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FUNCTIONAL EQUIVALENCE: AN EXPLORATION THROUGH SHORTCOMINGS TO SOLUTIONS

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ABSTRACT

Since the emergence of cyberspace there have been different legal principles evolving, such as functional equivalence and technology-neutrality, with the aim to ease the regulator's challenge of coping with the new paradigm of virtual, digital and electronic. Currently our societies have reached the doorstep of another similar disruption: infrastructures decentralized on the basis of blockchain and distributed ledger technology, or so-called cryptoeconomics. It is time to turn to cyberspace-related principles for inspiration on how to solve similar concerns, such as applying existing regulation(s) to new technological disruption. This article looks at different understandings of the functional equivalence principle, its shortcomings and the guidance it provides to regulators and courts in dealing with the challenges related to technological innovation including that of cryptoeconomics.

KEYWORDS

Functional equivalence, technology-neutrality, blockchain technology, distributed ledger technology, cyberspace, cryptoeconomics

INTRODUCTION

Since Sir Tim Berners-Lee invented the World Wide Web,¹ regulators have been challenged with the question of how to regulate and apply regulation in the cyberspace.² The creation and development of cyberspace was a significant development that brought about the multi-faceted dilemma of how to secure equal treatment of the online and offline worlds without discriminating one over the other. Not to mention that “every significant technological revolution is accompanied by a narrative of broader change of the social, economic, and legal processes that govern value generation.”³

Ever since Satoshi Nakamoto introduced bitcoin as a means of payment⁴ and with it the technology of blockchain⁵ and distributed ledger (DLT)⁶, the regulators have been challenged with a similar task of how to regulate and apply regulation in the space of “cryptoeconomics”.⁷ Although the majority of the effect of these

¹ World Wide Web is based on the technology of hypertext and the interconnected network we know as Internet. More data on this invention on the website of the World Wide Web Foundation. Available at: <https://webfoundation.org/about/vision/history-of-the-web/>.

² According to Encyclopaedia Britannica, cyberspace is “amorphous, supposedly ‘virtual’ world created by links between computers, Internet-enabled devices, servers, routers, and other components of the Internet’s infrastructure. As opposed to the Internet itself, however, cyberspace is the place produced by these links. It exists, in the perspective of some, apart from any particular nation-state. The term cyberspace was first used by the American-Canadian author William Gibson in 1982 in a story published in *Ogni* magazine and then in his book *Neuromancer*. In this science-fiction novel, Gibson described cyberspace as the creation of a computer network in a world filled with artificially intelligent beings.” Available at: <https://www.britannica.com/topic/cyberspace>. Example of writings on this issue are: Lawrence Lessig, *Code version 2.0.*, 2nd Revised Edition (Basic Books, 2006) // <http://codev2.cc/>; Bert-Jaap Koops, “Should ICT Regulation Be Technology-Neutral?”; in: Bert-Jaap Koops, Miriam Lips, Corien Prins, and Maurice Schellekens, eds., *Starting Points for Ict Regulation. Deconstructing Prevalent Policy One-Liners, It & Law Series, Vol. 9* (The Hague: T.M.C. Asser Press, 2006) // <https://ssrn.com/abstract=918746>; Andrew Murray, *The Regulation of Cyberspace*, 1st edition (Routledge-Cavendish, 2006); Chris Reed, *Making Laws for Cyberspace*, 1st edition (Oxford University Press, 2012); Viktor Mayer-Schönberger, *Delete: The Virtue of Forgetting in the Digital Age* (Princeton University Press, 2009); Ian Walden, “Press regulation in a converging environment”; in: L. Gillies and D. Mangan, eds., *Mapping the rule of law for the Internet* (Edward Elgar Publishing, 2017) // https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2717734.

³ Philipp Hacker, Ioannis Lianos, Georgios Dimitropoulos, and Stefan Eich, “An Introduction”: 2; in: Philipp Hacker, Ioannis Lianos, Georgios Dimitropoulos, and Stefan Eich, eds., *Regulating Blockchain Techno-Social and Legal Challenges*, 1st edition (Oxford University Press, 2019).

⁴ Satoshi Nakamoto, “Bitcoin: A Peer-to-Peer Electronic Cash System” // <https://bitcoin.org/bitcoin.pdf>. Satoshi Nakamoto is a pseudonym and the real author(s) of the whitepaper explaining the bitcoin technology are not known to the public. Read more on Satoshi Nakamoto here: https://en.wikipedia.org/wiki/Satoshi_Nakamoto.

⁵ “A form of distributed ledger in which details of transactions are held in the ledger in the form of blocks of information. A block of new information is attached into the chain of pre-existing blocks via a computerised process by which transactions are validated” (ESMA, “Initial Coin Offerings and Crypto-Assets,” Advice (9 January 2019): 42 // https://www.esma.europa.eu/sites/default/files/library/esma50-157-1391_crypto_advice.pdf).

⁶ DLT is explained as “a means of saving information through a distributed ledger, i.e., a repeated digital copy of data available at multiple locations. DLT is built upon public-key cryptography, a cryptographic system that uses pairs of keys: public keys, which are publicly known and essential for identification, and private keys, which are kept secret and are used for authentication and encryption” (*Ibid.*).

⁷ Cryptoeconomics may be defined as “a discipline concerned with the production, consumption and transfer of wealth using computer networks, cryptography, and game theory to enhance prosperity of groups in current and future digital market economies” (Alex Lielacher, “An Introduction to Cryptoeconomics,” *BTCMANAGER* (June 14, 2017) // <https://btcmanager.com/an-introduction-to->

technologies thus far has been on the financial sector, the “technological change operates on multiple socio-economic dimensions.”⁸ Usually, the technology itself is not an object that should be regulated or intervened upon. Similarly with blockchain, it is the technology use cases and its outputs - tokens⁹, crypto-assets¹⁰ and virtual currency¹¹ – and the new infrastructure itself that have required the attention of the regulator. Yet, “while blockchain technology proliferates rapidly in a seemingly legal vacuum, it is clearly not beyond legal norms, even where these norms struggle with the technology’s implications.”¹² Consequently, blockchain and DLT are seen as “replicating the regulatory curse of the internet”¹³ or cyberspace along with the difficulty of “identifying agents to whom regulation can be meaningfully addressed.”¹⁴

Upon such a development, the regulators must take up a wider examination of how the technology impacts the industries and infrastructures that were created by cyberspace. Furthermore, as the world is welcoming the new phenomenon of “cryptoeconomics”, the same problem emerges as with the emergence of cyberspace – the difference in treatment. This does not always have to be a negative effect but may also generate preferential treatment of the new technology as it does not fall under certain licensing obligation. Yet, in order to be aware, recognize and act rather than react we should learn lessons from the introduction of the cyberspace. The online-offline dimension led to the introduction of both the principle of technology-neutrality and functional equivalence, which encouraged regulators to adopt laws that had a similar effect on the online behaviour of subjects as for the offline behaviour. Therefore, at times the regulation had to be very specific to a certain business model to achieve the same effect in behaviour in the online context as in the offline context. The same approach may be needed also

cryptoeconomics/). Zamfir has proposed a definition of cryptoeconomics as follows: “A formal discipline that studies protocols that govern the production, distribution and consumption of goods and services in a decentralized digital economy. Cryptoeconomics is a practical science that focuses on the design and characterization of these protocols” (Sinclair Davidson, Primavera De Filippi, and Jason Potts, “Economics of Blockchain” (March 8, 2016) // <http://dx.doi.org/10.2139/ssrn.2744751>).

⁸ Philipp Hacker, Ioannis Lianos, Georgios Dimitropoulos, and Stefan Eich, *supra* note 3: 2.

⁹ According to ESMA token is a “digital representation of an interest, which may be of value, a right to receive a benefit or perform specified functions or may not have a specified purpose or use” (ESMA, *supra* note 5: 42).

¹⁰ “Crypto-assets” refer to tokens and according to ESM “crypto-assets can be defined as a type of private asset that depends primarily on cryptography and Distributed Ledger Technology as part of their perceived or inherent value” (ESMA, *supra* note 5: 7-8).

¹¹ The terms “virtual currency” and “cryptocurrency” are not distinguished in the article. The 5th AML Directive uses the term virtual currency, which is considered a broader term as it may include also digital currency (*Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 amending Directive (EU) 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, and amending Directives 2009/138/EC and 2013/36/EU* // <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018L0843> [5th AML Directive]).

¹² Philipp Hacker, Ioannis Lianos, Georgios Dimitropoulos, and Stefan Eich, *supra* note 3: 1.

¹³ *Ibid.*, 14.

¹⁴ *Ibid.*, 16. An in-depth discussion on the potential subjects of regulation can be found in Michele Finck, *Blockchain Regulation and Governance in Europe* (Cambridge University Press, 2019), 45-65.

in order to adapt the existing regulations to cryptoeconomics. This is especially true since among scholars there is "a clear anxiety ... as to the need for the legal system to be proactive and experiment with and develop the establishment of a legal framework capable of adequately responding to the social and economic challenges raised by blockchain technology."¹⁵

Some might question whether there is truly a difference of treatment and in cases where there is, what does this have to do with cyberspace? In response to the sceptics, one might say that in a way the transition from a physical offline world to the virtual online world was very similar to the currently ongoing transition from centralized virtual cyberspace to many decentralized virtual infrastructures based on blockchain technology. This transition brings about challenges that might upon first glance seem irrelevant and minor concerns on a bigger scale. Yet, these challenges are the core of the innovation that blockchain technology brings with it. For example, the services that are available through the use of different infrastructure that provide higher levels of transparency, trustworthiness and integrity can be provided easier than ever before without a trusted services provider. Transactions can be concluded that fulfil a list of different functions, without the need of a trusted authentication service provider such as a notary. Furthermore, the registries of records and data can be maintained simply using a protocol and not developing and administering an expensive single point of failure on the basis of a centralized infrastructure. However, in order for the blockchain technology to actually bring these solutions into existence and use, the regulator needs to recognize the need to be open-minded towards the business models using the new infrastructure in a similar way as during the 1990s to the online world of cyberspace.

The lesson learned (somewhat still ongoing) of the offline-online transition is of great value to the currently relevant scale of centralized-decentralized; consequently, in order to address this problem of difference of treatment, it is useful to seek assistance from the same principles developed to overcome the problems of accepting the earlier transition - the principles of technology-neutrality and functional equivalence. This article looks at only one of these - the functional equivalence - which is sometimes considered the same as the principle of technology-neutrality. However, the principle of functional equivalence does not pursue exactly the same aims as that of technology-neutrality. Considering recent scholarly research that proposed to dismiss the functional equivalence approach as a legislative technique, this article examines different understandings of functional

¹⁵ Philipp Hacker, Ioannis Lianos, Georgios Dimitropoulos, and Stefan Eich, *supra* note 3: 2.

equivalence and the solution that the principle of technology-neutrality brings in resolving the challenges of cyberspace and “cryptoeconomics”. Furthermore, the article proposes to conceptualize a legal design model arising from the principles of technology neutrality and functional equivalence to address the disruptive changes in society due to the fast-evolving technologies.

This article focuses on the following questions:

(i) How is functional equivalence understood by different scholars in the current debate?

(ii) Can the principle of functional equivalence be helpful in overcoming the difference of treatment of cryptoeconomics’ related outputs, process and services?

In the first section the background of the principle and the understanding on the functional equivalence principle by David John Harvey and Andrej Savin is discussed; the second section describes the criticism of the author and the lessons learned from the use of the principle in different court cases and also the understanding of the principle by Andrej Savin in the regulatory domains such as telecoms, ecommerce and media, and the shortcomings of the principle identified by these authors; section three discusses the understanding of the principle by Furrer and Müller, who have developed the principle further and applied it to blockchain technology applications; in section 4 the explanations of the meaning of the principle by Chris Reed are discussed to clarify how the principle can be applied. The Conclusions section synthesizes the different understandings in order to be able to use the principle effectively in solving the difference of treatment problem in relation to the centralized-decentralized dimension(s).

For the purposes of the article, the regulator refers to both the legislative and executive branches of state power.

1. UNDERSTANDING FUNCTIONAL EQUIVALENCE

Technology neutrality and functional equivalence are not the same principle. According to Koops “if the effects of a technology are regulated rather than the technology itself, the regulation will usually establish functional equivalence between “off-line” and “on-line” technologies.”¹⁶ Koops calls this the starting point of the technology-neutrality principle. Reed also separates these two from one another stating that functional equivalence guides the regulator in relation to the principles of law that should apply to the new behavior and technology neutrality guides as to “the choice between the available substantive rules which could be

¹⁶ Bert-Jaap Koops, *supra* note 2: 83.

used to implement those legal principles."¹⁷ Functional equivalence is the starting point to address the problem of difference of treatment and represents the principles of law that should apply to resolve the problem.

1.1. BACKGROUND OF THE PRINCIPLE

One of the earliest legal text drafts on this principle is the United Nations Commission on International Trade Law (UNCITRAL) Model Law of Ecommerce¹⁸ that serves as a guideline for national legislation. The UNCITRAL Model Law introduced the concept of functional equivalence that David John Harvey considers the most significant effect of this act. The aim of introducing the concept in the Model Law was to secure the legal recognition of the outputs in electronic form - records, signatures and contracts, and to ensure that the medium in which a record, signature or contract was, did not affect its legal effect and significance.¹⁹

In order to reach this aim an analysis was conducted by UNCITRAL of the purposes and functions of these requirements that apply to the paper-based records, signatures or contracts that were recognized as valid. The aim was to determine the purposes or functions of these requirements that can be fulfilled using techniques of electronic-commerce in order to have the same level of recognition of electronic records, signatures and contracts as the paper-based ones.²⁰

As a result of the analysis it was clear that the application of the principle of functional equivalence involves "an examination of the function fulfilled by traditional form requirements ('writing', 'signature', 'original', 'dispatch', and 'receipt') and a determination as to how the same function could be transposed, reproduced or imitated in a dematerialised environment."²¹

UNCITRAL approached it as follows:

- (i) Firstly, recognize the essential differences between the mediums of paper and the digital;
- (ii) Secondly, identify the purpose for the paper medium rules;
- (iii) Thirdly, identify the qualities of the new medium – the digital medium to understand whether a 'functionally equivalent' rule can be introduced;

¹⁷ Chris Reed, "Online and Offline Equivalence: Aspiration and Achievement," *International Journal of Law and Information Technology* Vol. 18, Issue 3 (2010): 249 // <https://doi.org/10.1093/ijlit/eaq006>.

¹⁸ The text of the UNCITRAL Model Law is available here: https://www.uncitral.org/pdf/english/texts/electcom/05-89450_Ebook.pdf.

¹⁹ David John Harvey, *Collisions in the Digital Paradigm: Law and Rule Making in the Internet Age* (Bloomsbury Publishing, 2017), 59-60.

²⁰ UNCITRAL Model Law on Electronic Commerce with Guide to Enactment 1996 with additional article 5 bis as adopted in 1998 // http://www.uncitral.org/pdf/english/texts/electcom/V1504118_Ebook.pdf.

²¹ David John Harvey, *supra* note 19, 60.

(iv) Fourthly, draft the new medium rule.²²

This means it is equally important to understand the qualities and capabilities of the new medium to identify the differences in comparison with the existing ones and after this to try to come up with a new rule that could be applicable to the new medium.

1.2. PROBLEMS WITH APPLYING THE FUNCTIONAL EQUIVALENCE PRINCIPLE IN COURT CASES (DAVID JOHN HARVEY)

In a recent book David John Harvey analysed the functional equivalence concept from the context of when is it justified for a judge or court to apply a legal norm to a functionally equivalent digital system considering the rule was meant for the physical and not the virtual world. He summarizes functional equivalence as follows:

The concept of 'functional equivalence' in law arose primarily as a result of the development of electronic commerce (e-commerce) and the need to ensure that legal requirements prescribing the use of paper-based documentation for the purposes of recording transactions did not constitute a major or continuing obstacle to the development of e-commerce and the use of digital systems.²³

Upon application of the principle of functional equivalence, the stress should be on the analysis of the function of the pre-digital requirement or rule and on how this function can be met in the new medium. In other words, it is important to figure out what the "technological parallel or equivalent" of the non-digital requirement would be.²⁴ This in turn requires an examination of the technology in order to determine "the achievability of the digital equivalent and if achievable, how that should be applied."²⁵

However, the examination of the technology and its qualities and capabilities is a task that should not be taken lightly,²⁶ as the analysis must be more in-depth than merely a comparison or a transfer of the approach used in one paradigm (medium) and application of it to a different paradigm (medium) based on identified but often quite narrow similarities.²⁷ Using functional equivalence liberally may result in unfounded comparisons that would result in "anchoring them in the

²² *Ibid.*

²³ *Ibid.*, 59.

²⁴ *Ibid.*

²⁵ *Ibid.*

²⁶ *Ibid.*

²⁷ *Ibid.*, 61.

outdated characteristics and properties of the old"²⁸ and potentially hampering the effect of technological innovation.

Harvey stresses that the functions should be "equivalent" and not "parallel" for the court to apply the *ex ante* regulation on the new digital systems and this task "necessarily requires an engagement with the technology by lawyers, judges and rule makers together with a more than superficial understanding of the technological implications of old rules and new equivalents."²⁹ This is difficult for the courts to identify and, therefore, leads to uneven practice.

However, as examined by Harvey, in these court cases most judges tend to use analogy (instead of equivalence) as a criteria for functional equivalence and often are comparing apples with oranges.

Harvey brings examples of court cases where in order to invoke liability:

1. The hard-drive was considered equivalent to a document;³⁰
2. The computer itself was compared to a document³¹ or was likened to one single object or a thing like a paper form letter and not like a filing cabinet,³² and the fact that there is an "accumulation of information on computer storage media"³³ was ignored;
3. Mobile phones were compared to wallets in case of a search with the goal to obtain the right to examine the phone in its entirety similarly to the wallet;³⁴
4. (to a limited extent) Google was compared to a hardcopy library catalogue;³⁵
5. The court discussed at length whether a platform enabling blogging should have similar liability as the owner of the house with graffiti on it or owner of a notice board with notices;³⁶

²⁸ *Ibid.*, 66.

²⁹ *Ibid.*

³⁰ *Kent Pharmaceuticals Limited v Director of Serious Fraud Offences and Others*, [2002] EWHC 3023 Admin; in: David John Harvey, *supra* note 19, 67.

³¹ *R v Misic*, [2001] 3 NZLR 1; in: David John Harvey, *supra* note 19, 67.

³² *R(H) v Commissioners of Inland Revenue*, (2002) EWHC 2164 Admin; in: David John Harvey, *supra* note 19, 67.

³³ David John Harvey, *supra* note 19, 67.

³⁴ *Riley v California*, 134 S Ct 2473 (2014) 42 Media LR 1925; in: David John Harvey, *supra* note 19, 70-71. The court qualified this comparison "like saying a ride on horseback is materially indistinguishable from a flight to the moon [as] both are ways of getting from point A to point B, but little else justifies lumping them together". The court explained in detail the characteristics of a mobile phone - from storage capacity to data types it holds - and on the basis of this explanation made the conclusion that the difference between a wallet and mobile phone was "paradigmatic".

³⁵ *Metropolitan Schools Ltd v Designt Technica Corporation and Google*, [2011] 1 WLR 1743, [2009] MLR 27; [2009] EWHC QB; in: David John Harvey, *supra* note 19, 73. Harvey is of the opinion that the comparison is incomplete - the library catalogue that was compared to Google was compiled due to human intervention and in case of Google the content was created by algorithms ("web-crawler robots") as an automatic process. Hence, the relevant case demonstrated that analogies were always incomplete and the court needed to take into account the specifics of the technologies in order to be inline and not to inhibit technological reality.

³⁶ *Tamiz v Google*, [2012] EMLR 24; [2012] EWHC 449 (QB); in: David John Harvey, *supra* note 19, 73.

6. Internet was considered similar forum to radio and television;³⁷
7. Internet was differentiated from the traditional communication forums and mediums;³⁸
8. Hyperlinking to other sites was argued to be equivalent to publication.³⁹

These cases show that often the functional equivalence approach is used for superficial comparisons of old and new technologies. Comparing static medium (paper) with dynamic medium (digital record) without having an amended new rule might be unreasonable, and this is why these different mediums need to be analysed. The use of analogies in the application of the functional equivalence principle is always incomplete and the court needs to take into account the specifics of the technologies in order to be inline and not to inhibit technological reality.

He cautions that "in the context of the digital paradigm there is a problem in that the set of circumstances which provides the basis for comparison has arisen in an environment that is often quite different from the new one."⁴⁰ He feels that at least partly the problem for lawyers and judges is that they "tend to focus upon one aspect of the technology – the content layer – whereas information in the Digital Paradigm has different qualities and operates in a multi-layered environment"⁴¹.

According to Harvey:

³⁷ *Dow Jones v Gutnik*, [2002] 210 CLR 575; [2002] HCA 56; in: David John Harvey, *supra* note 19, 77.

³⁸ *Barrick Gold Corp v Lopehandia*, (2004) 71 OR 3d 416 (ON CA); in: David John Harvey, *supra* note 19, 77.

³⁹ *Crookes v Newton*, [2011] 3 SCR 269; in: David John Harvey, *supra* note 19, 77. Harvey was of the opinion that under the threat of hyperlinking being qualified as publication of the text on the link the results of the acceptance of such analogy by courts could have been devastating for the Internet use. As hyperlinks operate like addresses in the Internet the court rather looked at their functioning and consequently, was stern in cautioning against any comparison of these with the act of publication stating that: "The Internet cannot, in short, provide access to information without hyperlinks. Limiting their usefulness by subjecting them to the traditional publication rule would have the effect of seriously restricting the flow of information and, as a result, freedom of expression. The potential "chill" in how the Internet functions could be devastating, since primary article authors would unlikely want to risk liability for linking to another article over whose changeable content they have no control. Given the core significance of the role of hyperlinking to the Internet, we risk impairing its whole functioning. Strict application of the publication rule in these circumstances would be like trying to fit a square archaic peg into the hexagonal hole of modernity." Similar discussions in the U.S. can be found in cases such: *Ticketmaster Corp. v. Tickets.Com, Inc.*, No. CV 99-7654 HLH(BQRX), 2000 WL 525390, (C.D. Cal. Mar. 27, 2000) "hyperlinking does not itself involve a violation of the Copyright Act [...] since no copying is involved"; *Perfect 10 v. Google, Inc.*, 416 F. Supp. 2d 828, 838 n.9 (C.D. Cal. 2006) "Google does not risk liability for direct infringement merely by linking to content hosted on and served by third-party websites"; *Pearson Educ., Inc. v. Ishayev*, 963 F. Supp. 2d 239, 250 (S.D.N.Y. 2013) "A hyperlink does not itself contain any substantive content; in that important sense, a hyperlink differs from a zip file." Discussed in Edward Klaris, Alexia Bedat, "Copyright liability for linking and embedding: an E.U. versus U.S. comparison and guide" (March 12, 2018) // <https://klarislaw.com/wp-content/uploads/klarislaw-copyright-liability-for-linking-and-embedding.pdf>. Hyperlinking has also been the subject of cases in CJEU: *Nils Svensson, Sten Sjögren, Madelaine Sahlman, Pia Gadd v Retriever Sverige AB*, C466/12 [2014] OJ C 379/31; *Sociedad General de Autores y Editores de España (SGAE) v Rafael Hoteles SA*, C-306/05 [2006] ECR I-11519; *GS Media BV v Sanoma Media Netherlands BV and Others*, Case C-160/15, Request for a preliminary ruling from the Hoge Raad der Nederlanden (Netherlands) (2015); available at: Evangelia Papadaki, "Hyperlinking, making available and copyright infringement: lessons from European national courts," *European Journal of Law and Technology* Vol. 8, No. 1, 2017.

⁴⁰ David John Harvey, *supra* note 19, 67.

⁴¹ *Ibid.*

The concept of functional equivalence is very useful, but only so long as the examination is carried out in a rigorous fashion. If this is not done, the currency of the term is cheapened and results are reached which retard the development of rules surrounding new technologies and, as a result of these rules, may retard the development, scope, use and innovation of the technology itself.⁴²

The second problem that Harvey identifies is that the functional equivalence approach is often used by courts to invoke liability of a wider circle of parties. This aspect is relevant to cryptoeconomics as well; currently there is a vast amount of articles published about the liability types for actors on the blockchain and distributed to the ledger technology network.⁴³ That often refers to functional equivalence as grounds for invoking the liability. Some scholars expand the liability of partnership regulation⁴⁴ to the network actors. However, upon analysis vast degrees of difficulties arise linked to the construction of the network and the role, rights and accesses of its members to the assets of the network. Such liability expansion analogy is challenged by some scholars⁴⁵ in cases of permissionless blockchains in which case the role, rights, and accesses of its members to the assets of the network are considerably more limited than in the case of permissioned blockchains. This liability expansion rests on the premise that distributed ledger technology networks are comparable in its properties, qualities and characteristics to those of partnerships.

Some scholars have examined the technology itself with its different layers and have introduced different liability layers considering the characteristics of the different layers of the technology; such novelties include endogenous⁴⁶ and exogenous⁴⁷ liability of nodes. Endogenous being the liability the nodes owe to each other to secure the viability of the network and exogenous liability is related with third parties outside the network. Only such in-depth examination with proper

⁴² *Ibid.*, 87.

⁴³ Aleksei Gudkov, "Control on Blockchain Network," *Nova Law Review* Vol. 42 (2018); see also, Laila Metjahic, "Deconstructing the DAO: The Need for Legal Recognition and the Application of Securities Laws to Decentralized Organizations," *Cardozo Law Review* Vol. 39 (2018); Christopher Koopman, Matthew Mitchell, and Adam Thierer, "The Sharing Economy and Consumer Protection Regulation: The Case for Policy Change," *Journal of Business Entrepreneurship and Law* Vol. 8 (2015); Mark Fenwick, Joseph McCahery, and Erik Vermeulen, "The End of 'Corporate' Governance: Hello 'Platform' Governance," *European Business Organization Law Review* Vol. 20 (2019) // <https://doi.org/10.1007/s40804-019-00137-z>; Eliza Mik, "Smart Contracts: Terminology, Technical Limitations and Real World Complexity," *Law, Innovation and Technology* Vol. 9 (2017); Jeremy M. Sklaroff, "Smart Contracts and the Cost of Inflexibility," *University of Pennsylvania Law Review* Vol. 166 (2018); Patrick Berarducci, "Collaborative Approaches to Blockchain Regulation: The Brooklyn Project Example," *Cleveland State Law Review* Vol. 69 (2019).

⁴⁴ Ori Oren, "ICO's, DAO'S, and the SEC: A Partnership Solution," *Columbia Business Law Review* (2018); and Usha Rodrigues, "Law and the Blockchain," *Iowa Law Review* Vol. 104 (2019).

⁴⁵ Dirk A. Zetzsche, Ross Buckley, and Douglas Arner, "The Distributed Liability of Distributed Ledgers: Legal Risks of Blockchain," *University of Illinois Law Review* (2018).

⁴⁶ *Ibid.*

⁴⁷ *Ibid.*

care being applied to the attempt to understand the technology and its effects could be accepted as grounds for such liability.

For the past 11 years, the global economy has been trying to cope with the effects of bitcoin and other cryptocurrencies. The regulators have identified the risks related to cryptocurrencies already since 2014⁴⁸ and extended the legal framework of anti-money laundering and counter-terrorism financing (AML/CTF) on the basis of the functional equivalence approach on this domain without much consideration of its differences. The participants in cryptocurrency trading and exchange have been subjected to the *ex ante* AML/CTF legal framework often creating more burdensome rules than for fiat currency exchanges. For the past three years the regulators have been dealing with the phenomenon of Initial Coin Offering (ICO) and aiming to react quickly, yet, effectively. Ever since July 2017, various securities regulators have qualified the issuance of tokens⁴⁹ in the form on ICOs to fall under securities law and the regulation of initial public offering (IPO).⁵⁰ This practise has led various regulators in different jurisdictions to issue fines to the ICO organizers for failing to comply with the *ex ante* regulation.⁵¹ Similar practise has spun across the globe starting from US also to the Member States of the European Union, where according to research the argumentation is different, but the conclusion that securities law applies is often the same.⁵² This raises the question of whether the ICO and IPO are functionally equivalent and whether the practise of applying the *ex ante* legal norms of the securities law of ICOs is in compliance with the principle of functional equivalence. As Harvey explains, the

⁴⁸ FATF, "Virtual Currencies Key Definitions and Potential AML/CFT Risks," FATF Report (June 2014) // <https://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-currency-key-definitions-and-potential-aml-cft-risks.pdf>.

⁴⁹ According to ESMA token is a "digital representation of an interest, which may be of value, a right to receive a benefit or perform specified functions or may not have a specified purpose or use" and "tokenisation is a method that converts rights to an asset into a digital token. It is effectively a means to represent ownership of assets on DLT. Virtually anything can be tokenised, ranging from physical goods to traditional financial instruments." Furthermore, ESMA uses also the term "crypto-assets" to refer to tokens and explains that: "Crypto-assets can be defined as a type of private asset that depends primarily on cryptography and Distributed Ledger Technology as part of their perceived or inherent value" (ESMA, *supra* note 5: 7-8).

⁵⁰ "The SEC's Report of Investigation found that tokens offered and sold by a "virtual" organization known as "The DAO" were securities and therefore subject to the federal securities laws" (SEC, "SEC Issues Investigative Report Concluding DAO Tokens, a Digital Asset, Were Securities," U.S. Securities and Exchange Commission Press Release (July 25, 2017) // <https://www.sec.gov/news/press-release/2017-131>).

⁵¹ For example, SEC settled with Block.one to pay 24 MUSD in damages for organizing an ICO that was not properly registered under securities law (SEC, "SEC Orders Blockchain Company to Pay \$24 Million Penalty for Unregistered ICO," Press Release (September 30, 2019) // <https://www.sec.gov/news/press-release/2019-202>).

⁵² For short overview see: Philipp Maume and Mathias Fromberger, "Initial Coin Offerings: Are Tokens Securities under EU Law?" Blog, University of Oxford, Faculty of Law (September 7, 2018) // <https://www.law.ox.ac.uk/business-law-blog/blog/2018/09/initial-coin-offerings-are-tokens-securities-under-eu-law>. For longer overview see: Philipp Maume and Mathias Fromberger, "Regulation of Initial Coin Offerings: Reconciling US and EU Securities Laws," *Chicago Journal of International Law* Vol. 19.2 (2019) // <http://dx.doi.org/10.2139/ssrn.3200037>.

regulators must not take any comparators lightly and should carefully examine the utility of the technology in order not to create an effect on innovation.

1.3. FUNCTIONAL EQUIVALENCE IS INSUFFICIENT (ANDREJ SAVIN)

In a similar direction, but more critically, the same principle is portrayed in a recent article by Andrej Savin.⁵³ He states that the functional equivalence approach is often used by the EU institutions to amend regulation in the context of three regulation domains: (i) telecoms, (ii) media under editorial control, and (iii) e-commerce. Yet, as shown by Savin, the functional equivalence approach is not sufficient to address the regulative concerns of the disruptive technologies and could potentially be damaging to the innovation these technologies bring.⁵⁴ According to Savin, this is caused by the fact that the regulator often does not examine the new technology sufficiently enough and the effect of *ex ante* regulation on the use cases of the new technology. Savin stresses that the functional equivalence approach is a difficult one, as the exercise “needs to be performed not only by lawmakers but also courts and regulatory agencies in its charge”⁵⁵ who often are unequipped for this task.

Savin argues that the aim of the Digital Single Market, to create a level playing field for all digital business, is a futile attempt, since society is changing extremely rapidly. Furthermore, it is Savin’s claim that the “level playing field” itself as an aim is destructive as its goal is to protect the existing actors on the market who often wish to curb the disruptors who claim to operate outside the scope of regulation. This, however, reduces innovation and is protectionist of the *status quo*.

Savin is critical of any legal drafting in general and regards the traditional legal drafting means to be unequipped to cope with the challenge of disruption. He provocatively states that:

The reality of a technologically converged world infused with digitisation, which requires not only that new models of regulation be invented for the new reality (Is a contract self-executing on the blockchain a contract? Is online defamation a tort?) but also that the traditional approach to regulation be thoroughly rethought (What is a contract? What constitutes defamation?).⁵⁶

⁵³ Andrej Savin, “Rule Making in the Digital Economy: Overcoming Functional Equivalence As a Regulatory Principle in the EU,” *Journal of Internet Law* Vol. 22, Issue 8 (2019) [Copenhagen Business School, CBS LAW Research Paper 19-10]: 5 // <https://ssrn.com/abstract=3340886>.

⁵⁴ *Ibid.*

⁵⁵ *Ibid.*

⁵⁶ *Ibid.*

Savin is of the opinion that “the literature on models of regulation in the digital world is incomplete and often limited to sector-specific problems”⁵⁷ as there is no clarity as to the “EU digital regulatory method”⁵⁸ and strictly speaking no methodological guidance specific to technology law or law where technology is an influencer.⁵⁹

In his article Savin talks about the negative outcomes and the cause for subjecting the new modern and emerging technologies under the *ex ante* sector-specific legal norms. The negative outcome is obvious - the regulation may be unfit as the technologies solving the same problem are very diverse and evolving with enormous pace. The cause for the subjecting of the new under the old he identifies as fear. Firstly, fear by the regulator of the impact of the new technologies on consumers, the environment or the public control over the industry. Secondly, the fear by the industry itself that must bear the heightened competition the new technology brings. Thirdly, the regulator’s discomfort. This is understandable, as the existing regulation was carefully drafted over decades and is currently applicable to the service providers who are experiencing competition by the disruptors. Consequently, the question of the ruling market players is obvious: how can it be that the regulation does not fit on the disruptor’s business model who are entering our market? Their position is that the existing rules must apply to the incumbents and also to the challengers.

Additionally, the task of creating any new regulation is a cumbersome one that is all the more difficult considering that the regulator does not understand the new technology and its possible impact.

Savin acknowledges that “functional equivalence is currently one of the dominant methods for regulating information technology in the EU.”⁶⁰ Yet, he believes that this is not a solution and he contends that this principle needs to be dismissed as a solution. His reasoning is the following: the regulator is motivated to solve the challenges brought about by emerging technologies with existing regulation by expanding it on the basis of the functional equivalence approach. This is done by comparators and analogue-seeking as described above by Harvey or as Savin calls it: “typifying the Fourth Industrial Revolution to ‘legacy’ regulatory models”.⁶¹ Due to the fact that the alternative is equally bleak - to create new *ex post* regulation at a rapid speed without understanding the technology yet – the regulator chooses the option that is more sustainable and aims for stability.

⁵⁷ *Ibid.*: 14.

⁵⁸ *Ibid.*: 15.

⁵⁹ *Ibid.*: 17.

⁶⁰ *Ibid.*: 5.

⁶¹ *Ibid.*: 5.

Savin uses the examples of telecom regulation that has seen the Electronic Communications Code⁶² being built on ideas developed in 2002, subjecting the market disruptive innovations called “over-the-top” (OTT) service providers to already expired regulatory models, video-sharing platforms to legal norms developed for linear (and later extended to non-linear) TV and introduction of platform regulation to partly control competition with the aim of the “level playing field”.⁶³ Therefore, Savin claims that “the three regulatory circles that currently affect the Internet (e-commerce, audio-video, and telecoms) are essentially based on old and well-tested regulatory models largely developed for pre-Internet technology”.⁶⁴ Furthermore, these three regulatory circles (e-commerce, media and telecoms) have been until recently developed in regulatory silos⁶⁵ with their distinct enforcement structures and separate authorities. Another way of looking at these silos is as layers – (i) *telecoms* being the “carrier layer” that carries the electronic signals, (ii) *information society services* (regulatory bundles of e-commerce, copyright, privacy and consumer protection) being the “content layer” and (iii) “*media under editorial control*” (regulation of advertising and protection of minors) as the third silos also being part of the “content layer”. Each of these silos was developed as a response to a particular challenge that was then current and in need of a solution – e.g. breaking down national monopolies and securing free transmission across borders.

This raises a question about emerging technologies: what if these technologies cross industry borders and fall in multiple industry sectors (e.g. Skype – e-commerce and telecoms, Facebook – e-commerce, media and telecoms, etc)? Is the solution then to force it under one as then the regulation fits or is the solution to amend the regulation to break the silos barriers? On the basis of these questions Savin finds that thus far the regulators have essentially expanded *ex ante* legal norms “to functionally similar but substantively different realities, essentially preventing the development of new regulatory ideas.”⁶⁶

Savin’s research is relevant for cryptoeconomics, where similar concerns arise as the challenges posed by cryptocurrencies and tokens are addressed by different legal domains – payment tokens⁶⁷ by payment services regulation,

⁶² Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code (Recast), PE/52/2018/REV/1 OJ L 321 // <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1575871089458&uri=CELEX:32018L1972>.

⁶³ Andrej Savin, *supra* note 53: 6.

⁶⁴ *Ibid.*

⁶⁵ Silos represent the industry or sector specific bundle of regulation.

⁶⁶ Andrej Savin, *supra* note 53: 7.

⁶⁷ Often referred to as virtual or cryptocurrencies (EBA, “Report with advice for the European Commission” (9 January 2019): 7 // <https://eba.europa.eu/documents/10180/2545547/EBA+Report+on+crypto+assets.pdf>.

investment tokens⁶⁸ by securities and investment regulation, and utility tokens⁶⁹ by consumer and general contract law norms. Whether the application or development of regulation in these domains is applicable to the named tokens is completed in a convergent and universal way is a relevant question for each jurisdiction. The aforementioned tokens might not fit under the existing regulatory regimes and, hence, the regimes must be either adjusted or applied considering the differences resulting from the use of the technology; however, developing new regulation is time- and resource-consuming.

2. LOOKING FOR SOLUTIONS

In this section, solutions to the problems identified in the previous sections are explored and presented on the basis of theory on the topic of functional equivalence by noted scholars Chris Reed, Bert-Jaap Koops, Laura Tielemans, Mireille Hildebrandt and also by law practitioners Andreas Furrer and Luka Müller.

2.1. FUNCTIONAL EQUIVALENCE AS A SUBSTANTIVE GUIDELINE

Although EU law has been guided by the functional equivalence approach, which promotes equal treatment of the new with the old, according to Reed the approach should not be taken without regard to the principle of technology-neutrality.⁷⁰ While functional equivalence guides the regulator in relation to the principles of law that should apply to the new behavior, technology-neutrality guides as to “the choice between the available substantive rules which could be used to implement those legal principles.”⁷¹

Reed confirms that the courts are often asked to choose “between categorisation of ISPs as mere telecommunications carriers or as publishers, and websites as new sources of cable programming services.”⁷² He agrees that as soon as bandwidth appeared these categories converged and the application of the correct category of regulation domain is difficult because of these regulatory silos mentioned by Savin. The separate treatment of these silos and layers resulted in a discriminatory effect due to exactly the unfit categorization of the use case of the

⁶⁸ Typically provide rights (e.g. in the form of ownership rights and/or entitlements similar to dividends). For example, in the context of capital raising, asset tokens may be issued in the context of an ICO which allows businesses to raise capital for their projects by issuing digital tokens in exchange for fiat money or other crypto-assets (*ibid.*).

⁶⁹ European Banking Authority (EBA) has in early 2019 defined utility tokens as follows: “Typically enable access to a specific product or service often provided using a DLT platform but are not accepted as a means of payment for other products or services. For example, in the context of cloud services, a token may be issued to facilitate access” (*ibid.*).

⁷⁰ Chris Reed, *supra* note 17: 249.

⁷¹ *Ibid.*

⁷² *Ibid.*: 267.

new emerging technology, as lines between e-commerce separation from media and telecoms have been blurred for quite some time due to Internet usage in both of these sectors. This is where the principle of technology-neutrality should be of assistance, as the regulator should not only apply the equivalence principle in the respective silos, but allow the regulator to pick and choose the substantive rules from different silos after the respective analysis of the new technology and reality has been completed. It is possible to cross the silos barrier by using the technology-neutrality principle; if a solution is not e-commerce, telecom, or media in their strict sense, then it could be all or some of these at the same time. This could quite possibly not be a solution in reality as these regulations might be in conflict with one another, but it is possible for the court to analyse, examine and argue that these rules should be mixed and applied at the same time exactly because of these principles.

Reed explains that the functional equivalence includes the equivalence of *application* and the equivalence of *outcome* - the first means that the "obligations imposed on the subject of the rules should be equivalent in burden"⁷³ and the latter means that the legal implications on validity of the outcome should be equivalent (such as on the handwritten signature and the qualified electronic signature). On the basis of the overviews provided on the articles by Harvey and Savin it seems the regulator and the courts often focus on the equivalence of application and not the outcome. The focus is much more on sharing the burden of compliance and liability with the disruptors than sharing the validity, acceptance in form, privileges, tax deductions, exemptions, etc. However, one should not forget about the equivalence of outcome as otherwise the competitive advantage is embedded on the old technology and the new just endures the burden.

Consequently, Reed suggests on the basis of the technology-neutrality principle an alternative usage of the functional equivalence principle, stating that the principle should act "as a substantive guideline for the application of existing law and the creation of new law" and seeks "to achieve functionally equivalent treatment [outcome]".⁷⁴ This may sound like we are back to theory and it is exactly what the courts and regulators have been doing and have not succeeded in (as Harvey and Savin have portrayed earlier). In the legal practise the judge has to be able to categorize as otherwise it is very difficult to apply the law. The solution that it is one category of objects with elements of another category of objects does not guide the court as to how to apply the legal norms that exist for both categories. This means that the application of law becomes less certain, arbitrary and

⁷³ *Ibid.*: 245.

⁷⁴ *Ibid.*: 248-273.

subjective. Plus, in continental European jurisdictions creating new law with every ruling, like in precedent law, is not part of the legal tradition.

As a solution Reed suggests the approach that “the legislative solution must necessarily concentrate on the characteristics which are required to achieve [a] legal consequence.”⁷⁵ However, the regulation built in such a manner could also only be “potentially neutral” as when the regulation is built some technologies already possess these characteristics and although the regulation does not prevent other technologies to be modified to also meet these characteristics, it will “inevitably favour technologies which do not need such modification.”⁷⁶ Furthermore, according to Reed, the laws become outdated and discriminatory of innovation typically not due to the technology being described in a manner that is too specific and detailed, but rather by changes in the “underlying business models for use of these technologies.”⁷⁷ This means that the characteristics chosen for description as a legislative solution might also become meaningless in the new business model context.

In summary, the fact that there is convergence of technologies, abrupt changes in business models and disruption in the sectors regulated in silos has caused the regulators to seek for new alternative legislative design solutions like the one introduced in the following section by Hildebrandt and Tielemans to the problems raised by Savin and Harvey above.

2.2. FUNCTIONAL EQUIVALENCE AS A LEGAL DESIGN METHOD

Hildebrandt and Tielemans provide a solution to the concerns raised above through a method used in the General Data Protection Regulation⁷⁸ (GDPR). Hildebrandt and Tielemans claim that the only way to achieve sustainability in laws in this fast-evolving society – with functional equivalence approach intact and no discrimination against the innovators and disruptors – is not to describe even the characteristics (recommended by Reed), but to let the law describe the interests that need to be protected. The interests mean: the purpose and the aim of such protection. This would allow the market to come up with the design models for this protection of these interests. Hildebrandt and Tielemans say that in GDPR exactly this logic was used by constructing an entirely open-ended solution called “privacy

⁷⁵ Chris Reed, “Taking Sides on Technology Neutrality,” *SCRIPT-ed* Volume 4, Issue 3 (September 2007): 268 // DOI: 10.2966/scrip.040307.263.

⁷⁶ *Ibid.*

⁷⁷ *Ibid.*: 276.

⁷⁸ *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)*, OJ L 119, 4.5.2016, p. 1–88

by design". This approach supports in its core technology-neutrality and functional equivalence, since it does not dictate a particular solution or standard, but merely requires the data processor to design the system in a way to achieve the objectives of the Regulation.⁷⁹ To apply this method the regulator established "a general requirement stipulating that at the level of the technical design data protection obligations must be met, if technically and economically feasible."⁸⁰ According to Hildebrandt and Tielemans this also incentivizes the disruptors to advance technological innovation in the direction of the interest that the regulation aims to protect with built-in data protection. The only risk with this approach to GDPR is that, upon applying this, the courts might still be baffled by the technology and it would be the responsibility of trustworthy technical experts to validate and certify technical systems to be able to attest to these technically achieving these stated aims and protecting the interests.

Koops describes this as the notion that the regulator should care more about the effects and not the means how. Koops brings the example of the Dutch regulator supporting this approach who in drafting the Computer Crime Act "tried to abstract as much as possible away from the current state of the art in technology and instead to connect to the societal function of the new technical possibilities".⁸¹

This approach of creating more abstract norms and allowing the market to comply and explain is a reasonable approach also because in the digital era society changes at a much higher pace; hence, the laws are not able to catch up as the "law-making processes are still largely the same as they were in the pre-ICT era".⁸² This means that either the law-making process must change or the law itself must be more fluid, flexible, abstract, and dynamic.

⁷⁹ Recital 78 and Article 25 clearly leave it to the data processor to design an effective system of protection. Article 25 states:

"1. Taking into account the state of the art, the cost of implementation and the nature, scope, context and purposes of processing as well as the risks of varying likelihood and severity for rights and freedoms of natural persons posed by the processing, the controller shall, both at the time of the determination of the means for processing and at the time of the processing itself, implement appropriate technical and organisational measures, such as pseudonymisation, which are designed to implement data-protection principles, such as data minimisation, in an effective manner and to integrate the necessary safeguards into the processing in order to meet the requirements of this Regulation and protect the rights of data subjects.

2. The controller shall implement appropriate technical and organisational measures for ensuring that, by default, only personal data which are necessary for each specific purpose of the processing are processed. That obligation applies to the amount of personal data collected, the extent of their processing, the period of their storage and their accessibility. In particular, such measures shall ensure that by default personal data are not made accessible without the individual's intervention to an indefinite number of natural persons.

3. An approved certification mechanism pursuant to Article 42 may be used as an element to demonstrate compliance with the requirements set out in paragraphs 1 and 2 of this Article."

⁸⁰ Mireille Hildebrandt and Laura Tielemans, "Data protection by design and technology neutral law," *Computer Law & Security Review* Vol. 29 (2013): 516 // https://www.academia.edu/20491832/Data_protection_by_design_and_technology_neutral_law.

⁸¹ Bert-Jaap Koops, *supra* note 2.

⁸² *Ibid.*: 11.

Furthermore, this legislative method is supported by Koops also because of his claim that the legal framework should promote certain substantive principles (fundamental values⁸³ and rights) at stake “rather than put all effort into creating specific regulations for specific problems.”⁸⁴ In addition to embracing substantive principles, as stated by Koops, the regulator should also interpret the existing laws (even if technology-specific) in a “functional, teleological way.”⁸⁵ More often than not this would be a way towards allowing the design of a technical solution or business model to differ from the technology-specific regulation in case the fundamental values the regulation protects or aims to attain can be achieved also by the novel technical design.

In support of the above, Philipp Hacker and others have recommended (in line with the above indicated) that the regulator should use more diverse forms of regulation than only application of i) “hard” law, ii) risk-based approach, or iii) command-and-control. An example of an additional form of regulation is a method of open-ended regulation – influencing and motivating the developers of the technology to develop in line with the values protected by the regulation promoting and rewarding compliance. This form of regulation Hacker et al. call “regulation by design”.⁸⁶

It is important to identify the interests that the existing rule aims to protect. Then, the new technical or business solution needs to be analysed to establish whether the same interests are at risk at all or in an effort of the developers or business solution designers of the design these interests have already been protected. On the basis of the offline-online functional equivalence example, Reed has stated that upon application or revision of any existing rules “the lawmaker also needs to consider the *utility* of the online solution” and “if the revised rule makes the online activity more onerous or less effective than its offline counterpart the new rule will not achieve full functional equivalence.”⁸⁷ This in essence means that there needs to be analysis of the utility and whether the interests protected with existing regulation are at all at risk upon the use of the new technological solution before any rule can be applied to create equivalence of application. In a way all of these solutions still lead to a law reform, the end result of which is that the law needs to be more abstract, less specific as to the means how, but more focused on

⁸³ The same was indicated by the Commission communication of 2016 as one of the principles to develop the legal framework for online platforms (European Commission, “Online Platforms, and the Digital Single Market,” Communication, 25.5.2016 COM(2016) 288 final, p. 5 // <https://ec.europa.eu/transparency/regdoc/rep/1/2016/EN/1-2016-288-EN-F1-1.PDF>).

⁸⁴ Bert-Jaap Koops, *supra* note 2: 25.

⁸⁵ *Ibid.*

⁸⁶ Philipp Hacker, Ioannis Lianos, Georgios Dimitropoulos, and Stefan Eich, *supra* note 3: 2.

⁸⁷ Chris Reed, *supra* note 17: 270.

what interests need protection and whether these interests are at risk in the new solution.

2.3. ALTERNATIVE EQUIVALENCE SOLUTION

In another recent article, Andreas Furrer⁸⁸ and Luka Müller⁸⁹ have developed the functional equivalence principle further on the basis of examples from transport law.⁹⁰ They discuss the principles in relation to blockchain and distributed ledger technology use cases. According to them, this principle is especially relevant in the context of initial coin offering (ICO)⁹¹ and blockchain-based smart contracts,⁹² as these concepts are innovating the domains of securities law and contract law. However, these authors seem to have a somewhat different understanding of the meaning of functional equivalence from Savin and Harvey.

According to Furrer and Müller, the functional equivalence principle means that:

- (i) The aim of the substantive and formal requirements set in the law for the validity of a transaction or existence of a legal institution must be analysed;
- (ii) The functioning of the digital system claiming to achieve the same aims must be analysed;
- (iii) In case the aims can be achieved by using the digital system, the substantive and formal requirements can be waived for the digital system's

⁸⁸ Prof. Dr. Andreas Furrer is an attorney at MME law firm in Switzerland. He is a part-time professor of comparative, private international and European law at the University of Lucerne; available at: https://www.mme.ch/en/team/andreas_furrer/.

⁸⁹ Dr. Luka Müller-Studer is an attorney at MME law firm. He works with companies in the technology and financial sectors which focus on blockchain technology; available at: https://www.mme.ch/en/team/luka_mueller/.

⁹⁰ Andreas Furrer and Luka Müller, "Functional equivalence" of digital legal transactions A fundamental principle for assessing the legal validity of legal institutions and legal transactions under Swiss law," *Jusletter* (18 June 2018): 15 // https://www.mme.ch/fileadmin/files/documents/MME_Compact/2018/180619_Funktionale_AEquivalenz.pdf.

⁹¹ For the benefit of this article ICO will also include ETO and STO. According to ESMA ICO means "effectively allow businesses to raise capital for their projects, by issuing digital tokens in exchange for fiat currencies or other crypto-assets, e.g., Bitcoin or Ether. ICOs are typically promoted on the web and social media to potential investors using so-called 'white papers'," which usually provide either technical, or technical and economic description of the project the capital is raised for" (ESMA, *supra* note 5: 11). ETO or "Equity Token Offering" is a non-legal term and in the community means an issue of tokens "function as a traditional stock asset. They represent ownership of some third-party asset or venture and take their value from that property's success or failure." "Security Token Offering" or "STO" means an issue of tokens that "function as a traditional security asset. They represent a stake in the wealth created by a third party and take their value from that party's success or failure. Distinct from an equity token in that no ownership of the underlying venture is created" (Eric Reed, "Equity Tokens vs. Security Tokens: What's the Difference?" *Bitcoin Market Journal* (February 13, 2019) // <https://www.bitcoinmarketjournal.com/equity-token/>).

⁹² According to ESMA "smart contracts are self-executing pieces of code that replicate a given contract's terms. They effectively translate complex contractual terms, e.g., payment terms and conditions, into computational material to automate the execution of contractual obligations. Smart contracts may be used to provide specific guarantees, e.g., for Initial Coin Offerings (ICOs) the guarantee that the funds will be returned to the investor in case the ICO does not reach the minimum subscription target" (ESMA *supra* note 5: 11).

functions as there is no need for the substantive and formal requirements as the aims of these requirements are achieved through the functioning of the system.

This means that if the requirements set for some outcome is to be achieved, it can be achieved through a different process than by accepting the new process, and then the equivalence of outcome – the aim promoted by Reed – is fulfilled. The interpretation by Furrer and Müller in essence results in functional equivalence in the sense that the functions required by the law to regard transaction valid or legal institution existing can be replaced by other means (such as those performed by a digital system e.g. programme, network or an infrastructure) that are functionally equivalent.⁹³

It seems that the burden in this solution is again on the courts to analyse and examine, which on the basis of the overview provided by Harvey we identified the courts have trouble with. As in the previous section we can also here conclude that the solution requires the assistance of technical experts who examine the digital system. Yet, the judge is required to understand the aims of the requirements of the legal norms – the interests the regulation protects. In case the judge is unable to retrace the aim of the regulation, the regulation has failed to be transparent as to its purpose, aims, and the interests it protects. The courts need to accept that they need to analyse these digital systems much in the same way as biological evidence is analysed for a DNA match - send it to a lab of experts who verify its functioning and the judge needs to compare the aims of the requirements to the functioning analysis to make sure the functions of the system are functionally equivalent. In case the regulator considers such burden on the courts to be too excessive, the regulator could consider establishing an alternative certification procedure for the functions of these digital systems or the market itself could set-up private certification bodies where the disruptors can certify their products, systems, applications, algorithms, and which the regulators could recognize in order for the disruptors to enjoy the benefit of the functional equivalence principle without burdening the court system.

The solution suggested by Furrer and Müller does not require activity only from the courts in applying the functional equivalence principle. Rather, the authors foresee the application of this principle as a working solution only if the legal norms are also amended, but not in such a substantial overhaul as required by the legal design approach portrayed in section 2.2. Instead this solution would merely

⁹³ Andreas Furrer and Luka Müller have suggested the existence and recognition of the principle of functional equivalence as a general legal principle. The referred authors explain the principle as follows: "Insofar as ... law attaches the validity of legal transactions or the existence of a legal institution to substantive or formal requirements, these requirements shall be deemed to be fulfilled if a digital system can functionally replace the legal protection concerns behind these requirements on an equivalent basis" (Andreas Furrer and Luka Müller, *supra* note 90: 4).

require adding a general clause about the recognition of the principle of functional equivalence and that any process that can achieve the same outcome in a functionally equivalent way should also be recognized having functionally equivalent outcome (burden effect and liability).

However, as the principle of functional equivalence should be recognized as a principle of law also without any amendment in the law, it is questionable whether any regulatory amendment is necessary. Furthermore, it is unclear whether Furrer and Müller foresee that this amendment of law needs to be introduced in relation to any particular process described through substantive and formal requirements in regulation. If so, then such setup is not necessary; the general principle as such should be applied in any case by the regulator and the courts.

If and when innovative digital systems disrupt the status quo reality, the regulator and court should assess the systems functions and compare these functions with the purpose and aim of the substantive and formal requirements stated in the applicable law. As a result of such comparison the regulator and court should evaluate if the aim and purpose of the function stated in the substantive or formal requirement can be achieved by the functionalities of the digital system in an equivalent manner and consider if the transaction or legal institution affected by such a system should be regarded as functionally equivalent and recognized equally.

The benefit of the principle understood in this way according to the authors is exactly the aim of the technology-neutrality principle: to prevent “the legal system from continuing to lag behind the *de facto* technical development and thus behind actual practice”⁹⁴ “without endangering the legal protection functions guaranteed by classical law.”⁹⁵ Considering that law lags behind innovative technology applications and adoption of new business models, by recognizing the functional equivalence principle in the way explained by the authors, the regulator avoids “a deterioration of legal transactions via digital instruments and optimally implements the principle of contractual freedom.”⁹⁶

CONCLUSIONS

Although according to Harvey the courts have difficulties applying the functional equivalence principle; this can be solved by the inclusion of technical experts in the analysis of the technical setup and the functions of the digital systems used. The market actors themselves can assist in sharing know-how about

⁹⁴ *Ibid.*

⁹⁵ *Ibid.*

⁹⁶ *Ibid.*

the technical solution through technical descriptions, whitepapers, solution descriptions and market analysis in comparing the innovative systems (such as smart contracts) to existing solutions (electronic form and electronic signatures). The market actors, analytics service providers, and certification bodies can issue technical analysis guidelines for the use in court proceedings or in the certification process.

On the basis of the research by Savin, the regulator is using the functional equivalence in a very restricted sense and creating legal frameworks in silos by not sufficiently examining the innovative business models, applications, and solutions. This leads to the developed regulation being unadapted to the reality of the market and innovative disruptors being forced to comply with rules developed for the business models of the past. Therefore, the regulator should consider a law reform much in the lines as described by Hildebrandt and Tielemans on the basis of a law design method - stipulating merely the interests that need to be protected but not indicating the means, methods, and processes of how it needs to be done similarly to "privacy by design" regulation under GDPR.

Similar concerns are relevant in cryptoeconomics, as the challenges posed by cryptocurrencies and tokens are addressed by different legal domains of payment services regulation, securities and investment regulation, consumer and general contract law norms. Courts lack experience and knowledge for dealing with these new digital systems of cryptoeconomics. Yet, these systems should not be merely forced under *ex ante* rules or dismissed as not being exactly the same as past existing digital systems. Examination, analysis, and comparison of these systems needs to be undertaken by market supervision bodies, courts, or regulators themselves in order to apply the functional equivalence principle not merely to invoke liability on the actors participating in cryptoeconomics but also for participants, these systems, and its outputs - such as cryptocurrencies and tokens - so as to enjoy the same benefits, privileges, and exemptions as an equivalent outcome with outputs of past technology used for the same purpose.

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