on a server and re-uploaded on a website, the German Federal Court of Justice considered the application of both reproduction and communication to the public *Cordoba* BGH (23 February 2017) I ZR 267/15, [13]; Case 161/17 *Land Nordrhein-Westfalen v Renckhoff* EU:C:2018:634, para 47.
[88] Case 160/15 *GS Media* EU:C:2016:644, para 51.
[89] Emanuela Arezzo, 'Hyperlinks and Making Available Right in the European Union – What Future for the Internet after Svensson?' (2014) 45 IIC 524, 526.
[90] Case 348/13 *BestWater International v Michael Mebes and Stefan Potsch* EU:C:2014:2315, para 19.
[91] *GS Media* (n 88) paras 49-51. At a national level, *GS Media* was applied to embedding scenarios. See Eleonora Rosati, 'After Sweden and Germany, GS Media finds its application in the Czech

potentially is beyond the understanding of the average internet user, paves the way for the development of a ripe market for image licensing.

The BLS in this context resolves the economic problem related to the difficulties of rightholders ensuring their rights are respected.[92] The service potentially opens new remuneration possibilities. It is difficult for rightholders to identify and track infringement of their images online on a large scale. It is not uncommon for even amateur photographers to produce hundreds of images. In this way, small rightholders can enjoy further benefits from the protection awarded to them by the legal framework. Not all rightholders are large international corporations that have at their disposal unlimited resources to invest in technology or pursue court proceedings to enforce their rights. Furthermore, the enforcement does not burden the taxpayer and in fact creates additional tax revenue.

A BLS, as it targets infringement in the public sphere (ie potential infringers use images on their websites or other public internet locations such as social media and online markets), mitigates limitations related to identifying infringers in the private sphere. In cases of enforcement against peer-2-peer infringement, an important element is the participation of courts and ISPs in revealing the identity of their users. While in Germany and the UK courts and ISPs have enabled rightholders to reach potentially infringing internet users, Nordic countries have lately pushed back on this. In Denmark, in the aftermath of litigation initiated by two of the main Danish telecommunication companies, the Østre Landsret, one of Denmark's two High Courts, said that based on Danish privacy laws and the balance of interests involved, user's personal data can only be handed to the police in the course of investigating criminal offences.[93] In Sweden, one ISP found a practical way to avoid revealing subscriber identity, which was by limiting the assigned IP log to only 24 hours. This

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Republic' (*IPKat*, 6 February 2017) <http://ipkitten.blogspot.com/2017/02/after-sweden-and-germany-gs-media-finds.html> accessed 24 March 2019.

[92] Shyamkrishna Balganesh, 'The Uneasy Case against Copyright Trolls' (2013) 86 S Cal L Rev 723, 728.

[93] Andy, 'ISPs Win Landmark Case to Protect Privacy of Alleged Pirates' (*Torrent Freak*, 8 May 2018) <https://torrentfreak.com/isps-win-landmark-case-protect-privacy-alleged-pirates-180508/> accessed 6 August 2018.

means that there is nothing to share with rightholders following their request.[94] For the business model to work, it requires the willingness and participation by courts and the ISP.

The operation of the BLS where infringement takes place in the public sphere lowers barriers for potential infringer identification. Copyright bots identify a positive match and then the service has a number of sources available for responsible party identification. For example, when an image is posted without consent by an individual on social media, the social media profile might contain the person's full name, or if the alleged infringement takes place on a website, the site itself might offer information about the identity of its owner. In addition, there are various services which offer data as to who owns a particular domain.[95] This makes it easier for the BLS to identify potential infringers and offer them a 'settlement'.

In comparison with other privatised rights protection structures, such as YouTube's Content ID system, the BLS does not lead to the ex-ante and potentially indiscriminate removal of content when infringement is flagged up. Elkin-Koren argues that Content ID often blocks material before it goes live on YouTube, thus rendering any recourse for the user in case of an error more difficult.[96] The BLS only intervenes ex post which does not lead to pre-censoring of images that go online. The letter sent to the potential infringer which requires a takedown is sent after material is already available online.

3.3.3   The role of blockchain in photograph licensing and enforcement is symbolic

As well as benefits, there are also many shortcomings to the BLS model. This section argues that the use of blockchain technology in the BLS provides limited added value to advancing rightholder interests. The advertisements for these services appear to

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[94] Ernesto, 'ISP: Piracy Extortion Letters Are Easy to Thwart without Logs' (*Torrent Freak*, 2 September 2018) <https://torrentfreak.com/isp-piracy-extortion-letters-are-easy-to-thwart-without-logs-180902/> accessed 8 September 2019.

[95] For example, there are websites that provide domain look-up services, such as <https://www.register.com/whois.rcmx> accessed 8 September 2018.

[96] Niva Elkin-Koren, 'Revisiting the Copyright Liability of Online Intermediaries' in S Frankel and D Gervais (eds), *The Evolution and Equilibrium of Copyright in the Digital Age* (Cambridge University Press 2015) 47. There is, however, extensive criticism of YouTube's Content ID for its potential to generate false positives and the limitations of technology to effectively take into account applicable exceptions and limitations, thus blocking content which would otherwise be exempt, see Ira Nathenson, 'Civil Procedures for a World of Shared and User-Generated Content' (2010) 48 U Louisville L Rev 937.

conflate the role of blockchain in rights protection, for example, Copytrack refers to an 'image tracking and rights enforcement with blockchain as a global solution', implying a direct effect of blockchain technology in enforcement.[97] However, blockchain technology in the context of these business models does not appear to have a direct or stand-alone application in the practical enforcement of exclusive rights. In other words, blockchain technology does not detect infringement or conduct any technical operation to stop infringement from taking place, for example, by removing content or by blocking access. The added value of blockchain technology is actually that of a database.

Indeed, services advertise the blockchain as a record of truth which can be used to 'register' a right.[98] It could be said that making registration of metadata on a blockchain a pre-requisite to the use of the service amounts to imposing a formality on the exercise of the rights, which is prohibited by Article 5(2) of the Berne Convention.[99] Under this Convention, 'exercise' means enforcement.[100] However, the voluntary registration of images in a database may not be prohibited as a formality when this is necessary for the creator to disseminate their work.[101]

The same database functionality can be achieved via other technologies as the use of blockchain in the configuration described in the chapter is simply to store data.

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[97] These services imply that blockchain will have a more direct role in the enforcement of copyright. For example: Copytrack, 'Image Tracking and Rights Enforcement with Blockchain as a Global Solution' <https://iptc.org/download/events/phmdc2018/IPTC-PhMd2018-MSchmitt-Copytrack.pdf> accessed 1 June 2018. After Copytrack was rebranded as Concensum, the website says that 'the service connects the copyright of digital content with its authors based on blockchain technology to protect their assets worldwide' <https://concensum.org/en/about> accessed 1 June 2018. Binded was initially ambiguous as to the role of blockchain: 'Blockchain record has built-in fraud deterrence. If someone is committing fraud, there is a permanent paper trail back to them.' But then explains that the blockchain will work as an index of rights <https://help.binded.com/blockchain/how-does-binded-use-the-blockchain> accessed 1 June 2018. KodakOne under the heading 'How does Blockchain Technology Help Photographers and Agencies?' says: 'The infringement detection and post-licensing service will provide photographers and agencies access to additional revenues and help protect their copyrights.' <https://kodakone.com/ico/faq.html> accessed 1 June 2018.
[98] Copytrack (n 97).
[99] Berne Convention for the Protection of Literary and Artistic Works (as amended 28 September 1979) art 5(2). The prohibition on formalities is referred to in the Agreement on Trade-Related Aspects of Intellectual Property (15 April 1994) 1869 UNTS 299, art 9(1); WCT (n 14) art 1(4); WPPT (n 14) art 20.
[100] Jane C Ginsburg, 'Berne-Forbidden Formalities and Mass Digitization (2016) 96 Boston University Law Review 1, 2.
[101] On the complexities of this type of registration, see Jane C Ginsburg, 'With Untired Spirits and Formal Constancy: Berne-Compatibility of Formal Declaratory Measures to Enhance Title-Searching' (2014) 3 Berkeley Technology Law Journal 1583.

YouTube's Content ID has successfully indexed rightholder works in its system without a blockchain.[102] Similarly, rights management organisations have kept indexes of rightholders and their adjacent metadata of works for royalty distribution and licence management. A normal non-distributed database that maintains a record of users and corresponding images as a comparable measure for the data collected by the bots could work just as well. As a direct comparison, Copytrack itself offers similar facilities to their BLS without the use of blockchain.[103] This raises important queries regarding the relevance of blockchain in this context and the credibility of stakeholders that advance blockchain's use in this context.

One argument potentially in favour of blockchain use in this area is that, unlike regular databases which are potentially corruptible, the structure of the blockchain does not permit any changes to be made to the data recorded.[104] Should details of the post-licences be recorded in a blockchain, these cannot be tampered with. Therefore, the blockchain will hold an accurate audit of the post-licences issued on the work. It is, however, unclear if this is desirable from a rightholder's perspective. For example, assuming *arguendo* that the post-licence sum linked to an image is somehow placed on a public blockchain, available for all to see, and the rightholder then wishes to negotiate the use of their image with the CocaCola company, CocaCola could view the data since it is public and use it to negotiate down the price of the licence.[105]

However, the main use of blockchain in these projects is in the issuance of a cryptocurrency coin which is used as a fundraiser for the system.[106] In other words,

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[102] YouTube, 'Content ID for Music Partners'
<https://support.google.com/youtube/answer/2822002?hl=en> accessed 21 August 2018.
[103] Copytrack itself is in fact one such service which offers enforcement without the use of blockchain.
[104] Vikram Dhillon, David Metcalf and Max Hooper, *Blockchain Enabled Applications: Understand the Blockchain Ecosystem and How to Make it Work for You* (Apress 2017) 4.
[105] This would never happen because of data protection laws and costs associated with storing data on public blockchain as advanced in sub-section 2.5.3.
[106] Sean Au and Thomas Power, *Tokenomics: The Crypto Shift of Blockchains, ICOs, and Tokens* (Packt 2018) 71-79. This explains that ICOs refers to the situation where people buy a blockchain token, which has a similar role as a share in a company, linked to a project that promises to be disruptive, in the hope to make money. ICOs are seen as 'speculative bubbles'. Similarly, The Economist, 'Manias, Panics and ICOs; Free Exchange' (*The Economist*, 7 October 2017) <https://www.economist.com/finance-and-economics/2017/10/07/manias-panics-and-initial-coin-offerings> accessed 1 April 2019.

the initial coin offering (ICO) works as crowdfunding for the business model.107 In some situations, the licensee will have to pay the rightholder in the platform's cryptocurrency.108 The running of the ICOs in the context of photography licensing and enforcement challenges the credibility of the issuers. For example, Kodak's blockchain photography licensing and enforcement initiative and accompanying ICO, which boosted Kodak shares by 60%, has been touted as a smokescreen for Kodak's financial problems, and the company's practices before the ICO were said to be borderline illegal.109 Indeed, some argue that such blockchain copyright solutions only piggyback on the boom in ICO popularity and work only to enrich profiteering entrepreneurs with little practical effect.110 In a similar manner, Copytrack directors may face legal action from investors for giving misleading information related to the ICO.111 As will be seen below, there are other problems raised by the model.

3.3.4 Private evaluation and the complexity of the legal framework may lead to over-estimation of infringement

An imbalance of power appears where the assessment of a potential infringement is done in a private context.112 In the context of BLS, after the bots have identified a potential match, the decision to send a letter is taken either by the rightholder or the service based on an evaluation of the case. This section will advance that that there is

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107 An Ethereum ERC-20 performs the crowdfunding token as well as the internal platform currency KodakOne. Maxwell Bolton, 'Kodak ICO Team Confirms Stellar-Based Payment Solution' (*The Independent Republic*, July 2018) <https://theindependentrepublic.com/kodak-ico-team-confirms-stellar-based-payment-solution/> accessed 22 March 2018.
108 Copytrack (n 66).
109 The analysis is provided by Kerrisdale Capital which is not impartial but is informative, see Kerrisdale Capital, 'Eastman Kodak Company (KODK) Gone in a Flash' (*Kerrisdale Capital*, February 2018) <https://www.kerrisdalecap.com/wp-content/uploads/2018/02/Eastman-Kodak-Company-KODK.pdf> accessed 6 February 2018.
110 Decentralize Today, 'The Ugly Truth behind Steemit' (*Decentralize Today*, 19 August 2016) <https://decentralize.today/the-ugly-truth-behind-steemit-1a525f5e156> accessed 6 February 2018.
111 The ICO documents and Copytrack White Paper are considered to contain misleading information regarding the origin of the company and the business model, for example, the investors were led to believe that they were placing money in Copytrack GmbH Berlin, already an established photography licensing model, whereas instead the blockchain ICO referred to a separate legal entity, Copytrack Pte Ltd Singapore, although both are under the same patronage. See, Wolfgang Kerler, 'Criminal Charge after Million ICO: Anger for Boss of the Berlin Start-up Copytrack' (GQ Magazine, 13 September 2018).
112 Referring to online intermediaries, Elkin-Koren argues that 'we know very little about how online mechanisms of algorithmic copyright enforcement exercise their power'. Niva Elkin-Koren and Maayan Perel, 'Algorithmic Governance by Online Intermediaries' in Eric Brousseau, Jean-Michel Glachant and Jérôme Sgard (eds), *Oxford Handbook of International Economic Governance and Market Regulation* (Oxford University Press 2018) 5.

an inherent one-sidedness in the assessment of infringement claims in the context of a BLS, which may lead to the offering of post-licences in cases of false positives.

Services such as Copytrack/Concensum allow the rightholder to decide if there is a case of potential infringement and a cost-effective means of conducting the assessment. This is not new in copyright enforcement, for example, in graduated response systems rightholders monitor infringement activity largely on peer-2-peer sites and then notify the ISP of an infringement done through its network, who then sends a warning and educational letter to the infringer.[113] Other notice and takedown systems work on the assumption that the rightholders monitor the use of the work.

When the assessment of a potential infringement is done by the rightholder, it is not unreasonable to assume that the rightholder will have a (conscious or unconscious) bias towards a self-serving evaluation.[114] The same assumption applies when the platform team assesses a potential infringement.[115] This assumption is supported by neo-classical economic reasoning which assumes the behaviour of rational individuals is self-serving.[116] It is also supported by practice, whereby in the context of peer-2-peer enforcement the business model of sending letters before action offering settlements to potential infringers led to these letters being sent out on a large scale regardless of the potential liability of the receiver.[117] In the case of BLS, both the rightholder and the platform may be incentivised to cover as much scope as possible by the prospect of securing post-licences.[118] An obvious conflict of interest appears which raises doubts over the neutrality of the assessment of a potential infringement.

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[113] Rebecca Giblin, 'Evaluating Graduated Response' (2014) 37 Columbia Journal of Law & the Arts 147, 169.

[114] For example, Andrea Caputo, 'A Literature Review of Cognitive Biases in Negotiation Processes' (2013) 24(4) International Journal of Conflict Management 374, 388 identifies that the role played in a negotiation will have an implication on the self-serving interpretation of the facts.

[115] When the assessment of the infringement is done by the platform, there is no information available in the white papers (n 66) (n 67) as to the characteristics of the person assessing the claim. KodakOne White Paper (n 67) 13 and 22 mentions that the infringement is checked by 'our staff' and legal partners only appear at the court stage of the claim. Therefore it is not clear if the staff is legally trained; if they were it would be a selling point to be mentioned in the White Paper.

[116] For criticism, see Milan Zafirovski, 'Classical and Neoclassical Conceptions of Rationality— Findings of an Exploratory Survey' (2008) 37(2) Journal of Socio-Economics 789.

[117] *Golden Eye (International) Ltd v Telefónica UK Ltd* [2012] EWCA Civ 1740. The practice has led to extensive media coverage, for example, see Andy, '82-Year-Old Great-Grandmother is a Pirate, Trolls Say' (*TorrentFreak*, 12 February 2016) <https://torrentfreak.com/82-year-old-great-grandmother-is-a-pirate-trolls-say-160212/> accessed 24 March 2019.

[118] The incentive to overestimate infringement may go beyond other types of private enforcement mechanisms, for example, YouTube Content ID where the algorithm is set at a prevention level in an

The business model appears to benefit from the complexity of the legal framework related to the use of works made available online as outlined above. However, there are loopholes. For example, whereas copying and re-uploading on a site a work freely (and for free) made available online with consent may be *prima facie* an infringing act, embedding such a work on a website is not.[119] Yet both sets of acts give the same impression to the viewers: that the work is included in the site. Viewers of the site cannot know that third party content has been incorporated in the site from another server.[120] Given that the preliminary identification of infringement is done by bots who copy the website, it is unclear how these differentiate between copied work and an embedded work made available online freely with rightholder consent. In other words, a lawfully embedded work may be falsely reported to the rightholder as an unauthorised act. The embedding internet user who is subsequently served with a letter may not be aware of the legal distinction between copying/uploading and embedding content made available with consent and so pay a settlement fee. Indeed, a user receiving a settlement letter might decide it is better to pay the settlement than engage in expensive legal proceedings. In the situations where there is no infringement but the internet user decides to pay the licence, if the licence issued is recorded on the blockchain then the blockchain register bears evidence of an unwarranted licence.

A connected point concerns the application of E&Ls in Article 5 InfoSoc Directive.[121] Again, it is not clear how the rightholder can assess the application of these, which normally involve a degree of complexity and copyright law knowledge. Although outside the scope of the thesis, it will be briefly noted that the rightholder cannot know when, for example, the re-use of an image is a parody and thus potentially covered by an exception.[122] In this context, vesting the rightholder with the decision about the

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effort to cooperate with rightholders for infringement claim mitigation. In other words, YouTube does not stand to profit directly from finding infringing uploads on its servers.

[119] This is the effect of the interaction between CJEU decisions *Renckhoff* (n 87) and *Bestwater* (n 90).

[120] Matthias Leistner, 'Copyright Law on the Internet in Need of Reform: Hyperlinks, Online Platforms and Aggregators' (2017) 12(2) JIPLP 136, 137. He argues that embedding content made available freely and for free should fall under the scope of Article 3(1).

[121] The application of E&Ls to images differs from country to country. Lien Verbauwhede, 'Legal Pitfalls in Taking or Using Photographs of Copyright Material, Trademarks and People' (WIPO) <https://www.wipo.int/export/sites/www/sme/en/documents/pdf/ip_photography.pdf> accessed 21 May 2018.

[122] For the elements of parody, see Case 201/13 *Deckmyn v Vandersteen* EU:C:2014:2132.

validity of the infringement might skew the effective application of E&Ls when the potential infringer, ie the beneficiary of the E&Ls, decides to pay for the post-licence nonetheless or simply takes a work down, the use of which might be covered by an exception. Given that E&Ls reflect users' fundamental rights, the non-application of such provisions will affect the exercise of such fundamental rights by users.[123]

The complex legal scenario, combined with an assessment of a potential infringement done from evidence gathered by bots and assessed by the rightholders themselves, might be seen to tilt the balance to the rightholder's disadvantage. Users may then come to associate the model with unfairness.[124] In addition, internet users who may not be infringing, for example, who are not themselves uploading the image but may be embedding a legally available image, may settle anyway. There are also limited ways in which a user may reply to a claim in a cost-effective manner. To somewhat mitigate this situation, there are measures that the licensing service can take to level the playing field.

3.3.5 Lessons from the 'speculative invoicing' model for blockchain copyright enforcement systems

The findings above resonate with the issues generated by the controversial 'speculative invoicing' business model developed in response to peer-2-peer infringement. 'Speculative invoicing' is the practice whereby legal firms representing rightholders or, at times claiming to represent rightholders, send hundreds of letters to internet subscribers claiming settlements for copyright infringements, without confirming their responsibility.[125] The business model is based on scaring people into paying the settlement as it is more financially rewarding to collect the monies from those who pay than to incur substantial costs in the context of court proceedings.[126]

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[123] E&Ls reflect fundamental rights, see Thomas Dreier and Paul Bernt Hugenholtz (eds), *Concise European Copyright Law* (2nd edn, Wolters Kluwer 2016).

[124] This is something which is already happening in non-blockchain versions of the Copytrack model, where entire internet forums are dedicated to user complaints over Copytrack letters.

[125] Andrew Murray, *Information Technology Law: The Law and Society* (3rd edn, Oxford University Press 2016) 316; *Golden Eye* (n 117) para 36. For a summary of the case, see Mark Hyland, 'The Seductive Interface between Adult Entertainment and Norwich Pharmacal Relief' (2013) Communications Law 56. For an empirical discussion on the topic in the US, see Matthew Sag, 'Copyright Trolling: An Empirical Study' (2015) 100 Iowa Law Review 1105.

[126] ibid. The definition by Open Rights Group is similar: 'Speculative invoicing is the name given to the practice of identifying alleged copyright infringers (file-sharers), obtaining their contact details (usually with a Norwich Pharmacal Order), and then sending letters demanding payment with the

In peer-2-peer cases, rightholders' representatives have monitored peer-2-peer activity, recoding IP addresses involved and seeking assigned IP personal data from ISPs via court orders; in the UK this is done via the court order devised in *Norwich Pharmacal*.[127] Such claims have generated case law between the alleged infringers and the legal firms involved in the letter campaigns.[128]

It is important to clarify that speculative invoicing is not illegal per se yet aspects of it are morally and legally questionable.[129] In Arnold J's view, what separates speculative invoicing from a 'genuine claim' is that speculative invoicing describes a business model where it is more cost effective to collect monies from potential infringers without taking them to court for non-payment of the settlement.[130] What further describes speculative invoicing is that the internet account holder is asked to pay settlements regardless whether they are the person engaging in file-sharing activities, and there is a profit arrangement between the rightholder and the law firm.[131] The sum claimed is assumed to exceed the losses suffered by the rightholder.[132] At its core, speculative invoicing monetises compliance via settlement out of court so is not an attempt to genuinely seek legal redress, which skews the adequate administration of justice.[133] This was explained by Patton LJ; the arrangements are not illegal when they amount to a genuine attempt to protect rights, only when 'they are a money making exercised designed to take advantage of the rights of the Other Claimants'.[134] Marking out the line between the two may be difficult at times. However, the core of speculative invoicing is the act of intentionally 'taking advantage' of vulnerable users to settle out of court.

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threat of potential court action.' See Open Rights Group Wiki, 'Speculative Invoicing' <https://wiki.openrightsgroup.org/wiki/Speculative_invoicing> accessed 24 March 2019.

[127] Norwich Pharmacal is a court order for disclosure of documents and information, see *Norwich Pharmacal Co v Customs and Excise Commissioners* [1974] AC 133.

[128] Murray (n 125) 316-320 for a summary of the case law.

[129] In the UK, the first law firm to send settlement letters was Davenport Lyons which was ultimately reported by Which? to the Solicitors' Regulatory Authority, see Murray (n 125) 317.

[130] *Golden Eye (International) Ltd and others v Telefonica UK Ltd, Consumer Focus intervening* [2012] EWHC 723 (Ch) para 36.

[131] ibid.

[132] Paul Joseph and Charlotte Ward, 'Golden Eye (International) Ltd v Telefonica UK Ltd (Case Comment)' (2012) 23(6) Ent LR 184.

[133] ibid.

[134] *Golden Eye* (n 117) para 28.

There are certain structural similarities between the peer-2-peer model and the blockchain licensing service discussed in this section: in both situations private enforcement companies enforce on behalf of rightholders, there is a degree of internet surveillance involved, potential infringers are offered an out of court settlement (post-licence), and the revenue is split between the platform and the rightsholder. However, it is not argued that the BLS is a speculative model. Especially given the newness of the BLS, it may be an overstretch to suggest it.[135] Yet it is also important to bring awareness to the issue. Guidelines emerging from the speculative invoicing case law, the vulnerability of internet users and information asymmetry may be applicable to the BLS given the structural similarities between the models.

3.3.5.1 *Vulnerability of the user arising from information asymmetry*

The business model of sending letters to internet users alleging infringement and offering a settlement may lead to the situation where innocent users do not understand the letters yet still settle out of fear of more serious legal consequences or costs incurred in proceedings. In the situation of the BLS, where innocent users remove content and settle, for example, where an image freely available online with consent is embedded on a site but removed due to receiving a post-licence, this may be seen to infringe their fundamental rights to access and impart information.[136]

The combination of the level of knowledge of users in understanding the claim and the language of the letter are essential here.[137] In *Media Cat*, Justice Briss pointed out that many recipients of the letters settle despite being innocent for fear of more expensive repercussions from being involved in legal proceedings.[138] Justice Briss pointed out the difficulties for lay people of understanding the 'intricacies of the Norwich Pharmacal jurisdiction. They will not appreciate that the court order is not based on a finding of infringement at all'.[139] Similarly, in *Golden Eye*, one argument

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[135] This is especially in the case of KodakOne as Copytrack/Concensum runs a parallel, 'blockchainless' service for the invoicing of unauthorised use of images online.
[136] In *GS Media* (n 88) para 45 the CJEU stated the importance of hyperlinking to freedom of expression and information safeguarded by Article 11 of the Charter of Fundamental Rights of the European Union (ratified 7 December 2000).
[137] The incentives to settle for fear of being publicly-shamed for potentially file-sharing pornographic material was important.
[138] *Media CAT v Adams No, 4* [2011] EPC 10.
[139] ibid 21.

raised by Arnold J in the High Court and the Court of Appeal in the context of the proportionality analysis of the order was the potential for the arrangement to become a money-making scheme by relying on the vulnerability of the intended defendants to being exposed for downloading pornographic material.[140] Arnold J raised an argument related to the potential of the intended defendants targeted by the Norwich Pharmacal order to counter the infringement claims. In the judge's view, the users do not have a cost-effective avenue available to them to counter any infringement claims as they 'are ordinary consumers'.[141] In these cases, guidance was provided how services issuing letters can better inform potential infringers over the nature of the claim, which is set out below.

i)   The language used in the letters

In *Golden Eye*, Arnold J issued some guidance as to the formulation of the settlement letters to make them more consumer-friendly. He noted that it should be clarified that the letter is not based on a finding of infringement.[142] In addition, the letter should be balanced and acknowledge the consequences of the claim either being successful or unsuccesful.[143] The letter should not exaggerate or give the impression of multiple infringement if that is not applicable. The response time given should be 28 days.[144] Other safeguards were advanced by Consumer Focus but ultimately rejected.[145]

This guideline should be taken into account by the blockchain copyright enforcement services in the UK as such services raise similar issues in terms of information asymmetry between potential infringers regarding the terms offered in the post-licence. It should especially be clarified that the post-licence is not based on a finding of infringement and that if court proceedings ensue, then there can be consequences for the blockchain copyright enforcement services, for example, the payment of costs.[146]

ii)   Damages

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[140] *Golden Eye (International) Ltd and Another v Telefonica UK Ltd* [2012] EWHC 723, para 119.
[141] ibid para 119.
[142] *Golden Eye* (n 117) paras 125-126.
[143] ibid para 127.
[144] ibid para 123.
[145] ibid paras 139-143.
[146] For speculative invoicing, see *Media CAT Ltd v Adams* [2011] EWPCC 6.

In addition, in relation to damages, Arnold J stated that the letter before action should not mention a specific sum but rather:

> [the claimants should] indicate that they are prepared to accept a lump sum in settlement of their claims, including the request for disclosure, but not to specify a figure in the initial letter. The settlement sum should be individually negotiated with each Intended Defendant.[147]

This is clearly against the practice advertised by some blockchain copyright enforcement services who seek to claim on the basis of MFM.[148]

iii) Locus standi

In *Media Cat*, Justice Briss found that the law firm ACS Law misrepresented its locus standi to bring the claims forward.[149] What emerged from that case was that those representing rightholders should ensure they have at least an exclusive licence in order to legally be a claimant without having to join the rightholder as section 102 of the Copyright, Designs and Patents Act 1988 (CDPA) requests it.[150] It is unclear from the Copytrack/Concensum and KodakOne websites how they address the issue of standing.

3.3.6 Discussion

The guidance issued in the case law on speculative invoicing is useful for blockckchain copyright enforcement services. This does not mean that blockchain copyright enforcement services qualify as speculative businesses themselves as that depends on a concurrence of factors. Yet, for users to respond to a post-licence letter is onerous in all situations. For example, when a letter is erroneously sent, then the only way in which the user can assert their innocence or counter the claim for infringement is by responding to the letter. The suspected infringers have to pay for legal advice. This may be problematic when these are vulnerable users or small businesses. As observed by Arnold J above, those targeted by such letters 'are ordinary consumers, many of whom may be on low incomes and without ready access to legal advice, particularly specialised legal advice of the kind required for a claim of this nature'.[151] In 2015, the cost of a denial letter in relation to peer-2-peer infringement in

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[147] ibid para 138.
[148] Such as Copytrack/Concensum.
[149] *Media CAT* (n 146) para 106.
[150] ibid para 26.
[151] *Golden Eye* (n 117) para 119.

the UK was £350 plus VAT.[152] Given that the blockchain copyright enforcement services offer no simple appeals procedure for users outside of answering the letter, similar costs are incurred by those targeted by post licence requests.

Furthermore, a BLS seeking to represent rightholders should ensure that proper licences or assignments of rights are put in place that gives them the legal standing to act in the name of the rightholder. Registering metadata on the blockchain regarding the ownership of works etc does not carry with it any legal meaning. In addition, BLS could be more transparent as to the criteria they use to charge users, for example, the MFM rate from Copytrack/Concensum may not be fit for all scenarios. The MFM rate as such is only an information and planning tool; in many situations it will not reflect the price paid by the user after negotiations with rightholders. The Regional Court of Düsseldorf said that '[t]he MFM recommendations can only be used in the relationship of professional market participants, ie if there are persons on both sides who have acted in connection with their professional or commercial activity'.[153]

The implementation of best practices reduces the controversy surrounding copyright enforcement services that specialise in letters before action. This is important because one of the most important consequences of the speculative invoicing practice and its case law has been the permanent negative branding of the invoicing model, which is now connected in the mind of the public with abusive practices.[154] Thus, linking blockchain technology to this business model may reduce public confidence in the technology.

Unfortunately, given the territorial nature of copyright law, the guidance given in English case law will have a restricted impact. Indeed, other national courts have been less engaged with the concerns of the users targeted by the letters and the overall assessment of the orders for disclosure. In Germany, the system of mass letter campaigning has also been deployed as a tool of private copyright enforcement outside

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[152] ibid.

[153] LG Düsseldorf (24 October 2012) 23 S 66/12, 24. The MFM table results in extremely high amounts of compensation, which in most cases do not match the photographer's licensing practice. District Court of Berlin (29 January 2016) 16 O 522/14 as cited in Carl Christian Müller, 'Berlin Courts Dismiss Excessive Demands for Photo Warnings' <https://sos-recht.de/abmahnung/en/copytrack/> accessed 24 March 2019.

[154] Murray (n 125) 320.

courts. The strategy is the same as in the UK but phonographic films have also been included in the claim. Again, the purpose has not been to bring infringement proceedings against the individual infringers but to generate financial benefit from letter campaigns.[155] In the *RedTube* case, the Regional Court of Cologne ordered the ISP Deutsche Telekom to disclose the identities of users on the basis of n § 101 II, IX of the German Copyright Act which gives rightholders access to information concerning the origin of an infringement. However, the issue with the application is that Section 101 of the German Copyright Act permits disclosure of information only for an 'obvious infringement' but there is currently no obvious infringement as streaming from unlawful sources is not yet a restricted act. In fact, the applicant had misrepresented the infringing act as 'downloads via download links' in the application, thus giving the impression that the infringement had taken place in the peer-2-peer context. In addition, the District Court was not concerned with the specific details of data collection.[156] Schmitz identifies that the court spent little time in examining the disclosure requests.[157] Ultimately, the regional Court of Hamburg demanded the rightholders stop sending out cease and desist letters regarding porn clips on the RedTube website.[158] Furthermore, the Regional Court of Cologne rejected the disclosure orders declaring that streaming from RedTube was not an obvious infringement.[159] In Germany, however, there are no guidelines for abuse mitigation. This suggests that the implementation of the BLS model may not be the same across all Member States.

3.3.7   Legality of web crawling – copyright infringement

The practice of the BLS of sending copyright bots to identify potential infringements deserves closer attention from a copyright perspective. It should be emphasised at this point that blockchain technology is not involved in the crawling of webpages and social media profiles, which is done by bots. The blockchain only registers data regarding the images uploaded on the licensing system. The data-gathering process

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[155] Sandra Schmitz, 'The RedTube Copyright Infringement Affair in Germany: Shame on Who?' (2015) 29(1) IIC 42.
[156] Carl Christian Müller, 'Das Gutachten zur Software GLADII 1.1.3 liegt nun im Wortlaut vorhttps' (*SOS Abmahnung*, 17 January 2014) <http://abmahnung.sos-recht.de/news/das-gutachten-zur-software-gladii-1-1-3-liegt-nun-im-wortlaut-vor/> accessed 15 July 2018.
[157] Schmitz (n 154) 42.
[158] LG Hamburg (19 December 2013) 310 O 460/13 as cited in Schmitz (n 154) 43.
[159] LG Koln (24 January 2014) 209 O 188/13 as cited in Schmitz (n 154) 41.

works by sending bots or scraping software which search for instances of content (hits). The bots then download the website (or social media profile) and compare the website data with the potentially infringed images.160 Internet scraping is not a new process; the use of automatic collection via software is the backbone of the internet we know today. For example, search engines scrape websites and other parts of the internet in order to make their search engines work efficiently.161

As in the case of KodakOne, bots download the entire internet page or social media page that contains the suspected images which are then compared with the index.162 The nature of this process, as it downloads and stores both the website and images contained therein, may infringe copyright of the images downloaded should the download be a false positive.163 Furthermore, making a copy of the website may infringe any copyright or sui generis database rights in the website.164 The copying of the website which includes the image by the bots triggers the reproduction right in Article 2 InfoSoc Directive if the image copied is not an infringing image owned by the subscriber of the blockchain, but an independent work of third parties. The CJEU held in *Painer* that 'a reproduction exists if the defendants in the main proceedings published the contested photos without modification'.165 In this case, the photograph was copied in its entirety without modification so was a case of direct copying.

3.3.8   Discussion

An in-depth review paints a nuanced picture of the BLS model. Firstly, the application of standalone blockchain technology in the context of the image rights enforcement service is detached from the the actual licensing or enforcement as it acts as a database within the broader model and appears to fulfil an advertising function. Blockchain

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160 KodakOne (n 67) 13.

161 *hiQ Labs, Inc v LinkedIn Corp* 273 F Supp 3d 1099 (ND Cal 2017) 2.

162 KodakOne (n 67) 13. The operation is not described in the case of Copytrack/Concensum.

163 For the purposes of the analysis, it can be assumed that the image indexed is a work which satisfies the protectability criteria under the Copyright Term Directive, Directive 2006/116/EC of the European Parliament and of the Council of 12 December 2006 on the term of protection of copyright and certain related rights [2006] OJ L372/12, art 6: 'Photographs which are original in the sense that they are the author's own intellectual creation shall be protected in accordance with Article 1. No other criteria shall be applied to determine their eligibility for protection. Member States may provide for the protection of other photographs'. For the standard of originality, see Case 145/10 *Eva-Maria Painer v Standard Verlags GmbH and Others* EU:C:2011:798, [2012] ECDR 6, para 94.

164 On the reproduction of a website, see Case 360/13 *Public Relations Consultants Association Ltd v Newspaper Licensing Agency Ltd and Others* EU:C:2014:1195, para 10.

165 *Painer* (n 163) para 126.

technology in this context is not paradigm shifting. However, it does enable the rebranding (with some potential additional security features for rightholders) of an existing copyright enforcement model as identifying infringers and sending them settlement letters is not new. Rightholders may be drawn to the intuitive appeal of blockchain technology, as are investors. Infringers themselves may also not fully understand what the technology can do and may become incentivised to settle, although this can only be checked empirically.

To ensure that the BLS and similar do not re-open the controversy raised by the speculative invoicing era, a code of conduct should be put in place that binds the service to a set of best practices. For example, Ofcom, in response to the Digital Economy Act 2017 (DEA), which implements a graduated response in the UK, ordered a code to regulate the initial obligations related to the measures in the DEA targeted at reducing copyright infringement.[166] Although the code never materialised, it sought to introduce oversight on several aspects including standards on infringement reports, subscriber identification, appeals and information-gathering.[167] A similar approach could be taken in relation to purely private enforcement efforts such as the BLS.

3.4   Conclusions

This chapter answers the research topic by indicating that a number of proposals focus on the role of blockchains in achieving licences for content to turn infringers into paying customers. In this context, blockchain could be used either as a registry of works or in the context of smart licensing solutions. This type of diversification in the marketplace should be encouraged when it increases the supply and access to legal works, though this is not always the case as will be shown in Chapter 5. Although blockchain technology appears to promise a great deal, its innovation and market penetration in the copyright area is not easy and is likely to be expensive. Another aspect are shortcomings in the technology which may not be mature enough to fulfil on its promise. A connected aspect involves politics which could throw a spanner in

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[166] Ofcom, 'Online Infringement of Copyright and the Digital Economy Act 2010 Notice of Ofcom's Proposal to Make by Order a Code for Regulating the Initial Obligations' (26 July 2016) <https://www.ofcom.org.uk/__data/assets/pdf_file/0032/45986/notice.pdf> accessed 12 September 2018.
[167] ibid.

the works in the sense that the big players may be reluctant to invest in blockchain if its use has the potential to undercut their existing business models in the market. Although small players have demonstrated incremental innovation, like the Ujo Music smart contract, expanding the model may be tricky due to copyright law's inherent fragmentation.[168] More intensive efforts are required to iron out the issues and enable broader market adoption. Sustainability in developing models for copyright licensing which include blockchain may be advisable to avoid association with controversial models that may tarnish the perception of the technology, which may in turn undermine interest in its development. For example, and although in a separate area, peer-2-peer technology always carries with it the caché of infringement, and closer to home TPMs raise suspicion of overprotection as discussed in Chapter 2.

With the development of blockchain technology through new functionalities, new and unforeseen proposals for blockchain use in the copyright area will emerge. Two characteristics are likely to be imperative for the success of any blockchain model in the area: when these are user-facing, such as registers, smart contracts etc, these need to be user-friendly and functional; and second, to provide added value on top of what existing models are offering to convince consumers to use them. Equally, working out new uses for technology to incentivise users to pay is subject to many boardroom meetings on both sides of the Atlantic. The next chapter will continue this discussion by proposing two novel uses of blockchain technology to enhance user access to copyright works.

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[168] Bodó and others (n 58).

4 Chapter 4 Enter the matrix: blockchain technology in the management of a peer-2-peer legalisation scheme – dystrophic future or reformed reality?

4.1 Introduction

In this chapter, the role of blockchain technology is explored in the context of file-sharing legalisation solutions consisting a private, non-commercial and non-exclusive licence for peer-2-peer file-sharing.[1] As advanced by Gervais, in relation to enforcement against end users, the second (but better) tool is to 'to allow access and adopt a 'licensing perspective'.[2] Legalisation proposals are not new in copyright literature. These have been advanced by academics in policy documents and under various names: a non-commercial levy, *licence globale*, file-sharing licence, alternative compensation schemes and copyright compensation systems to name a few. The idea can be summarised as follows: a fee is paid by the internet user/ISP/hardware manufacturer under voluntary/extended/mandatory/statutory collective management to a collective management organisation (CMO) which manages the scheme to ensure that the copyright holders are remunerated for the private and non-commercial reproduction and communication to the public of their works via file-sharing.[3] Collective management refers to the situation where the rightholder authorises a CMO to monitor works usage, license and negotiate licences,

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[1] Internet users covered are private individuals.

[2] Daniel Gervais, 'Collective Management of Copyright and Neighbouring Rights in Canada: An International Perspective' (Report Prepared for the Department of Canadian Heritage, 2006) 80 <http://aix1.uottawa.ca/~dgervais/publications/collective_management.pdf> accessed 21 December 2018.

[3] Examples include but are not limited to Neil Netanel, 'Impose a Noncommercial Use Levy to Allow Free Peer-to-Peer File Sharing' (2003) 17 Harv JL & Tech 1; Alexander Peukert, 'A Bipolar Copyright System for the Digital Network Environment' (2005) 28(1) Hastings Communications and Entertainment Law Journal 1; Volker Grassmuck, 'The World is Going Flat(-Rate): A Study Showing Copyright Exception for Legalizing File-Sharing Feasible as a Cease-Fire in the 'War on Copyright' Emerges' (*Intellectual Property Watch*, 2009) <https://www.ip-watch.org/2009/05/11/the-world-is-going-flat-rate/> accessed 21 December 2018; Assemblée Nationale, 'Projet de Loi relative au Droit d'Auteur et aux Droits Voisins dans la Société del'Information, Compte Rendu Analytique Officiel' (Session Ordinaire de 2005-2006, 22 December 2005) <http://www.assemblee-nationale.fr/12/cra/2005-2006/112.asp> accessed 18 October 2018; For wider models, see João Pedro Quintais, *Copyright in the Age of Online Access: Alternative Compensation Systems in EU Law* (Wolters Kluwer 2017); Bernt Hugenholtz and João Pedro Quintais, 'Towards a Universal Right of Remuneration: Legalizing the Non-commercial Online Use of Works' in Bernt Hugenholtz (ed), *Copyright Reconstructed: Rethinking Copyright's Economic Rights in a Time of Highly Dynamic Technological and Economic Change* (Wolters Kluwer 2018) 241-282.

and collect and distribute the monies.4 The licence paid by the users (directly or indirectly) in this case essentially covers end users' liability for file-sharing.

One of the shortcomings of such proposals is the management side of the system – in this context, the availability of reliable usage data in such a framework to adequately process and share the money collected between the relevant rightholders.5 In proposals which envisage that internet users pay for the licence, another issue concerns the inclination of internet users to pay when otherwise peer-2-peer file-sharing is largely free. Overall, it is advanced that 'the practical side of the matter … appears to raise even more intricate questions than the legal aspect'.6

The chapter makes, for the first time in copyright literature, the connection between blockchain technology and legalisation models for private and non-commercial file-sharing by end users. It develops two out-of-the-box conceptual blockchain uses in the management aspects of peer-2-peer legalisation proposals. The first application of blockchain advanced focuses on the potential role of a private blockchain to be linked with a number of torrent clients and work as a log of internet user peer-2-peer content file-sharing consumption.7 The private blockchain is managed collectively by relevant CMOs, and is potentially accessible by other stakeholders, such as a regulator, according to the type of legal licence used to implement the system. The role of blockchain is to inform the distribution of revenues in a peer-2-peer legalisation model. The second proposal approaches blockchain differently, via its cryptocurrency function to conceptually explore its practical and economic feasibility and rightholder

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4 For a more extensive definition of collective management, see study commissioned by the European Parliament, KEA European Affairs, 'The Collective Management of Rights in Europe the Quest for Efficiency' (July 2006) 26
<http://www.europarl.europa.eu/meetdocs/2004_2009/documents/dv/study-collective-management-rights-/study-collective-management-rights-en.pdf> accessed 5 January 2019.
5 Daniel Gervais, 'The Price of Social Norms: Towards a Liability Regime for File-sharing' (2005) 12 JIPLP 39, 66; Christophe Geiger, 'The Rise of Criminal Enforcement of Intellectual Property Rights … and its Failure in the Context of Copyright Infringements on the Internet' in Susy Frankel and Daniel Gervais (eds), *The Evolution and Equilibrium of Copyright in the Digital Age* (Cambridge University Press 2014) 140, fn 117.
6 Annette Kur and Jens Schovsbo, 'Expropriation or Fair Game for All? The Gradual Dismantling of the IP Exclusivity Paradigm' (Max Planck Institute for Intellectual Property, Competition & Tax Law Research Paper No 09-14, 2009) 16.
7 This idea was submitted by the author as an essay for the 2018-2019 Association Littéraire et Artistique Internationale, ALAI, 'European Authors' Right Award'
<http://authorsocieties.eu/uploads/ALAI%20European%20Authors%20Right%20Award%20-%20Guidelines.pdf> accessed 26 March 2019.

acceptance as an alternative payment system by internet users for their private non-commercial infringement. Here, internet users harness their PCs' resources to 'mine' cryptocurrency as a payment for their private, non-commercial and non-exclusive licence to file-share.

The chapter answers the research question as it explores additional avenues for blockchain technology use to provide a solution to infringement by end users. The chapter advances the knowledge over the manner in which legalisation proposals may be implemented in practice. In this sense, it encourages new ways of thinking about blockchain and copyright infringement. The chapter is divided into two parts. The first part provides a conceptual model of a private blockchain-based database of user consumption levels. It then places this structure into the context of available collective management solutions. The second part elaborates a proposal for cryptocurrency as a payment system for internet users' private and non-commercial infringement.

4.2   Option 1: Management side blockchain solution for an alternative compensation system

One of the main shortcomings of non-commercial private use peer-2-peer file-sharing legalisation proposals in music and other works is determining the 'nuts and bolts'[8] of the system, including calculations over the distribution of revenues to rightholders. As noted by Hellings and Piryns, 'it is extremely difficult today to measure the current uses of the Internet'.[9] Proposals include measurements on popularity via anonymous data samples from internet users, surveys, etc.[10] Some take inspiration from the levy paid in the context of the private copy exception, where the distribution is, for example, made on market assessment by CMOs.[11] However, the rigour of this method

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[8] Quintais (n 3) 144.

[9] Benoît Hellings and Freya Piryns, 'Proposition de Loi Visant à Adapter la Perception du Droit d'Auteur à l'Evolution Technologique tout en Préservant le Droit à la Vie Privée des Usagers d'Internet' (Senat de Belgique, Session de 2009-2010, January 2010) <http://desguin.net/spip/spip.php?article191> accessed 26 March 2019.

[10] For an overview of online use measurement, see Quintais (n 3) 146.

[11] WIPO, International Survey on Private Copying: Law and Practice 2015' (*WIPO*, 2016) <http://www.wipo.int/edocs/pubdocs/en/wipo_pub_1037_2016.pdf> accessed 26 March 2019; Copie Privee, 'What is Private Copying: Private Copying in France' (*Copie Privee*) <http://www.copieprivee.org/en/la-copie-privee-cest-quoi/copie-privee-en-france/> accessed 26 March 2019. In Sweden, the money is distributed according to a market survey in copying behaviour; for levy-based legalisation proposals see Netanel (n 3) 43-44; Dutch alliance of artists and consumers proposal see Ernesto, 'Dutch Artist Unions Call Government to Legalize File-Sharing' (*Torrentfreak*,

is criticised.12 It imperfectly quantifies peer-2-peer use, which may generate high levels of discontent in revenue allocation. Other proposals exist. For example, Fisher suggests that upon registration with the US Copyright Office the rightholder in music or audio-visual works could receive an ID number which may be attached to his work.13 Then, the Copyright Office, through the ID number, may track the level of consumption.14 Eckersley remarks on the imperfect link between funding and distribution of revenues to artists in compensation systems before proposing a 'one dollar one vote' system as a proxy for use.15 For his part, Lohman argues that determining what is consumed by users requires finding the balance between ensuring user privacy and an accurate estimate of popularity.16 The popularity is measured via anonymous monitoring of file-sharing activities and human oversight.17 Aigrain advances that samples of users could agree to have their usage metered to inform the general consumption level.18 The Virgin Media Group partnership with Sony BMG, Universal Music, PRS, indies, EMI Music and Playlouder sought to offer a subscription bundle where users could file-share in a 'gated' file-sharing community within which Playlouder MSP could monitor via audio fingerprinting (audible magic) the use of the works for revenue distribution purposes.19 Grassmuck advances the use of a detection and reporting module which may be plugged into various applications

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24 November 2010) <https://torrentfreak.com/dutch-artist-unions-call-government-to-legalize-file-sharing-101124/> accessed 26 March 2019.

12 The methods employed by CMOs are perceived to favour more famous creators over those who have smaller audiences. See JP Hugot and O Hugot, 'The DADVSI Code: Remodelling French Copyright Law for the Information Society' (2006) 17(5) Ent LR 2006 139, 141.

13 William Fisher, *Promises to Keep: Technology, Law, and the Future of Entertainment* (Stanford University Press 2004) 9-10.

14 Because the registration appears mandatory, from the perception of international treaties on copyright law this may amount to a formality under Article 5(2) of the Berne Convention. The enjoyment and exercise of these rights shall not be subject to any formality. This is especially if they can be seen to limit the rightholder's enforcement potential. See, more generally, Jane Ginsburg, 'The US Experience with Copyright Formalities: A Love/Hate Relationship' (Columbia Public Law & Legal Theory Working Papers, Paper 9181, 2010) 5 <https://lsr.nellco.org/cgi/viewcontent.cgi?article=1073&context=columbia_pllt> accessed 26 March 2019.

15 Peter D Eckersley, 'Virtual Markets for Virtual Goods: The Mirror Image of Digital Copyright?' (bepress Legal Series, working paper 386, 17 September 2004) 27-28.

16 Fred von Lohman, 'Voluntary Collective Licensing for Music File Sharing' (2004) 47(10) Communications of the ACM - Voting systems 21, 23.

17 ibid 23.

18 Philippe Aigrain, *Sharing: Culture and the Economy in the Internet Age* (Amsterdam University Press 2012) 93.

19 Top40-Charts, 'World's Only Music ISP Signs Landmark UK Deal with Sony BMG' (26 August 2005) <http://top40-charts.com/news.php?nid=16750> accessed 26 March 2019.

used for downloading to log metadata of the works played and generate a monthly report.[20]

This section proposes the use of a blockchain, as part of a technology stack, to resolve the difficulty in collecting internet user peer-2-peer consumption data for revenue allocation in a manner that is transparent and which internet users and other third parties can trust. To achieve peer-2-peer legalisation, a custom made private blockchain integrated with a number of torrent clients could record what individual users download to better tailor the distribution of revenues and potentially inform the amount payable by users. As the blockchain is data add-only, it provides a tamper-proof audit trail of all the consumption entries and this generates a single version of 'truth' of participant peer-2-peer consumption. The blockchain keeps a pooled record of users' file-sharing consumption which can be maintained by a number of relevant CMOs/consumer representative organisations/other government bodies, depending on the legal set-up (although at the beginning an entity would have to invest in the development of the blockchain). In essence, the blockchain works like a back-end facility of a content service that records customer consumption for royalty payments. Such recording in the context of peer-2-peer legalisation proposals minimises the potential for disputes.[21] For example, it may mitigate suspicions that some rightholders may be put at an advantage compared to others for pay-outs. The potential for disagreement over royalty distribution would be very high given the distributed nature of peer-2-peer file-sharing.[22] Also, should the licence fee be informed by actual use, then the blockchain will show the record of consumption and reduce the possibility of disputes with users. Since the data are collected automatically and transparently, the blockchain facilitates compliance with the CRM Directive for participating CMOs.[23]

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[20] Volker Grassmuck, 'A Copyright Exception for Monetizing File-Sharing: A proposal for Balancing User Freedom and Author Remuneration in the Brazilian Copyright Law Reform' (18 January 2010) 12 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1852463&download=yes> accessed 12 January 2018.

[21] For example, rightholders are pulling out of the Spanish SGAE collecting society because of a number of concerning practices, including a scandal where certain SGAE members and TV broadcasters conspired to skew the manner in which royalties were distributed to writers and music publishers. Chris Cooke, 'Global Publishers Now Reportedly Pulling Rights from Controversial Spanish Society SGAE' (*Complete Music Update*, 3 July 2018) <https://completemusicupdate.com/article/global-publishers-now-reportedly-pulling-rights-from-controversial-spanish-society-sgae/> accessed 1 September 2018.

[22] ibid.

[23] Council Directive 2014/26/EU of 26 February 2014 on collective management of copyright and related rights and multi-territorial licensing of rights in musical works for online use in the internal

4.2.1　Elements of the model

A designated CMO, or a number of CMOs or other organisations,[24] pool together to develop a number of purpose-built torrent clients (compatible with various existing peer-2-peer networks) which are all integrated with same blockchain database.[25] Torrent clients are computer programs that, 'once downloaded on a user's PC, allow her to share some of her computer's contents (files) with other users of the same, or compatible software'.[26] In other words, a client is a gateway to a peer-2-peer network, which is the infrastructure of connected computers. A number of clients may be necessary in this context as users may have preferences over the peer-2-peer network used (of course, only one client can also be created, for example, to match with BitTorrent). The torrent clients enable users to file-share via existing peer-2-peer networks as some of these protocols allow third-party developed clients to join. For example, the BitTorrent protocol supports a number of third-party developed clients.[27]

The blockchain would likely be a purpose-built private and permissioned blockchain that permits internet users to automatically add data as they file-share and allows CMOs and potentially other organizations to access and verify the data for distribution and audit purposes. A private blockchain ensures that the data added to it are available only to permissioned entities and not accessible by the public. End users only have write-only permission, and no access to general usage logs. End users could potentially request their logs in case of any dispute. CMOs or other relevant organizations involved in the distribution of revenues have read-only permission. They can consult the log for distribution purposes but not change the data recorded.

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market [2014] OJ L 84/72. This is especially in the case of multi-territorial licensing, see Articles 25 to 26.

[24] Private companies could potentially be interested. For example, Noank Media provided 'non-compulsory blanket licenses that monetize and legalize online file-sharing'. The company essentially acts as a 'content wholesalers' as it enters into agreements with copyright owners such as record companies, music publishers, film studios who authorise Noank to further distribute copies of the work to ISPs, mobile services and universities in return for a fee in China and Canada. The company facilitates a flat rate licensing scheme. The company operated between 2007 and 2009.

[25] For example, one of the existing music licensing hubs, such as Ice or Armonia, could invest in the technology, then other organisations could join, for example, rightholders in audio-visual works could also be co-opted.

[26] Gervais (n 5).

[27] Similarly, the Gnutella network. Techopedia, 'Gnutella Network' <https://www.techopedia.com/definition/445/gnutella> accessed 1 April 2019.

Blockchain and torrent client integration is not unprecedented. The pioneers are the developers of Tribler, a BitTorrent client created by a number of researchers from Delft University of Technology, the Netherlands. In 2018, these released a new version of their BitTorrent client, upgraded with a blockchain.[28] The Tribler blockchain is used internally. It tracks the user bandwidth contributions to encourage uploading.[29] Similarly, the new owners of the BitTorrent protocol who also develop the TRON blockchain are in the advanced stages of integrating the TRON blockchain with the existing BitTorrent network.[30] They propose a new BitTorrent client, called BitTorrent Speed, which will include a Torn cryptocurrency called BitTorrent (BTT)/byte.[31] This cryptocurrency enables internet users to offer computer storage space in return for tokens ('for provision of infrastructure services in small increments across a very large installed base').[32] In these configurations the blockchain is used to incentivize uploading in a peer-2-peer setting. This use of blockchain will be analyzed in Chapter 5 which considers the role of blockchain in facilitating infringement.

In our system, once the end user downloads a blockchain adapted torrent client and engages in file-sharing with other end users, each download of works and potentially the seeding (upload) period of the file is recorded as an entry on the blockchain. This generates real time download data, with the seeding time potentially acting as a proxy to calculate upload use. The same blockchain is multitasked to work with the various torrent clients provided, which means that the single blockchain contains a record of all participating users' consumption across the various peer-2-peer networks. The blockchain is designed to allow multiple CMOs to consult the registered data as is necessary for money distribution. The blockchain could also be collectively administrated by the CMOs. The set-up would look like this:

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[28] Ernesto, 'Tribler Invented "Paid" Torrent Seeding Over a Decade Ago' (*Torrentfreak*, 13 October 2018) <https://torrentfreak.com/tribler-invented-paid-torrent-seeding-over-a-decade-ago-181013/> accessed 20 October 2018.
[29] Downloading is done via maintaining an adequate 'token balance' with tokens gained by seeding. This is not explained directly, but can be deduced from the client's forum, Tribler, 'Confusion regarding Token Balance' (forum posts, December 2018) <https://forum.tribler.org/t/confusion-regarding-token-balance/4914> accessed 20 October 2018.
[30] BitTorrent Foundation, 'BitTorrent (BTT) White Paper v0.8.7' (February 2019) <https://www.bittorrent.com/btt/btt-docs/BitTorrent_Token_Whitepaper.pdf> accessed 12 January 2019.
[31] ibid 7.
[32] ibid.
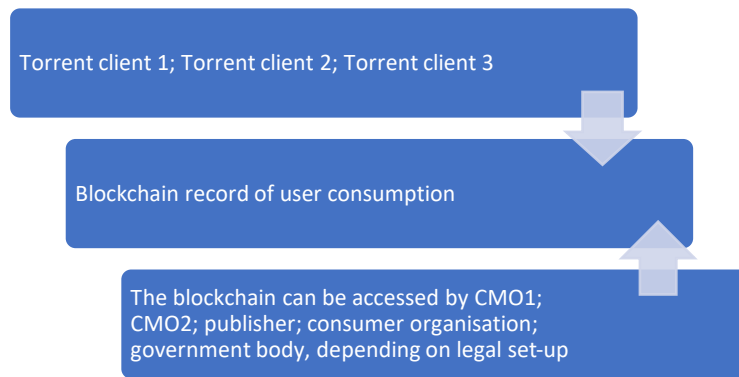
Figure 2 – Conceptual model of blockchain and torrent integration

The prerequisite is that the internet user downloads one of the blockchain-integrated torrent clients to file-share as otherwise consumption would not be measured. Each torrent client comes with an ID number, which will be assigned to the consumption logged on the blockchain. User participation can be market incentivised, made compulsory by law or a combination between market incentives and legal enforcement (again depending on the legal set-up for the licence).[33] For example, for end users who would not be willing to participate in an opt-out system, perhaps because they do not file-share, more stringent penalties could be available should they be caught file-sharing. The user would also have to consent to his consumption data being recorded by the blockchain. Indeed, the system would have to be made GDPR-compliant, which is less of a problem for private blockchains yet potentially impossible for public blockchains.[34] As mentioned above, only CMOs, organisations controlled by CMOs (such as the ICE hub) and publishers may access the usage data collected and only for distribution purposes. Gervais argues that in a legalisation system CMOs are best placed to safeguard users' privacy as 'they have demonstrated an ability to decouple users from usage data'.[35] Indeed, the recording done by the blockchain does not exceed the data collection done by streaming services such as Spotify and Netflix.[36] Also the

[33] For example, the developed torrent could offer a better user experience, combined with higher legal enforcement against users caught 'cheating'. Dougherty notes that users may not desire to participate as they are not afraid of the threat of enforcement; Meghan Dougherty, 'Voluntary Collective Licensing: The Solution to the Music Industry's File Sharing Crisis?' (2006) 13 J Intell Prop L 405, 430.

[34] Michele Finck, 'Blockchains and Data Protection in the European Union' (Max Planck Institute for Innovation & Competition Research Paper No 18-01, 2017) <http://dx.doi.org/10.2139/ssrn.3080322> accessed 8 September 2018.

[35] Gervais also makes the further point that a CMO has no interest in further selling or mining the data, see Gervais (n 5) 66.

[36] Most recently, see Matthew Gault, 'Netflix has Saved Every Choice you've Ever Made in "Black Mirror": Bandersnatch' (*Motherboard*, 12 February 2019)

blockchain layer does not entail general monitoring of all internet user activity but is only limited to the specific torrent consumption.

4.2.2 Quality of data collected and compatibility with CMO operation

Of importance here is the level of detail of the data recorded on the blockchain. For example, if only general numbers of consumption are recorded, although informative, this would be less useful to rightholder revenue distribution and may generate limited added value. Instead, if the entry on the blockchain represents the exact titles of the file downloaded/uploaded, this would show clear consumption data. It is normally expensive to add data to a public blockchain but on a private purpose-built blockchain adding additional data may not be a problem. Indeed, the entry would consist of little more than a sentence. It is the capacity of the blockchain to record actual and real time consumption data via the torrent client which is key and would have to be experimentally tested. A further issue is the compatibility of the data collected by the blockchain with existing rightholder databases owned by CMOs to enable the automated matching and processing of usage data. Here, the automatic matching of the work usage with the distribution relevant data is crucial. For example, the cost of manual processing is estimated at 15 euros per work (if it at all possible) whereas automated processing costs 0.02 euros per work.[37] Some of the data collected via the torrent clients may be problematic – torrent titles may reference works incorrectly, misspell titles or contain other errors which would imply additional efforts to match the usage information to works.[38] CMOs may have to implement new processing strategies that potentially combine various identification strategies.

4.2.3 Implementation of the system: collective management

This section argues that the legal implementation of the blockchain technical model above is best suited to forms of collective administration of rights. In that area, the

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<https://motherboard.vice.com/en_us/article/j57gkk/netflix-has-saved-every-choice-youve-ever-made-in-black-mirror-bandersnatch> accessed 12 February 2019.

[37] European Commission Staff Working Document, 'Impact Assessment, Proposal for a Directive of the European Parliament and of the Council on Collective Management of Copyright and Related Rights and Multi-territorial Licensing of Rights in Musical Works for Online Uses in the Internal Market' COM (2012) 372 final 25 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012SC0204&from=EN> accessed 30 November 2018.

[38] This would add complexity to the existing problem of different collecting societies claiming the same work which leads to double invoicing.

easiest model to implement from a legal perspective is voluntary collective management (VCM) which requires minimal state intervention and reflects rightholder willingness to participate. Extended collective licence (ECL) is another option with the help of some legal intervention. Non-voluntary forms of collective management are also envisaged but these raise particular legal issues which may be insurmountable. The section will first set out the case for collective management application in the area before working through the various options available.

Although it was shown in Chapter 3 that blockchain technology may create new forms of individual management via smart contracts,[39] legalization systems as discussed in this chapter are not the ideal ground for such licenses. Individual management is the situation where rightholders themselves exercise their right as they negotiate remuneration for their rights for each use of the work.[40] In the case of low value, high volume transactions, individual management generates market failure as it is impossible for a user to monitor each use.[41] Such an environment is peer-2-peer file-sharing where it is impossible for rightholders to charge individually. Yet, legalisation proposals challenge copyright orthodoxy based on the supremacy of exclusive rights and prior authorisation of the rightholders by placing the exclusive rights engaged in peer-2-peer use under various forms of collective management, at the expense of individual management of works.

Collective management is perceived as an economically efficient compromise as the rights of their members are managed collectively.[42] Collective management largely involves the assignment of rights by contract or by law by a rightholder to a CMO.[43]

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[39] Digital technology as a whole is expected to expand the feasibility of individual licenses, especially via the combination of TPMs and RMI; Mihaly Ficsor, 'Collective Management of Copyright and Related Rights at a Triple Crossroads: Should it Remain Voluntary or May it be "Extended" or Made Mandatory' (Copyright Bulletin, October 2003) 2 <http://bat8.inria.fr/~lang/orphan/documents/unesco/Ficsor+Eng.pdf> accessed 26 March 2019.
[40] Indeed, as explained by Ricolfi, historically collective management follows individual management. See, Marco Ricolfi, 'Individual and Collective Management of Copyright in a Digital Environment' in Paul Torremans (ed), *Copyright Law: A Handbook of Contemporary Research* (EE 2007) 284.
[41] Morten Hviid, Simone Schroff and John Street, 'Regulating CMOs by Competition: An Incomplete Answer to the Licensing Problem?' (2016) 79(3) JIPITEC 256, 258.
[42] ibid.
[43] A CMO is defined in the CRM Directive (n 23) art 3(a): 'any organisation which is authorised by law or by way of assignment, licence or any other contractual arrangement to manage copyright or rights related to copyright on behalf of more than one right holder, for the collective benefit of those

It simplifies licensing and decreases the costs of negotiation by achieving economies of scale.[44] Collective management achieves efficiency also for users, for example, it is cost-prohibitive for a music service to track down and license works from the rightholders themselves. The scale is even greater since the rights in a musical work are fragmented and hence held by various parties who may be located in different territories.[45] Even when individual licensing is possible, rightholders may still wish to join collective management to enjoy the benefits generated by collective bargaining.[46] Furthermore, collective management via CMOs has an important cultural role, for example, it enables lesser-known works to reach the marketplace.[47]

A tradition of collective management exists in Europe, especially in music. The operation of CMOs is regulated at EU level by the CRM Directive.[48] In addition, the CRM Directive prescribes a set of rules for the issuance by CMOs of multi-territorial music licences.[49] The CRM Directive Impact Assessment states that authors of musical works have traditionally used CMOs as well as performers and phonogram producers for their remuneration rights, and largely used direct licensing for their exclusive rights.[50] Collective administration in its various forms has historically, and successfully, complemented exclusive rights to keep up with technological change. In situations where exercising individual rights was impractical (or when policy goals required curtailing the exercise of rights) collective management achieved balanced and workable solutions. Indeed, Arpad Bogsch, Director of WIPO, stated that, 'with

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right holders, as its sole or main purpose, and which fulfils one or both of the following criteria: (i) it is owned or controlled by its members; (ii) it is organised on a not-for-profit basis'.

[44] See generally, Christian Handke and Ruth Towse, 'Economics of Copyright Collecting Societies' (2008) 38(8) IIC 937, 937.

[45] European Commission, 'Directive on Collective Management of Copyright and Related Rights and Multi-territorial Licensing – Frequently Asked Questions' 2 (Memo 14/79, Brussels, 4 February 2014).

[46] For the various strategies by users to encourage rightholders to deal with them directly, outside of collective management, see Robert Hooijer and J Joel Baloyi, 'Collective Management Organizations – Tool Kit' (February 2016) 25 <http://www.wipo.int/edocs/pubdocs/en/wipo_pub_emat_2016_1.pdf> accessed 26 March 2019.

[47] Nérisson explains that 'the role collective management plays in striking a balance in the relation between industry on the one hand and creators on the other hand, but also between the narrow realm for statutorily permitted uses on the one hand and the public's call for easy access to works on the other hand.' Sylvie Nérisson, 'Has Collective Management of Copyright Run its Course? Not so Fast' (2015) 46 IIC 505, 506-507; see also Daniel Gervais, 'The Cultural Role(s) of Collective Management Organizations' (2018) 40(6) EIPR 349, 349.

[48] CRM Directive (n 23) Title II.

[49] ibid Title III.

[50] European Commission (n 37) fn 29.

galloping technological developments, collective administration of such rights is becoming an ever more important way of exercising copyright and neighboring rights'.[51]

In one configuration, CMOs could be trusted to oversee the development and implementation of the private blockchain and torrents.[52] Collective management organisations already have in place distribution schemes and the monies collected can be added on to those schemes. As already indicated in Chapter 3, CMOs are open to exploring with blockchain technology. Charging for the licence could be done via an official online portal for the system, set up by the CMOs, like the BBC TV licence portal in the UK, although in this case the management of the portal would generate further costs. In another view, the licence could be payable by end users directly to their ISP and passed onto to the CMO, but ISPs who are under no legal obligation to be involved in licensing peer-2-peer.[53]

4.2.3.1   Parameters of the end user licence

The file-sharing licence offered to end users is a private, non-exclusive, non-commercial licence for peer-2-peer use.[54] The licence would include a cross-border element. The notion of 'non-commercial' would have to be defined as it remains undefined at EU level.[55] The rights covered by the licence are the reproduction right in Article 2 InfoSoc Directive which represents the download of the works, and the making available side of the communication to the public right in Article 3 InfoSoc Directive which covers its subsequent upload. The licence would remove individual user liability for infringing rights in works via file-sharing. At the same time, copyright and related rightholders would receive payment from peer-2-peer activity. It is

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[51] WIPO, *Collective Administration of Copyright and Neighboring Rights* (WIPO 1990) 6.

[52] Other proposals envisage such licences being offered to users by third parties such as ISPs or file-sharing software providers. Gaetano Dimita, 'Copyright and Shared Networking Technologies' (PhD Thesis, Queen Mary University of London, 2010) 182.

[53] Séverine Dusollier and Caroline Colin, 'Peer-to-Peer File Sharing and Copyright: What could be the Role of Collective Management?' (2011) 34(4) Columbia Journal of Law and the Arts 809, 823.

[54] The licence could be given to an individual PC or household.

[55] The CRM Directive (n 23) refers to 'non-commercial' but no definition is provided, see Recital 19 and Article 5. One approach would be to import the definition of non-commercial from the Creative Commons BY-NC licence which defines non-commercial as use 'not primarily intended for commercial advantage or monetary compensation'. Creative Commons, 'Attribution-NonCommercial 3.0 Unported' (CC BY-NC 3.0) <https://creativecommons.org/licenses/by-nc/3.0/> accessed 27 January 2019.

important to note that the licence does not cover third party services, such as torrent index platforms, which remain infringing.

Certain legalisation proposals argue that users could receive a blanket licence known as a 'global licence' or blanket licences for the category of works covered.[56] This is a licence issued by a CMO 'permitting the user, during the term of the license, to use any one of such works or performances without the need of procuring an individual or transactional license for such usage'.[57] The categories of works covered could begin with music. The system may be subsequently extended as necessary.

The blockchain set-up above may in theory generate choice over the manner in which the licence for private and non-commercial peer-2-peer use is charged. The system could inform both blanket licences as well as blanket transactional licences. For blanket licences, which cover the whole repertoire in the territory of a CMO, royalties are paid as a lump sum deal on the basis of actual or potential audience, and the user pays for the potential use of the whole repertoire. Exact usage data are not necessary for the payment of the blanket licence but are instead relevant for the distribution of collected royalties.[58] Hence, all participating users may pay a lump sum payment. However, the blockchain database when it records individual consumption levels may enable transactional blanket licences, which are charged on the basis of actual usage of works, and so enable a more accurate payment of the licence.[59] However, this would in turn require additional data processing as the blockchain would have to indicate a clear link between a certain user and the works consumed. In addition, transactional licences may require advance permission to use a specific work, which is unsustainable in the peer-2-peer system as users are not used to seeking permission before engaging in file-sharing. Furthermore, such a system would make the

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[56] A blanket licence is defined as 'a license issued by a CMO permitting the user, during the term of the license, to use any one of such works or performances without the need of procuring an individual or transactional license for such usage.' Hooijer and Baloyi (n 46) 25. Examples of blanket licence legalisation proposals include Dougherty (n 33) 405; Jessica Litman, 'Sharing and Stealing' (2005) 27(1) Hastings Comm & Ent LJ 9, 38; On global licence, see Hellings and Piryns (n 9).
[57] Hooijer and Baloyi (n 46) 25.
[58] European Commission, 'Case M.6800-PRSfM/STIM/GEMA/JV: Merger Procedure Regulation (EC) 139/2004' COM (2015) 4061 final, point 80.
[59] In the marketplace, the ICE licencing hub offering includes transactional licences for music services. See PRS for Music, 'Licensing Joint Venture with STIM and GEMA to Provide Services across Europe' (*PRS for Music*, 17 June 2013) <https://www.prsformusic.com/press/2013/licensing-joint-venture-with-stim-and-gema-to-provide-services-across-europe> accessed 3 January 2019.

administration of the licence more complex as the CMO would have to invoice (and potentially chase for non-payment) each individual user. The magnitude of the endeavour affects the feasibility of the system. Therefore, the transactional licence, although in theory possible, may raise more problems than it solves.

4.2.4 Voluntary collective management

This section argues that VCM is the most appealing option for the development of the proposal, although it raises significant drawbacks. Interest in developing the technology advanced above would be accelerated if participant rightholders were open to offering a licence that covered peer-2-peer use via CMOs. In this case, VCM is the most legally straightforward avenue to offer the peer-2-peer licence to users as it does not require changes to the law. VCM largely enables market-driven solutions to peer-2-peer. In the context of existing legalisation proposals, Fisher observes that the best set-up is one where the individual artists and users 'thought it superior to existing agencies'.[60] Similarly, Lincoff argues that market-driven licences are preferable to compulsory or statutory licences.[61] Indeed, Hugenholtz and Quintais argue that VCM has been extensively applied in Europe, for example, in music, for mechanical reproduction and broadcasting.[62] Lohman states that rightholders could form into a collecting society and licence to users just as rightholders formed into CMOs (ASCAP and BMI) in the US.[63] The Dutch proposal also asked interest groups to come to the table to negotiate a VCM.[64]

From the perspective of exclusive rights, a non-mandatory model of collective management in the form VCM has the least restrictive effect on rightholder exclusivity as it only curtails the individual exercise of rights but does not alter the nature of the rights.[65] The model requires no changes to EU copyright law and international

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[60] Fisher (n 13) 257.
[61] Bennett Lincoff, 'A Full, Fair and Feasible Solution to the Dilemma of Online Music Licensing' 13 <http://www.bennettlincoff.com/music.pdf> accessed 26 March 2019.
[62] Hugenholtz and Quintais (n 3) 253. However, they later argue that it is unlikely that the broadcast model will be extended to the online world.
[63] Fred von Lohman, 'A Better Way Forward: Voluntary Collective Licensing of Music File Sharing' (*EFF*, April 2008) https://www.eff.org/wp/better-way-forward-voluntary-collective-licensing-music-file-sharing accessed 25 March 2016.
[64] VCM was proposed as the InfoSoc Directive did not offer the possibility of a legal exception for user private and non-commercial uploads, see Ernesto (n 11).
[65] Quintais (n 3) 100; Dusollier and Colin (n 53) 818.

copyright agreements.[66] Because of this, more stringent legalisation proposals fall back on VCM.[67] In VCM, by virtue of a contractual arrangement the CMO can then license on behalf of the rightholder a specific right/rights/catalogue of works.[68] Territoriality is messy from the perspective of online rights clearance.[69] The CRM Directive seeks to address that, at least in music licensing.[70] Quintais argues that the multi-territorial licensing model in the CRM Directive is a 'model of reinforced voluntary collective licensing.[71] The CRM Directive encourages the voluntary aggregation of CMO repertoire as a means of reducing licences required for multi-territorial licensing.[72]

Some argue that at EU level, under a VCM, the availability of a peer-2-peer licence could be based on Article 5(3) CRM Directive which recognises the author's right to grant such licences.[73] Under Article 5(3), '[r]ightsholders shall have the right to grant licences for non-commercial uses of any rights, categories of rights or types of works and other subject-matter that they may choose'.[74] Then, Recital 19 paragraph 3 further clarifies that Member States should ensure that CMOs enable rightholder exercise of the right to grant non-commercial licences. In this, the CMO should decide on the conditions attached to the exercise of that right and inform its members of those conditions.

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[66] Silke von Lewinski, 'Certain Legal Problems related to the Making Available of Literary and Artistic Works and other Protected Subject Matter through Digital Networks' [2015] Copyright Bulletin 15, 108.
[67] Quintais (n 3) 403.
[68] Hooijer and Baloyi (n 46).
[69] Although aspects of copyright are harmonised, copyright law remains territorial with 28 (potentially soon 27) Member States maintaining their own copyright and related rights legislation. The territoriality of copyright is enshrined in international treaties and EU law and confirmed by the CJEU: 'Those rights are therefore of a territorial nature and, moreover, domestic law can only penalise conduct engaged in within national territory' Case 192/04 *Lagardère Active Broadcast* EU:C:2005:475, para 46.
[70] CRM Directive (n 23) Title III.
[71] Quintais (n 3) 100.
[72] European Commission (n 37) 163; Sebastian Felix Schwemer, 'Emerging Models for Cross-border Online Licensing' in Thomas Riis (ed), *User-Generated Law: Re-Constructing Intellectual Property Law in a Knowledge Society* (EE 2016) 77-98.
[73] Quintais (n 3) 403.
[74] Guibault explains that non-commercial licences can only be granted in relation to any rights, specific categories of rights or types of works or other subject matter, but not individual works Lucie Guibault, 'Collective Management Directive' in Irini Stamatoudi and Paul Torremans (eds), *EU Copyright Law: A Commentary* (EE 2014) 14.33.

Although Article 5(3) provides further licensing flexibility for rightholders, it also introduces additional layers of uncertainty. For example, it is unclear what is meant by non-commercial and who is specifies the term.[75] In this sense, Metzger and Heinemann argue that '"non-commercial" must be interpreted as a European legal term that finally has to be specified by the ECJ based upon autonomous, European criteria'.[76] Another issue is how would this licence be managed collectively as necessary by the system. CMOs in certain sectors have historically resisted this.[77] Further clarification is necessary over the application of Article 5(3) CRM Directive in the context of peer-2-peer licensing to users. Regarding the tariff for the licence, it is not known if Article 16(2) of the CRM Directive may provide guidance for the rate of the licence, given the non-commercial nature of the licensed use.[78] A workaround may be to licence willing ISPs or other third parties who can be seen as a 'commercial user' and take it from there.[79]

Offering a peer-2-peer licence via VCM presents additional practical problems. The biggest challenge is achieving meaningful agreement between the rightholders.[80] The fact that rightholders and their representative organisations are yet to offer such a licence sends the message that the marketplace is still wary of peer-2-peer in a licensed format. This is likely because of the unknown market impact of such a licence. The blockchain set-up advanced above may generate some opposition from rightholders because of adjacent torrent development. This may be perceived as encouraging infringement. A split may generate between different rightholders in a collective on the issue of supporting such a system. In a voluntary model, determining which CMO invests in the technology may also generate disagreement, for example, over funding.

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[75] Axel Metzger and Tobias Heinemann, 'The Right of the Author to Grant Licenses for Non-Commercial Use' (2015) 6(1) JIPITEC 11, 18.

[76] ibid.

[77] ibid 13, Metzger and Heinemann explain that prior to Article 5(3) Distance Marketing Directive, the CMO licence of the works of creators they represent on the basis of non-commercial licences was seldom practised. Creators assign their rights on an exclusive basis to a CMO, and the CMO does not wish to grant non-commercial licences. One example refers to the German music CMO GEMA which has creators and other right holders assign all rights in existing and future works, but does not grant non-commercial licences on the basis of impracticality and administration costs, cherry-picking amongst others.

[78] Quintais (n 3) 404.

[79] Hellings and Piryns (n 9) also envisage the licence negotiated by an ISP. However under an ECL, Dusollier and Colin (n 53) 832-833 note the interplay between a scheme offered by ISPs and ISPs as intermediaries.

[80] von Lohman (n 16) 24.

By enabling internet users to purchase such a licence, the system turns file-sharing into a music/audio-visual or other content service in all but name. Rightholders may also be concerned about the licence rate paid by end users.[81] Given that some legalisation proposals envisage rather low levels of payment for rightholders, these may be wary of establishing a low-level licence payment as a precedent. In a commercial context, the CRM Directive may be seen to prevent that from happening via Recital 32 which states that 'collective management organisations should ... provide … individualised licences for innovative online services, without the risk that the terms of those licences could be used as a precedent for determining the terms for other licences'. Existing services would nonetheless see the peer-2-peer end user licence as a source of competition and use their market position as leverage in an attempt to force rightholders and CMOs not to participate in the legalisation proposals. Certain legalisation proponents were advancing a VCM on the background of a poorly-developed legal marketplace.[82] The market has moved on since then. Furthermore, in markets such as audio-visual, content services are also rightholders, for example, Netflix and Amazon Prime produce their own very popular shows. Should the licence be extended in such markets, these rightsholders would not participate as the peer-2-peer end user licence may be seen as cannibalising their subscription base.

Other challenges to VCM are structural. A high degree of coordination is required between CMOs and other rightholders to provide a licence to users from a single point.[83] This is enhanced if the licence covers categories of works. Regarding music, academics agree that one major drawback of the system is that a voluntary system cannot produce a blanket licence that is comprehensive enough to meet the expectations of users to download all kinds of content. One issue is the fragmented

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[81] In some situations, voluntary licences may pay less then statutory royalty rates Alyssa Goldrich, 'Streaming Moguls are Biting the Hand that Feeds them: Artists Beg for a Change in Intellectual Property Laws' (2016) 15(2) 287 <https://scholarlycommons.law.hofstra.edu/cgi/viewcontent.cgi?article=1296&context=jibl> accessed 27 March 2019.
[82] Dougherty (n 33) 429. EFF argued that legal business models were failing, von Lohman (n 16).
[83] Similarly, Dusollier and Colin (n 53) 834 argue that various categories of users will also have different incentives to participate (or not) in such a system.

status quo where no single CMO can offer such a comprehensive licence. For example, as Dusollier and Colin explain:

> It is well known that copyright is fragmented in many regards: a single CMO does not hold all the rights to a copyrighted work (e.g. the reproduction and performance rights), does not represent all the rights holders to a work (e.g. authors, producers, performers) and does not cover all types of works that might be transmitted through P2P networks.[84]

A single song involves three layers of rights: rights in the musical work (this includes music and lyrics), the rights in the performance, and the rights in the recording.[85] The use of the work involves mounting several copyright rights owned by separate people which require authorization.[86] Gervais calls this a matrix of rights.[87] In this set-up, publishers do not always wish to entrust the making available right to collective management, and when they do so it can easily be revocable. Phonogram producers, for their part, wish to enforce their rights individually.[88] The prospect of success of VCM therefore remains unclear.[89]

4.2.5 Extended collective management

Another avenue to develop the technology and implement the licence may be the extended collective licensing model (ECL).[90] An ECL refers to the situation where the scope of a licence obtained under a VCM system by a CMO, related to an entire class of works or rights, is extended via explicit statutory provision or presumption to non-members of the CMO.[91] ECL has emerged in Nordic countries as a means for the efficient clearance of mass uses of works.[92] A national CMO seeking to issue an ECL needs to satisfy a number of criteria such as a critical mass of representativeness, equal

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[84] Dusollier and Colin (n 53) 833; Daniel Gervais, 'Copyright: Theory and Practice in the Digital Age' in Daniel Gervais (ed), *Collective Management of Copyright and Related Rights* (2nd edn, Kluwer Law International 2010) 10-12.

[85] ibid Gervais 12. Furthermore, collecting societies have developed their own internal categories of rights to correspond to certain uses in addition to legally prescribed rights, see Giuseppe Mazziotti, 'New Licensing Models for Online Music Services in the European Union: From Collective to Customized Management' (EUI Working Papers Law 2011/14) 761 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2026362> accessed 27 March 2019; Violaine Dehin, 'The Future of Legal Online Music Services in the European Union: A Review of the EU Commission's Recent Initiatives in Cross-Border Copyright Management' (2010) 32 EIPR 220, 211.

[86] For a historical overview of how such fragmentation occurred, see Gervais (n 2) 10-12.

[87] Gervais (n 84) 13.

[88] von Lewinski (n 66); Hugenholtz and Quintais (n 3) 8.3.1.1.

[89] Dimita (n 52) 184.

[90] Aigrain (n 18) 35-37; On global licence, see Hellings and Piryns (n 9) art 2.

[91] Quintais (n 3) 107.

[92] Thomas Riis and Jens Schovsbo, 'Extended Collective Licenses and the Nordic Experience: It's a Hybrid but Is it a Volvo or a Lemon?' (2010) 33 Colum JL & Arts 471, 473-474.

treatment and individual remuneration, and remuneration for domestic and foreign uses.93 In the present model, the licence may be managed at the national level by a representative CMO. The torrent clients and blockchain database could be developed and maintained by the various national CMOs that offer users blanket licences for non-commercial peer-2-peer use. Each CMO would consult the blockchain database and process the data necessary for distribution of the monies collected. In this situation, the IP of each download could also be recorded on the blockchain to further tailor the geographical distribution. The blockchain encryption as well as other security measures would protect such sensitive user data.

The advantage of ECL is that more rightholders can then be co-opted under the scheme, enhancing the workability of the system.94 By licensing works of unrepresented rightholders, the repertoire managed can be enhanced, thus enhancing the attractiveness of the licence. Indeed, ECL is expected to create a one-stop-shop for licensing, ie all rights to a certain form of use of a work can be licensed in one place. ECL alleviates some problems related to fragmentation of rights such as when the authorisation of non-members is required.95 For ECL in the present situation the exclusive rights are retained by authors but the copying and making available for peer-2-peer use are permissible as set out in the agreement.96 The extra-territorial

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93 For the full list of criteria to issue an ECL, see ALAI, 'Opinion on the Cross-border Effect of Licences Granted for Digitization and Communication of Out-of-Commerce Works by Cultural Heritage Institutions under a Regime of Extended Collective Licences (ECL)' (*ALAI*, 14 September 2016) <http://www.alai.org/en/assets/files/resolutions/160914-opinion-cross-border-ECL.pdf> accessed 15 January 2019.

94 Thomas Riis, Ole Andreas Rognstad and Jens Schovsbo, 'Collective Agreements for the Clearance of Copyrights – The Case of Collective Management and Extended Collective Licenses' (University of Copenhagen Faculty of Law Legal Studies Research Paper Series, Paper No 2016-16) 8 <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2764192> accessed 27 March 2019.

95 Daniel Gervais and Alana Maurushat, 'Fragmented Copyright, Fragmented Management: Proposals to Defrag Copyright Management' (2003) CJL & T 15, 24.

96 Quintais (n 3) 107. In Europe, ECL is accepted by Article 3(2) of Council Directive 93/83/EEC of 27 September 1993 on the coordination of certain rules concerning copyright and rights related to copyright applicable to satellite broadcasting and cable retransmission [1993] OJ L248/15. This provides that an agreement between broadcasting organisations and a CMO for the communication to the public by satellite concerning a given category of works can be extended to rightholders of the same category who are not represented by the CMO; Recital 18 of Council 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] OJ L167/10; Council Directive 2012/28/EU of the European Parliament and of the Council of 25 October 2012 on certain permitted uses of orphan works OJ L299/5, Recital 24; CRM Directive (n 23) Recital 12;

application could be ensured via a country of origin principle.97 In this way users would obtain a single pan-European licence from a national CMO. A legal intervention at EU level to introduce such a scheme would be required, for example, via a new directive or amendment or existing one such as the CRM Directive.98

Authors argue that compliance of the ECL model with international norms may require the existence of an opt-out of the scheme for rightholders.99 At issue here is whether the extension effect of the ECL amounts to a limitation or whether it is a limited management arrangement which does not affect the exclusive right.100 Should an ECL amount to a limitation to the exclusive right, its legality is conditioned on the three-step test of Article 9(2) Berne Convention and Article 13 of the TRIPS Agreement, which states that: '[m]embers shall confine limitations and exceptions to exclusive rights to certain special cases which do not conflict with a normal exploitation of the work and do not unreasonably prejudice the legitimate interests of the rights holder'.101 As explained by Dusollier and Colin, the purpose of the test is to safeguard forms of exploitation that produce substantial revenues for rightholders or are likely to do so in the future.102 The existence of an opt-out increases the chance that the extension effect is not seen to strip the rightholder of his exclusivity as it may be presumed that the rightholder would not oppose such exploitation and the rightholder may at any time opt out of the system.103 In doing so, the rightholder returns to full exercise of their exclusive rights.104 The existence of an opt-out appears to create a catch-22 in the context of legalisation proposals. As stated earlier, from a legal perspective, the opt-out appears desirable to mitigate the burden of compliance with the three-step test. Yet, in a peer-2-peer legalisation licence, many rightholders whose works may be

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97 Hugenholtz and Quintais (n 3) 256; Quintais (n 3) 112; in the context of digitalisation of collections of cultural heritage institutions, see Lucie Guibault, 'Cultural Heritage Online? Settle it in the Country of Origin of the Work' (2015) 6 JIPITEC 173, 173.
98 Quintais (n 3) 112.
99 For the debate, see Quintais (n 3) 109. Similarly, Dusollier and Colin (n 53) 819 explains that opt-out is not an essential trait of ECL.
100 As explained by Riis, Rognstad and Schovsbo (n 94) 4.
101 Christian Rydning, 'Extended Collective Licenses: The Compatibility of the Nordic Solution with the International Conventions and EC Law' (Complex No 3/2010, Norwegian Research Center for Computers and Law) 22 <http://www.complexserien.net/sites/complexserien/files/Complex%202010-03.pdf> accessed 31 March 2019; TRIPS (n 99) art 13.
102 Dusollier and Colin (n 53) 828.
103 Similarly, see Dusollier and Colin (n 53) 828; Ficsor (n 39) 9.
104 Dusollier and Colin (n 53) 828.

licensed for peer-2-peer use may be uncomfortable with such use and may opt out en masse, rendering the system unworkable.

The combination between the blockchain set-up above and opt-out may generate additional unintended side effects. Should some but not all rightholders opt-out, the blockchain database would still contain records of users' consumption of then unlicensed copies of the works of opted out rightholders. These rightholders may wish to access the blockchain database which essentially contains evidence of infringement. This may generate a conflict of interest for CMOs who manage the blockchain. Access of rightholders that have opted out of the system should only be allowed in exceptional circumstances and by court order, as in the situation of ISPs disclosing internet user identities.[105]

The recent decision in *Soulier and Doke*[106] raises questions over the compliance of the ECL system with EU law as well as mandatory collective management in general.[107] In 2012, Articles L 134-1 to L 134-9 of the French Intellectual Property Code introduced a regime which enabled the commercial use of out-of-print books.[108] An 'out-of-print' book is 'a book published in France before 1 January 2001 which is no longer commercially distributed by a publisher and is not currently published in print or in a digital format'.[109] The authorisation of the rightholders is presumed by law and

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[105] See sub-section 3.4.2.
[106] Case C-301/15 *Marc Soulier, Sara Doke v Ministre de la Culture* EU:C:2016:878.
[107] Axel Paul Ringelhann and Marc Mimler, 'Digital Exploitation of Out-of-Print Books and Copyright Law: French Licensing Mechanism for Out-of-Print Books under CJEU Scrutiny' (2017) 39(3) EIPR 2017; Oleksandr Bulayenko, 'Permissibility of Non-Voluntary Collective Management of Copyright under EU Law: The Case of the French Law on Out-of-Commerce Books' (2016) 51(5) JIPITEC 7.
[108] The legislative procedure is explained in *Soulier and Doke* (n 106) para 14: 'Loi No 2012-287, du 1 er mars 2012, relative à l'exploitation numérique des livres indisponibles du XXème siècle' (Law No 2012-287 of 1 March 2012 on the digital exploitation of out-of-print 20th century books) (JORF No 53 of 2 March 2012, 3986) added to Title III of Book One of the first part of the Intellectual Property Code, which deals with the exploitation of rights related to copyright, a Chapter IV, entitled 'Special provisions relating to the digital exploitation of out-of-print books', comprising Articles L. 134-1 to L. 134-9 of that code. Some of those articles were subsequently amended or repealed by the 'Loi No 2015-195, du 20 février 2015, portant diverses dispositions d'adaptation au droit de l'Union européenne dans les domaines de la propriété littéraire et artistique et du patrimoine culturel' (Law No 2015-195 of 20 February 2015 containing various provisions implementing EU law in the fields of literary and artistic property and cultural heritage) (JORF No 45 of 22 February 2015, 3294).
[109] ibid art L 134-1, para 15.

the reproduction right and communication right are placed under collective management by a CMO.110

The characteristics of the system are that a public database is managed by the Bibliothèque National de France which indexes registered out-of-print books. When a book has been registered for more than six months with the database, the right to exercise the reproduction and the public display of the work in digital format is bestowed to the approved collecting society for remuneration on a non-exclusive basis for five years, which is renewable.111 The rightholder is given the opportunity to opt out. The author or the publisher can oppose the exercise of the authorisation for the digital publication of a work.112 The law allows a narrow 6-month period from registration in the database to opposition to authorisation, giving the collecting society to exercise the rights above.113 Once the six months have passed, the author can still oppose if the reproduction and public display of the work can be shown to negatively impact their good name or reputation.114 The author and publisher may also jointly notify the collecting society of their decision to withdraw the reproduction and public display of the book in digital format.115

Finally, an author may decide to withdraw from collective management for the digital exploitation described above if evidence can be provided that he alone holds the rights in the reproduction and public display of the work.116 Rightholders were informed of the scheme by way of a campaign organized by the Culture Minister together with the collecting society. The campaign consisted of an online description of the system, a mailing campaign and the distribution of flyers in the press and banners on websites. This campaign lasted for 6 months from 1 January 2001.

This legislation was challenged by two authors. In particular, they argued that Articles L 134-1 to L 134-9 of the French Intellectual Property Code worked as an exception or limitation to Article 2(a) InfoSoc Directive, which is laid down in Article 5 Infosoc

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110 ibid art L 134-3 (I).
111 ibid.
112 ibid a L 134-4 (I).
113 ibid.
114 art L 134-4 (III).
115 ibid art L 134-6 (I).
116 ibid art L 134-6, para 2.

Directive.[117] Ultimately, the Conseil d'État referred the case to the CJEU to clarify if the legislation was compliant with Articles 2(2) and 5 InfoSoc Directive.

The CJEU found that the rights enshrined in Article 3(1) are preventative in nature so any use falling in the scope of those rights requires the prior consent of the rightholders.[118] Prior consent can be implicitly and explicitly given, yet the situations where implicit consent is available must be strictly defined.[119] Every author should be individually informed of the future use of the work and the means she has to oppose that use.[120] The French legislation on out-of-print books was seen not to ensure a means through which individual authors were individually informed, with the consequence that some authors may not even be aware of the use of their works in that system. The lack of opposition by those authors cannot amount to their implicit consent, especially since the system concerned books which were out of print for some time.[121] The obligation to individually inform rightholders of the future use of the work may be seen to undermine ECL which only works because the agreement between a representative number of rightsholders and a CMO is extended to non-members on the basis of a legal fiction. The raison d'etre of the ECL is that it removes the need to seek agreement of all necessary rightholders. It could be argued that *Soulier and Doke* has put at risk the introduction of legalisation proposals based on ECL.

4.2.6   Other non-voluntary forms of management

Other forms of management require extensive reform of international and EU copyright norms because these currently present an important barrier to such legalisation proposals, given that in some situations the implementation of the legalisation may require a reduction in rightholder exclusivity. Non-voluntary is a term that applies both to mandatory collective management and legal licences.[122] In principle, the voluntary/non-voluntary nature of the licence should not affect the relevance of the blockchain in the set-up as it is applicable in the management of the licence.

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[117] *Soulier and Doke* (n 106) para 19.
[118] ibid para 34.
[119] ibid paras 35 and 37.
[120] ibid para 38.
[121] ibid para 44.
[122] Quintais (n 3) 92.

Under mandatory collective management (MCM), the exercise of the rights of reproduction and communication to the public are exercised by a CMO.[123] This means that the rightholder cannot individually prohibit the reproduction and making available of works on peer-2-peer networks by end users; he can only do so through a CMO, which exercises their right in the best interests of the rightholder.[124] The consequence may be that a larger number of works could be co-opted by the licence, and so more works could be included in the system. MCM would thus avoid the lack of rightholder participation problem encountered with VCM and ECL.[125]

A MCM model is already implemented at EU level in the SatCab Directive[126] to exclusive rights to impose in Article 9 a special regime for cable retransmissions of simultaneous, unabridged retransmissions by cable of TV programmes originating in another Member State following an initial broadcast over air or wire. The implementation of the system was justified largely to facilitate exploitation of TV programmes by cable operators.[127] This section does not argue that the system in the SatCab Directive may be used as a legal basis for a peer-2-peer licence because internet retransmissions are not included in the scope of the SatCab provisions and peer-2-peer use goes beyond the application of that Directive and into the scope of the broad exclusive rights of reproduction and communication of the InfoSoc Directive.[128] Instead, the introduction of an MCM-based peer-2-peer licence requires reform of secondary EU law. The advantage of the model is that it avoids the problems identified above in the context of VCM and ECL related to rightholders opting out.[129] In the present system, the blockchain could be maintained and accessed by the respective CMOs.

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[123] ibid 113; Hugenholtz and Quintais (n 3).

[124] Definition inspired by Silke von Lewinski, 'Mandatory Collective Administration of Exclusive Rights – A Case Study on its Compatibility with International and EC Copyright Law' (2004) Copyright Bulletin 1, 6.

[125] von Lewinski (n 66) 108.

[126] SatCab Directive (n 96).

[127] Sari Depreeuw, *The Variable Scope of the Exclusive Economic Rights in Copyright* (Kluwer Law International 2014) 402-404. Depreeuw shows that the introduction of MCM in the SatCab Directive was justified on ensuring that cable operators could acquire rights necessary for retransmission when individual rightholders refuse to licence.

[128] Quintais (n 3) 75.

[129] von Lewinski (n 66) 108.

However, there are important legal challenges to the MCM model – some of which are outlined here. From one perspective, there is intensive debate over the effects of MCM on rightholder exclusivity, specifically whether MCM can be applied only exceptionally to remuneration or compensation rights or in a broader manner.[130] The issue is whether the application of MCM to exclusive rights in all cases is an exception or limitation on these rights, and hence subject to the three-step test.[131] Others invoke the decision in *Soulier and Doke* as a further limitation on MCM.[132]

Other options envisage 'legal licences' in the form of statutory licences.[133] These turn the rights of reproduction and communication to the public for peer-2-peer use into non-exclusive rights of remuneration or compensation.[134] From a legal perspective these are most restrictive for rightholder exclusivity. A number of proposals model the introduction of a levy for private and non-commercial reproduction and communication to the public of works on the existing private copy exception in Article 5(2) InfoSoc Directive, which is subject to fair compensation.[135] In that context, Roßnagel points to the lack of clarity in data collection:

> The objection could be made against the suitability of a culture flat-rate that it does not allow for an exact distribution of the revenues corresponding to the exact distribution of acts of reproduction. Because of their decentralised structure, file sharing networks are difficult to monitor, which also represents the principal reason for the lack of success of taking action against them.[136]

The blockchain set-up advanced above would resolve this as user consumption could be recorded, ensuring more precis measuring for distribution.

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[130] For a summary of the debate, see section 3.3.4.2 Quintais (n 30). For further limitations of the MCM model in the context of P2P legalisations, see Dusollier and Colin (n 53) 818.

[131] Mihaly Ficsor, 'Collective Management of Copyright and Related Rights from the Viewpoint of International Norms and the Acquis Communautaire' in Gervais (n 84).

[132] Caterina Sganga, 'From Soulier to the EU Copyright Law Reform: What Future for Non-voluntary Collective Management Schemes?' (Era Forum, No 1/2018) 4. She argues that the decision has created further uncertainties for such management schemes.

[133] Netanel (n 3); Carine Bernault and Audrey Lebois, 'Feasibility Study on P2P Compensation Envisage the Extension of the Private Copy Exception to Downloads from P2P and Place the Making available under Mandatory Collective Management' (June 2005) 12 <http://privatkopie.net/files/Feasibility-Study-p2p-acs_Nantes.pdf> accessed 1 April 2019.

[134] Quintais (n 3) 128.

[135] ibid 392.

[136] Alexander Roßnagel and others, 'The Admissibility of a Culture Flat-Rate under National and European Law Short Report, Institute of European Media Law (EML) in collaboration with The Project Group for Constitutionally Compatible Technology Design (Provet) EML at the University of Kassel' (6 March 2009) <https://www.malte-spitz.de/wp-content/uploads/2013/05/emr_study_culture_flat_rate.pdf> accessed 27 March 2019. The study was conducted for the German and European Parliament factions of the Green Party.

Unfortunately, the EU legislator and the CJEU have resisted the application of the private copy exception and the adjacent levy system to downloads from illegal sources.137 Still, convincing workarounds have been proposed to demonstrate how a limitation-based alternative compensation scheme could be acceptable and bypass the three-step test.138 The three-step test, as mentioned above, is a legal device enshrined in international copyright treaties and EU law which limits the introduction of mechanisms that interfere with exclusive rights (such as E&Ls).139 Should a peer-2-peer legalisation system be perceived to satisfy the test implemented via remunerated exemptions, the blockchain set-up above could contribute to the calculation of 'fair compensation' as required by Recital 35 InfoSoc Directive which refers to the compensation owed to rightholders for the use of their works or other subject matter in cases of E&Ls. The level of compensation should be adequate and assessed according to the particular circumstances of each case. A valuable criterion is the potential harm suffered by the rightholder, with the notion and level of fair compensation linked to the harm suffered by the author.140 Although the notion of harm requires uniform interpretation, the parameters of its evaluation are not fully clear. The blockchain technical set-up outlined above could inform the level of harm suffered as it provides an actual log of user consumption volumes as well as actual consumption. This is net superior to survey methods currently employed by CMOs.141 In a best-case scenario, the potential for a fairer and clearer distribution of the revenue collected, as facilitated by blockchain, may act as an additional incentive to the legislator to rethink the position of a compensation-based legalisation scheme.

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137 The extension of non-voluntary licence systems was opposed in policy discussions pre-InfoSoc Directive: 'Levies cannot be used to justify acts that constitute an infringement of rights. Levies are not and were never intended to constitute a mechanism to compensate for piracy' see European Commission, 'Intellectual Property Rights and Digital Rights Management Systems' (IS Policy, FactSheet 20, September 2004) <http://ec.europa.eu/information_society/doc/factsheets/020-ipr_drm-october04.pdf> accessed 25 February 2019. This position was subsequently confirmed by the CJEU in Case 435/12 *ACI Adam and others* EU:C:2014:254.

138 Roßnagel and others (n 136); Dusollier and Colin (n 53) 827-831; Quintais (n 3) chapter 5.

139 The three-step test can be found in TRIPS Agreement (n 99) art 13; WIPO Copyright Treaty (adopted 20 December 1996, entered into force 6 March 2002) art 10; WIPO Performances and Phonograms Treaty (adopted 20 December 1996, entered into force 20 May 2002) art 16.

140 Case 467/08 *Padawan v SGAE* EU:C:2010:620, [2010] ECR I-10055.

141 For example, SONT, 'Decree on Private Copying Levies 2018 – 2020' (2017) <https://www.cedar.nl/uploads/15/files/file/Thuiskopie/Persberichten/Press_release_new_private_copying_levies_the_Netherlands_24-10-2017.pdf> accessed 27 March 2019.

4.2.7 Evaluation

The section advanced a novel and out-of-the-box conceptual use of blockchain as part of a technology stack which may aid the distribution of revenue in the context of collective management solutions for private and non-commercial peer-2-peer file-sharing by internet users. There are, however, costs as well as benefits to this proposal. The technical set-up may seem controversial, especially via the creation of designated torrents, which may be perceived as encouraging file-sharing. However, a torrent client per se is a mere technical tool and, in this case, it achieves together with the blockchain a potentially superior level of transparency and coordination between different CMOs and other institutions over a legalisation scheme. In theory, the collective management of peer-2-peer use could be achieved with much more precision, avoiding debates, obfuscation and potential litigation over the distribution of revenues. This would certainly be in line with the standards set by the CRM Directive.[142] Yet the blockchain application advanced requires the squaring of the circle via research in terms of its practical development. In this sense, with the help of computer scientists the real-life creation of the torrent/blockchain stack needs to be experimented with and tested.

What is also problematic is the adjacent licence applicable in a legalisation model which may be intertwined with the blockchain set-up advanced. All the various collective management options available involve barriers to their implementation as shown above. Although the justification for CMOs is the ability to effectively facilitate licensing, a licence for peer-2-peer use is not yet available.[143] Yet, the management advantages that blockchain may add are superior to existing measurements based on rough and imperfect assessments of user consumption, and this is in line with the market practice of existing music and audio-visual services. This enhances the case for legalisation systems as a solution to end user peer-2-peer infringement.

4.3   Option 2: Payment side blockchain solution for ACS

The alternative application of blockchain technology in the context of a peer-2-peer legalisation scheme envisaged by this chapter harnesses blockchain's original capacity

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[142] For example, Articles 13(1) and 18.
[143] Gervais and Maurushat (n 95) 19.

as an alternative payment system. The section advances the knowledge on available means of rightholder compensation in the context of legalisation proposals. This section explores the feasibility of blockchain as a self-generating form of finance, a unique form of funding, which may be perceived not to cost the payee any money whilst nonetheless being rewarding to rightholders.

The online world generates new and unforeseen forms of value exchanges. For example, in the context of social media, users provide a non-obvious form of payment for the services they receive: their attention and data which is then efficiently monetised by these services. These barter-like exchanges between users and services may be seen to provide value on both sides. Indeed, the format where various internet-based services are offered in return for user provided content, identities, IPs, etc is becoming codified in Europe.[144]

This model, however, is not exclusive to 'legal' services. In the realm of infringing content The Pirate Bay (TPB) also explores the concept as it monetises infringement via advertising revenue generated from website traffic.[145] In addition, TPB harnesses the power of each visitor's central processing unit (CPU) for the length of their stay on the site (approximately five minutes a day) to surreptitiously mine

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[144] For example, the Proposal for a Directive which covers business to consumer transactions, refers to an Article 3 covering digital content, including 'digital content supplied not only for a monetary payment but also in exchange for (personal and other) data provided by consumers, except where the data have been collected for the sole purpose of meeting legal requirements.' European Commission, 'Proposal for a Directive of the European Parliament and of the Council on certain aspects concerning contracts for the supply of digital content' COM (2015) 634, 11. Furthermore, the Impact Assessment for that Directive states that 'digital content is increasingly provided against users' data or other counter-performance, all kinds of counter-performances should be covered'. European Commission Working Staff Document, 'Impact Assessment: Accompanying the Document – Proposals for Directives of the European Parliament and of the Council (1) on certain aspects concerning contracts for the supply of digital content and (2) on certain aspects concerning contracts for the online and other distance sales of goods' COM (2015) 634 final, 62 <https://www.eu.dk/samling/20151/kommissionsforslag/kom(2015)0634/kommissionsforslag/1285660/1582653/index.htm> accessed 27 March 2019. Examining the intersection between legal regimes and user provided data and its use as digital currency, see Gianclaudio Malgieri, '"User-Provided Personal Content" in the EU: Digital Currency between Data Protection and Intellectual Property' (2018) 32(1) International Review of Law, Computers & Technology 118.
[145] Erick Schonfeld, 'The Pirate Bay Makes $4 Million a Year on Illegal P2P File-Sharing, Says Prosecutor' (*TechCrunch*, 31 January 2008) <https://techcrunch.com/2008/01/31/the-pirate-bay-makes-4-million-a-year-on-illegal-p2p-file-sharing-says-prosecutor/?guccounter=1&guce_referrer_us=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_cs=zfi7eX-NxK-xtnGOTHTn3g> accessed 27 March 2019.

cryptocurrency.[146] Drawing from these, the section tests the theoretical viability of an alternative payment model for user private and non-commercial online sharing of works, based on a cooperative use of blockchain technology. This proposal may be combined with Option one torrent/blockchain stack in the sense that one can be used for distribution and one for payment, or work as a stand-alone system. First, the manner in which standard internet user computer resources can be used to generate financial value with be explained. The value which may potentially be generated will then be measured and set against other estimates of legalisation proposals as well as market value data. Finally, internet user and rightholder incentives to participate will be considered.

4.3.1 Central processing unit or graphic processing unit as a generator of economic value via blockchain

Aggregating the idle CPU, which is a piece of hardware common to all computers, or graphic processing unit (GPU), which is a chip used to enhance videos and graphics,[147] from the computers owned by internet users participating in a legalisation scheme could generate economic value for rightholders via blockchain technology. In such a scheme, internet users leave their PCs switched on at night and connected to a pre-existing cryptocurrency mining pool and their PC's CPU/GPU is used for mining. Mining refers to the process where cryptocurrency is apportioned to those who invest CPU/GPU to solve cryptography puzzles (which is done by trial and error) in public blockchains to verify and add transactions to blocks.[148] Those who invest CPU/GPU in solving the puzzles are called miners. Mining works in the following way: participants in a blockchain submit transactions to miners and these are then placed in a queue to be added to a block.[149] Once the block is created, the nodes check the block for its validity via the SHA-20 cryptographic hash function and add it to the chain.[150]

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[146] Shayan Eskandari and others, 'A First Look at Browser-Based Cryptojacking' (IEEE European Symposium on Security and Privacy Workshops, 2018).

[147] Techopedia, 'Graphics Processing Unit' (*Techopedia*)
<https://www.techopedia.com/definition/24862/graphics-processing-unit-gpu> accessed 27 March 2019.

[148] Daniel Drescher, *Blockchain Basics, A Non-Technical Introduction in 25 Steps* (Apress 2017) 89-92.

[149] Dylan Yaga and others, 'Blockchain Technology Overview' (Draft NISTIR 8202, January 2018) 19 <https://csrc.nist.gov/CSRC/media/Publications/nistir/8202/draft/documents/nistir8202-draft.pdf> accessed 27 March 2019.

[150] Andrew Tar, 'Proof of Work Explained' (*Coin Telegraph*, 2017)
<https://cointelegraph.com/explained/proof-of-work-explained> accessed 27 March 2019; Christian

This process is essential for public blockchain operation as it enables the functioning of a 'consensus' which is the agreement reached between nodes.[151] The higher the CPU/GPU investment, the higher the probability for cryptocurrency rewards. CPU/GPU translates into hashing power, with the hashing referring to the speed at which an operation is performed. A mining pool is the aggregate of individual miners.[152] Mining pools combine the hashing power generated by the CPU/GPU. Only cryptocurrencies that can be mined with CPU/GPU are candidates in this proposal.[153] The higher the total number of internet users that connect to the pool, the higher the chances that a particular cryptocurrency is mined. The currency obtained can then be distributed to rightholders, either as is or exchanged for fiat currency. However, that may take additional efforts from CMOs who are not natural managers of cryptocurrency.

It is argued that it would be inefficient for individual participating PCs to singlehandedly mine coins via CPU/GPU, especially since the chances of successful cryptocurrency mining are increased the higher the CPU/GPU power, hence the concept of mining pools. This is why the obvious choice would be to combine the power of many PCs by joining a cryptocurrency mining pool. Mining pools allow participants that aggregate resources to split the rewards according to the amount of work performed.[154] In our scenario, the participant PCs would have to join an existing mining pool, with the aggregate gains going to the rightholders. In this situation, the mining pool would have to make some adjustments regarding the distribution of the currency so that the coins are not sent to the wallet of the individual mining PC but to the general 'rightholder wallet'.

Cachin and Marko Vukolić, 'Blockchain Consensus Protocols in the Wild' 1:4 <http://drops.dagstuhl.de/opus/volltexte/2017/8016/pdf/LIPIcs-DISC-2017-1.pdf> accessed 27 March 2019.

[151] Shehar Bano and others, 'SoK: Consensus in the Age of Blockchains' (UCL, 2017) 1 <https://arxiv.org/pdf/1711.03936.pdf> accessed 27 March 2019; Cachin and Vukolić (n 150).

[152] Eskandari and others (n 146) 2.

[153] Cryptocurrencies such as Bitcoin are mined with special hardware called ASICs. On the use of cryptocurrencies that use standard computer equipment, see Jan Rüth and others, 'Digging into Browser-based Crypto Mining' (Internet Measurement Conference, 31 October-2 November 2018, Boston, MA, USA).

[154] Recabarren Ruben and Carbunar Bogdan, 'Hardening Stratum, the Bitcoin Pool Mining Protocol' (2017) 3 Proceedings on Privacy Enhancing Technologies 57, 59.

The choice of cryptocurrency which may be mined for the legalisation system is relatively simple as it is limited to those which accept CPU/GPU mining.[155] This is because cryprocurrencies such as Bitcoin and Ethereum require specialised mining equipment to achieve returns, and such equipement not owned by the average internet user. The main option is the Monero coin whose consensus algorithm is designed to work with CPU/GPU mining.[156] An alternative to Monero could be the ZCash coin, which is another cryptocurrency coin that can be mined with CPU/GPU. The downside is that the ZCash coin comes with an additional 'Founder's Reward' a type of taxation system designed to reward the cretors of the coin.[157] Monero does not have such a taxation system in place, thus potentially making it a more attractive option as more coins are retained by righthholders. The section will largely focus on the Monero coin and refer back to Zcash at key points.

The incentive for existing mining pools to participate in such a system where the monies mined by a number of PCs go to the account of CMOs is largely financial. A mining pool wishing to participate in the system would normally retain approximately 1% of the coins mined, which is the going fee for mining pool participation. The more CPU/GPU power invested in the pool, the higher the earnings, with the caveat that the more users mining, the higher the complexity of the process.

In an alternative, and given the potential scale of the system, a national CMO or a CMO hub or other players implementing the system placed in the position to test out such an alternative payment system could invest in setting up its own cryptocurrency mining pool, which would compete with existing mining pools to mine Monero coins. The advantage is that the CMO mining pool would cut out the pool fee as well as have better information about participant PC contribution. The end user PC could connect to the pool by downloading an app or by logging on to a designated website. In other

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[155] For example, Bitcoin's consensus mechanism requires ASIC mining - specialised equipment to respond to the difficulty of solving the proof of work puzzles. For an overview of Bitcoin mining technologies, see Michael Bedford Taylor, 'The Evolution of Bitcoin Hardware' (2017) 50(9) Computer 58.

[156] Emilien Le Jamtel, 'Swimming in the Monero Pools' (11th International Conference on IT Security Incident Management &9 IT Forensics, 2018) 110.

[157] Zcash, 'Frequently asked questions' (*Zcash*) < https://z.cash/support/faq/> accessed 29 September 2019.

words, a specially designed mining pool would provider further finetuning for the system.

4.3.2   Financial feasibility

To assess the financial feasibility of the system, this section focuses on the Monero coin to measure how much value can be extracted for rightholders from such a system. Calculations generated by the operators of two Monero pools estimate that one million 'mid-range'[158] PCs mining with CPU for five hours a night for a 30-day period would generate between 47,500USD[159] and 54,360 USD[160]. This calculation is done at a hash rate of 40 megahash/s and at Monero coin rate of approx. 44 USD. Rounding the numbers to 50,000 USD per month and extrapolating this to one PC per household per 21 million households (total number of UK households with internet connection), the monthly revenue would amount to 10.5 million USD per month.[161] This would generate approximately 120 million USD a year in rightholder revenue in the UK (approximately 105.5 million euros). However, this does not take into account the adjustment in difficulty generated by the multitude of users. Furthermore, it is expected that GPU mining will render much better results than CPU mining, but not all PCs have a graphics card.[162] Although the calculations provided by the Monero pools need to be independently confirmed by specialists, they do suggest that in a legalisation system CPU-based mining may in theory generate revenues for rightholders. The same calculation done by the author in the context of Zcash leads to a result of approximately 1.5 million dollars per year profit from the system in Europe, which suggests that rightholders may be less inclined to mine Zcash.[163]

To put these numbers into perspective, the largest potential sum generated by the Monero coin appears closer to half of the value of fair compensation paid in the context of the private copy exception, which is estimated at 179 million euros in

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[158] The INTEL CORE I5-650 CPU is considered mid-range for the purpose of the calculation. Nanopool calculation offered at Monero price of 23 January 2019, on file with the author.
[159] MineXMR, calculation offered at Monero price of 22 January 2019 on file with the author.
[160] ibid.
[161] Calculation on file with author, Zcash rate of 29 September 2019.
[162] Some computers have a graphic chip in the motherboard.
[163] Rate of 28 February 2019.

France.[164] The UK could not be used as a measurement as it does not operate a private copy exception. France can instead be used as a proxy given the similar population size.[165] Whereas the fair compensation only covers ancillary reproductions made for private use, legalisation proposals cover both the reproduction and the communication to the public right. Equally, unlike private copies which at least in theory are bound to remain contained, copies in a legalisation system are forever replicable. This may mean that the financial reward expected by rightholders from peer-2-peer legalisation is higher than what is received via the private copy exception. Moreover, since the cryptocurrency model, at least under the Monero model above, delivers levels of compensation similar to those produced under the private copying levy, it may not attract sufficient rightholder support.

Another way of assessing the financial feasibility of the cryptocurrency compensation system is to set it against other payment evaluations identified in existing legalisation proposals. For example, the cryptocurrency revenue appears lower in comparison to the results of a contingent valuation through a discrete choice experiments study based on a sample of the Dutch population.[166] The study estimates the value of a compensated mandatory exception which would substitute all commercial purchases would 621 million euros per year (including operation costs).[167] Indeed, the discrepancy between the pure fiat payment amount suggested in the study and the cryptocurrency exchange is staggering even if we take Dutch internet user willingness to pay with a pinch of salt. In the cryptocurrency model, even by increasing the mining time, the results would still not be comparable to the Dutch survey result.

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[164] For the overall EU value of the private copying levy between 2001-2009, see Martin Kretschmer, 'Private Copying and Fair Compensation: An Empirical Study of Copyright Levies in Europe' (October 2011) 8 <https://www.wipo.int/edocs/mdocs/mdocs/en/wipo_ip_econ_ge_1_12/wipo_ip_econ_ge_1_12_ref_kretschmer.pdf> accessed 27 March 2019; for the period between 2007-2014, see Hester Wijminga and Wouter Klomp, 'International Survey on Private Copying: Law and Practice 2015' (2015) WIPO and Stichting de Thuiskopie 15 <https://www.wipo.int/edocs/pubdocs/en/wipo_pub_1037_2016.pdf> accessed 27 March 2019.
[165] The UK population is estimated at 66,826,417 and the French population at 65,395,658 <http://www.worldometers.info/world-population/france-population/> accessed 27 March 2019.
[166] Christian Handke, Bodo Balazs, Joan-Josep Vallbé, 'Going Means Trouble and Staying Makes it Double: The Value of Licensing Recorded Music Online' (2016) 40 J Cult Econ 227.
[167] ibid 244.

On the other hand, the potential revenue generated from the Monero mining model appears closer to legalisation proposals that advance more modest payments by internet users. The Brazilian legalisation proposal, for instance, envisaged a payable sum of 1,35 euro per month that works out at approximately 93 million euros a year.[168] The Portuguese Communist Party proposal envisages a levy paid by the ISP at 0.75 euro per internet contract per month.[169] The total amount payable to rightholders per year would be 46 million euros.[170] As for the Dutch Artists Union proposal, this seeks a 5 euro levy per device.[171]

A further measure of comparison could be the size of the EU market for music downloads, which was estimated in 2018 at 562 million USD.[172] This is edifying as legalisation proposals may be perceived by opponents to cannibalise the legal market. The Monero cryptocurrency model does not seem to outperform the market. Yet, the Monero sums would be added to the existing sources of rightholder income. The extent to which a legalisation proposal displaces customers from incumbent licensed models, such as Spotify, is a matter that is extremely difficult to measure exactly. The assessment depends on a number of variables, such as the extent to which a legalisation scheme is in direct competition with existing services, the level of migration from those services to the scheme, the effects of a legalisation scheme on market competition, etc. It would have to be empirically tested whether the financial addition via cryptocurrency would make rightholders better off in existing market conditions. Overall, the Monero estimates based on CPU appear encouraging when they provide additional revenues to what is generated by the marketplace.

4.3.3   Internet user incentives to participate

From the perspective of internet users, the participation may be optional or compulsory by law as above. Internet user participation is key as without a sufficient

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[168] Vgrass, 'Compartilhamento Legal! - Brazil is Putting an End to the "War on Sharing" at R$ 3,00 per month' <https://www.vgrass.de/?p=382> accessed 27 March 2019.
[169] PCP, 'Regime Jurídico da Partilha de Dados Informáticos, 4 de Maio de 2012'
<http://www.pcp.pt/regime-jur%C3%ADdico-da-partilha-de-dados-inform%C3%A1ticos-0>
accessed 27 March 2019.
[170] ibid.
[171] Ernesto (n 11).
[172] Statista, 'Digital Music' <https://www.statista.com/outlook/202/102/digital-music/europe>
accessed 27 March 2019.

mass the value mined would be minimal, which hints at the benefits of a compulsory model. An incentive for user participation is the seemingly 'for free' nature of the exercise, which is an offering more in line with internet user expectations.[173]

Yet 'for free' is an illusion in as much as mining will have costs in terms of electricity as well as faster CPU/GPU degradation. From this perspective, end users may not support the system. Furthermore, in compulsory models, some users may object in as much as some users do not engage in any or engage in insubstantial file-sharing yet mine for the same amount of time as more prolific file sharers. In addition, more performant PCs may mine more currency and therefore generate more earnings than lower performance PCs. However, it is important to maintain full participation for revenue maximisation. The side effect is that the system leads to cross-subsidisation from occasional to prolific infringers and from high performance PC owners to normal and substandard PC owners. The latter, however, is desirable from a welfare perspective as poorer file-sharers can still benefit from the system.

From a policy perspective, a good explanation should be given as to why that pool of money should go into rightholders' pockets and not contribute to cancer research, charity, welfare support, or indeed go into users' own pockets. Internet users may desire to harness the power of their PCs for other ends, or not at all. The decision to remove internet user autonomy and divert funds to rightholders would have to be based on strong policy considerations, further pointing towards state intervention in the area.

4.3.4 The compatibility of the cryptocurrency payment model with existing legal licence proposals

As shown above in subsections 4.2.3-6. there are a number of options available to ensure rightholder participation in peer-2-peer legalisation schemes. To avoid duplication of the above discussion, only the aspects relevant to the cryptocurrency payment model are addressed here. First of all, the desirability of collective

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[173] Kantar Media, 'Online Copyright Infringement Tracker Latest Wave of Research: Overview and Key Findings Prepared for the Intellectual Property Office by Kantar Media' (June 2018) 6 <https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/729184/oci-tracker.pdf> accessed 1 April 2019.

management as a default for the legalisation scheme remains the same as there is nothing inherent in the cryptocurrency payment model above to require individual management of rights. However, in the situation where the CMO manages the pool or pool account, the desire of CMOs to collect cryptocurrencies on behalf of the rightholders they represent is still unknown. CMOs may eye these with suspicion. Receiving payments in cryptocurrency and managing that cryptocurrency on behalf of members raises the need for additional know-how. Just as in the context of the conceptual blockchain management model above, the CMOs would have to be open to the idea and then develop and become versed in the technology necessary to make the system workable. In such a system, the CMO may be delegated the power either to exchange the coins and distribute the royalties in fiat currency or simply distribute cryptocurrency, although this would entail yet another complex technical system where each participant rightholder had a crypto-wallet.[174] The provision of cryptocurrency royalty management is not part of the obligations enshrined in the CRM Directive, which was designed with fiat in mind. CMOs are not obliged to offer an exchange system for rightholders and it is unclear if they are inclined to do so. Furthermore, at the moment, cryptocurrencies are not legally recognised currencies in many countries. A further practical challenge given the large sums involved, existing infrastructure of exchanging cryptocurrency into fiat may not support the system.[175] Importantly, cryptocurrencies suffer from volatility which may put off CMOs which, although they need to work in the best interests of the rightholders they represent, are not financial advisers.

Similar aspects impact rightholder participation in the context of non-compulsory licensing models. These add to the structural problems outlined above in sub-section 4.2.4 with the consequence that voluntary licensing models are even more unlikely to materialise as many rightholders may not be convinced by cryptocurrency. In the context of non-voluntary models, such as remunerated exceptions for reproduction and communication to the public, state intervention to oblige rightholders to accept cryptocurrency and users to connect their PCs for mining in the context of legalisation

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[174] This may be desirable for right holders in light of taxation.
[175] Phillip Moskov, 'How to Convert Altcoins to USD and other FIAT Currencies' (*CoinCentral*, 5 January 2018) <https://coincentral.com/convert-altcoins-usd-fiat-currencies/> accessed 27 March 2019.

proposals also seems unlikely. Furthermore, the system would likely generate litigation over whether or not concepts such as 'fair compensation', which are necessary for remunerated exceptions under the InfoSoc Directive, can be satisfied via cryptocurrency.

4.3.5 Evaluation

The technology appears largely available to harness internet user PC resources as an alternative payment system for online infringement, if there is a willingness to invest in the necessary technical adaptation and an acceptance for such a system. In addition, the still-young cryptocurrency phenomenon may raise further concerns. For example, should internet users' PCs be pooled on a large scale for mining smaller coins such as Monero, this might lead the coin to collapse as there would not be sufficient other participants to compete for the mining process. Potentially, spreading out the mining between different coints such as Zcash could somewhat moderate this effect by reducing the computation impact on the coins. However, given the lower returns generated by Zcash spreading out the computation power generated by the system across the two coins may reduce the economic fesability of the system.

Overall, the existence of endogenous instability and other risks are still not known.[176] It is simply too early to comprehend how the dynamic in the market development of such cryptocurrency will develop. From a broader market perception, the adoption of cryptocurrencies as a payment method may follow a 'winner takes all' approach where larger coins such as Bitcoin push smaller coins (that can be mined with CPU/GNU) out of the market.[177] This further affects the interest in Monero as a payment system for end user content consumption in peer-2-peer.

From another perspective, internet websites are already exploring the use of user's PCs for cryptocurrency mining as an alternative revenue stream. Rightholders could be seen as missing out on the new wave of technology. In this sense, cryptocurrency may be used as part of a legalisation scheme where, if the cryptocurrency model fails,

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[176] Ke Wu, Spencer Wheatley and Didier Sornette, 'Classification of Cryptocurrency Coins and Tokens by the Dynamics of their Market Capitalizations' (2018) 5(9) Royal Society Open Science, point 4.
[177] Abeer El-Bahrawy and others, 'Evolutionary Dynamics of the Cryptocurrency Market' [2017] Royal Society Open Science 1, point 3.

rightholders can fall back on fiat payments from users/ISPs. Such a mixed model, although more complex, may take advantage of both worlds and ensure peace of mind for rightholders.

4.4 Conclusions

The chapter explored two distinct ways in which blockchain technology may advance the case for the legalisation of private, non-commercial, individual internet user file-sharing. This feeds into the research question as it advances ways in which that technology can place legalisation proposals of end user peer-2-peer file-sharing one step closer to being workable, to the benefit of all stakeholders involved. There are costs and benefits associated with the models. Whereas the strong point of the torrent/blockchain stack is clarity in consumption for royalty distribution purposes, it requires investment in the feasibility of the technical set-up and the consent of users and rightholders. On the other hand, the CPU/GPU mining solution may seem seamless for internet users and achieve additional rewards for rightholders, but the newness of the technology challenges the stability of the system. Overall, the chapter advances the knowledge on peer-2-peer legalisation proposals and challenges rightholders to rethink the idea and the role of technology as part and parcel of the proposals. This is especially the case as many legalisation proposals came from a time when technology and the market were at an inferior development stage.[178]

However, blockchain, or any other technology cannot resolve copyright's inner turmoil which is clearly seen in the content of peer-2-peer file-sharing. The chapter has shown that the licensing models to implement any legalisation proposal raise important barriers. The fact that there is no acceptable compromise shows that rightholders and the legislator are risk adverse. Although the current discussion at EU level focuses on 'value gaps' if rightholders are not forward-looking and harness blockchain technology to work for their purpose, stakeholders in the illegal market have not shown such reticence. As is indicated in the next chapter, the use of blockchain technology in the context of potentially infringing content services may

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[178] See, for example: 'En conséquence, le marché traditionnel du disque et du cinéma s'est effondré. Au cours de la période 2000-2008, par exemple, le marché de la distribution physique de musique en Belgique à connu une baisse de 46% du point de vue de la vente de disques. La même tendance est prévisible pour l'industrie du livre et la presse.' Hellings and Piryns (n 9) 2.

have the side effect of further complicating legalisation proposals. Chapter 5 will discuss how internet users may generate cryptocurrency benefits from file-sharing. This may turn infringement done by users away from a non-commercial setting, which is a pre-requisite for legalisation proposals. Technological development has consistently shown that it does not wait for rightholders to decide, and so far the winners in the game of content distribution, on both sides of legality, are those that manage to make best use of technological tools.

5 Chapter 5 Blockchain black sheep: assessing the role of blockchain micropayment-incentivised file-sharing services in end user copyright infringement

5.1 Introduction

The central theme of the chapter is the application of blockchain to technical set-ups that may incentivise copyright infringement by end users and the applicable liability regime at EU level of providers of such set-ups. To do so, the chapter identifies and categorises a number of emerging decentralised applications that may be seen to facilitate end user infringement as these incentivise end user (unlicensed) content uploads and sharing via cryptocurrency micropayments. A decentralised application (dApp) is an application that looks like a normal app on the front end but runs its back end (server) on a peer-2-peer network like a blockchain Ethereum smart contract or other peer-2-peer network and not on a centralised server (like a normal application).[1] As it will be shown below, blockchain is but one element of the technology used by the dApps. These layer a website or a downloadable interface on top of peer-2-peer networks which supply content, and use a blockchain to run the dApp code and as the payment system for the cryptocurrency incentive scheme. Therefore, the analysis will take into account the whole dApp structure. The chapter then assesses the type of liability that may be attached to such dApps providers should they incentivise end user infringement. Specifically, it will be considered how the law may respond to the emergence of the blockchain micropayment dApps in a balanced manner that ensures both respect for copyright and related rights and does not stifle technological innovation. Given that the dApps discussed in the chapter are in the early stages of development or in beta, the purpose of this chapter is exploratory – the intention is not to provide a precise and definitive answer as to the application of liability.

The chapter focuses on dApps that use blockchain cryptocurrency micropayment as an incentive to user uploads in light of a review of the online status quo. This application of blockchain exists not only at the abstract proposal state but in fact a small number of such dApps are available, either in beta stage or at an advanced level

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[1] BlockchainHub, 'Decentralized Applications – dApps' (*BlockchainHub*) <https://blockchainhub.net/decentralized-applications-dapps/> accessed 26 February 2019.

of development. The chapter also addresses the expectation in the literature that smart contracts on Ethereum can enable 'users to exchange anonymous digital currency—like Darkcoin—for a complete PDF copy of The Hunger Games (novel). This program, by way of its "smart contract," can collect money and distribute unauthorized PDFs without need for further human interaction.'[2] It is expected that the use of peer-2-peer networks and blockchain can be used to obscure the application of the copyright framework.[3] Instead, this chapter will show that the 'decentralisation' achieved via the use of peer-2-peer networks and anonymous cryptocurrency payments does not negate the liability of developers of such services; instead, it will play a part in the liability assessment.

The first part of the chapter identifies the state of the art in dApps that apply blockchain technology in a manner that may incentivise infringement. The chapter places the identified services into categories according to their specific technical make-up. A challenge to the classification is the constant technical flux generated by the necessary experimentation with novel technologies, which means that the set-ups may be subject to change or outright failure. The second part of the chapter sets the categories identified against the emerging direct European copyright intermediary liability test which is beginning to contour via the CJEU case law on Article 3(1) InfoSoc Directive, starting with the decision in *GS Media* and developed in *Filmspeler* and *TPB* cases. Article 3(1) will be considered as it may provide a harmonised response to the liability of such dApps. Furthermore, the legal tests established in the CJEU case law applicable to intermediaries that facilitate unlicensed user uploads of works will be applied *mutatis mutandis* to the blockchain content services reviewed. This is possible because of certain conceptual similarities between certain incumbents and the dApps reviewed. Furthermore, it will be shown that Article 3(1) emerges as a flexible legal tool applicable to emerging technologies. Finally, the application of the liability exemptions in the E-Commerce Directive[4] as well as the regime in Article 17 (previously 13) of the proposed Copyright Directive will be addressed and then

2 Nick Vogel, 'The Great Decentralization: How Web 3.0 Will Weaken Copyrights' (2015) 15(1) John Marshall Review of Intellectual Property Law 136, 147.
3 ibid.
4 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) [2000] OJ L178/1.

dismissed.5 It was indicated in Chapter 3 that blockchain smart contracts may innovate online copyright licensing by enabling creators to directly licence a work to users (streaming or personal use download) in return for a cryptocurrency (micro)payment.6 The use of blockchain and smart contracts in this chapter shows the opposite use of that technology and how the cryptocurrency micropayment model may become a breakthrough in copyright infringement.

5.2   Specification of blockchain dApps that are involved in the distribution of content uploaded by third parties

This section provides a review of existing dApp models which use blockchain that have already been launched or are in beta stage or other advanced stages of development and which have the potential to be used for infringement purposes. The classification obtained will then be used in the next section as the subject of analysis under Article 3(1) InfoSoc Directive.7 Interestingly, dApps are not a new phenomenon, for example BitTorrent, which enables the distributed transmission of large files across the internet, is an early example of a dApp as it runs on a peer-2-peer network.8 The Popcorn Time app was another early variation of a dApp.9 The application operated as a torrent client, incorporated a media player, an index of works available in the network and a search engine for torrents.10 Popcorn Time was a BitTorrent client but went beyond the capacity of traditional BitTorrent clients as it enabled sequential downloading, which meant that the torrents could be streamed, as well as fully downloaded.11 The Popcorn Time app was shut down as a result of

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5 European Commission, 'Proposal for a Directive of the European Parliament and of the Council on Copyright in the Digital Single Market' COM (2016) 593 final.

6 Ujo Music <https://www.ujomusic.com/> accessed 28 March 2019.

7 Inspiration for this methodology is an article by Jane Ginsburg, 'The (New?) Right of Making Available to the Public' in David Vaver and Lionel Bently (eds), *Intellectual Property in the New Millenium: Essays in Honour of William R Cornish* (Cambridge University Press 2004); She sets a number of scenarios against the (then new) right of making available in Article 8 of the 1996 WIPO Copyright Treaty and 'Communication to the public' rights under the Berne Convention to compare their coverage in relation to novel online situations. This chapter performs a similar task in that it checks for the application of the rights of communication to the public in EU Directives against novel blockchain content services.

8 Siraj Raval, *Decentralized Applications: Harnessing Bitcoin's Blockchain Technology* (O'Reilly 2016) 8.

9 ibid 9.

10 *Twentieth Century Fox and others v SKY UK Limited and others* [2015] EWHC 1082, paras 17-18.

11 ibid para 20; in addition, the Popcorn Time app could circumvent blocking order encryption, see para 21.

rightholder efforts.12 This short history of dApps suggests that the notion is less new than initially perceived.

The advent of blockchain has brought additional innovation to the world of dApps. In the context of blockchain dApps, the blockchain can serve a number of functions, for example, an Ethereum smart contract can work as the 'server' for the dApp or the blockchain can provide the cryptocurrency for in app economy or both, or fulfil other functions.13 While a blockchain is not a prerequisite for a dApp, blockchains can be a part of a dApp configuration as in the below example:
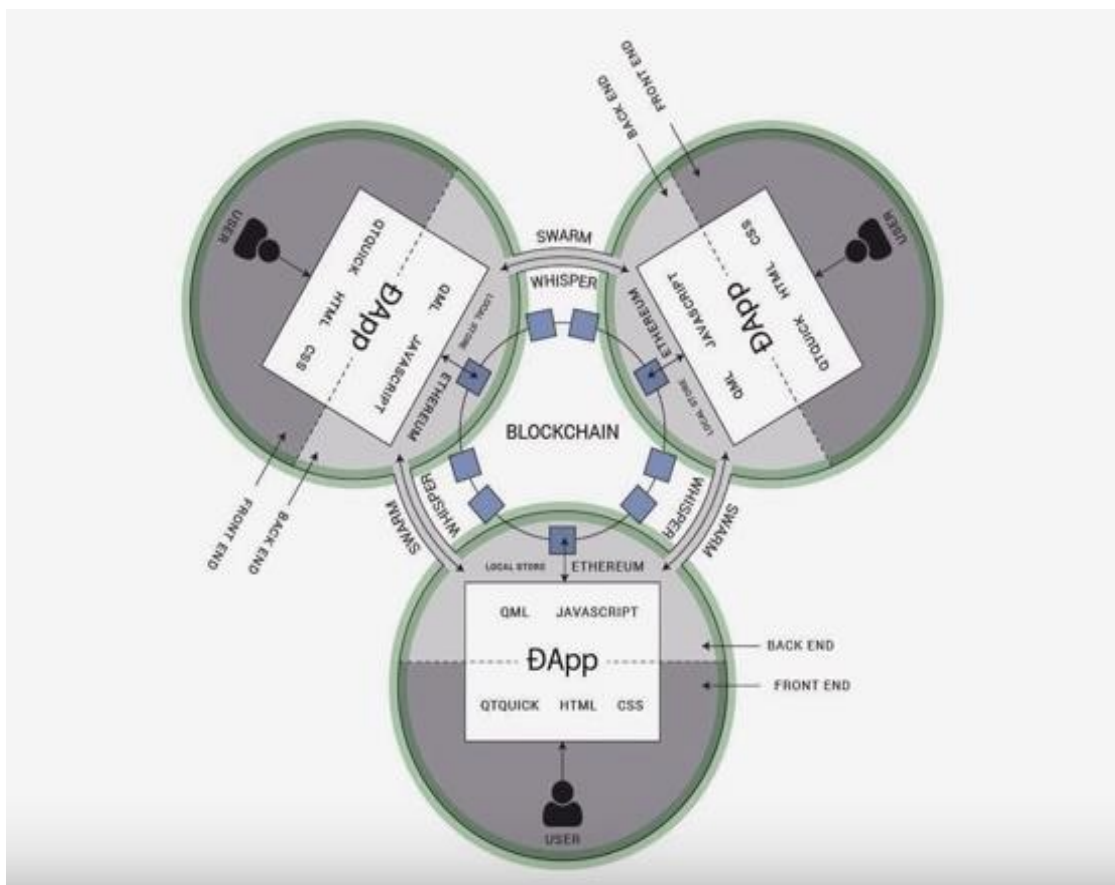
Figure 3 – Graphical representation of dApps connected to a blockchain[14]

12 Dave Calpito, 'Popcorn Time Community Edition Forced to Shut Down by MPAA but Promises to be Back with a Vengeance' (*TechTimes*, 15 December 2015) <https://www.techtimes.com/articles/117686/20151219/popcorn-time-community-edition-forced-to-shut-down-by-mpaa-but-promises-to-be-back-with-a-vengeance.htm> accessed 16 June 2016.
13 For further classifications, see David Johnston and others, 'The General Theory of Decentralized Applications, Dapps' (15 June 2014) <https://medium.com/@DJohnstonEC/the-general-theory-of-decentralized-applications-dapps-4901877d368> accessed 28 March 2019.
14 BlockchainHub (n 1).

This section will categorise below the dApp structures which may facilitate the trade of infringing copies of works with the help of blockchain technology by enabling a type of paid file-sharing. The specific contextual and technical aspects of each set-up will be illustrated in detail as these are new in copyright literature. Furthermore, these aspects of dApps are also necessary for the liability application below in sub-section 5.4.3. Blockchain dApps that may help end user infringement are set out below:

a) Upfiring- cryptocurrency micropayment torrent client and torrent file index website

Upfiring is a dApp that runs on top of Ethereum smart contracts and which works as a peer-2-peer torrent client that incentivises file-sharing with cryptocurrency.[15] The dApp works for Windows, MacOS, and Linux. The dApp operates two Ethereum ERC-20 smart contracts. One is for the ICO, the crowdfunding of the project, and the other manages the cryptocurrency token used on the platform to trade torrent files.[16] The internal cryptocurrency which is used to trade files is called Upfiring (UFR). The dApp enables users to automatically file-share copies of works that are stored on participants' PCs in a manner somewhat similar to the BitTorrent client.

There are also important innovations generated by the dApp that sets it apart from BitTorrent. The dApp uses its own peer-2-peer network complete with proprietary extension for files. A modified BitTorrent protocol is used so that the app can generate the torrent files which are encrypted, which means that a user will not be able to access files she is sharing.[17] To decrypt a file in order to view it, an small payment is necessary, which is done through the second Ethereum smart contract.[18] The rate of

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[15] This describes the Upfiring platform which describes itself as an 'Incentivised P2P File sharing platform Built on Ethereum' The application is already released in the Ethereum main-net <https://www.upfiring.com/> accessed 29 March 2019.

[16] Upfiring, 'Whitepaper' (Draft version 0.9.1, 21 December 2017) 13 <https://www.upfiring.com/Upfiring_Whitepaper.pdf> accessed 29 March 2019.

[17] Reddit, 'Upfiring Prepares to Release a Fully-Open Source, Smart Contract-Based Torrenting Appplication where Users Earn Cryptocurrency by Seeding and Sharing Files' (CryptoCurrency forum) <https://www.reddit.com/r/CryptoCurrency/comments/9am0lu/upfiring_prepares_to_release_a_fully_opensource/> accessed 28 March 2019.

[18] Upfiring deploys two smart contracts: one which tracks the movement of the files between peers and one to manage the exchange of the Upfiring coin (UFR). Upfiring (n 16) 14. Regarding the former, as explained by Upfiring: 'Each file employs a Merkle root hash by breaking down the file into segments (of constant size) and forming a Merkle tree. File smart contracts store file size information that can be used to determine the UFR price, among other variables, between the seeder and their client.'

the one Upfiring coin (UFR) is 0.019 USD.[19] However, no payment is necessary for downloading and 'seeding' without decrypting the file. Yet users who download encrypted files and seed them are rewarded with micropayments (tokens) for making the file available.[20] The advantage for the seeder is that one can generate micropayments cryptocurrency just for making the file available without decrypting it. This means that users can download as many seeding files as possible for free and earn cryptocurrency crypto by simply seeding them. The crypto prices exchanged for transactions are minimal.[21]

To upload a file a user must assign it a name, set a price, add a file description and save the file in a designated folder on their PC. Upon upload, two files are generated with different extensions – one is used for sharing and one for seeding – to enable the system above. When a work is uploaded on the system a link to the uploaded file is generated. Users can post that link on websites to invite other users to access the content.

The service also makes available a forum where links to works stored can be made available.[22] There is no moderation of what is uploaded on the peer-2-peer network, but there is human moderation of illegal content on the forum.[23] Other sites however exist that show many dApp links that lead to illegal content.[24] The dApp therefore may be seen to be used for unauthorised content file-sharing.

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[19] Upfiring, 'Currencies/Upfiring' (CoinMarketCap, 29 September 2019) < https://coinmarketcap.com/currencies/upfiring/> accessed 29 September 2019.
[20] It is not clear what the calculation looks like when there are more seeders.
[21] It is estimated that a download on the Upfiring platform to cost between 0.03-0.04 dollars. Reddit, 'How Much Eth would be Required to Run the Smart Contract' (Upfiring forum) <https://www.reddit.com/r/Upfiring/comments/9kput7/how_much_eth_would_be_required_to_run_the_smart/> accessed 28 March 2019.
[22] Upfiring, 'Chat' <https://www.ufr.chat/> accessed 28 March 2019.
[23] Upfiring, 'Files' <https://www.ufr.chat/topic/11-sharing-upfiring-files-rules/> accessed 28 March 2019. The platform appears to ban infringing content by stating: 'After you have accumulated 5 posts on the ufr.chat forums, this subforum can be used to share or request Upfiring files from other users. All content shared in this channel must be the user's original work or be copyright-free - piracy is NOT welcome here. This rule will be strictly enforced and failure to follow this rule will result in an automatic ban from the forum without warning. Users should report any instances of possible copyright violations to the administrators via personal message or email (support@upfiring.com) immediately. A good rule to follow - if you're not sure if a file is against the rules, either ask an admin first or don't post it.' However, the dApps Telegram channel reveals discussion regarding copyright infringement. On file with the author.
[24] Upfiring Hunt, 'Links' <https://ufr.io/> accessed 28 March 2019.

b)   BitTorrent Speed: a BitTorrent upgrade that incentivised seeding of content

An upgrade of the well-known and very popular BitTorrent client incentivises users with cryptocurrency for bandwidth.[25] BitTorrent Speed, a new feature designed for the BitTorrent protocol by its new patron, the developers of the TORN blockchain and TORN cryptocurrency, proposes the design of a cryptocurrency incentive system for the peer-2-peer network.[26] The system would work largely the same as the existing BitTorrent client with the exception that users who want to download faster can make a micropayment in BitTorrent Speed's native cryptocurrency – the BTT.[27] The BTT is a utility token that provides users of BitTorrent speed the incentive service. This encourages longevity of content availability in the network. The current rate of BTT is 0.00042 USD.[28] The BTT is based on the TRON blockchain which is a hard fork- a change in the algorithm- of Ethereum.[29] The TRON blockchain was founded to solve the scalability problems of Etherum.[30]

The purpose of BitTorrent Speed is advertised as related to improvements in BitTorrent network efficiency. However, from a copyright perspective certain statements in the White Paper are questionable, such as:

> A decentralized content delivery service to enable service requesters to advertise bids and pay BTT for bandwidth to receive a particular piece of content. This service will be well suited for mass distribution of content, especially in the presence of censors or other types of attackers. Service providers will be incentivized to make available content which they can serve to as many people as possible, thus ensuring robust performance even with very large numbers of service requesters.[31]

The feature will be built into BitTorrent and uTorrent. However, it will be optional. The users will be given a wallet required for the micropayment and the payments will be taken automatically unless they are switched off.[32] Unlike the dApp above, this

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[25] BitTorrent Speed <https://www.bittorrent.com/speed/> accessed 1 April 2019.
[26] No commission is taken by the BitTorrent Speed.
[27] BitTorrent Foundation, 'BitTorrent (BTT) White Paper v0.8.7' (February 2019)
<https://www.bittorrent.com/btt/btt-docs/BitTorrent_Token_Whitepaper.pdf> accessed 29 March 2019.
[28] CoinGekko, 'BitTorrent (BTT)' (CoinGekko, 29 September 2019)
<https://www.coingecko.com/en/coins/bittorrent> accessed 29 September 2019.
[29] Ki Chong Tran, 'EOS vs Ethereum vs TRON – Which Is Best? In-Depth Review' (*Blockt*, 18 April 2019) < https://blokt.com/guides/eos-vs-ethereum-vs-tron-review#TRON> accessed 18 September 2019.
[30] Tron Foundation, 'Tron: Advanced Decentralized Blockchain Platform, Whitepaper Version: 2.0 TRON Protocol Version: 3.2' (10 December 2018) <
https://tron.network/static/doc/white_paper_v_2_0.pdf> accessed 18 September 2019.
[31] BitTorrent Foundation (n 27) 15.
[32] ibid 11.

consists only of the sharing software and does not have a search engine or other forum where the content within the peer-2-peer network may be found. Once the service is launched, it will work without further input from the developers.

   c)   Lbry: cryptocurrency micropayment peer-2-peer YouTube alternative

Lbry is yet another dApp flavour enables the streaming and downloading of works made available by users on the underlying peer-2-peer network. Essentially, the dApp is a peer-2-peer version of YouTube, with the major difference between Lbry and YouTube being that the works are not hosted on centralised servers run by the dApp but on users' PCs. Furthermore, YouTube does not enable the downloading of content uploaded therein. However, Lbry enables users to charge cryptocurrency for access to restricted content and downloads. Lbry users can pay other user content providers in lbry Credits to access various videos. The current value of a Lbry credit is 0.0096 USD.[33] The Lbry credit is generated via the Lbry blockchain, which is a public, proof of work blockchain that is inspired from Bitcoin.[34] This means that Lbry does not operate smart contracts. In 2019, there are approximately 750.000 items of content published on Lbry.[35] Lbry and other Youtube blockchain alternatives such as D-Live and D-Tube appear to create competition in the market for user uploaded content streaming, with some big content creators already switching platforms.[36]

The Lbry system consists of three main layers: a downloadable interface, which serves as a media player, search facility and user wallet; a peer-2-peer network where the works are stored on users' hard drives; and a blockchain which indexes the metadata of the works uploaded, issues addresses which work similarly to HTTP internet addresses for the uploaded works and issues the cryptocurrency necessary for micropayments. The user wishing to participate in the protocol needs to download the app on their PC, which automatically provides the user with a wallet which he can use for micropayments. In doing so, the user also becomes part of the network exchange.

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[33] CoinMarketCap, 'Lbry Coin' (CoinMarketCap, 29 September 2019) https://coinmarketcap.com/currencies/library-credit/ accessed 29 September 2019.
[34] Alex Grintsvayg and Jeremy Kauffman, 'LBRY: A Decentralized Digital Content Marketplace' (*Lbry*) https://lbry.tech/spec accessed 21 September 2019.
[35] Ibid.
[36] Camila Russo, 'YouTube and Facebook Are Losing Creators to Blockchain-Powered Rivals' (Bloomberg, 10 April 2018) https://www.bloomberg.com/news/articles/2018-04-10/youtube-and-facebook-are-losing-creators-to-blockchain-powered-rivals accessed 21 September 2019.

When a person streams or downloads a file, the DApp will automatically store the 'blobs', ie the pieces of the works downloaded in the users' PC and seed them to the network so others can also stream/download the work.[37]

The dApp enables users to create their own channel for the transmission of content where the audience can pay the uploader of the video directly, with the dApp providers retaining only a small amount of the payment. Only legal content is encouraged in the terms of service, and a copyright filer must ensure that no illegal content uploaded on the dApps peer-2-peer system can reach the dApp front end.[38] Lbry appears largely focused on the UGC market as it seeks to encourage creators of UGC such as vloggers to migrate from YouTube to Lbry.[39] Although the dApp takes measures to prevent the availability of infringing content via an automated filter, some content that is potentially infringing is already observable.[40]

5.3   Evaluation: innovation and challenges to user adoption of blockchain dApps

This section summarises the common denominators of the systems identified above as a preliminary discussion to the main liability analysis. One important common denominator of the dApps reviewed is they are spin-offs of existing models. Some are alternatives to file-sharing utilities and clients, others are alternatives to centralised models with a cryptocurrency and file-sharing spin. Another common denominator is that dApps make use of public blockchain technology: Ethereum smart contracts are used by Upfiring, the TORN blockchain will be added to BitTorrent Speed, and a hard fork[41] of Bitcoin is used by Lbry. Another common denominator is the use of micropayments as an incentive mechanism in the context of transferring files between individuals.

The use of micropayments to incentivise seeding is an innovation which solves an important problem in peer-2-peer file-sharing models: the consistent supply of content necessary for effective download speeds. For a file transfer to go well, a balance

[37] Lbry, 'FAQs: Lbry App Basics' <https://lbry.io/faq/lbry-basics> accessed 29 March 2019.
[38] Lbry, 'FAQs: DMCA' <https://lbry.com/faq/dmca> accessed 29 March 2019.
[39] Lbry, 'FAQs: YouTube' <https://lbry.com/faq/youtube> accessed 29 March 2019.
[40] For example, music mash-ups and remixes, examples on file with author.
[41] A hard fork is known as a software upgrade of a blockchain which is not compatible with the old blockchain.

should be achieved between uploaders (known as seeders) and downloaders (known as leeches).42 A problem with existing public file-sharing clients is that users disconnect from seeding a file immediately after they have finished downloading it (for example, by removing it from the computer's designated seeding file). Such uncooperative users affect the efficiency of the system as the availability and speed of the download depends on the existence of seeders. The more users that seed a file, the faster it can be downloaded. Download speed is essential to maintain the popularity of a file-sharing system as long download speeds are tiresome to users. Increases in download time are especially relevant when a user is seeking to download a piece of rare content as they will have to wait until a seeder makes the work available.43

Closed torrent communities have developed solutions to the seeder shortage.44 For example, private file-sharing trackers have solved this problem by adding incentives to the act of sharing.45 A private file-sharing tracker is a limited access server that indexes the available content as well as the download and upload rates of its users. Sharing (seeding) is incentivised via a 'sharing ratio enforcement' whereby users owe a form of diligence to the tracker to maintain their sharing/downloading numbers to a certain level in order to continue the usage of the private tracker or by using credits (credit is gained by seeding and is depleted on downloading). If insufficient credit renders a download impossible, the user can seed for more.46 Incentive strategies can thus be seen as ways of motivating participants as well as excluding non-performing users. This is a high maintenance system where file-sharers have to put effort into maintaining the adequate ratio in order to download content. On the other hand, the

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42 Peer-2-peer file-sharing works is a cooperation-based system known in torrent terminology as a 'tit-for tat'. Bram Cohen, 'Incentives Build Robustness in BitTorrent' (22 May 2003) <http://www.bittorrent.org/bittorrentecon.pdf> accessed 29 March 2019.
43 Some estimate that as much as 30% of files available on BitTorrent suffer from a lack of seeders, especially rare content, see Anirudh Ramachandran, Atish Das Sarma and Nick Feamster, 'BitStore: An Incentive-Compatible Solution for Blocked Downloads in BitTorrent' (College of Computing, Georgia Tech, 2007) 1 <http://gtnoise.net/papers/2007/ramachandran:bs:netecon07.pdf> accessed 29 March 2019.
44 Ian A Kash and others, 'Economics of BitTorrent Communities' (Proceedings of the ACM International World Wide Web Conference, 21st International Conference on World Wide Web, 2012) 221 <https://dl.acm.org/citation.cfm?id=2187867> accessed 29 March 2019.
45 A private file-sharing tracker is a limited access server that indexes the available content as well as the download and upload rates of its users.
46 The 'sharing ratio enforcement' system is labour intensive as it requires active participation to maintain the ratio. If users fail to do this, they can be banned. Tamas Vinko and Helga Najzer, 'On the Sustainability of Credit-based P2P Communities' 2 <http://real.mtak.hu/28412/1/csus.pdf> accessed 29 March 2019.

use of incentives means that closed torrent trackers translate these into significant advantages over public systems such as TPB in terms of download speeds and availability of content.[47]

Blockchain cryptocurrency may achieve another workable incentive system to improve user experience for the downloaders (leechers). Blockchain technology introduces financial rewards, such as payments and micropayments, as an incentive for seeding and uploading content. For example, a user on Upfiring is charging 10 UFR, for 'Coldplay – A Head Full Of Dreams Documentary 2018' which is the equivalent of 0,60 USD.[48] What enables the use of micropayments here is the low market capitalisation of the internal dApp currency.[49] BitTorrent Speed will apply a very fine-grained cryptocurrency, which amounts to extremely low values for each transaction.[50] The processing of such transactions is done in a 'on-chain/off-chain exchange' suggesting that not all the transactions will be processed directly via the public Tron blockchain.[51] If this can be done in a seamless manner, for example, via a quick and easy to use fiat-cryptocurrency exchange, internet users may wish to pay a small percentage to benefit from a fast and potentially higher quality download. Seeders may try to maximise returns by uploading or maintaining online a high number of good quality copies. In this way, file-sharing may take on a renewed appeal.

The concept of cryptocurrency micropayments has already been discussed in Chapter 2, sub-section 2.5.2. It can theoretically be applied to any form of content access and one day may become ubiquitous. One important technical limitation of existing proposals, which extends to all forms of blockchain micropayments systems, is the current lack of user awareness of the technology and unclear trajectory of cryptocurrency development. The examples above require users to set up or connect a

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[47] Zhengye Liu and others, 'Understanding and Improving Incentives in Private P2P Communities' (Department of Computer Science, Sun Yat-Sen University) <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.158.3828&rep=rep1&type=pdf> accessed 29 March 2019.
[48] At 1 UFR price of 0.06 USD as of 26 March 2019 <https://coinmarketcap.com/currencies/upfiring/>; see link of Upfiring Coldplay documentary <https://ufr.io/sub/coldplay-full-discography-1998-2018-mp3-version-flac-verison-upriser/> accessed 29 March 2019.
[49] ibid.
[50] BitTorrent Foundation (n 27) 7.
[51] ibid 7.

cryptocurrency wallet. However, the majority of internet users do not own cryptocurrency and only a minority plan to own some in the future.[52] In addition, the setting up of a wallet takes time and involves technical knowledge beyond the base internet user level.[53] Furthermore, once connected to a dApp and receiving micropayments, there may be limitations to spending that cryptocurrency. It is likely that any micropayments gained by infringers will be further spent on access to other content instead of being used to buy third party services or items (especially as micropayments will add up to a small sum anyway). The sums made by seeders are likely to be relatively low, as shown in the examples above, therefore the users may wish to simply (re)spend them in the system. Also, anyone wishing to withdraw cryptocurrency as fiat will also encounter problems as such exchange providers are limited.

The problems associated with cryptocurrency user-friendliness are well known in the cryptocurrency community and apply to cryptocurrency use in general. Therefore, the interest in resolving the problems is extremely high. However, until these are resolved, the penetration of services relying on them is likely to be limited to certain internet savvy communities, such as hackers, cryptocurrency enthusiasts, etc. However, the author retains a positive outlook because, as said above, user-friendliness and public acceptable of cryptocurrencies goes to the core of the system. Furthermore, cryptocurrency developers may be interested in finding solutions sooner in order to fill the already noticeable gap opened by the phasing out of paper cash, due to the increasing popularity of electronic payment systems. Therefore, it is in the concurrent interest of the players in the marketplace to streamline cryptocurrency-based methods of payment to the user. In this sense, there is already evidence that important progress is being made in developing easy-to-use cryptocurrency products.[54] Any solutions found to the lack of straightforward use of cryptocurrencies by the public are likely to

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[52] Molly Jane Zuckerman, 'New Survey Shows around 26 mln Americans own – and 8 per cent Plan to Buy - Cryptocurrencies' (*CoinTelegraph*, 20 March 2018) <https://cointelegraph.com/news/new-survey-shows-around-26-mln-americans-own-and-8-percent-plan-to-buy-cryptocurrencies> accessed 29 March 2019.
[53] For example, some dApps require users to connect via a Metamask wallet which is a third party cryptocurrency wallet. All of this requires technical skill beyond what is necessary to use TPB, for example.
[54] Dave Gutteridge, '6 Projects and Platforms that are Making it Easy to Use Cryptocurrency in Everyday Life' (*Invest in Blockchain*, 23 October 2018) <https://www.investinblockchain.com/use-cryptocurrency-everyday-life/> accessed 29 March 2019.

be applicable to the systems reviewed in this chapter to the extent that more people will use these. If the boom in micropayment-incentivised user upload dApps is just around the corner, how can the law respond?

5.4 Crafting the *prima facie* liability of developers of dApps that enable incentivised user sharing via cryptocurrency under the right of communication to the public in Article 3(1) Infosoc Directive

The advent of the above dApps that enable incentivised content-sharing between end users raise the issue of whether the persons who launch such apps may be liable for copyright infringement. This section is an exercise in apportioning liability as it analyses the application of the legal framework to the categories of dApps identified above to assess the potential for *prima facie* liability of operators of such services. The focus is on the dApps as these raise the most complex and interesting legal issues. The analysis will explain each step of the legal test and each step will be referenced to Upfiring, BitTorrent Speed and Lbry. The choice of legal framework applicable is informed by the nature of the service provided as well as the current approach taken by courts in the context of services which may appear analogous from a legal perspective. An outline of the national level rules will be reviewed to explain why we address the issue via the application of Article 3(1) and the legal test emerging from the CJEU's case law.[55]

Parties that launched the dApps reviwed are keen to advertise on the websites of their services that their role is only as creators of a technical ecosystem which is automated.[56] This because of a number of characteristics of the models: open source development of the blockchain technology; increased automation of in-app processes, now reinforced by blockchain which may automate in-app transactions; automatic indexation of uploaded works; extensive use of peer-2-peer, etc. The core message is

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[55] For an overview of the case law, see Jane Ginsburg, 'The Court of Justice of the European Union Creates an EU Law of Liability for Facilitation of Copyright Infringement: Observations on Brein v. Filmspeler [C-527/15] (2017) and Brein v. Ziggo [C-610/15]' (Columbia Law and Economics Working Paper No 572, 22 August 2017).
[56] See, for example, 'LBRY is a free, open, and community-run digital marketplace. You own your data. You control the network. Indeed, you are the network. Hollywood films, college lessons, amazing streamers and more are on the first media network ruled by you.' Lbry <https://lbry.io/?gclid=EAIaIQobChMIkazG5IHr4AIVzbXtCh2j3AD9EAAYAiAAEgLA5vD_BwE> accessed 29 March 2019.

that the developers of these apps are detached from any activities done by users. Indeed, the perception in the technical world is that dApps are highly autonomous tools. As explained by Cai et al in the general context but also applicable here, a 'deployed dApp will need no maintenance and governance from the original developers. In other words, an ideal blockchain application or service should be operable without any human intervention'.57 From a copyright perspective, this resonates with approaches at national level where courts have been reluctant at times to find liability for providers of technology which may be used by end users to infringe copyright.

5.4.1 National level solutions to the liability of software providers in the context of user copyright infringement

National approaches to the provision of software that may be used for infringement is somewhat divergent. However, a distinction may be identified between the provision of torrent and torrent related technology such as torrent indexes in a manner that knowingly incentivises end user infringement and the simple distribution of torrent technology.58 National courts have developed via copyright statutes, general principles or other legal devices ways to apportion the liability of various software providers when these are seen to knowingly facilitate and/or profit from infringement. This section gives the reader a flavour of the variety of solutions applied at national level as a background discussion for the application of Article 3(1) Infosoc Directive.59

In the UK, the doctrine of secondary liability via the concept of authorisation in Section 16(2) CDPA as well common law authorisation and joint liability have been applied in the extensive case law on blocking orders.60 In *Dramatico Entertainment*61 Arnold J focused on the nature of the relationship between The Pirate Bay (TPB) and

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users, the means used to infringe, inevitability of infringement, degree of control, and steps taken to prevent infringement to find an act of authorisation.[62] These led the judge to find TPB jointly liable for the infringement committed by users as it incited or persuaded them to infringe.[63] These concepts were subsequently applied to other technologies used to infringe.[64] In Germany, in *Cybersky*, the BGH banned the distribution of an application that enabled internet users to share TV signals via peer-2-peer on the basis of the active role undertaken by the software provider to promote infringing use in its advertisements.[65] In France, the liability of software providers was envisaged via the criminal law provisions of Article L 335-2-1 of the French Intellectual Property Code. In the French *Radioblog* case, the French Supreme Court took into account 'that the defendants were perfectly aware of their deficiency with regard to the respect of the rights of authors and the nonexistence of any authorizations or procedures for the protection of copyrights'.[66] In addition, the site had 800,000 connections per day as recognised by the advertisement companies; the site not only provided an index and a database but the site itself, by the features stated, could also modify or create the accessible contents, in this case the 'playlists' (of works), and keep them available in the database of the site and allow access to them.[67]

On the other hand, in the UK, for example, although courts extensively dealt with the liability of various services that knowingly facilitated infringement, such as torrent indexes, torrent search engines and torrent clients that obviously incentivised infringement in the case law on blocking injunctions, the liability of torrent technology providers as such was never under consideration.[68] Moreover, in Germany, the Federal

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[62] ibid.

[63] ibid para 83.

[64] In chronological order: *EMI Records Ltd v British Sky Broadcasting Ltd* [2013] EWHC 379; *Football Association Premier League Ltd v British Sky Broadcasting Ltd* [2013] EWHC 2058; *Paramount Home Entertainment International Ltd v British Sky Broadcasting Ltd* [2013] EWHC 3479; *Paramount Home Entertainment International Ltd v British Sky Broadcasting Ltd* [2014] EWHC 937; and *Football Association Premier League Ltd v British Telecommunications Plc* [2017] EWHC 480, cf *Twentieth Century Fox Film Corp v Sky UK Ltd* [2015] EWHC 1082.

[65] *Cybersky* BGH (15 January 2009) I ZR 57/07; Hannes Rösler, 'Germany: Copyright Act, secs.87(1), 97(1); Act Against Unfair Competition, secs.3, 4 No.10, 8(1) - "Cybersky"' (2006) 37(8) IIC 898, 989.

[66] Court of Cassation, Criminal Chamber (25 September 2012) 11-84.224 <https://www.legifrance.gouv.fr/affichJuriJudi.do?idTexte=JURITEXT000026485372> accessed 29 March 2019.

[67] ibid.

[68] Although the wording of some decisions points to the key role of BitTorrent in the infringement: 'BitTorrent was a P2P protocol the key part of which was the creation and distribution of torrent files associated with particular content files. The torrent files did not themselves contain any material from

Court of Justice saw peer-2-peer technology as 'legally unobjectionable'.[69] In addition, in Spain, developers and distributors of peer-2-peer technology are not considered to indirectly infringe copyright as the deployment of file-sharing technology:

> … would not be incurring as such in any behaviour legally defined in our legal system as an infringer against the exclusive right and without such legal support it would not be possible to censure the illegality of its conduct (moving in a grey area would not be equivalent to the commission of illegality if he did not violate any prohibition) or assign responsibilities.[70]

The non-liability of torrent developers appears to be supported by the literature. For example, Gibbin argues, albeit in the Australian context, that 'those clients are invulnerable to threats of vicarious and contributory liability because the technology does not give them the control over third party infringement that various physical world assumptions led the law to require'.[71] Placing liability on torrent providers may be seen to disturb the balance between copyright protection and technological innovation by treating such providers as facilitators of infringement.[72]

The advantage of the various doctrines applied at national level to find the (non-) liability of providers of technology used by end users to infringe is that such a procedure stays true to national legal traditions. Yet, this avenue appears incompatible with the cross-border nature of digital services, including dApps, as it affects legal certainty. An alternative approach is now provided via CJEU case law under Article 3(1) InfoSoc Directive whereby the same test for communication to the public may be

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the associated content files. Rather, they enabled the identification, and hence the uploading and downloading, of the relevant content files.' See *Dramatico* (n 53) 6; 'The BitTorrent system is an extremely powerful tool for the making of illicit copies because it allows a user to assemble a copy of a film by acquiring all its constituent parts from other users of the system.' *Twentieth Century Fox Film Corpn and others v Newzbin Ltd* [2010] EWHC 608, para 94.

[69] Cybersky (n 65); Angelopolous (n 59) 164.

[70] Provincial Court of Madrid - Section 28 (Commercial) (31 March 2014) Sentencia 103/2014.

[71] Rebecca Gibbin, *Code Wars: 10 Years of P2P Software Litigation* (EE 2011) 158.

[72] On the lawful use rationale see, *MGM Studios Inc v Grokster* 545 US 913, 125 (S Ct 2764, 2005) 2770. For the case against BitTorrent developers' secondary liability, see Okechukwu Benjamin Vincents, 'Secondary Liability for Copyright Infringement in the BitTorrent Platform: Placing the Blame where it Belongs' [2008] EIPR 4; contra Matthew Helton, 'Secondary Liability for Copyright Infringement: BitTorrent as a Vehicle for Establishing a New Copyright Definition for Staple Articles of Commerce' (2006) 40(1) Columbia Journal of Law & Social Problems 1. For further debates on the liability of BitTorrent in the US, see Rebecca Giblin-Chen, 'Rewinding Sony: An Inducement Theory of Secondary Liability' [2005] EIPR 428; Paul Ganley, 'Surviving Grokster: Innovation and the Future of Peer-to-Peer' [2006] EIPR 15. Although not a case on torrent use, some courts have disregarded the innovative aspect of technologies that enable infringement: 'it is also irrelevant that the software put in place has been innovative and has represented a breakthrough in a highly evolving technical field'. Court of Cassation (n 58).

uniformly applied by national courts to determine the *prima facie* infringement by facilitating end user infringement that would otherwise be discussed under doctrines of secondary liability. This achieves a more unified solution as explained by the AG Szpunar in *TPB*:

> … this type is a matter of copyright application, which can be resolved not at the level of EU law but under the domestic legal systems of the Member States. Such an approach would, however, mean that liability, and ultimately the scope of the copyright holders' rights, would depend on the very divergent solutions adopted under the different national legal systems. That would undermine the objective of EU legislation in the relatively abundant field of copyright, which is precisely to harmonise the scope of the rights enjoyed by authors and other rightholders within the single market. That is why the answer to the problems raised in the present case must, in my view, be sought rather in EU law.[73]

5.4.2 Testing the application of Article 3(1) InfoSoc Directive in shaping the *prima facie* liability of dApp providers which enable the sharing of content between users via cryptocurrency micropayments

This section tests whether on the basis of CJEU guidance in its jurisprudence on facilitation of third-party infringement the operators of blockchain dApps reviewed above are candidates for the *prima facie* infringement of Article 3(1) as it is not the operators of the blockchain dApps that upload protected works on the networks but rather their users that use the system to infringe. From this perspective, the test emerging from the CJEU case law on Article 3(1) and facilitators is applied *mutatis mutandis* to the blockchain dApps reviewed as a whole. There are, however, some limitations to this methodology given that the dApps reviewed involve previously unexamined and novel issues in the context of Article 3(1), such as the liability of a torrent client and the role of blockchain cryptocurrency as incentives for user uploads and to store metadata. The section will outline the contours of a potential liability according to available case law to show the direction of a harmonised response to the dApps reviewed at EU level. Furthermore, the test in the CJEU case law reviewed and applied here is developed in situations of 'blatant' infringement.[74] In the view of the author, in less than blatant infringement situations, the calculation of liability established in *Filmspeler*/*TPB* might require some latitude to take into account for

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[73] Opinion of Advocate General Szpunar delivered on 8 February 2017 Case 610/15 *Stichting Brein v Ziggo BV, XS4ALL Internet BV* (*TPB*) EU:C:2017:456, para 3.

[74] If the application of the standard applies only to blatant infringers, it also may counter the broad-brush statement that the CJEU has harmonised indirect copyright liability through the backdoor in *GS Media*/*Filmspeler*/*TPB* trilogy, for example as in Christina Angelopoulos, 'AG Szpunar in Stichting Brein v Ziggo: An Indirect Harmonisation of Indirect Liability' (*Kluwer Copyright Blog*, 23 March 2017) <http://copyrightblog.kluweriplaw.com/2017/03/23/ag-szpunar-stichting-brein-v-ziggo-indirect-harmonisation-indirect-liability/> accessed 29 March 2019.

example efforts to prevent infringement, which should be assessed on a case-by-case basis.75 These limitations will be taken into account and signalled throughout the analysis of blockchain dApps as required.

To date, no blockchain dApp has been (publicly) challenged by rightholders. The reason may well be that such models are still too niche, technically complex yet insignificant in size to draw any significant rightholder attention. Furthermore, many models are only in pilot or beta mode, thus there is only a potential for bulk infringement. However, it is sufficient that illegal content is made available therein, Article 3(1) is still applicable even if the services do not have many viewers as Article 3(1) also covers 'inchoate' acts of communication to the public.76 Thus liability may not require proof of actual damage.77

The section proceeds as follows. First, the CJEU's methodology in Article 3(1) case law will be briefly considered to understand the Court's perspective. Then, the test for liability under Article 3(1) for facilitators of third-party infringement will be outlined. This is challenging in itself as the scope and application of Article 3(1) as per the CJEU decisions have become one of the most complex aspects in EU copyright law. After defining the test, each step will be worked through in further detail and applied to the dApps reviewed above. The author envisages this structure of analysis to be 'buildable' in the sense that further layers may be added to it as CJEU case law progresses and new blockchain dApps appear (or disappear). The infringement test will be arranged according to the elements of the tort as emerging from the definition in Article 3(1) and CJEU case law.

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75 This will be further revealed in Referral Case 682/18 *Google and Others* (6 November 2018) and *Sharehosting* BGH (20 September 2018) I ZR 53/17.
76 'It follows from Article 3(1) of Directive 2001/29 and Article 8 of the WIPO Copyright Treaty that for there to be communication to the public it is sufficient that the work is made available to the public in such a way that the persons forming that public may access it. Therefore, it is not decisive … that customers who have not switched on the television have not actually had access to the works.' Case 306/05 *SGAE v Rafael Hoteles* EU:C:2006:764, para 43.
77 Other torts that do not require proof of actual damage are various (if not most) forms of trespass or libel (in the UK).

5.4.3 The right of communication to the public as regulation of technology

Historically, the right of communication to the public is applied to situations where developments in technologies or new uses of existing technologies have led to the exploitation of works in a manner unforeseen by the rightholders.[78] Indeed, the wording under Article 3(1) is designed to 'stand the test of changing technology'.[79] Therefore, the right of communication applies to (re)transmissions of signals[80]/broadcasts[81], transmission of signals by direct injection,[82] online retransmission of broadcasts,[83] hyperlinking[84]/embedding[85]; cloud storage of protected works,[86] the sale of a media player that gives access to illegal copies,[87] the management of an online platform that indexes torrents,[88] and reposting of a work already online with consent freely and for free[89]. In its extensive case law on Article 3(1) the CJEU has generated a flexible methodology to address the various technical set-ups considered under the communication right.

In addressing the scope of Article 3(1), the CJEU applies its in-house 'individual assessment' methodology which consists of various elements developed in the Court's long-standing 'communication to the public' jurisprudence.[90] The methodology is applied to determine what amounts to a relevant act as well as to determine who is a relevant user under that provision for the purposes of setting liability.[91] Under an

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[78] As of 11 January 2019, there were 23 preliminary rulings and 5 pending referrals on Infosoc Directive, art 3(1) and Council Directive 92/100/EEC of 19 November 2002 on rental right and lending right and on certain rights related to copyright in the field of intellectual property [1992] OJ L346/61, art 8(2).

[79] ECOSOC, 'Proposal for a European Parliament and Council Directive on Harmonization of Certain Aspects of Copyright and Related Rights in the Information Society' (Opinion) [1998] OJ C407/30 <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:51998AC1122> accessed 29 March 2019.

[80] *SGAE* (n 76); Case 351/12 *OSA* EU:C:2014:110.

[81] Case 403/08 *Premier League* EU:C:2017:144; Case 135/10 *SCF v Marco del Corso* EU:C:2012:140; Case 117/15 *Reha Training* EU:C:2016:379; Case 138/16 *AKM* EU:C:2017:218.

[82] Case 325/14 *SBS Belgium v SABAM* EU:C:2015:764.

[83] Case 607/11 *ITV Broadcasting and others v TVCatchUp Ltd* EU:C:2013:147.

[84] Case 466/12 *Svensson v Retriever Sverige AB* EU:C:2014:76; Case 160/15 *GS Media* EU:C:2016:644.

[85] Case 348/13 *BestWater International* EU:C:2014:2315.

[86] Case 265/16 *VCAST* EU:C:2017:913.

[87] Case 527/15 *Stichting Brein v Wullems (t/a Filmspeler)* EU:C:2017:300.

[88] Case C-610/15 *Stichting Brein, Other parties: Ziggo BV and XS4ALL Internet BV*ECLI:EU:C:2017:99.

[89] Case 161/17 *Land Nordrhein-Westfalen v Renckhoff* EU:C:2018:634.

[90] For the individual assessment, see *Reha Training* (n 73) paras 35 and 44.

[91] *SCF* (n 81) paras 76 and para 78; Case 162/10 *Phonographic Performance (Ireland) Ltd v Ireland and Attorney General* EU:C:2012:141, para 28.

individual assessment, two essential and cumulative criteria must be met: an 'act of communication' to 'a public'.92 The analysis is supplemented by other (main) sub-criteria such as the indispensable role of the user and the deliberate nature of his intervention or the new public test. To steer the analysis, a further set of (ever-growing) sub-criteria is invoked, such as 'full knowledge of the consequences of its actions', 'indeterminate number of potential recipients', 'persons in general', 'specific individuals belonging to a private group', 'fairly large number of people', 'de minimis threshold', 'cumulative effect', 'targeted public', 'specific technical means', 'public taken into account by rightholders', 'profit-making nature', 'receptivity of the public', 'access subject to restrictive measures' 'possible lack of consent', 'direct link', 'direct access', 'knew or ought to have known', 'circumvent access restrictions', 'necessary checks' and 'full knowledge of the protected nature of that work and the possible lack of consent to publication on the internet'.93

These elements are deemed complementary, interdependent and are not autonomous.94 They are applied both individually and in combination with each other.95 Article 3(1) case law applies semantic and teleological arguments coupled in some cases with a systematic interpretation of secondary legislation provisions.96 Via this methodology, the CJEU has mixed and matched these criteria on a case-by-case basis. What emerges are variations of the test applicable to clusters of means to communicate works as well as liability aspects of such communications. Yet this approach focused on flexibility is criticised as lacking in coherence.97 The CJEU appears to have subordinated *elegantia juris* to the necessity to adapt the communication right to technological innovation.

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92 *ITV Broadcasting* (n 83) paras 21 and 31; *Svensson* (n 84) para 16, when one criteria is not met there is no communication to the public *Reha Training* (n 81) para 45.

93 Pierre Sirinelli, 'Chronique de Jurisprudence: Le Droit de Communication au Public' (2017) 251 RIDA 207, 254.

94 *Reha Training* (n 81) para 35; *SBS Belgium* (n 81) para 15 and case law cited.

95 ibid.

96 Marcella Favale, Martin Kretschmer and Paul C Torremans, 'Is there an EU Copyright Jurisprudence? An Empirical Analysis of the Workings of the European Court of Justice' (CREATe Working Paper 2015/07) 27 <https://www.create.ac.uk/publications/is-there-a-eu-copyright-jurisprudence-an-empirical-analysis-of-the-workings-of-the-european-court-of-justice/> accessed 21 June 2017. The teleological and systematic interpretations are sometimes criticized in the literature as giving support to activist interpretations. See Robert Schütze, *European Constitutional Law* (Cambridge University Press 2012) 138.

97 On structural lack of coherence, see, for example, Sirinelli (n 83) 258.

5.4.4 Constructing the legal test for the liability of facilitators of access and application to dApps

This sub-section narrows down the case law of the CJEU on Article 3(1) aspects related to the liability of facilitators of access to unlicensed content to tease out the test before applying it to the emerging case of blockchain content dApps. Article 3(1) sets out a general exclusive right for authors to prohibit and authorise any communication of their works done by wire or wireless, or by making them available (on demand communications). The making available right in Article 3(1) and Article 3 more generally implements the EU's international copyright obligations.[98]

In case law, starting with the *GS Media* decision and developed more intensively in the *Filmspeler* and *TPB* decisions, Article 3(1) of the CJEU extends the scope of Article 1 to cover the knowing provision of a technical tool that facilitates third party infringement.[99] As stated above and established by the Grand Chamber of the CJEU in the *Reha Training* decision, for a communication to the public, two main elements have to be established: an act of communication which is made to a '(new) public'. An act of communication online requires two aspects: an objective act of making available which covers 'any technical means of communication'[100] and the 'essential role of the player originating the communication and the deliberate nature of its intervention' who 'intervenes, in full knowledge of the consequences of its action, to give its customers access to a protected work, and does so in particular where without

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[98] Articles 3(1) and (2) Infosoc Directive implement the 'umbrella solution' in the Article 8 of the WIPO WCT and Articles 10 and 14 of WPPT 'which envisages the neutral description of the act of digital transmission 'free from specific legal characterization; that such a description should not be excessively technical and, at the same time, should convey the interactive nature of digital transmissions'. WIPO, *Intellectual Property Handbook: Policy, Law and Use* (2nd edn, WIPO, 2004) 272. The umbrella solution complements and avoids the complexity of the Berne Convention for the Protection of Literary and Artistic Works (as amended 28 September 1979). The Berne Convention makes available several provisions on specific rights which apply to certain categories of works: art 11(1)(ii) on the public performance applies to dramatic, dramatico-musical and musical works; art 11(bis)(1) provides for a broadcasting (i), rebroadcasting (ii), communication to the public by wire of broadcasted works(ii) and public communication by loudspeaker (iii) of/for all categories broadcasted works; art 11(1)(ii) refer to the communication to the public of recitation of literary works; art 14(1)(ii) provides for the public performance and communication to the public of films and applies to cinematographic adaptations.

[99] Indeed, the emerging test bears resemblance to Article L 335-2-1 of the French Intellectual Property Code which covers the criminal liability of those who provide technology essential for infringement as it covers anyone who 'publishes, makes available or communicates to the public, knowingly and in any form whatsoever, software manifestly intended to communicate unauthorised works or protected objects to the public by French courts.'

[100] *TPB* (n 73) para 34.

that intervention its customers would not, in principle, be able to enjoy the broadcast work'.[101] For liability, the CJEU focuses on the central role of the user and the intentional nature of his intervention.[102] In *Filmspeler* and *TPB*, the knowledge of the infringer is emphasised and appears both at the stage of the act of communication as well as the (new) public.[103] The onus on knowledge was introduced in *GS Media* by way of exception to the general rules of non-liability of those who provide hyperlinks to unlawful copies when these have no knowledge that the work linked to is unlawful or when they do not have a profit-making goal.[104] The assessment of the knowledge of the infringer was taken up more generally in cases of overt facilitation of access to infringing works in *Filmspeler* and *TBP*. Knowledge is construed in the following way:

- Those who provide hyperlinks to unlawful copies when these 'know or ought to have known' that the work linked to is unlawful will be liable. Given the direct provision of a hyperlink, the knowledge appears specific.

- For-profit 'hyperlinkers' are placed under a (rebuttable) presumption of full knowledge that the content linked to is illegal, and are placed under a duty to undertake 'necessary checks' to ensure that the content linked to is not illegal.[105] Again, given the direct provision of a hyperlink the knowledge is specific.

- The configuration for sale of a media player loaded with hyperlinks to illegal copies of works leads to full knowledge of the seller, on the basis of the presumption of knowledge above;[106] only general knowledge is required, given the indirect provision of hyperlinks.

- The operation for-profit of a platform that indexes, categorises and curates torrents to illegal works does not resort to the presumption of full knowledge.[107] A duty to check would be redundant when the service is clearly designed for blatant infringement. At least the general knowledge of the

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[101] *GS Media* (n 84) para 35; *TPB* (n 73) para 37.
[102] *Filmspeler* (n 87) para 31
[103] Jane Ginsburg and Luke Budiardjo, 'Liability for Providing Hyperlinks to Copyright-Infringing Content: International and Comparative Law Perspectives' (2017) 41 Colum JL & Arts 153, 164 and 166.
[104] *GS Media* (n 84) para 48.
[105] ibid para 51.
[106] *Filmspeler* (n 87) paras 49-50.
[107] Matthias Leistner, 'Is the CJEU Outperforming the Commission?' (26 November 2017) 9 <http://dx.doi.org/10.2139/ssrn.3077615> accessed 14 December 2017.

operators that infringing works are being exchanged is necessary, although that standard is unclear from the wording of the decision.[108]

In addition, the CJEU gives consideration to 'the mere provision of technical facilities' element (as an escape from liability) as well as to 'a public' which are 'persons in general' assessed cumulatively and the 'new public': 'a public different from the public at which the original act of communication of the work is directed'.[109] Based on the background of these elements, the liability of dApps reviewed may be construed.

The following is a conceptual map of Article 3(1) test in the case of facilitators of access to illegal copies of works.

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[108] *TPB* (n 73) paras 38 and 45.

[109] *SGAE* (n 76) para 40; For criticism of the new public element see ALAI, 'Opinion on the Criterion "New Public", developed by the Court of Justice of the European Union (CJEU), put in the context of making available and communication to the public' (17 September 2014) 11 which sees the new public test as incompliant with international treaties on copyright law.

An act of
communication

Conduct that makes a work
available

=

+

+

Essential role of the user
and intentional intervention

≠

Provision of technical facilities

+

=

No act of communication

≠

=

No liability

A public

+

+

New Public   Specific knowledge or negligence
(implied if   ('non-profit' hyperlinking to illegal copies)
illegal copies)

Or   Presumption of knowledge/ duty of care
          ('for profit' hyperlinking to illegal copies)

Or   General knowledge of infringement
          (indirect hyperlinking to illegal copies)

Or   General knowledge or 'blind eye' knowledge (could not be unaware)
          (making available and curating a platform that indexes torrents)
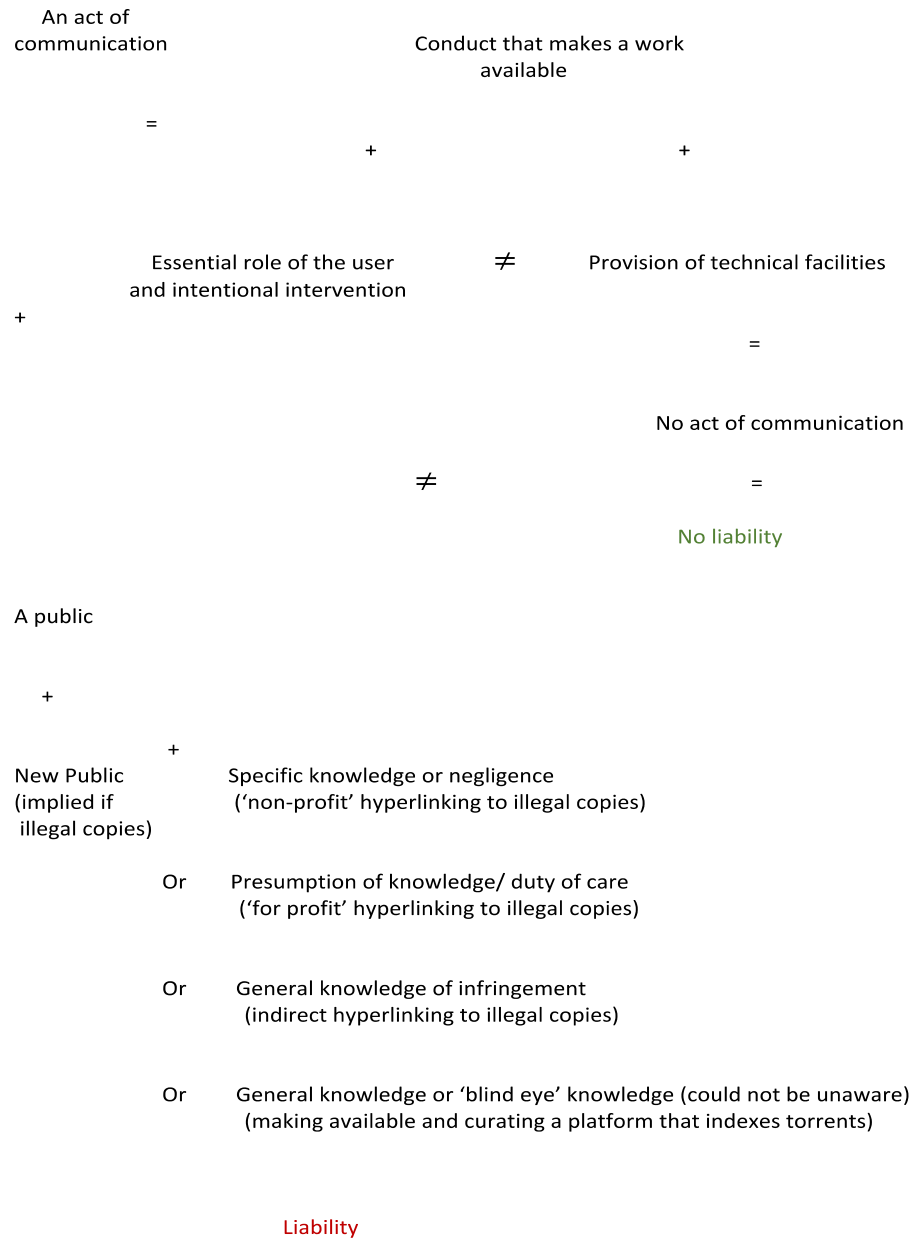
Liability

Figure 4 – Conceptual map of Article 3(1) test for facilitators of third party
infringement

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5.4.5   The act of communication

For blockchain dApps to trigger Article 3(1), the provision of such a service needs to be considered an act of communication. There is no definition provided for the notions of communication or making available in the InfoSoc Directive. However, the CJEU has clarified that it deserves a broad interpretation to ensure the goal of 'high level of protection' enshrined in Recital 9 of the InfoSoc Directive is met.[110] Traditionally, the CJEU has largely followed a functional interpretation of the concept of communication, which 'emphasises the aim of adequate protection of authors, irrespective of the technical details'.[111] An act of communication is triggered by the actual transmission of the work in non-internet cases and by the provision of access in the case of making available online.[112]

The making available is designed to cover interactive communications emphasised by the element of individual choice, reflected in the wording of the provision: 'from a place and at a time individually chosen by them'.[113] By way of example, an act of making available covers the mere connection to a server from which works may be accessed individually by members of the public at their choice.[114] Therefore, it 'would be sufficient to make works available (for example, by transferring a work to an electronic bulletin board)'.[115] The making available to the public is seen as a special case of communication to the public.[116] The notion of making available is expressed in technically neutral terms.[117] The broad interpretation of the concept enabled its

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[110] Recitals 9, 10, and 23 InfoSoc Directive. *SGAE* (n 76) para 36; SCF (n 81) para 186; Case 283/10 *Circul Globus* EU:C:2011:772, para 33; *ITV* (n 83) para 20; *Svensson* (n 84) para 17; OSA (n 80) para 23; SBS (n 82) para 14.

[111] The consequence of abstracting away technical aspects is the enlargement of the notion of communication. The functional approach is contrasted with the 'technical approach' which takes into account technical details. Advocate General Trstenjak in SCF (n 81) para 102. Indeed, it is unclear how technical details are irrelevant when the CJEU takes into account elements such as 'specific technical means', see ITV (n 83) para 24.

[112] *TPB* (n 73) para 34.

[113] Article 3(1).

[114] Jörg Reinbothe and Silke von Lewinski, *The WIPO Treaties on Copyright: A Commentary on the WCT, the WPPT, and the BTAP* (Oxford University Press 2015) point 7.8.26.

[115] WIPO, 'Report of the Seventh Session of the Committee of Experts on a Possible Protocol to the Berne Convention' (Geneva, 22-24 May 1996) WIPO Doc BCP/CE/VII/4-INR/ CE/VI/4, 4 <www.wipo.int/mdocsarchives/BCP_CE_VII_INR_CE_VI/BCP_CE_VII_4_INR_CE_VI_4_S.pdf> accessed 23 January 2016.

[116] *Sharehosting* (n 75) para 39.

[117] WIPO, 'Diplomatic Conference on Certain Copyright and Neighboring Rights Questions, Proposal for the Substantive Provisions of the Treaty on Certain Questions Concerning the Protection of Literary and Artistic Works to be Considered by the Diplomatic Conference' (10 December 1996)

application to facilitators of access to works, in spite of strong academic criticism.[118] The existence of an objective act of making available can be seen as a type of *actus reus*. In addition, the existence of an act of making available is further qualified by two other interconnected sub-elements: the essential role played by the user and the intentional nature of the intervention to give access. Each element will be assessed in turn.

5.4.5.1 *CJEU approaches to the objective act of making available and implications for blockchain dApps*

a) Hyperlinking and direct access

In *Svensson*, to qualify hyperlinking as an act of making available, and therefore a communication, the CJEU introduced the so-called 'access theory' which defines an act of making available as the provision of (direct) access to protected works, namely: the provision of hyperlinks 'to protected works published without any access restrictions on another site [that] affords users of the first site direct access to those works'.[119] The extension of the means of making available naturally involves an extension of the identity of the user. *Svensson* was applied in *GS Media*, in the case of hyperlinking to works made available online without the consent of the rightholders.[120] The *GS Media* case would be applicable to blockchain dApp services when any links lead to unauthorised copies of works.

Upfiring issues hyperlinks upon upload that users can post on websites to direct users to the file uploaded. Libry also generates a type of hyperlink which defines the individual 'channel' where the content is uploaded.[121] With Lbry, these links are stored on the blockchain. Yet in both situations, the links are issued automatically. It is

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WIPO CRNR/DC/4, 10.14; Mihaly Ficsor, 'The Spring 1997 Horace S. Manges Lecture—Copyright for the Digital Era: The WIPO "Internet" Treaties' (1997) 21 Colum JL & Arts 197, 210.

[118] European Copyright Society, 'Opinion on the Reference to the CJEU in Case C-466/12 Svensson' (2013) <https://europeancopyrightsocietydotorg.files.wordpress.com/2015/12/european-copyright-society-opinion-on-svensson-frstsignatoriespaginatedv31.pdf > accessed 29 March 2019.

[119] *Svensson* (n 84) para 18, *GS Media* (n 84) para 48; *Filmspeler* (n 87) para 48. The approach to the concept of communication in *Svensson* set down the roots for the court's further extension of the notion. Commenting on the breadth of the act, see Severine Dusollier, 'Les Hyperliens en Droit d'Auteur Européen: Quand tout Deviant Communication' [2014] Revue du Droit des Technologies de l'Information 57.

[120] *GS Media* (n 84) para 32.

[121] For example, Lbry, 'FAQs: How to Publish' <https://lbry.io/faq/how-to-publish> accessed 29 March 2019.

unclear if the automatic provision of a hyperlink is covered by CJEU case law. The wording in *GS Media* suggests that the hyperlinker himself must manually create the link to the content.122 Therefore, it is unclear if an automatically issued hyperlink is included. Although the issue is not settled at EU level, the German Federal Supreme Court implicitly accepted that the automatic provision of hyperlinks by search engines is an act of making available by rejecting the application of Article 3(1) on the (subsequent) criteria of presumption of knowledge as set down in the *Thumbnails* case.123 Another issue may be to whom can the linking be attributable: the user who uploads or the dApp? The success of the analogy with hyperlinks remains unclear.

b) The sale and set-up of a media player and the indirect provision of a hyperlink
Another vision of the objective act of making available was devised by the CJEU in *Filmspeler*, where the sale and set-up of a media player device loaded with apps that contained hyperlinks to works – a device which essentially allows the purchaser access to a type of 'pirate Netflix' –was treated by the CJEU as equivalent to the situation of hyperlinks.124 As explained by the AG, the 'provision of links to that protected content, the making available of that content to the public, is a feature common to both types of conduct'.125 Although the direct analogy to dApps appears limited, *Filmspeler* indicates that the provision of a modular system can be seen as an act of making available. It was stated in the case that the defendant, Mr Wullems:

> … enables, in view of the add-ons pre-installed on it, access via structured menus to links that those add-ons which, when activated by the remote control of that multimedia player, offer its users direct access to protected works without the consent of the copyright holders.126

It is thus irrelevant that the system was modular, comprising hardware and software developed by third parties, but linked together by Mr Wullems which enabled users to directly view works on their PC/TV screens. Furthermore, the clients themselves must conduct the final steps of the set-up as they physically connect the device itself to their TV sets and link the device to their internet connections in order to make it operational. The performance of these ancillary acts by users does not appear to break the 'direct

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122 Peka Savola, 'EU Copyright Liability for Internet Linking' (2017) 8 JIPITEC 139, paras 1 and 69.
123 *Thumbnails III* BGH (21 September 2017) I ZR 11/16, paras 60-61.
124 *Filmspeler* (n 87) paras 41-42.
125 ibid para 51.
126 ibid para 48, see also *Paramount Home Entertainment International Ltd v British Sky Broadcasting Ltd* [2013] EWHC 3479, para 34.

link' and preclude the existence of act of making available by Mr Wullems.[127] Although the *Filmspeler* guidance is rather specific to the facts of the case, it may be read to suggest that the intervention of the users does not remove the existence of the act of communication. In the situation of the dApps above, users need to download the dApps, install them and set up a wallet that gives them access to the cryptocurrency necessary to download or stream works will not affect the conclusion that a dAapp is making available.

c) The management of an online platform and the provision of means to infringe

A more relevant case on the classification of an act of making available in the situation of dApps is *TPB* which concerned the liability of the operators of the TPB torrent index site under Article 3(1). The CJEU introduced the rule that 'any act by which a user, with full knowledge of the relevant facts, provides its clients with access to protected works is liable to constitute an act of communication'.[128] This is in line with the Court's earlier decisions, including *Reha Training* where the Grand Chamber held that the act of communication referred to 'any transmission of the protected works, irrespective of the technical means or process used'.[129] By means of the online sharing platform, works are findable by users.[130]

Specifically, TPB, 'by means of indexation of metadata relating to protected works and the provision of a search engine, allows users of that platform to locate those works and to share them in the context of a peer-to-peer network'.[131] As a result, the management and operation of such an online platform is an act of making available and therefore a communication as it provides users access to copyrighted works.[132] However, there can be no access to works objectively without the users themselves

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[127] However, it is questionable whether any access is given as such. This can be contrasted with the decision in SGAE (n 76) para 32 where the hotel not only set up the TV sets receiving the TV signals but also installed the TV with signal.

[128] Case *TPB* (n 73) para 34.

[129] *Reha Training* (n 73) para 38. But there is a danger in this abstraction as it reveals inconsistency in the Court's interpretation of Article 3(1). If technical aspects are irrelevant, why do we need to check if the communicator is a technical intermediary for the purposes of Recital 27 InfoSoc or if the communication is done or not via the same/different technical means? *ITV* (n 83) para 39. On the same point, see Sirinelli (n 83) 256.

[130] *TPB* (n 73) para 35.

[131] ibid para 18.

[132] ibid paras 37 and 39.

participating in as much as they upload torrent files on the platform.133 The CJEU has historically juggled with the possibility that a single act of communication can be committed jointly.134 Without specifically saying so, *TPB* decision communicates that the operators of an online platform can be held responsible for acting in concert with the users: 'the works thus made available to the users of the online sharing platform TPB have been placed online on that platform not by the platform operators but by its users'.135

The guidance in *TPB* has important implications for the dApp categories in this chapter, especially as 'any act' with the requisite knowledge may amount to an act of making available. Upfiring, which is a cryptocurrency micropayment torrent client on which users can upload works for sharing in the peer-2-peer network, and which maintains a website where users can place links to the torrent files, is also likely to be covered by maintaining both the torrent client and the website as it enables users to locate the file, as an alternative hypothesis to the hyperlinking approach. In addition, Lbry, which is a peer-2-peer alternative to YouTube, indexes on the blockchain metadata of the works uploaded and has a search which aids the findability of the works in the system's underlying peer-2-peer network will amount to an act of making available.136 As for BitTorrent Speed, this simply consists of the micropayment update of BitTorrent client that is necessary for the sharing of torrent files. Unlike Upfiring and Lbry, which provide additional facilities to users, BitTorrent Speed only provides the tool to move the torrents and enable the quicker download of files via the cryptocurrency incentive scheme. Simple torrent clients can be seen as a special case

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133 ibid para 36.

134 CJEU jurisprudence, however, has reached diverging conclusions in Case 432/09 *Airfield* and *Canal Digitaal* EU:C:2011:648, paras 69 and 84 and *SBS Belgium* (n 82), which concerned a single act of communication can be done by more persons. In *Airfield*, the CJEU established that a satellite package provider had to obtain permission from rightholders for its intervention in a single and indivisible act of communication via the direct or indirect transmission of television programmes initiated by the broadcasting organisation. There, both the broadcasting organisation and the satellite package provider required permission in the context of the same act. Originally, the idea was launched by Claude Masouyé, 'The Place of Copyright in the Use of Space Satellites' (1972) 72 RIDA 10, 26 to strengthen rightholder position and control over works broadcast. For comment, see Stephen Vousden, 'Airfield, Intermediaries and the Rescue of EU Copyright Law' (2012) 4 IPQ 311, 321.

135 *TPB* (n 73) para 36.

136 'Like Bitcoin, the LBRY blockchain maintains balances - in this case, balances of LBC, LBRY's cryptocurrency and unit of credit. More importantly, the LBRY blockchain also provides a decentralized lookup and metadata storage system.' The metadata relates to the channels where content is uploaded. See Lbry <https://lbry.io/what> accessed 29 March 2019.

and therefore will be discussed in sub-section 5.4.4.6 on the provision of a 'technical facilities' element. In summary, so far Upfiring and Lbry appear to commit an act of making available under the CJEU guidance in *TPB*.

5.4.5.2 *'The indispensable role played by the user and the deliberate nature of its intervention'*

An act of communication is not, however, complete until the central role of the user, ie 'the indispensable role played by the user and the deliberate nature of its intervention', is also shown.[137] Again, due to the interrelated and interconnected nature of the elements, some overlap with the objective act of making available will be present. This indispensable role and deliberate intervention is rooted in the CJEU's earlier case law on communication to the public.[138] In the author's view, this works as a causation test; it informs why the person who committed the objective act of communication is the factual cause (the indispensable role played by the user for the findability/sharing of the works[139]) and why such a user should also be considered legally responsible because of the deliberate nature of his intervention, in full knowledge that he is facilitating infringement.[140]

On the indispensable role, in *GS Media* it was stated that the hyperlink in question enhanced the findability of the leaked photos, which were not easy to find, 'so the fact of posting that link on its site greatly facilitated access to those photos'.[141] The *Filmspeler* decision replaces the notion of 'indispensable role' with 'essential role'.[142] Mr Wullems, who pre-installed add-ons leading to illegal copies of the work being on the media player so that viewers could watch those illegal works on their screens, was 'enabling a direct link to be established between websites broadcasting counterfeit works and purchasers of the multimedia player, without which the purchasers would find it difficult to benefit from those protected works'.[143] In addition, the intervention

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[137] *GS Media* (n 84) para 35; *Filmspeler* (n 87) para 31; *TPB* (n 73) para 31.
[138] The element was introduced in *SCF* (n 81) para 82.
[139] *TPB* (n 73) para 26.
[140] GS Media (n 84) para 49; *Filmspeler* (n 87) para 49; *TPB* (n 73) para 26; Ginsburg and Budiardjo (n 95) 163.
[141] *GS Media* (n 84) para 23.
[142] *Filmspeler* (n 87) para 31.
[143] ibid para 41. In fact, the reasoning is more reminiscent of *Airfield* than *SGAE*. In *Airfield*, the satellite package provider 'first, encrypts the communication concerned or supplies access keys for the communication to the broadcasting organisations so that its subscribers can decode it and, second,

can be essential even when there are other means to access the work.[144] In the *TPB* decision, the notions of indispensable role and essential role appear interchangeably. TPB indexed torrent files that allowed users to locate and store the works on the peer-2-peer network.[145] TPB also sorted through the categories to delete misplaced torrent files. Thus, 'without the aforementioned operators making such a platform available and managing it, the works could not be shared by the users or, at the very least, sharing them on the internet would prove to be more complex';[146] '[t]heir role is therefore essential in making works available'.[147] While the CJEU did not identify this formulation as a causation test, this was apparent from the use of the contrafactual inference normally used in causation (without X, Y would not have happened). The reference to the essential role played by the user in the *TPB* decision suggests the Court's desire to accommodate the liability of more parties involved in the commission of the single act of communication.[148]

Based on the same findings related to the indispensable role of the user in increasing findability of works, the deliberate nature of the intervention which requires a user acting 'with full knowledge of the consequences of his conduct, to provide access to protected works' is also established.[149] This criterion complements and is weaved into the indispensable essential role of the user that shows that the user intended to cause the consequences, ie the user is not acting in error or from a lack of understanding.[150] It could be seen to reveal the conscious choice by the user which may justify responsibility.

Overall, it can be said that in blatant infringement cases, when a user knowingly provides a technical tool which enhances the findability/sharing of illegal works and

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provides the corresponding decoding devices to those subscribers, these operations thus enabling the link to be established between the communication introduced by the broadcasting organisation and those subscribers.' *Airfield* (n 134) para 78.

[144] *Filmspeler* (n 87) para 41; *TPB* (n 73); *GS Media* (n 84) para 36.

[145] *GS Media* (n 84).

[146] *TPB* (n 83) 36.

[147] ibid para 37.

[148] Similarly, see Leistner (n 107) 4.

[149] *GS Media* (n 84) para 51; Filmspeler (n 87) para 50

[150] On intention, see HLA Hart and Tony Honoré, *Causation in the Law* (Oxford University Press 1985) 329: Also, '[i]f an act is done deliberately and with knowledge of the consequences, I do not think that the actor can say that he did not "intend" the consequences or that the act was not "aimed" at the person who, it is known, will suffer them'. *Bourgoin SA v Minister of Agriculture* [1986] 1 QB 716, 777.

takes proactive action to facilitate access to these works, that user is playing an essential role, in spite of the fact that the works can be found via other means and other players can also participate in the commission of the act.[151]

5.4.5.3   Application to dApps reviewed

It is unclear if the guidance in the case law above is applicable to Upfiring and Lbry. Upfiring enables users via structured and automatic menus to share content in a peer-2-peer network. A link is also automatically issued but there is no search engine. Furthermore, the site which is controlled by the dApp that hosts some links to content in the underlying peer-2-peer is moderated to avoid the presence of links to illegal content.[152] As for Lbry, although it provides a search engine to content uploaded in the underlying peer-2-peer network, it has installed a filter that automatically prevents illegal uploads from reaching the front end of the dApp.[153] Furthermore, it informs users in their T&Cs that only legal content may be uploaded. The level of involvement with illegal content is much reduced and it seems that both dApps seek to prevent its accessibility (even though illegal content exists in the underlying peer-2-peer networks). On the other hand, both dApps reviewed incentivise one way or another user upload via cryptocurrency. Aspects related to automatic uploading and filtering, incentivisation of uploads and T&Cs are covered in the pending referrals in *YouTube*[154] and *Sharehosting*,[155] on which the BGH asked, amongst other things, whether these services are communicating to the public as per Article 3(1) InfoSoc Directive.

The German Senate believes that the YouTube service does not play a central role provided that it has knowledge of the availability of copyright infringing content, deletes it or blocks access to it immediately.[156] In addition, the service operators do not know about the cessation of infringing content given the automatic content ID

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[151] Reaching the same conclusion, Ginsburg and Budiardjo (n 103) 165-166.

[152] Although, as stated in section 5.2, other sites exist which show Upfiring links to illegal content.

[153] At 6:40-7:11 Jeremy Kauffman, 'Episode 109' (14 May 2017) <https://www.podcastinit.com/episode-109-lbry-with-jeremy-kauffman/> accessed 29 March 2019.

[154] *YouTube* BGH (pending) I ZR 140/15; Request for a preliminary ruling from the BGH on 6 November 2018 — Case 682/18 *LF v Google LLC, YouTube Inc, YouTube LLC, Google Germany GmbH*.

[155] *Sharehosting* (n 75); no number has yet been allocated at the CJEU.

[156] Ibid para 50.

programme. Therefore, YouTube does not operate in full knowledge of the consequences of its actions. Furthermore, it informs users in their terms of use and during the upload process that the use of infringing content is prohibited. It also provides tools that enable rights owners to counteract the availability of infringing content. The assumption of a central role is therefore at best only considered if YouTube does not immediately delete the information on the availability of infringing content or does not immediately block access to it.[157]

In *Sharehosting*, the defendant operates the Sharehosting service which gives anyone free storage for uploaded files of any content. The service is used for both legal and illegal uses. For each uploaded file, the defendant automatically creates an electronic link (download link) to the file storage location and automatically communicates this to the user. Similarly to Upfiring, the Sharehosting service offer neither a search engine for the files stored, nor a table of contents nor a corresponding search function. However, users can set the download links in so-called link collections on the internet. These are offered by third parties and contain information about the content of the files stored on the defendant's service. In this way, other users can access the files stored on the defendant's servers. The download of files from the platform of the defendant is possible for free. However, quantity and speed are limited for non-registered users and those with a free membership. Paying users have, with prices ranging from 4.99 euros for two days to 99.99 euros for two years, a daily download quota of 30 GB with unlimited download speed. In addition, the defendant pays a percentage of the download fees to users who upload files, up to 40 euros for 1,000 downloads.[158] The BGH Senate opined that the defendant, by operating the Sharehosting service, plays a central role required for the act of communication within the meaning of the CJEU's case law.[159] This is despite the fact that the operator of the Sharehosting service states in the terms of use of the site that copyright infringing content shall not be uploaded. Instead, the system is seen to incentivise the upload of illegal content via the compensation system, issuing unrestricted download links, and allowing for the anonymous use of its service. The reimbursement for uploading files is higher the more attractive the files that are uploaded are. The reimbursement offered works as an

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[157] Ibid para 54.
[158] Sharehosting (n 75) para 5.
[159] Ibid para 44.

incentive to upload copyrighted content that is otherwise available to users for a fee only. By issuing unlimited download links, it is possible for uploading users to easily find the files via link collections so that they can download them if they wish.[160] Overall, the Senate seems to support the argument that the service is acting in full knowledge of the consequences of its action because it knows that copyright infringing content is available on its service to a considerable extent. At the same time, the defendant significantly increases the risk of infringing use in they way he designed the compensation system, by providing unrestricted download links and by enabling anonymous use of the service.[161]

It is unclear if the CJEU will follow the interpretation offered by the BGH. However, on the basis of the BGH guidance, it appears that the swift deletion of infringing files or the application of an automatic filter may suggest that the service is not playing a central role in the infringement. Upfiring and Lbry operate such moderation. However, in the case of Upfiring, since the moderation is manual, the operators may still have actual knowledge of the illegal content. Furthermore, links to illegal content available on the peer-2-peer system may be found on other websites. Also, Lbry does not per se remove content like YouTube's Content ID but it only blocks it from reaching the app surface so that content still exists in the underlying peer-2-peer network. Furthermore, the business model of both the dApps is to incentivise user uploads of works via cryptocurrency, which, as per the view of the German Senate, such financial incentive schemes increase the risk of infringement. On balance, it appears that based on the guidance available from the German Senate the likelihood that such services are seen to play an essential role in infringement by users exsists. It remains to be seen if the CJEU will follow the German BGH.

5.4.6 The public and the 'new' public

Another main element in Article 3(1) assessments is the existence of 'a public' in the sense that the act of communication of making available should be targeted towards a public. The notion is assessed quantitatively, and it involves a de minimis threshold, which means that too-small groups of people are excluded. On the other hand, the CJEU assesses the public cumulatively, which takes into account the number of people

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[160] Ibid para 46.
[161] Ibid para 48.

that can access the work in succession.162 As anyone with an internet connection can download the Upfiring and Lbry dApps, this constitutes a fairly large number of people.163

Regarding the new public element, it is important to note that in cases of facilitation of access to illegal content, the knowledge of the infringer is also intertwined with a finding of 'new public', and a strict separation between the elements is not straightforward, which is unsurprising as the criteria are 'not autonomous' and 'interdependent'.164 First, the notion of new public will be explained both in general and as applied to cases of facilitation. Then, the adjacent knowledge element will be developed. The application of these criteria to the blockchain services will be done as above on an ongoing basis.

The new public measures whether the act of communication widens the audience for the work to a public not envisaged by the authorisation given by the rightholders, ie whether the communication 'is made to a public different from the public at which the original act of communication of the work is directed'.165 This subjective test assesses the extent of the original authorisation by the rightholders for the initial communication. Given that infringement of the communication to the public is an economic tort, the new public test has economic foundations.166 The new public has led to a degree of inconsistency and has been extensively criticised as lacking a coherent basis in international copyright treaties.167

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162 *Phonographic Performance* (n 91) para 35; *OSA* (n 80) para 28; and of 31 May 2016, *Reha Training* (n 85) para 43 and the case-law cited; *Filmspeler* (n 87) para 44

163 By analogy with *Filmspeler* (n 87) para 45.

164 For example, 'it is clear from the order for reference that the operators of the online sharing platform TPB *could not be unaware* that this platform provides access to works published without the consent of the rightholders, given that, as expressly highlighted by the referring court, a very large number of torrent files on the online sharing platform TPB relate to works published without the consent of the rightholders. In those circumstances, it must be held that there is communication to a "new public"'. *TPB* (n 73) para 45.

165 See, for example, the CJEU in the *SGAE* (n 76) para 40: 'Thus, such a transmission is made to a public different from the public at which the original act of communication of the work is directed, that is, to a new public'; *Svensson* (n 84) paras 24 and 31.

166 On the economic foundations of the new public see Case 293/98 *Entidad de Gestión de Derechos de los Productores Audiovisuales (Egeda) v Hostelería Asturiana SA (Hoasa)* EU:C:2000:66, paras 20-26.

167 For criticism of the new public test, see ALAI (n 109); Toby Headdon, 'An Epilogue to Svensson: The Same Old New Public and the Worms that didn't Turn' (2014) 9(8) JIPLP 662; Dusollier (n 119);

In cases of facilitation of access to unauthorised copies, the new public appears to be implied. This is not immediately obvious from the decisions. However, a closer look at the remarks in *Filmspeler* on consent and new public are revealing. In it, the CJEU restated that in the context of hyperlinks to protected works made freely available on a website with the consent of the rightholder, the authors' consent for that making available includes all internet users as the public, therefore there will be no new public when someone hyperlinks to that work.[168] Then, the CJEU said that '[t]he same finding' (that the authors' consent to the making available has included all internet users as the public, ie no new public) cannot be deduced 'from those judgments failing such an authorisation'.[169] An oblique way of saying that the new public is implied where there is no authorisation for the original communication despite the work being made freely available online.[170] When the dApps facilitate access to works uploaded without authorisation, these will communicate to a 'new public'.

The knowledge of the user for giving access to works made available without consent appears in the discussion of the new public. When discussing knowledge in the context of the 'new public', the assignment of legal responsibility for the conduct is nuanced according to varying degrees of knowledge relevant for each typology of access provision. Knowledge is found via notifications or is inferred from the facts, or presumed in the context of for-profit players.

Bernt P Hugenholtz and Sam van Velze, 'Communication to a New Public? Three Reasons Why EU Copyright Law Can Do Without a "New Public"' (2016) 47(7) IIC 797; Maud Cock and Benoit Von Asbroeck, 'Le Critere du «Public Nouveau» dans la Jurisprudence Recent de la Cour de Justice' (2015) 4 IRDI 259.

[168] *Filmspeler* (n 87) para 48.

[169] ibid para 48.

[170] ibid para 48. This convoluted approach obfuscates an obvious inconsistency in the literal application of the new public test in this context: if there is no consent for the original communication, it is not clear how we can assess if there is 'a public which was not taken into account by the authors of the protected works when they authorised their use by the communication to the original public'. The new public test here is similar to the decision of the BGH, in the continuation at national level of the *Bestwater* (n 77) CJEU order.[170] This interpretation is also supported by the aspect that the concept of 'new public as defined by the CJEU is a public which the proprietor of the copyright did not have in mind when authorising the original communication to the public. If the copyright holder did not authorise the original public communication, he necessarily could not have considered a public to which this communication was addressed. In such a case, therefore, every communication of the work by a third party is addressed to a new public in the sense of the case law of the CJEU.' AF Case Comment, 'Germany: "The Reality II"' (2016) 47(2) IIC 232, para 34; *The Reality* BGH (9 July 2015) I ZR 46/12; also more recently in LG Hamburg (13 June 2017) 310 O 117/17, 50

In *Filmspeler* and *TPB*, the profit-making nature of the communication was taken into account but there was no extension of the *GS Media* duty of care in those cases.[171] This makes sense. For example, in *TPB* providing a duty to check would generate conflict with the prohibition on general monitoring in Article 15 the E-Commerce Directive[172] on hosting providers as fulfilling the duty to check may materialise in general monitoring, as already notified by the AG in *TPB*.[173] In *Filmspeler*, the advertisement of the media player sold by Mr Wullems stated that it gave access to illegal copies of works.[174] Furthermore, the device was sold on his website so he was making a profit. In *TPB*, the operations had been notified by rightholders that works were made available with authorisation. Furthermore, the operators expressly made statements encouraging user infringement.[175] Therefore, the operators 'could not be unaware' given that a large number of torrents had been uploaded on the site.[176] The reference to 'could not be unaware' slightly lowers the knowledge standard.[177] In the case of Upfiring and Lbry, the most obvious approach is to derive knowledge from cryptocurrency revenue retained by the dApps for their service. Overall, the knowledge test in the context of the new public is much easier to establish than the central role of the user as discussed above.

5.4.7 BitTorrent Speed – between the provision of a technical facility and an act of communication to the public

This sub-section considers whether BitTorrent Speed may be exempt via the application of Recital 27 Infosoc Directive which refers to a category of users who do not perform an act of communication when their intervention is limited to the mere provision of physical facilities for enabling or making a communication.[178] It

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[171] *GS Media* (n 84) para 51.

[172] 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 [2000] OJ L178/1.

[173] *TPB* (n 73) para 83.

[174] *Filmspeler* (n 87) para 50.

[175] *TPB* (n 73) para 48.

[176] ibid para 45.

[177] Other commentators assimilate 'could not be unaware' with constructive knowledge, see Eleonora Rosati, 'The CJEU Pirate Bay judgment and its impact on the liability of online platforms' [2017] EIPR 737, 743.

[178] It is unclear who would qualify as a purely technical intermediary. For an explanation, see Mireille van Eechoud and others, *Harmonizing European Copyright Law: The Challenges of Better Law-making* (Kluwer Law International 2009) 125.

implements the joint declaration in Article 8 WIPO Treaty.[179] This provision was designed to alleviate ISP concerns that the provision of internet signals may fall under the scope of Article 3(1) Infosoc Directive.[180] At the national level, Recital 27 has achieved that goal.[181] Although the recital refers to 'physical' facilities, the CJEU in *TPB* saw fit to test that Recital in relation to the provision of software, ie TPB platform, potentially as a tactic to exclude software that only performs technical functions.[182] In this context, the logical extension of that enquiry to the provision of the torrent client seems appropriate. In the view of the author, only the BitTorrent Speed client could be a candidate as it is closest to a pure technical provider. This is because, unlike the other dApps, it does not index, provide a search engine, etc, but only the torrent software is provided, and now it also has the cryptocurrency mechanism that incentivises seeding. The application of Recital 27 to a torrent provider has not been tested previously.

Recital 27 CJEU case law includes in the scope of Recital 27 'any technical service',[183] including the provision of internet access, the sale or rent of TV sets or radios;[184] the supply of technical equipment that improves the reception of a signal;[185] and technical means 'ensuring or improving reception of the original broadcast in its catchment

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[179] WIPO, 'Agreed Statements concerning the WIPO Copyright Treaty adopted by the Diplomatic Conference on December 20, 1996' <https://www.wipo.int/treaties/en/text.jsp?file_id=295456> accessed 29 March 2019. This states that '[i]t is understood that the mere provision of physical facilities for enabling or making a communication does not in itself amount to communication within the meaning of this Treaty or the Berne Convention. It is further understood that nothing in Article 8 precludes a Contracting Party from applying Article 11bis(2)'.

[180] Dusollier (n 119) 52.

[181] In Belgium, the main collecting society SABAM sought to charge the main Belgian ISPs fee of 3.4% of their annual subscription rate paid by internet users for the communication of their works to the public by the ISPs. The Brussels Court of First Instance has ruled that the main Belgian ISPs purely play a technical role in the transmission of content and thus not carry out a communication to the public with the meaning of Article XI.165, §1, paragraph 4 of the Belgian Code of Economic Law. *Etat Belge v SABAM* Tribunal de première instance francophone de Bruxelles (13 March 2015) IEFbe 1259. SABAM appealed and 9th Chamber of the Brussels Court of Appeal declared SABAM's appeal unfounded, and also dismissed its claim. *SABAM v Etat Belge* Cour d'appel Bruxelles (3 June 2016) IEFbe 1881.

[182] *TPB* (n 73) para 38.

[183] *SBS Belgium* (n 82) para 31.

[184] *Phonographic Performance* (n 91) para 92; *SGAE* (n 76) para 47.

[185] *Airfield* (n 134) para 79; *ITV* (n 83) para 28.

area.[186] Such facilities 'may make public access to a broadcast technically possible'.[187] Overall, Recital 27 appears to cover the provision of purely 'technical services'.[188]

On the other hand, the intervention in full knowledge and 'for profit' to provide a service which allows internet users access to works which they would not have access to is different from the provision of a technical service. In *SBS Belgium*, the provision of broadcast distributors of an 'autonomous service' provided for remuneration when the subscription paid by the subscribers of the broadcast distributors did not go to the broadcasting organisations but to the distributors was 'not for any technical services, but for access' to the works.[189] A similar rationale appears in *Filmspeler* where the CJEU refers to the same set of facts to contrast the intervention in full knowledge to provide access to illegal works to the (non)-provision of technical facilities. Therefore, provision of the *Fimspeler* device cannot constitute the 'mere' provision of physical facilities as in Recital 27 since Mr Wullems, with full knowledge of the consequences of his conduct, pre-installed onto the 'filmspeler' multimedia player that he marketed add-ons that 'specifically enable purchasers to have access to protected works published—without the consent of the copyright holders of those works—on streaming websites and enable those purchasers to watch those works on their television screens'.[190] The meaning of this may be illuminated by the AG who explained that Mr Wullems was knowingly providing a remunerated service to his customers which consisted of enabling those customers to avoid paying for lawful content.[191]

In *TPB*, the nuance of the evaluation slightly changes towards a mix of technical and human intervention and less focus on the profit-making element: the platform indexes the torrent files to enhance user findability of the works to which the torrents refer;

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[186] *SBS Belgium* (n 82) para 31.
[187] *Filmspeler* (n 87) para 40; SGAE (n 86) para 46.
[188] 'the subscription fee … being payable not for any technical services, but for access to the communication in question and, therefore, to the copyright-protected works'. SBS Belgium (n 74) para 30.
[189] ibid para 30.
[190] *Filmspeler* (n 87) para 41.
[191] 'Mr Wullems' conduct involving the installation of hyperlinks to those works in his devices, which he clearly does in pursuit of a profit and in awareness of its unlawfulness, assists purchasers of the filmspeler to avoid the consideration payable for lawful access to those works, that is, payment of the remuneration due to the right holders which usually takes the form of a membership fee, subscription or another pay-per-view method.' *Filmspeler* (n 87) para 54.

and offers a search engine and an index that classifies works according to categories or popularity. The operators themselves check 'to ensure that a work has been placed in the appropriate category' and 'delete obsolete or faulty torrent files and actively filter some content, with such involvement requirement being a novelty for the provision of facilities element'.[192] Thus, on the basis of TPB, next to control over the technical infrastructure (offering the search engine to increase findability), the active involvement of the operators to curate the offering shows they go beyond the provision of technical facilities.[193]

Unlike TPB, the operators of BitTorrent Speed are not actively involved in what is shared via the torrent client. BitTorrent only provides a computer programme, without offering further intervention. Furthermore, the cryptocurrency incentive system does not generate profits, as such, for a torrent client.[194] In addition, the cryprocurrency is used to improve the speed of the system, which optimises the system. The sharing of data can relate to both legitimate and illegitimate uses. However, empirical evidence suggests that at least 89.9% of files shared through BitTorrent contain infringing content.[195] Furthermore, as mentioned by the German Senate in the context of incentives in the *Sharehosting* case, the cryptocurrency incentive system may ultimately be seen as tilting towards the essential role of the system in the provision of content. This is especially so if it can be shown that the design incentivises the provision of unauthorised content. In this sense, there is written evidence in the White Paper of BitTorrent Speed which may be seen to link the incentive system with the provision of unauthorised content.[196] All of this might suggest the active role of the torrent client as opposed to being a mere technical facility.

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[192] *TPB* (n 73) para 38.

[193] Ginsburg and Budiardjo (n 103) 175 note the similarities between the CJEU case law on provision of physical facilities and the CJEU case law on host providers.

[194] However, it may be seen to indirectly generate profits as the owner of BitTorrent Speed also develops the Tron blockchain; and BitTorrent Speed is now used as a use case of the Tron blockchain which enhances the market valuation of the Tron cryptocurrency, see Joseph Young, 'TRON Up by Over 100% in 1 Month: Can BitTorrent Token's Success Push it Further Up?' (*CNN*, 2 February 2019) <https://www.ccn.com/tron-up-by-over-100-in-1-month-can-bittorrent-tokens-success-push-it-further-up> accessed 29 March 2019.

[195] Paul A Watters, Robert Layton and Richard Dazeley, 'How Much Material on BitTorrent is Infringing Content? A Case Study' (2011) 16(2) Information Security Technical Report 79, 79.

[196] Section 5.2.

5.4.8   Discussion

The CJEU case law on facilitation of access to illegal content under Article 3(1) presents a number of hypotheses which may be adaptable to the dApps reviewed. In this context, the application of blockchain technology, largely in the form of a financial file-sharing incentive system, may work as an aggravating factor if the CJEU follows the analysis of the German BGH. In that sense, an incentive system may tilt the balance towards a finding of *prima facie* liability as it may aid a finding of an essential role of the user. Furthermore, as shown above it may also offer the requisite knowledge in the context of the new public. However, a more precise answer may be forthcoming after the CJEU decisions in the pending *YouTube* and *Sharehosting* referrals.

The analysis above also suggests that the test in Article 3(1) InfoSoc Directive may be sufficiently flexible to withstand the launch of various flavours of torrents that incentivise user infringement with cryptocurrency micropayments. The advantage of the test is that it may be tailored to new decentralised business models of content exploitation beyond traditional centralised systems. This works as an advantage for rightholders. On the other hand, care should be exercised when dealing with new business models. The very broad interpretation of the notion of communication and making available together with the multi-element tool kit of interconnected elements leads to a very wide coverage of the right, which may stifle technological innovation and affect competition in the marketplace. For example, in our situation, Lbry attempts to operate a legal service in the sense that it genuinely takes steps to prevent infringing content from emerging from the underlying peer-2-peer network via a filter. A review of the dApp suggests that it does this relatively successfully, for example, it is not possible to find on Lbry the latest Beyonce song or music video. Furthermore, Lbry provides users such as vloggers and other parties the opportunity to migrate or sync their own YouTube UGC videos to Lbry and monetise their uploads there via blockchain cryptocurrency.[197] This generates competition in the marketplace, and the early application of liability via Article 3(1) on the basis of any infringing content that may be found therein might stifle that source of competition. This problem is further compounded by the fact that the dApps reviewed largely do not qualify for any

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[197] Lbry, 'LBRY offers an Easy Way for YouTubers to Sync their Content to the LBRY Network, Engage with LBRY Users, and Earn LBC' <https://lbry.com/faq/youtube> accessed 29 March 2019.

existing liability exemptions (which incumbents such as YouTube do benefit from to an extent) as it will be shown in the next sections.

5.5 The (non)-application of E-Commerce Directive and liability exemption in Article 14(1) to dApps

This section analyses whether the horizontal liability exemption regime of Section 4 of the E-Commerce Directive could be applicable to the dApps reviewed.[198] It therefore assumes that the dApps above may be *prima facie* liable for infringement. It can be said from the outset that BitTorrent Speed will not be discussed as it may not be covered by the E-Commerce Directive.[199] Also, Upfiring will not qualify if seen as a species of torrent client, although the separate website maintained by Upfiring may qualify.[200] Interesting legal issues are raised by Lbry in terms of whether the set-up where a peer-2-peer dApp which incentivises sharing with cryptocurrency may qualify as it also indexes metadata related to the uploaded content on the blockchain. Therefore, the rationale of the Directive's application is built on the indexation of metadata activities by Lbry and not on the underlying file-sharing peer-2-peer network. This section will first assess which dApp can satisfy the definition of 'society service provider'. The national case law on file-sharing 'utilities' such as indexes and trackers, and the application of the E-Commerce Directive to those services, will be used as an anchoring point, given certain similarities with Lbry. Second, the section will assess if these dApp may fall within the scope of the hosting exemption in Article 14 E-Commerce Directive. It is argued that the application of the E-Commerce Directive to Lbry is challenging.[201]

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[198] The Directive applies to tort claims under national law as well as trademark and unfair competition issues, whereas the DMCA in the US is applicable only to copyright and related rights, see Graeme B Dinwoodie, 'A Comparative Analysis of the Secondary Liability of Online Service Providers' in Graeme B Dinwoodie (ed), *Secondary Liability of Internet Service Providers* (EE 2017) 34.
[199] Gerald Spindler and Matthias Leistner, 'Secondary Copyright Infringement -- New Perspectives in Germany and Europe' (2006) 37(7) IIC 788, 795.
[200] This is likely as a host under Article 14 E-Commerce Directive.
[201] In general, it is argued that blockchain uses will not fall under the scope of the E-Commerce Directive liability exemptions because there will be nobody to respond to a takedown notice given their decentralised nature. This already assumes that entities that develop the projects that use blockchain technology cannot be identified and these fit the definition of the E-Commerce Directive and satisfies some criteria of the hosting provision, a matter yet untested until now and dependent on the details of each situation. See Primavera de Filippi, *Blockchain and the Law: The Rule of Code* (Harvard University Press 2018) 124. For a critical review of the book, see João Pedro Quintais and others, 'Blockchain and the Law: A Critical Evaluation' [2019] Stanford Journal of Blockchain Law & Policy <https://stanford-jblp.pubpub.org/pub/blockchain-and-law-evaluation/> accessed 29 March 2019.

The definition of intermediaries covered by the exceptions in the E-Commerce Directive is taken from Article 1(2) of the Technical Standards Directive,202 which defines information society services as 'any service normally provided for remuneration, at a distance, by electronic means and at the individual request of a recipient of services'. The definition was explained in the *Google* case as 'a service covers acts of facilitation of relations between buyers and sellers',203 and then extended further in *L'Oreal v eBay*:

> 'at a distance' meaning that the service is provided without the parties being simultaneously present, by electronic means" meaning that the service is sent initially and received at its destination by means of electronic equipment for the processing … 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.204

In applying this definition, the CJEU in *L'Oreal v eBay* stated that a centralised online market is an information society service.205 Furthermore, in the *Uber* decision it stated that an app can be an 'information society service' (ISS) as it transfers information concerning transport bookings between amateur taxi drivers and customers in a peer-2-peer network.206 Therefore, a system that uses a combination of centralised and decentralised technologies may qualify for the definition.

However, the application of the E-Commerce Directive to peer-2-peer file-sharing and related technologies is unclear as these technologies were 'unforeseen' at the time of the Directive's adoption.207 At national level, courts have placed torrent indexes and trackers under the E-Commerce Directive. In the Swedish *TPB* case, the Stockholm District Court stated that:

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202 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 [1998] OJ L204/37, as amended by Directive 98/48/EC [1998] OJ L217/18; Case 324/09 *L'Oreal SA v eBay International AG* EU:C:2011:474, para 8.

203 Joined Cases *Google France and Google* 236/08 (23 March 2010) and 238/08 (23 March 2010) EU:C:2010:159.

204 *L'Oreal SA v eBay International* (n 194) para 9.

205 ibid; although peer-2-peer is mentioned in Case 70/10 *Scarlet Extended v Société Belge des Auteurs Compositeurs et Editeurs* EU:C:2011:771.

206 Case 434/15 *Asociacion Profesional Elite Taxi* EU:C:2017:981, para 35.

207 European Commission, 'Online Services, including E-commerce, in the Single Market Accompanying the Document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Coherent Framework to Boost Confidence in the Digital Single Market of E-commerce and other Online Services' COM (2011) 942 final, 26.

> In the opinion of the District Court, it is, therefore, clear that the services from The Pirate Bay website have been supplied at a distance, electronically and at the individual requests of the users. Even if the users have not paid for the services, the requirement for compensation has still been met since the operation of The Pirate Bay has, at least to some extent, been financed by advertising revenue (Bill 2001/02:150, p. 56 f.). The Electronic Commerce Act is, consequently, applicable to the filesharing services supplied from The Pirate Bay website.[208]

The status of file-sharing utilities as ISSs is also implicit. The Italian Court of Cassation found that TPB did not fulfil the hosting conditions for liability exemptions.[209] In the Finnish *Finreactor* case, which dealt with BitTorrent tracker, the District Court of Turku also rejected the application of the hosting provision on the basis that the defendants were involved in the provision of the content.[210] In a related Lithuanian case, Vilnius Regional Court rejected the application of the provisions of Article 14 E-Commerce Directive in the context of a website which generated a database of torrent files and a search engine for those torrents.[211] Although the CJEU in the *TPB* case did not address the issue of the E-Commerce Directive's application, these national level case law snippets suggest that services which index certain data regarding the works, such as torrent data, can be seen as ISPs as per Recital 17 E-Commerce Directive.

In light of the above, Lbry may be seen as an ISS as it also provides an index of uploaded works and a search engine for the underlying peer-2-peer network. The issue then becomes whether the dApp may theoretically fall under the scope of the E-Commerce Directive liability exemptions, which it lists for 'information society service providers'.[212] At the time the Directive was negotiated, the case for these exemptions was to provide a degree certainty for emerging internet services.[213] As explained in *Google v Louis Vuitton*, Articles 12-15 of the E-Commerce Directive

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[208] *Hans Fredrik Lennart Neij* Stockholm District Court, Division 5 Unit 52 (17 April 2009) B 13301-06, 55 <http://www.ifpi.org/content/library/Pirate-Bay-verdict-English-translation.pdf> accessed 29 March 2019.

[209] *TPB* Court of Cassation, Third Criminal Chamber (29 September 2009) 49437 as cited European Commission (n 207) 30.

[210] Mikko Manner, Topi Siniketo and Ulrika Polland, 'The Pirate Bay Ruling: When the Fun and Games End' (2009) 20 Ent L Rev 197, 203.

[211] *Linkomanija* Vilnius District Court, Civil Case No 2-742-262/2012 as cited in Rita Matulionyte and Mindaugas Lankauskas, 'BitTorrent Loses Again: A Recent Lithuanian BitTorrent Case and What it Means for the Construction of the E-commerce Directive' (2013) 4(3) JIPITEC 179, fn 5. In that case, the website did not fulfil the conditions for the application of Article 14 E-Commerce Directive.

[212] For the history of the legislative proposal, see Martin Husovec, *Injunctions against Intermediaries in the European Union* (Cambridge University Press 2017) 42-44.

[213] Dinwoodie (n 198) 31.

'restrict the situations in which intermediary service providers may be held liable pursuant to the applicable national law'.[214] However, the liability exemptions of the E-Commerce Directive are activity-related as they only exempt activities of the service that falls into the exempted behaviours, for example, a service can be exempted from liability for hosting information but liable in relation to its other activities should they encroach on the law.

The first port of call is to clarify if the service satisfies the definition of hosting providers. Article 14(1) states:

> … [w]here an information society service is provided that consists of the storage of information provided by a recipient of the service, Member States shall ensure that the service provider is not liable for the information stored at the request of a recipient of the service, on condition that:
>
> (a) the provider does not have actual knowledge of illegal activity or information and, as regards claims for damages, is not aware of facts or circumstances from which the illegal activity or information is apparent; or
>
> (b) the provider, upon obtaining such knowledge or awareness, acts expeditiously to remove or to disable access to the information.[215]

The dApp would have to be seen to 'store' information at the request of the recipients of the service.[216] A challenge to this may be the underlying operation of Lbry as the storage of the files is done by users on their hard drives via the peer-2-peer network and Llbry only stores the metadata related to those files on a blockchain which is also a peer-2-peer network. Although the CJEU in *Google v Louis Vuitton* fount it sufficient that the service transmits and holds 'certain data', in that situation, 'the keywords selected by the advertiser, the advertising link and the accompanying commercial message, as well as the address of the advertiser's site.' As for *L'Oreal v eBay*, eBay was storing in its servers' memory 'data' supplied by customers such as data concerning the account and the offer for sale. There appears to be no quantitative threshold set by the Court as to how much data should be stored. Yet, the fact still remains that the decisions were taken in the context of centralised applications for which the Directive was devised. It is not clear if placing data on a blockchain hard

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[214] Joined *Google* Cases (n 203) para 107; the exemptions are applicable for liability for damages, other monetary remedies and criminal liability, see Tania Aplin, *Copyright Law in the Digital Society: The Challenges of Multimedia* (Hart 2005) fn 50.

[215] E-Commerce Directive (n 4) art 14(1)(a) and (b).

[216] Joined *Google* Cases (n 203) 113.

fork may amount to 'storage' for the purposes of Article 14. The hosting exemption may be a hard sell in relation to the dApp.

5.6   The unlikely match between dApp in d) and Article 17

As a final avenue for liability, the application of Article 17 (formerly Article 13) of the new Copyright Directive[217] to Lbry will be considered. Article 17 regulates services that, unlike TPB and other services which blatantly facilitate infringement, do not per se encourage users to infringe, yet these services benefit from revenue generated from the infringing works uploaded. This section shows that Article 17 may not be applicable to Lbry. The consequence of this is that such a service may not be able to benefit from the liability exemptions provided in Article 17. The section will first explain the raison d'etre and scope of Article 17 and the Proposed Directive and then apply the provision to Lbry.

Prior to the Commission's September 2016 proposal and the referral by the CJEU in the *YouTube* case, the liability of services that allow user upload of protected content had been addressed at national level, with mixed results for such services.[218] In September 2016, the European Commission put forward a controversial[219] proposal for a Copyright Directive[220] which sought to adapt copyright to the new realities of the digital environment, including the emergence of new digital uses and new business

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[217] This section has been amended to reflect the latest version of the proposal. European Parliament, 'Amendments by the European Parliament to the Commission Proposal' (A8-0245/271, 20 March 2019) <http://www.europarl.europa.eu/doceo/document/A-8-2018-0245-AM-271-271_EN.pdf> accessed 29 March 2019.
[218] The following are a sample of cases: *SA Télévision Française 1 (TF1) v Société YouTube LLC* Tribunal de Grande Instance de Paris (29 May 2012). It did not find YouTube liable for user uploads of infringing broadcasts. *TF1 et autres v YouTube* Tribunal de Grande Instance de Paris (29 May 2012). YouTube was considered to be a passive intermediary. However, it did not fulfil the duties to comply with that status. Compare with Hamburg LG (3 September 2010) 308 O 27/09 where YouTube had made the content uploaded its own due to its logo placement.
[219] Sophie Stalla-Bourdillon and others, 'A Brief Exegesis of the Proposed Copyright Directive' (24 November 2016) <https://ssrn.com/abstract=2875296> accessed 1 April 2019; EDRI, 'Deconstructing the Article 13 of the Copyright Proposal of the European Commission' (EDRI, Revision 2) <https://edri.org/files/copyright/copyright_proposal_article13.pdf> accessed 1 April 2019; Christina Angelopoulos, 'On Online Platforms and the Commission's New Proposal for a Directive on Copyright in the Digital Single Market' (January 2017) <https://ssrn.com/abstract=2947800> accessed 1 April 2019; Lionel Bently and others, 'EU Copyright Reform Proposals Unfit for the Digital Age' (24 February 2017) <https://www.create.ac.uk/wp-content/uploads/2017/02/OpenLetter_EU_Copyright_Reform_24_02_2017.pdf> accessed 29 March 2019; Martin Senftleben and others, 'The Recommendation on Measures to Safeguard Fundamental Rights and the Open Internet in the Framework of the EU Copyright Reform' (2018) 40(3) EIPR 149.
[220] European Commission (n 5).

models.[221] One problem as put forward in the proposal was that, in spite of the evolution of the internet as the main marketplace for the access and distribution of copyright protected content, there is an imbalance of power between rightholders and online services which give access to user-uploaded content. This is because of so-called 'false hosting providers' who intervene in favour of the infringing act by providing their users with user-friendly menus or recommendations, yet shield themselves behind the hosting liability exemption of Article 14 E-Commerce Directive.[222] Thus, 'rightholders face difficulties when seeking to license their rights and be remunerated for the online distribution of their works'.[223] The consequence is that rightholders lag behind in terms of receiving their fair share from the monies generated by such providers.[224] This is known as the 'value gap'. The proposal covered services that play an 'important' role in competing with incumbents, suggesting that services which are only ancillary involved in the provision of access to content are not covered.[225] The idea is that such online content services compete with licensed providers for the same users.[226] Excluded thus are traditional ISPs, cyberlockers, cloud services, online retail marketplaces as well as non-profit players such as encyclopaedias. Also excluded are services the main purpose of which is to engage or facilitate piracy.[227]

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[221] ibid 2-3.

[222] Eleonora Rosati, 'Why a Reform of Hosting Provider's Safe Harbour is Unnecessary Under EU Copyright Law' (CREATe Working Paper 2016/11, August 2016) 4; Pierre Sirinelli, Josée-Anne Benazeraf and Alexandra Bensamoun, 'Mission to Link Directives 2000/31 and 2001/29 – Report and Proposals' (High Council for Literary and Artistic Property, 3 November 2015) 3, 5 and 8; Jan Bernd Nordemann, 'Liability of Online Service Providers for Copyrighted Content – Regulatory Action Needed?' (prepared for Policy Department A upon request of the European Parliament's Committee on the Internal Market and Consumer Protection, IP/A/IMCO/2017-08, January 2018) 9-10.

[223] European Commission (n 5) 3. This is repeated in Recital 37 which states that: '(37) Over the last years, the functioning of the online content marketplace has gained in complexity. Online services providing access to copyright protected content uploaded by their users without the involvement of right holders have flourished and have become main sources of access to content online. This affects rightholders' possibilities to determine whether, and under which conditions, their work and other subject-matter are used as well as their possibilities to get an appropriate remuneration for it.'

[224] ibid 3.

[225] Council of the European Union, 'Proposal for a Directive of the European Parliament and of the Council on Copyright in the Digital Single Market – Mandate for Negotiations with the European Parliament' (867218, 17 May 2018) 37(a) <http://data.consilium.europa.eu/doc/document/ST-8672-2018-INIT/en/pdf> accessed 29 March 2019.

[226] ibid.

[227] ibid.

5.6.1   Scope of Article 17 of the proposed Copyright Directive

Overall, the Directive proposal sought to place rightholders in a better negotiation position.[228] Recitals 62-72 and Article 17 of the proposal cover these measures.[229] The legal basis for these measures rests on a primary liability of 'online content sharing service providers [who] perform an act of communication to the public or of making available to the public when they give the public access to copyright-protected works or other protected subject matter uploaded by their users.[230] The definition of an 'online content sharing service provider' (OCSSP) is:

> A provider of an information society service of which the main or one of the main purposes is to store and give the public access to a large amount of copyright-protected works or other protected subject matter uploaded by its users, which it organises and promotes for profitmaking purposes.[231]

Profit can be obtained, directly or indirectly, 'by organising it and promoting it in order to attract a larger audience, including by categorising it and using targeted promotion within it'.[232]

The Proposal then puts forward two avenues to address the liability of OCSSPs. The first option envisages, conditioned upon the availability of licences, the conclusion of fair and appropriate licensing agreements by such platforms.[233] This comes with an advantage for users as the licence, with the scope of its terms and conditions, would also cover exempt users who act in a non-commercial capacity.[234] The second option covers the situation where no licences are available from rightholders in which case OCSSPs should, in line with industry standards, prevent the availability of illegally uploaded content on such platforms and act expeditiously to remove the content.[235] This should be done in a manner that does not prevent the availability of non-

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[228] European Commission (n 5). The solution advanced the policy option selected in the aftermath of the Impact Assessment and is reflected in Option 2 which 'provides for an obligation for certain service providers to put in place appropriate technologies and fosters the conclusion of agreements with rightholders.' ibid 8.

[229] European Parliament (n 209). Previously, Recitals 37, 37(a), 38 and 39 and Article 13 see European Commission, 'Amendments adopted by the European Parliament on 12 September 2018 on the proposal for a directive of the European Parliament and of the Council on Copyright in the Digital Single Market' COM (2016) 593 final.

[230] European Parliament (n 217) art 17(1); Recital 64.

[231] ibid art 2(6).

[232] ibid Recital 62.

[233] ibid art 17(2).

[234] The idea is not new. It was advanced by the High Council for Literary and Artistic Property in France see Sirinelli, Benazeraf and Bensamoun (n 222) Proposed Recital 16(a); European Commission (n 229) Recital 38, art 13(2).

[235] European Commisssion (n 5) art 17(4)(b) and (c).

infringing works or works whose use is covered by quotation, criticism, review or use for the purpose of caricature, parody or pastiche.[236] The proposal is controversial because it is perceived to go beyond the case law of the CJEU in article 3(1) and the case law on the liability exemptions of Article 14 E-Commerce Directive, thus undermining the role of that legislation.[237]

5.6.1.1 *Application of Article 17 conditions to Lbry*

The definition of an OCSSP and Article 17 may not apply to Lbry. The definition of an OCSSP requires a number of key characteristics such as storing of the content uploaded by the users and giving access to significant amounts of content uploaded by users. A problem arises in relation to the requirement of storage of user data. In the case of Lbry, although it has a similar functionality and look to YouTube, the content is not stored on servers owned by Lbry as in YouTube's case. Indeed, the content which may be accessed on Lbry is held in the peer-2-peer network. Furthermore, the proposal clarifies that providers of 'sharing platforms' are not covered by the Directive.[238] The notion of 'sharing platform' is left undefined and the difference between that and OCSSP is unclear, yet should Lbry be considered an online sharing platform this reinforces the conclusion regarding the non-application of Article 17.

This means that the liability exemption via filtering and notice and take down duties in Article 17(4) are not available for Lbry. Should Lbry be found liable under Article 3(1) InfoSoc Directive as above, the only option potentially available is to pay damages and/or for a licence. This may result in a higher threshold for a new service such as Lbry than what is available for YouTube which falls under Article 17 and may mitigate its liability by fulfilling the filtering and removal obligations therein. This hypothesis, however, depends on the interplay between Article 3(1) InfoSoc Directive, Article 17 proposed Copyright Directive and the CJEU decision on YouTube which at the time of writing have not yet been clarified.

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[236] Art 17(7).

[237] Alexandra Kuczerawy, 'EU Proposal for a Directive on Copyright in the Digital Single Market: Compatibility of Article 13 with the EU Intermediary Liability Regime' in Bilyana Petkova and Tuomas Ojanen (eds), *Fundamental Rights Protection Online: The Future Regulation of Intermediaries* (2019, Forthcoming) 9.

[238] Recital 62, art 17(6).

5.7 Liability of end users that gain cryptocurrency micropayments from file sharing

End users who participate in the sharing of unauthorised content via the dApps reviewed will be primarily liable for copyright infringement both for reproduction under Article 2 as well as communication to the public in Article 3 InfoSoc Directive.[239] In the context of these services, users who download reproduce the works on their hard drives to consume the content and in order to further communicate these via uploads. In essence, given the underlying peer-2-peer exchange, the liability incurred is similar to traditional peer-2-peer cases. Should the use of these services be made user-friendly, internet users may be incentivised to make available the most desirable works, as fast as possible, and in the largest amounts possible, to maximise cryptocurrency returns. In theory, this may 'supercharge' infringement on dApps that permit such blatant file-sharing. A thriving market of good quality illegal copies may boom and disrupt the gains that content industries have worked to restore after the initial file-sharing impact.

Some Member States' statutes envisage the application of criminal provisions to those who profit from infringement as profit-making from infringement is an aggravating factor.[240] It remains to be seen if these will be applied to end users as the application of criminal provisions would generate a backlash. Furthermore, and from a broader perspective, should cryptocurrency micropayments for file-sharing become mainstream, it may lead to lobbying for stronger enforcement measures against users. For example, rightholders would have a stronger case for further and more intrusive penalties.

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[239] Recently, see Case Comment, 'France: "eMule"' (2018) 49(7) IIC 862.

[240] Copyright, Designs and Patents Act 1988, section 107 (2)a states that: 'A person ("P") who infringes copyright in a work by communicating the work to the public commits an offence if P—
(a) knows or has reason to believe that P is infringing copyright in the work, and
(b) either—
(i) intends to make a gain for P or another person, or
(ii) knows or has reason to believe that communicating the work to the public will cause loss to the owner of the copyright, or will expose the owner of the copyright to a risk of loss.'
Although 'gain' is to be interpreted as 'money' it remains to be seen if cryptocurrency could also be included in the future.

5.8   Conclusions

The purpose of this chapter for the thesis is to explore the manner in which blockchain technology could incentivise copyright infringement. It answered the research questions of Chapter 1 as it set out the main emerging dApp models that integrate blockchain integration that may, to various degrees, supercharge the sharing of illegal content via micropayment incentives. For this to take off on a large scale, the user-friendliness of the cryptocurrency needs to be resolved. When this happens, many end user file-sharers will be incentivised to shift to these services.

The legal analysis done in the chapter was largely pre-emptive as the models described are largely in an advanced proposed stage, beta stage or still very new. However, if one lesson can be learned from the enduring file-sharing saga it is that the legal framework was unprepared to manage the revolution brought about by the various systems of online infringement.[241] As this chapter showed, the situation is much different today, where the flexible test in Article 3(1) InfoSoc Directive accommodates the liability of the new dApps under harmonised doctrines of primary liability. In other words, the interests of rightholders and more safeguarded now then they were when filesharing first emerged. In this chapter, Article 3(1) was chosen as it offers a unified approach in line with the current EU level trend. Indeed, should these services take off, the further expansion of the legal framework should be resisted. If anything, the challenge is now to ensure that the framework can be so tailored as not to create an environment that is overly-litigious as this would have the unintended side effect of stifling technological innovation.[242]

The application of the legal framework for the purpose of this thesis may be summarised in the following way:

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[241] See generally, Alain Strowel (ed), *Peer-to-Peer File Sharing and Secondary Liability in Copyright Law* (EE 2009).

[242] For example, although in the context of the private copy exception, the Belgian Bhaalu, a cloud PVR service, suspended service in the midst of litigation with Belgian broadcasting associations. See *VRT, Medialaan and SBS Belgium v Right Brain Interface* Antwerp Commercial Court (4 November 2014) A/14/1067. The Antwerp Commercial Court held that Bhaalu acted as a service provider according to Article 2, 7° of Flemish Decree on Radio-broadcasting and Television, approved by the Flemish Parliament on 18 March 2009, which according to Article 180 requires service providers, among other things to obtain the prior consent of the broadcasters for the use of the works.

dApp Models / Legal Framework	Upfiring	BitTorrent Speed	Lbry
Article 3(1) InfoSoc	Yes	Yes-	Yes --
Exemptions	N/A	N/A	N/A
E-Commerce	N/A	N/A	No++
Article 17 Proposed Copyright Directive	N/A	N/A	N/A

Table 1 – Summary of applicable liability/exemptions

The chapter also shows the lack of legal breathing space for emerging dApps which do not be easily fit into any of the liability exemptions that may be available for their centralised counterparts. The selection of the dApps examples in the chapters was done on the basis of achieving a potential sliding scale of infringement in order to show the nuances of the cryptocurrency micropayment in various technical set-ups which enhance infringement to different degrees. For example, Lbry, at least at the time of writing, may not benefit from any of the available liability exemptions that its centralised counterparts may enjoy. Although this is not a strictly blockchain-related effect, it puts the status quo into perspective and the manner in which the legal framework ensures technical innovation.

6   Thesis conclusions

Copyright infringement is a perennial problem of the digital revolution. The advent of the internet and various internet technologies such as file sharing means that everyone can easily copy and distribute creative works without limits and borders. This thesis looked at the manner in which a particular technology, blockchain, can be applied to provide solutions to end user infringement on the one hand and to incentivise such infringement on the other. The research showed this duality with reference to existing or potential blockchain technology applications. The thesis answers the following central research question: **What are the specific blockchain uses that support solutions to online infringement and what blockchain uses promote such infringement?** This main question was supported by four complementary and interconnected sub-questions each addressing a specific legal issue related to online infringement. The answers for these are provided in the thesis chapters that work step by step through the application of the blockchain technology in the context addressed.

Chapter 2 analysed the manner in which blockchain can be used as a technical protection measure (TPM). Specifically, the chapter answered: How can blockchain technology be applied as a technical protection measure and what are the effects on the interests of rightholders and end users? To provide such an answer, the chapter placed blockchain against the definition of a TPM in Article 6(3) InfoSoc and existing examples of TPMs that prevent works from being accessed and/or control their use. The available literature set out conflicting hypothesis over blockchain as a TPM. From one perspective, blockchain was set out a 'super TPM' in the sense that a work could be wrapped into strong blockchain cryptography.[1] This would ensure perfect

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[1] Monitor Deloitte, 'Blockchain @ Media: A New Game Changer for the Media Industry?' (Monitor Deloitte and Blockchain Institute, 2017) 16 <https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/technology-media-telecommunications/deloitte-PoV-blockchain-media.pdf> accessed 21 January 2018; Primavera de Filippi and Samer Hassan, 'Blockchain Technology as a Regulatory Technology: From Code is Law to Law is Code' (2016) 21(12) First Monday <https://firstmonday.org/article/view/7113/5657> accessed 9 February 2018.

rightsholder control over the use of the work.[2] Another view expresses reservations over the relevance of blockchain as there is nothing the technology can do to prevent users from saving the works accessed.[3]

The findings of the chapter reveal a more nuanced situation. The chapter showed that blockchain technology might be applied in a manner that prevents users from accessing content without permission. Here, blockchain wallets and keys may be applied in a manner similar to existing password protections that gate the access to online content services.

What may separate blockchain from existing access control TPMs is its potential application as a cryptocurrency micropayment as access restriction model whereby internet users could be charged at every stage and every time, they wish to view a work online. Potentially, this system may be introduced in various internet technologies. For example, the system could be incorporated into browsers to charge users every time they access websites, turn the page of an e-book, view images on a site or read newspapers. The chapter argued that the effect of this use of blockchain is mixed. In some situations, it would lead to a fairer pricing structure and in some situations to over-payment. For example, if applied across the board these would effectively turn the internet into a giant content payment service.

On the other hand, the chapter found that blockchain use as a copy control system may be limited. Technically, the vast majority of works cannot be stored on a blockchain, so these cannot be 'wrapped up' in blockchain cryptography as cryptocurrencies can be. In this sense, blockchain technologies cannot work as traditional copy controls as it is very expensive to store most works on public blockchains. The chapter advances that it is unlikely that such a system will take off in the future. Therefore, once a work is purchased with cryptocurrency, the blockchain cannot protect it from being copied.

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[2] Ibid Deloitte 17.
[3] Petter Ericson and others, '#MTFLabs: Blockchain' (MTFLabs Berlin, Version 1.0, 23 August 2016) 7-8 <https://musictechfest.net/wp-content/uploads/2016/08/Blockchain-Whitepaper.pdf> accessed 21 January 2018.

However, the chapter advanced that a further use of blockchain as a TPM may emerge out in the collectable gaming market. There, a couple of Ethereum smart contracts are used to tokenise, i.e. enter on the blockchain some metadata regarding game collectibles and in game items such as swards. These can be traded across various players participating on a gaming platform that incorporates the requisite smart contracts. The collectibles and in-game items can also be used in other games provided the provenance of the item checks out by reference to the smart contract. Potentially, these blockchain smart contracts may inspire new TPM uses for boarder categories of works, for example as a means to ensure that only licenced copies are uploaded on an online website or platform. For example, a system may be set up where the upload of a work on a website is allowed on the user showing they have a token which check back to smart contract to show the user has the right to use the work. For example, a platform may only allow uploads of works by end users whose provenance can be checked out by reference to the blockchain.

In light of these findings, the chapter addressed the second part of the sub-question referring to the potential effects of blockchain as a TPM and end user interests. In this sense, the chapter argued that blockchain technologies may interfere with lawful uses when applied in the context of access restrictions. For example, should the application of micropayments as a condition on access to works be broadly applied, then works available in the public domain could be charged for. Also, the exception in Article 5(3)(d) InfoSoc Directive on quotations for the purposes of criticism and review may be affected should micropayments condition access to online newspapers as only the users who pay can view the work. Since blockchain technology as a TPM is protected against circumvention via Article 6(1) users are not allowed to try to circumvent blockchain TPMs when they encroach exceptions and limitations. Furthermore, the chapter found, in the eventuality that these blockchain TPMs develop, that there is little recourse available for users under Article 6(4) InfoSoc Directive should the application of exceptions and limitations be affected by these technical measures. This affects the 'fair balance' between the interests of rightsholders and users. Therefore, these findings suggest that the application of blockchain the area deserves careful consideration. Thus, the use of blockchain technology in resolving end user infringement could take on another approach as discussed in Chapter 3.

Chapter 3 continued the discussion on solutions to end user infringement as it made the connection between a healthy and rich legal offering and a reduction in end user infringement. The connection is made on the basis of policy documents, rightholder perspectives and empirical findings which suggest that improvements in the legal market turn infringers into paying customers. The chapter addresses the question: <u>How can blockchain contribute to the technical implementation of licensing solutions that transform end user infringers into paying customers?</u> To answer the question, the chapter was split in two parts which discuss separate issues raised the context of blockchain technology and licencing. This is because the research for the chapter found that while some blockchain proposals appear to bring about innovation in licencing, others refer to blockchain symbolically and potentially to repackage older business models.

The first part of the chapter reviewed a number of models where blockchain can be applied as a RMI and licencing tool. Out of these, a number of proposals stand out. For example, blockchain is proposed as a shared RMI database by a joint ASCAP, SACEM and PRS initiative. This project could have a meaningful impact on the viability of multi-territorial licencing and clarity according to which royalties are distributed. Another manner in which blockchain may advance the appeal of the legal market concerns the use of blockchain smart contract multi-party licence and payment systems. These enable the various parties involved in the production of a work to be remunerated on a real-time basis. This is a novelty in the sense that with normal payment systems, for example, for a piece of music, the royalties would be distributed to the relevant CMOs which then pass them on to various creators. From this perspective, the smart contract improves the situation of rightholders who can receive royalties for their works sooner rather than later. In these systems, the smart contracts enable users and artists to enter into direct contract. This is seen to reduce the need for collective societies. Furthermore, the smart contracts may even enable users to become stakeholders in a work created by their favourite artists.

However, these proposals are not without problems. Progress on development of the shared blockchain RMI database proposed by ASCAP, SACEM and PRS is unavailable, which may suggest that progress has stalled. In relation to the smart contract multiparty payment and licencing tool, the chapter also finds that code

language imprinted in the smart contracts operating such transactions is not sophisticated and largely consists of data regarding the percentage of the payment each party should receive. The chapter advances that on the basis of existing contracts it is unlikely that these could replace complex legal contractual arrangements at this stage in their technical development. Furthermore, the application of these smart contracts may lead to substantial disagreements when data introduced regarding the individual contributions in a work is incorrect.

The second part of the chapter focused on a type of service designed to enforce and license rights in images by using 'blockchain'. The chapter shows that the use of blockchain in the context of that service is symbolic largely for advertising. Furthermore, the nature of the service is somewhat similar to an existing and controversial enforcement service in copyright, known as 'speculative invoicing'. The chapter referred to the case law on speculative invoicing and the guidance provided there which may be applicable to the image licensing and enforcement model. The chapter argued that an association with controversial business models may affect public opinion on blockchain use in copyright, which may have further negative consequences on investment in that technology that may have real potential in licencing.

In light of the limitations identified in Chapter 3, Chapter 4 continued to answer the question How can blockchain contribute to the technical implementation of licensing solutions that transform end user infringers into paying customers? This time, the chapter narrowed down the discussion to the application of blockchain in the practical implementation of an end user private, non-exclusive and non-commercial licence for peer-2-peer file sharing. This type of solution if implemented may in one stroke neutralise the need for enforcement in the private sphere as file sharers would be 'licensed' and rightholders remunerated. The application of blockchain in that context was advanced from two perspectives. In one way, a technical set-up is created where a torrent client and a purpose-built blockchain are layered to enable end user sharing and the real time collection of such consumption data to inform royalty revenue distribution in the context of such a licence. The blockchain works as a distributed database of consumer usage which is transparent and secure in the sense that the data recorded therein cannot be subsequently altered. In essence, once the user downloads

the designated torrent and engages in file-sharing, the blockchain records metadata of each download and potentially upload time to provide an accurate log of consumption. The data in the blockchain can then be accessed by relevant CMOs participating in the system. The blockchain would need to be a purpose-built, private and permissioned type in order to ensure the privacy of data logged and to control the identity of the entities that access it. The chapter argues that such a system resolves problems related to the lack of clarity which may lead to dissensions between CMOs and their members regarding the distribution of royalties in the context of such a legalisation scheme. Rightholders may feel more at ease about licensing knowing that the remuneration is done via such accurate measurements.

The alternative blockchain use proposed by the chapter approached the technology from another perspective. It envisages internet users contributing their PC resources to collectively mine cryptocurrency as an alternative form of compensation for their private non-commercial file-sharing in the context of a legalisation proposal. This is in line with existing practices on the internet whereby end users offer their resources, such as attention and data, in return for online services. The section advances that cryptocurrencies could also be part of that discussion in the context of a peer-2-peer legalisation proposal. In this context, end users pool their computer resources, specifically CPU, to mine coins on behalf of rightholders. The chapter finds that this could be done with the Monero coin, which lends itself for CPU mining. In the hypothetical situation where one PC per household in the UK mines Monero for 5 hours a night for a year, this endeavour would generate an equivalent estimate of 105.5 million euros. The chapter argues that this may amount to an important incentive for rightholders to participate in a legalisation proposal. This is conditional, however, on the viability of CPU mining in the long term, which is not yet known.

Although these models may potentially advance the case for an end user private and non-commercial licence, the chapter found that there is no readily available licence format that may be readily implemented to launch the system. Problems exist regarding every type of legal licence proposal, from the (un)willingness of rightholders to participate, to the legal status of various licensing formats, including the need for state intervention to make such a system possible. The implication is that although technical solutions may be found to streamline the management of such a

licence, it needs a complementary workable legal solution for its implementation. However, such private and non-commercial end user file sharing licencing models may become redundant as internet users may move towards 'for profit' methods of file sharing as revealed in Chapter 5.

To address the question How can blockchain technology enable infringement by end users? Chapter 5 has continued the discussion on the impact of blockchain on peer-2-peer file-sharing with a focus on the manner in which blockchain may in fact be used to facilitate end user infringement. The chapter found that the main use of blockchain in the area is in the context of decentralised applications (dApps) that may be seen to facilitate end user infringement via the use of cryptocurrency incentives in return for uploading and sharing. Although the focus in this chapter is on a single mode of application of blockchain to end user copyright infringement, this should not take away from the importance of the dApp model which may provide an additional attraction for end users who wish to infringe.

The chapter identified and the explained the various dApps models that incentivise uploads and sharing via cryptocurrency. In this sense, the chapter found that dApps incentivise the upload of unlicensed content to different degrees. Some appear largely designed for infringement purposes, like Upfiring, while others take precautions to prevent the availability of illegal content to the user, like Lbry.

It is assumed that blockchain technologies lead to the creation of automated systems used to infringe, which are owned and controlled by nobody.[4] To address this, the chapter answered the question Who is liable when blockchain technology facilitates end user infringement? The chapter found that dApps are not fully decentralised as expected in the available literature but in fact they have centralised elements such as a website where the dApp can be downloaded from. Parties that develop these projects can be identified and sometimes identity of the people launching these is known from the project website.[5]

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[4] Nick Vogel, 'The Great Decentralization: How Web 3.0 Will Weaken Copyrights' (2015) 15(1) John Marshall Review of Intellectual Property Law 136, 147
[5] For example, Lbry, 'Leadership' <https://lbry.com/team> accessed 31 March 2019; the owner of BitTorrent and BitTorrent Speed is Tron Foundation controlled by Justin Sun, see Ernesto, 'BitTorrent Inc. Officially Confirms Acquisition by TRON Foundation' (*Torrent Freak*, 24 July

The chapter also found that the *prima facie* liability of developers of such dApps can be outlined according to a number of hypotheses emerging from the CJEU guidance in *GS Media*, *Filmspeler* and *TPB*. These decisions concern the liability for communication to the public under Article 3(1) InfoSoc Directive of technology providers which facilitate infringement by end users. It was shown that the guidance in that case law may lead to a number of hypothesis which support the liability of the dApps reviewed. However, it was argued that further clarity will be provided after the CJEU issues the decisions in the pending *YouTube* and *Sharehosting* referrals.

As the dApps are involved to different levels in end user infringement the the discussion was narrowed down to the application of liability exemptions in Article 14(1) E-Commerce Directive and (the new) Article 17 of the Proposed Copyright Directive to Lbry. Lbry is a dApp which, although incentivises user sharing via cryptocurrency, it seeks to stay within legal model by trying to filter out the sharing of illegal content. The discussion revealed that liability exceptions appear largely unavailable to this dApp. The chapter argues that limited application of exceptions to services built on technical structures may limit service innovation to fully centralised structures.

6.1   Weighing the outcomes

On balance and from a numerical perspective, the possibilities for blockchain use to advance exclusive rights outweigh its use in facilitating user infringement, which is also reflected in the topics covered by the chapters. This should be encouraging for rightholders should they wish to investigate further this technology. Given the ongoing nature of online infringement the research provides rightholders with new ideas to either address infringement, improve the appeal of their legal offering and turn 'infringers into customers' or become aware of any infringement dangers arising from this new technology.

2018) <https://torrentfreak.com/bittorrent-inc-confirms-acquisition-by-tron-foundation-180724/> accessed 31 March 2019.

Yet providers of technologies that may be seen to facilitate end user infringement are also experimenting with blockchain technology. Although numerically the use of blockchain towards end user infringement facilitation is limited at the moment to micropayments as an incentive system for uploads, this may become popular in the future, especially if cryptocurrencies become more widely used by the public. Ultimately, the role of blockchain technology in the context of end user infringement will be determined by the parties that place most effort in terms of investment and know how, put into the development of specific blockchain applications. development by the opposing powers that may wish to harness it.

From a policy perspective, the implication of the research is clear: the market should be allowed to work without any intervention at this point as the development of technology in the area is not yet fully matured. Hence, the application of technologies, as shown in this thesis and summarised here, although potentially fruitful is still unclear. This recommendation is largely in line with the existing approach taken by the EU which is not yet focused on any kind of intervention. Furthermore, the EU is investing funds into research related to blockchain such as that done by the EU Blockchain Observatory.[6]

6.2 Themes emerging from the thesis

One theme emerging is that blockchain technology may generate new relationships between rightholders and internet users which in some situations may reduce the need for enforcement. For example, the online collectible games which apply smart contracts to manage the possession of a digital collectible allow end users a degree of liberty in the use of a game item. As in the case of CryptoKitties, a whole industry of secondary games was created surrounding CryptoKitties as users are allowed to integrate their kitty image into third party games. It will be interesting to see if this model of interoperability can be adapted to the dissemination of other categories of works such as film or music.

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[6] European Commission 'EU Blockchain Observatory and Forum' (*Digital Single Market*) <https://ec.europa.eu/digital-single-market/en/eu-blockchain-observatory-and-forum> accessed 9 March 2019.

New relationships between rights holders and end users may be formed when blockchain technology is included in new distribution platforms to intermediate the direct interaction between rightholders and end users. Via smart contracts, end users can also have the possibility of becoming patrons of the artists they love and become more involved in the creation process. This may lead to a tighter knit and personal relationship between end users and artists.

Another main theme is the role of blockchain technology as a currency and payment system in relation to both solutions to and facilitation of end user infringement. This thesis shows that blockchain technology as a new and alternative digital payment systems leads to the creation of new markets of content consumption online. At the moment, these markets are only emerging. Should cryptocurrencies become widely used these new content markets may become disruptive. For example, the micropayment on access to content model could complement online advertising.

A third theme however relates to the limitations of blockchain technological development. One of the current disadvantages of the technology is the lack of clarity as to whether or not the discussed blockchain applications are sustainable. In the fast pace of technological development, the blockchain applications that are the focus of the thesis discussion may become phased out or fail, thus reducing the relevance of the analysis. In addition, is still also unclear if cryptocurrencies, such as the Monero coin, may sustain mass mining by users in the context of a peer-2-peer legalisation proposal. It is also not yet known if the Monero coin itself will stand the test of time or if it will be phased out by other currencies. Also not known is whether or not cryptocurrencies will become sufficiently appealing and user-friendly to ensure maximum penetration of the technology.

6.3   Future areas of expansion of the thesis research

A number of areas of future research may be developed on the basis of this thesis.

In particular the extension of the study area to include the discussion of these topics in the context of the US legislation and case law together with a further comparative analysis of the two. This would be in line with the borderless nature of the internet which defies the territorial nature of exclusive rights. Furthermore, from a legal perspective the comparative research leads to a more comprehensive understanding of the cross-border and multilevel interactions between blockchain, copyright law and end user infringement.

Another avenue for diversifying the discussion is an enquiry into privacy-related issues raised by the topic. As it was shown, as end user data may be recorded on blockchains, the next step of the discussion is to analyse the privacy implications raised by such measures. Specifically, it would be interesting to analyse if and how the fundamental right of internet users to privacy may be affected by the technologies presented in the thesis. Furthermore, the application of the GDPR is also a very important in this context as proposals record user personal data. Although points have been made in the thesis relating to the level of compatibility between public and private blockchains and the GDPR, the topic requires further clarifications. Research into the compliance of blockchain uses discussed in this thesis with the GDPR would put into further perspective the findings in the thesis and inform the adequate calibration blockchain use in the area.

Another thread deserving of future expansion is the application of the enforcement framework to providers of micropayment-incentivised file-sharing dApps and end users using these services as in Chapter 5. Although Chapter 5 has done the preliminary work of exploring who is liable, a further enquiry invites a discussion about the application of the enforcement framework against these parties. It would be also interesting to examine the extent to which these services may be closed down via alternative ways of enforcement. Since the business model of these services relies on cryptocurrency incentives built on internal cryptocurrency tokens, such as Upfiring UFR and Bitcoin Speed BTT, it must be considered whether banning these tokens at the wallet or cryptocurrency exchanges would put these services out of business. The manner in which these measures could be introduced raises issues of interest for further research.

Yet another area of interest is the practical development of the torrent/blockchain set-up advanced in Chapter 4. Here, an interdisciplinary project could be envisaged between the copyright lawyer and computer scientists which would clarify if integration between the two technologies could be done successfully to achieve the desired functionality. This would represent an important advance in the facilitation of a peer-2-peer private and non-commercial end user licence.

Overall, the thesis provides a fruitful reference point towards further avenues for research. These avenues have the potential to advance our knowledge further about the various facets raised at the interface between blockchain technology and end user copyright infringement.

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