

BLOCKCHAIN, DISINTERMEDIATION AND THE FUTURE OF THE LEGAL PROFESSIONS

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ABSTRACT

Will the 2020s herald the death warrant of the legal professions? If we listen to blockchain technology's most devout advocates, the answer is a resounding yes. Blockchain is often proclaimed as the ultimate tool for allowing unrestrained exchanges between contracting parties with no preexisting relationships, thus suppressing the need for intermediaries. In other words, blockchain could be a "trust machine,"³ which could open up the possibility of conducting transactions in full confidence, without the risk of non-performance or misguidance. However, it is utopian idealism to assume that blockchain technology could enable pure and total disintermediation. All trusted third parties cannot disappear in one fell swoop - especially legal professions. This Article problematizes blockchain's apparent objective of disintermediation and argues that, in reality, blockchain leads to a form of reintermediation. Of course, the role of the legal professions, vis-à-vis blockchain technology's advances, is inextricably linked to the impact of law and regulation in blockchain. While advocates have detailed the diminishing role of law and regulation in the application of blockchain technology, we adopt a comparison of the French and the American jurisdictions response to blockchain technology, to

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³ *The Trust Machine. The Technology Behind Bitcoin Could Change the Economy Works*, THE ECONOMIST (Oct. 31, 2015), <https://www.economist.com/leaders/2015/10/31/the-trust-machine>.

demonstrate that, in fact, the law cannot be extricated from blockchain's advance. This Article explores a new angle on blockchain's place in the legal professions and offers new perspectives for lawyers to anticipate a future defined by "known unknowns," and the "unknown unknowns" of blockchain technology.⁴

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⁴ *Id.*

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I. INTRODUCTION

For lawyers, blockchain is a relatively new technology that raises many issues about the future of legal professions.⁵ These concerns often stem from a lack of technological understanding. Broadly speaking, blockchain technology is a decentralized database, structured as a chain of blocks of information, where each block is linked to the others by a means of cryptographic function, intended to make the storage of data immutable.⁶ More generally, the term refers by proxy to the entire distributed network and its operating protocol.⁷ The first blockchain

⁵ For the purpose of this Article, we refer to the plural form of “legal professions” to stress the diversity of roles that exist within the legal profession (lawyer, notary, clerk, *inter alia*) in addition to the diversity of skills required of all these respective professions.

⁶ Olivier Hari & Ulysse Pasquier, *Blockchain and Distributed Ledger Technology (DLT): Academic Overview of the Technical and Legal Framework and Challenges for Lawyers*, 5 INT’L BUSINESS L. J. 423, 424 (2018); James Grimmelmann, *All Smart Contract Are Ambiguous*, 2 J. OF L. & INNOVATION 1, 6 (2019); see generally Aaron Wright & Primavera de Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia*, 2 (Mar. 10, 2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2580664; Kevin Werbach & Nicolas Cornell, *Contracts Ex Machina*, 67 DUKE L.J. 313, 326-27 (2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2936294.

⁷ *Les Impacts des Réseaux distribués et de la Technologie Blockchain dans les Activités de Marché [Impacts of Distributed Networks and Blockchain Technology in Market Activities]*, PARIS EUROPLACE (Oct. 26, 2017), https://www.paris-europlace.com/sites/default/files/public/paris_europlace_-_livre_blanc_blockchain_-_26_octobre_2017.pdf [hereinafter THE PARIS EUROPLACE REPORT].

was launched in January 2009, after the 2008 publication of a white paper signed by Satoshi Nakamoto.⁸ Nakamoto designed this first blockchain as the medium for the launch of a virtual currency.⁹ “Bitcoin” was born, and with it, the first blockchain. Bitcoin became the first virtual currency (hereinafter, cryptocurrency) not relying on any underlying physical assets. It is autonomous, decentralized, and managed by members of the Bitcoin community. Its functions are determined by mathematical algorithms that have stipulated the modalities of an asset’s creation and transfer, and the rules of consensus that underlie all of these transactions.¹⁰

Blockchain technology is considered to have three essential characteristics. First, it is a transparent technology, meaning each user can consult all of the transactions entered on the blockchain since its creation, therein forming a ledger. Second, this technology is secure. It relies on a cryptographic technique of asymmetric keys, only allowing the use of pseudonyms (a public key) for transactions that are then signed electronically (a private key).¹¹ It also carries out a verification process before a transaction is immutably recorded on to the blockchain. Lastly, blockchain is a decentralized technology that works without any control mechanism. It is a peer-to-peer system, in which each user has a copy of this decentralized ledger on his or her own computer.¹² Each new block of transaction is validated by network users and available to everyone on that network.¹³ Thus, trust is built on technology. Thanks to the ledger’s transparency and the immutability

⁸ Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, NAKAMOTO INSTITUTE (Oct. 31, 2008), <https://nakamotoinstitute.org/bitcoin/>.

⁹ Possibly an alias for several individuals. The identity of the person or persons hiding behind Satoshi Nakamoto remains unknown to this day.

¹⁰ Nakamoto, *supra* note 8; *see generally* Werbach & Cornell, *supra* note 6.

¹¹ Transactions recorded on a public blockchain are pseudonymous in that they are linked to the public addresses of the initiator and the recipient. In other words, it is not possible to directly identify the parties to the transaction, but certain elements allow a connection to be made. Blockchain technology is therefore not anonymous but pseudonymous. *See generally* W. Diffie & M. Hellman, *New directions in cryptography*, 22 IEEE TRANSACTIONS ON INFORMATION THEORY 644-654 (1976); R.L. Rivest, A. Shamir & L. Adleman, *A Method for Obtaining Digital Signatures and Public-Key Cryptosystems*, 21 ASSOCIATION FOR COMPUTING MACHINERY 120-26 (1978); THE PARIS EUROPLACE REPORT, *supra* note 7, at 17-18; Aurélie Bayle et al., *Smart contracts: étude de cas et réflexion juridique [Smart Contracts: case study and legal reflections]*, ECAN 36, <https://ecan.fr/Smart-Contracts-Etudes.pdf>.

¹² Werbach & Cornell, *supra* note 6, at 325.

¹³ *Id.* at 326-327.

of the transactions, users reasonably have faith in the reliability and validity of the information contained therein.

Blockchain technology's use cases are numerous and already widely used for fundraising, purchasing, and exchanging cryptocurrencies. However, additional applications already exist or have been envisioned to further broaden the scope of use for cryptocurrencies. These applications can be grouped into three separate categories: digital asset transfers, registries, and smart contracts. The first prong is the most obvious. Blockchain makes it possible to transfer securities, stocks, bonds, votes, cryptocurrency—any asset that can be digitally represented—almost instantaneously.¹⁴ The technology allows users to verify that the initiator of the transaction, is really the holder of the asset being transferred. This ensures that the initiator has not already transferred the asset to someone else, avoiding double spending.¹⁵

Blockchain is also well-known for its registry functions. As previously explained, blockchain is a distributed, encrypted, and secured searchable ledger. Accordingly, blockchains are used for limitless possibilities of registries: land titles, transcripts and certifications, taxes, medical records, civil records, patents and other intellectual property titles, supply chains, and possibly campaign finance.¹⁶

¹⁴ See, e.g., Grimmelman, *supra* note 6, at 7; see generally Aaron Wright & Primavera de Filippi, *supra* note 6, at 2.

¹⁵ Double spending is a potential flaw in a digital cash scheme, in which the same single digital token can be spent more than once. Contrary to physical currency, a digital currency consists of a digital file that can be duplicated or falsified. *Id.* However, assets lose their value if they are duplicated. By contrast, such flaws do not exist within the exchange of information, which does not lose its inherent (informative) value while it is transferred and replicated *via* the Internet. See Clément Jeanneau, *L'âge du web décentralisé [The Age of the Decentralized Web]*, DIGITAL NEW DEAL FOUND. 1, 12-13 (2018) (“The Internet has made it possible to decentralize information. With the Internet, any individual has been able to seize an unprecedented power: to publish and exchange the information he or she wants, instantaneously, to the whole world, without having to ask permission. The blockchain makes it possible to decentralize value. With the blockchain, each individual seizes a new power: to create and exchange value (...) without requiring the permission of any third party.”) (Fr.); see also S. Nakamoto is considered to have solved the double spending problem with the Bitcoin blockchain; see also Nakamoto, *supra* note 8.

¹⁶ See Aaron Wright & Primavera de Filippi, *supra* note 6, at 8; Werbach & Cornell, *supra* note 6, at 326; see also *European Parliament resolution of 3 October 2018 on distributed ledger technologies and blockchains: building trust with disintermediation*, EUROPEAN PARLIAMENT (Oct. 3, 2018), https://www.europarl.europa.eu/doceo/document/TA-8-2018-0373_EN.html.

Finally, blockchain technology can also be applied to implement smart contracts. Smart contracts are not legal contracts *per se*.¹⁷ A smart contract is an autonomous computer program or protocol that automatically executes a contract's terms according to an "if . . . then . . ." protocol: *if* these conditions are fulfilled, *then* that outcome will automatically occur.¹⁸ Smart contracts are self-governing and self-performing, rendering trust in another contracting party unnecessary.¹⁹ They can be applied to perform automatic payments in copyright royalties, govern car rentals, or ensure automatic penalties for non-payment in leases.²⁰ They can also trigger the order of new products at the precise time that inventory is sold. For example, insurance companies could automatically indemnify policyholders through index-based insurance.²¹ One could therefore imagine smart contract terms where, for example, after thirty consecutive days of drought, an insured individual could be automatically compensated, without filing a claim or going through an expert. The possibilities brought forth by smart contracts seem limitless.

However, these aforementioned applications raise many legal issues. Questions range from the identification of anonymous participants in blockchains,²² to the choice of applicable law. Discourse around blockchain technology has largely focused on the need for regulation and policymaking in this new autonomous, and almost

¹⁷ See Aurélie Bayle et al., *supra* note 11, at 6-7; see also Grimmelmann, *supra* note 6, at 2.

¹⁸ Werbach & Cornell, *supra* note 6, at 334; Max Raskin, *The Law and Legality of Smart Contracts*, 1 GEO. L. TECH. 304, 312 (2017) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2959166.

¹⁹ Werbach & Cornell, *supra* note 6, at 329; Grimmelmann, *supra* note 6, at 7; Raskin, *supra* note 18, at 316.

²⁰ At a fairly early stage, Nick Szabo envisaged the use of smart contracts to control vehicle finance leases. The idea is that the protocol gives control of the car to its owner. The car could then be rendered unusable if someone other than the owner tries to start the car. The smart contract could also be programmed to prevent the car from starting and give control of the car back to the creditor. For example if the debtor of the lease is no longer able to pay the monthly payments due. See Nick Szabo, *Formalizing and Securing Relationships on Public Networks*, FIRST MONDAY (Sept. 1, 1997), <https://firstmonday.org/ojs/index.php/fm/article/download/548/469>.

²¹ Alan Cohn, Travis West, & Chelsea Parker, *Smart After All: Blockchain, Smart Contracts, Parametric Insurance, and Smart Energy Grids*, 1 GEO. L. TECH. 273, 293 (2017).

²² See W. Diffie & M. Hellman, *supra* note 11.

independent space, formed outside any centralized authority.²³ Beyond this, however, questions arise as to whether the legal professions are at risk of being overtaken and suppressed by blockchains.²⁴ What place should be given to the law and the legal professions *vis-à-vis* blockchain? Could this vector of disintermediation and this new tool for trust and certification change the practice of law and transform the legal professions?

A prerequisite for this Article is to distinguish between the utopian idealism of this technology and its actual application and effects. Hence, Part II analyzes how “disintermediation” is often presented as blockchain technology’s key feature, apparently providing a credible alternative to the nation state’s core function and eliminating the need for trusted third parties.²⁵ We argue that although blockchain amounts to a form of deinstitutionalization, there is not a total disintermediation. On the contrary, we claim that blockchain operates a reintermediation, as there will always be a link to the physical world and thus, the need for a middleman.

Part III problematizes framing blockchain as a completely autonomous ecosystem, where computer code would replace the law and, more broadly, be beyond the scope of the law. A comparison between French and American legal systems allows us to conclude that blockchain cannot exist outside the law.

Part IV studies the role of the legal professions, which are, by essence, trusted third parties. The legal market cannot remain indifferent to blockchain technology, as it will be affected by its actual and potential applications. We address the shift in the legal professions and the legal market that could be initiated with the omnipresence of blockchain.

Part V concludes on what tomorrow’s lawyers might elect to become within the blockchain era.

²³ See Raskin, *supra* note 17, at 308; Werbach & Cornell, *supra* note 6, at 329, 332; see also Grimmelmann, *supra* note 6, at 7.

²⁴ See Pierre Gueydier et al., *Blockchain, au défi de la confiance*, OPTIC 20 (Jan. 22, 2018), <http://www.optictechnology.org/images/files/Research/OPTIC2017-Blockchain-au-dfi-de-la-confiance.pdf> (Fr.), [hereinafter THE OPTIC REPORT]. See also Matt Byrne, *Do Lawyers Have a Future?* THE LAWYER (Sept. 20, 2016), <https://www.thelawyer.com/issues/online-september-2016/do-lawyers-have-a-future-2>.

²⁵ THE OPTIC REPORT, *supra* note 24, at 20; Werbach & Cornell, *supra* note 6, at 325.

II. BLOCKCHAIN AND DISINTERMEDIATION: FROM UTOPIA TO REALITY

Blockchain technology is intended to substitute the need for a trusted third party.²⁶ Because of the transparency and reliability provided by blockchain, as well as its tamper-proof mechanism, people who do not trust each other are able to conduct transactions without the risk of being misled. Trust resides in the technology. However, it is necessary to first determine the scope of blockchain's apparent disintermediating applications: if blockchain's devout advocates claim disintermediation as blockchain's total and ultimate purpose, we note that the use of blockchain protocols also have the hidden effect of creating a form of "reintermediation."

A. *Disintermediation: Blockchain's Apparent Objective*

Disintermediation is a fairly novel term, originating in the 1960s to explain various changes in the financial services industry.²⁷ It can be defined as the economic phenomenon heralded by the emergence of the Internet and online platforms, resulting in the reduction, or even elimination of intermediaries in a supply chain.²⁸ Now, in the digital world and particularly in the blockchain ecosystem, we believe that the term "disintermediation" refers both to the substitution of traditional institutional intermediaries for platforms, as well as the elimination of any intermediary.

1. *From Bitcoin's Genesis to the Rejection of Intermediaries*

Bitcoin's ideological roots can be traced back to the libertarian "cypherpunk" communities of the 1990s.²⁹ The cypherpunks brought together mathematicians, cryptographers, computer scientists, and

²⁶ In the common sense, a trusted, third-party acts as an impartial and disinterested intermediary to an agreement or transaction, such as a bank, notary, or lawyer.

²⁷ Robert Gellman, *Disintermediation and the Internet*, 13 GOV'T INFO. Q. 1, 2 (1996).

²⁸ ÉTUDE ANNUELLE DU CONSEIL D'ÉTAT, *Puissance publique et plateformes numérique: accompagner l' « ubérisation »* [Annual Study 2017 From the Council of State, Public Power and Digital Platforms: Accompanying the Uberization of the Economy], 26 (July 13, 2017).

²⁹ See Timothy May, *The Crypto Anarchist Manifesto* (Nov. 22, 1992), <https://activism.net/cypherpunk/crypto-anarchy.html> (unpublished manuscript) (May, one of the main contributors to the cypherpunk movement, published the first text related to cypherpunks in 1992, entitled *The Crypto Anarchist Manifesto*).

hackers, to advocate for the protection of privacy through the use of cryptography.³⁰ Their goal was to dispel with the growing risks of intrusion by the state or by private companies into the lives of individuals.³¹ These groups suggested using cryptographic methods to guarantee privacy by encrypting correspondences. They imagined the possibility of self-managed and self-organized social relations,³² outside the confines of state surveillance, and without the involvement of third parties, especially central authorities, as a progression toward collective trust.³³

The libertarian and anarchist influences are palpable in many of blockchain's applications. In this context, blockchain technology comes as a "*cure for the irremediable tendency of states and banks to corrupt and opens a possible path . . . [for] individuals to manage themselves.*"³⁴ Blockchain purports to ensure two heretofore conflicting promises: on one hand to prevent fraud, and on the other hand, to free users from the need to use the services of any state or banking authorities.³⁵ For example, the promoters and users of blockchain protocols intended to transfer assets without a bank, certify documents without a notary public, contract without recourse to a lawyer, resolve disputes without a judge, and bet without a sports game organizer: disintermediation is the overall goal sought by blockchain.

³⁰ Nathaniel Popper, *Decoding the Enigma of Satoshi Nakamoto and the Birth of Bitcoin*, N.Y. TIMES (May 15, 2015), <https://www.nytimes.com/2015/05/17/business/decoding-the-enigma-of-satoshi-nakamoto-and-the-birth-of-bitcoin.html>; see also Timothy May, *Crypto Anarchy and Virtual Communities*, SATOSHI NAKAMOTO INSTITUTE (Dec. 1994), <https://nakamotoinstitute.org/virtual-communities/>.

³¹ See Popper, *supra* note 30; see also Yorick de Mombynes, *Anarchie, cypherpunk et liberté: les racines philosophiques du bitcoin [Anarchy, cypherpunk and freedom: the philosophical roots of bitcoin]*, CONTREPOINTS (Mar. 17, 2018), <https://www.contrepoints.org/2018/03/17/311911-anarchie-cypherpunk-et-liberte-les-racines-philosophiques-du-bitcoin>.

³² See John Perry Barlow, *A Declaration of the Independence of Cyberspace*, ELECTRONIC FRONTIER FOUND (Feb. 8, 1996), <https://www.eff.org/cyberspace-independence> ("Governments of the Industrial World, you weary giants of flesh and steel, I come from Cyberspace, the new home of Mind. On behalf of the future, I ask you of the past to leave us alone. You are not welcome among us. You have no sovereignty where we gather. We are forming our own Social Contract. This governance will arise according to the conditions of our world, not yours. Our world is different.")

³³ THE OPTIC REPORT, *supra* note 24.

³⁴ *Id.* at 16 (emphasis added).

³⁵ *Id.*

When the first blockchain transaction was recorded on Bitcoin on January 3, 2009, the virtual currency was framed as a libertarian response to the mistrust of banks and the government instigated by the 2007 financial crisis.³⁶ As acknowledged in the Optic Report,³⁷ Bitcoin essentially casts itself ideologically as the technical achievement of the neoliberal project to end the nation-state's monopoly over society. Its decentralized and self-managed nature was fueled by the libertarian dream to abolish political and governmental control of trade—an alleged cause of social injustice—in addition to resolving the consequences resulting from anti-democratic agreements between capital and power.³⁸ The introduction of Bitcoin enabled its users to trade in full confidence, without the need to rely on a regulatory authority.

2. *The Myth of Disintermediation*

By definition, the Bitcoin protocol presented the idea that there exists no need for any trusted third party, any regulatory authority, or any centralized institution: “*A purely peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution.*”³⁹ The primary idea was to eliminate any need for intermediation. By using the Bitcoin blockchain, asset transfers are carried out in an irremediable, transparent, and secure manner between parties who do not know one another, through the use of asymmetric cryptography.⁴⁰ Thanks to the developed encryption solutions, the trust established between two participants is based solely on mathematics, which makes it possible to eliminate the need for any trusted third party, state or private.⁴¹

³⁶ *Id.* at 9, 35; As one can read on the bitcoin blockchain explorer on *Block #0*, BLOCKCHAIN.COM, <https://www.blockchain.com/btc/block/0> (last visited Oct. 6, 2020).

³⁷ THE OPTIC REPORT, *supra* note 24, at 9.

³⁸ *Id.*

³⁹ Nakamoto, *supra* note 8, at 1 (emphasis added).

⁴⁰ See Marc Pilkington, *Blockchain Technology: Principles and Applications*, 2-3, in RESEARCH HANDBOOK ON DIGITAL TRANSFORMATIONS (F. Xavier Olleros & Majlinda Zhegu, eds. 2016); see also Werbach & Cornell, *supra* note 6, at 326-328, 330.

⁴¹ And this is exactly what the cypherpunks have always been aiming for. See May, *supra* note 29 (“Computer technology is on the verge of providing the ability for individuals and groups to communicate and interact with each other in a totally anonymous manner. Two persons may exchange messages, conduct business, and

At the time of the Bitcoin blockchain inception, the core argument for the adoption of blockchain was to achieve a true, total disintermediation: no more banking and financial institutions, no more state involvement, and no more central authority of any kind for certifying transactions. A myth was built around the idea of disintermediation, nurturing the belief that blockchain could free transactions and individuals themselves, from the yoke of centralized authorities.⁴²

In practice, the first “miners”⁴³ were allocated a considerable number of bitcoins for each block of recorded transactions they validated.⁴⁴ They collected large amounts of cryptocurrency, allowing them to subsequently transfer these assets to other users.⁴⁵ However, another mechanism available to obtain bitcoins is through the conversion of a *fiat* currency. Any user of a blockchain can convert a so-

negotiate electronic contracts without ever knowing the True Name, or legal identity, of the other . . . Just as the technology of printing altered and reduced the power of medieval guilds and the social power structure, so too will cryptologic methods fundamentally alter the nature of corporations and of government interference in economic transactions. Combined with emerging information markets, crypto anarchy will create a liquid market for any and all material which can be put into words and pictures.”).

⁴² THE OPTIC REPORT, *supra* note 24, at 16.

⁴³ Miners are blockchain users who validate transactions through the mining process. A miner can use an individual workstation or, on a larger scale, a mining company with hundreds of calculation units to mine in so called “mining farms.” Miners are often organized in pools of miners. The use of the term “miner” is not trivial. Just as gold miners labored to extract gold nuggets, miners in the Bitcoin blockchain are working to obtain bitcoins. In the case of the Bitcoin blockchain, the expected reward for mining the first blocks was 25 bitcoins. This amount is periodically halved to reach the total amount of bitcoins provided for in the protocol, namely 21 million in 2140. In addition to this reward in new bitcoins, transaction fees are paid by users. These fees are proportional to the number of transactions to be validated simultaneously on the network. See Bayle et al., *supra* note 11, at 37 ; see also Werbach & Cornell, *supra* note 6, at 328-329; Mark Pilkington, *Blockchain Technology: Principles and Applications, Research Handbook on Digital Transformations* 6 (F. Xavier Olleros, and Majlinda Zhegu & Edward Elgar eds., 2016), <https://ssrn.com/abstract=2662660>.

⁴⁴ Mining is a method of validating a set of transactions, grouped into blocks. The miner checks the transactions and then adds some information (including the digital fingerprint of the previous block and the time stamp). Then, in a network such as the Bitcoin blockchain, the miner must add a number such that the fingerprint of the complete block meets certain characteristics. This mathematical operation is remunerated for miners who obtain, in exchange for the validation of a block, a reward in bitcoin (or other cryptocurrencies on other blockchains). See *id.*

⁴⁵ *Id.*

called “fiat”⁴⁶ currency, i.e., euros, dollars, yen, etc., into so-called “crypto” currency, i.e., bitcoins, ethers, litecoins, etc.⁴⁷ To convert these “fiat” currencies into “crypto assets,” it is necessary to use an intermediary who will keep the “fiat” sums in a dedicated account and allow users to gain access to the cryptocurrency exchange service.⁴⁸ The same applies for all services based on blockchain protocols that have gradually been developed; for the sake of the average user, it is necessary to settle application layers and to present intuitive user interfaces. As a result, a lot of IT development work is required between the protocol layers and the application layers.⁴⁹ As this is necessarily carried out by third parties, it then becomes clear that disintermediation cannot be total.

It appears that if the utopia of a decentralized network, totally free from any intermediary, can be achieved, it is premised on the condition that it rely solely and exclusively on blockchain technology. However, any interaction with the real, physical world tears down the myth of disintermediation.

3. *The “Deinstitutionalization”: The Real Disintermediation*

In accordance with its anarcho-libertarian roots, blockchain ultimately promotes deinstitutionalization more so than disintermediation. “*The blockchain stands as a response to the trust crisis that both public and private institutions are experiencing today.*”⁵⁰ When speaking of blockchain’s disintermediating effects, what is being implicated, are all of our central institutions—not only in the private sector, such as banks, but also in the public sector, including notaries,

⁴⁶ Fiat currency is defined as currency that is declared by a country’s government to be legal tender. On blockchains, the adjective “fiat” is generally used to designate what comes from the physical world as opposed to what is “crypto.” See THE PARIS EUROPLACE REPORT, *supra* note 7, at. 101.

⁴⁷ See generally *All Cryptocurrencies*, COINMARKET, <https://coinmarketcap.com/all/views/all/> (last visited Oct. 15, 2020).

⁴⁸ Online platforms for cryptocurrency exchange such as “Coinbase” or “Gemini” provide identity verification features or secured wallet services. Where blockchain technology eliminates some intermediaries, there is ineluctably a need for new ones.

⁴⁹ See *Application Layer, OSI MODEL*, <https://osi-model.com/application-layer/> (last visited Feb. 9, 2020); see also *infra* section II(B)(2), *A Two-Tiered Re-intermediation*.

⁵⁰ ANTOINE GARAPON & JEAN LASSEGUE, JUSTICE DIGITALE : REVOLUTION GRAPHIQUE ET RUPTURE ANTHROPOLOGIQUE [DIGITAL JUSTICE: GRAPHIC REVOLUTION AND ANTHROPOLOGICAL RUPTURE] 153 (2018) (Fr.) (emphasis added).

civil registry officers, and administrative agencies. Indeed, as Messrs. Garapon and Lassègue, respectively a judge and a CNRS researcher studying computer science as a stage in the history of writing, acknowledge,⁵¹ the blockchain revolution competes directly with public institutions. It obviously challenges the sovereign capacity of states to issue traditional currency. It also confronts the state's privileged position in providing citizens' identity (civil status), certifying ownership (land register) and guaranteeing diplomas.⁵²

The libertarian and anarchist logic of the 1990s cypherpunks was based on a massive rejection of the state and of large institutional surveillance.⁵³ However, as we have highlighted, pure and total disintermediation is not possible, if only for the operability and accessibility of blockchain protocols. Of course, Satoshi's work allowed for a breakthrough in the libertarian cause.⁵⁴ There now exists a way of creating and exchanging virtual currencies and operating transactions on a blockchain, without relying on either a banking or financial institution, and without needing the involvement of the state or any other central authority.⁵⁵ In this view, blockchain has somehow put the libertarian utopia into practice and the disintermediation sought for by the cypherpunks takes the form of deinstitutionalization. In other words, we believe that blockchain technology mainly allows for the suppression of institutions, rather than the elimination of all trusted third parties.

However, we argue that not only does blockchain merely accomplish a form of deinstitutionalization and not real disintermediation, but it also has the hidden effect of creating a form of reintermediation. Because of the actual effects of blockchain in the real and physical world, links need to be drawn from the virtual to the physical worlds. For this reason, intermediaries are indispensable.

B. Reintermediation: The Hidden Effect of Blockchain's Use Cases

Reintermediation does exist. Blockchain challenges traditional trusted institutional third parties by substituting them with new private bodies. In the past few years, there has been a proliferation of new and

⁵¹ *Id.* at 152-53.

⁵² *Id.* at 152-153.

⁵³ See Mombynes, *supra* note 31.

⁵⁴ THE OPTIC REPORT, *supra* note 24, at 16.

⁵⁵ *Id.*

private trusted third parties, *i.e.*, startups, that have built their business models on the provision of third-party certification services.⁵⁶ This means that the “trusted third party,” is now included and located within the same market as the parties which certify transactions.⁵⁷ How can we explain such a reintermediation, which sees hundreds of startups and platforms blossoming every day? The computer code barrier is undoubtedly to blame and leads to a two-tiered reintermediation.

1. *The Impossible Direct Access to Blockchain Protocols: The Computer Code Barrier*

Blockchain protocols are primarily peer-to-peer computer networks, coded by computer programmers. Programming is a sequence of instructions to be processed based on a chosen data set. By definition, it “consists [of] organizing data in programs to process them,”⁵⁸ sending instructions “in order to classify, count, decipher the data from which the repetitive structure can be isolated.”⁵⁹

Like all computer codes, blockchain is a form of “digitization” and “consists . . . [of] coding events taking place in the physical world in the form of numbers,”⁶⁰ which has the effect of making “completely homogeneous very different phenomena.”⁶¹ Computer codes, or computer programs, are generally not intelligible to humans, for the simple reason that the instructions in the program have the same form as the data they must process: they are both sequences of numbers. Digital writing is therefore indecipherable by humans, unlike computers. This intrinsic unintelligibility makes it essential to use programs that organize these sequences of numbers and translate them into a more accessible human language.⁶² It is clear that computer code, and generally the need for programming instructions is necessary to communicate with computers and networks. However, computer code prevents users from having direct access to the deployed protocols.

⁵⁶ GARAPON & LASSÈGUE, *supra* note 50, at 152-53.

⁵⁷ *Id.*

⁵⁸ *Id.* at 33.

⁵⁹ *Id.* (emphasis added).

⁶⁰ *Id.* at 32.

⁶¹ *Id.* (emphasis added).

⁶² Intermediate coding languages then make it possible to link the level of processing operated by the computer and that of the programming languages themselves. See GARAPON & LASSÈGUE, *supra* note 50, at 35.

Ultimately, computer language is a barrier to the immediate execution of transactions via blockchain technology between people who wish to interact within the virtual world. In fact, users experience a two-tiered dependency: both with regard to coders and to platforms which offer user interfaces.

2. *A Two-Tiered Reintermediation*

Computer programmers, capable of dialoguing with computers and building the networks' protocol layers appear as indispensable intermediaries for the implementation of the slightest interaction between network users. This digital revolution amounts in the programmer delegating the execution of instructions to the computer.⁶³ For the lay user, it is a question of delegating this activity to computer scientists, thereby losing control of the process. Messrs. Garapon and Lassègue believe that "*this is undoubtedly the reason why this loss of control was so mythically interpreted as a takeover by computers. In reality, it is a takeover . . . by computer programmers.*"⁶⁴

Once the protocol layers have been implemented, the network is functional, but its interface remains rudimentary and is only intelligible to insiders. Further developments are then needed. On the one hand, additional protocol layers are introduced to add functionalities to the network and then application layers are subsequently incorporated.⁶⁵ These application layers provide an interface between the software (i.e., a set of programs) and the network.⁶⁶ This means that the application layer,⁶⁷ is a gateway to the network for applications, and by extension to the user. In between, application programming interfaces ("APIs") are often developed for the benefit of other programmers and are interfaces that provide services, simplifying the implementation and maintenance of other software,⁶⁸ so that the programmer developing an application layer does not have to deal with the operational details of the lower protocol layers.

⁶³ GARAPON & LASSÈGUE, *supra* note 50, at 37.

⁶⁴ *Id.* at 37 (emphasis added).

⁶⁵ MARK A. DYE, ET AL, NETWORK FUNDAMENTALS CCNA EXPLORATION COMPANION GUIDE 63 (1st ed., 2008).

⁶⁶ *Id.*

⁶⁷ See *Application Layer*, *supra* note 49.

⁶⁸ For more information, see *Application Programming Interface*, WIKIPEDIA, https://en.wikipedia.org/wiki/Application_programming_interface (last visited Feb. 8, 2020).

Platforms can then very easily be launched on networks, offering clear and accessible functionalities to the general public. With respect to blockchains, not only are we witnessing a proliferation of platforms dedicated to trading “fiat” currencies against crypto assets, and secondary markets for exchanging crypto assets among themselves, but we are also seeing many blockchain based services.⁶⁹ The lay user is not aware of the layers of computer programs that have been developed. Her customer experience will be further improved as the interface that offers her the service becomes more intuitive and easier to access.

Computer programmers, and more broadly the start-ups they work with, are the new intermediaries between users and the actual network. If traditional institutional third parties are gradually being replaced through blockchain, it is nonetheless impossible to eliminate the need for intermediaries. In light of the disappearance of traditional trusted third parties as well as the rejection of any central authority, the question of the role that should be given to the legal professions, and more broadly to the law, becomes all the more pertinent.

III. CAN BLOCKCHAIN TECHNOLOGY EXIST OUTSIDE THE LAW?

L. Lessig, Professor of Business Law at Harvard Law School's Berkman Center, published an article entitled “*Code is Law - On Liberty in Cyberspace*” in January 2000.⁷⁰ “*Code is Law*”⁷¹ is very often quoted to affirm that computer code must prevail and is immutable. This interpretation is a departure from the original thought of L. Lessig. In practice, the law necessarily has a role to play and cannot be excluded.

⁶⁹ To cite only a few promising applications, “Provenance” enables brands to present information about their products' supply chain history, in an effort to provide more transparency to final users. “Slock.it” value proposition is to connect devices to the blockchain, enabling the economy of things. The startup is currently involved in multiple projects ranging from renewable energy management to innovative governance schemes. Finally, “Enigma” offers cloud platform services allowing users to store and share sensitive data without revealing them.

⁷⁰ Lawrence Lessig, *Code is Law – On Liberty in Cyberspace*, HARVARD MAGAZINE (Jan. 2000), <https://www.harvardmagazine.com/2000/01/code-is-law.html>.

⁷¹ *Id.*

A. *Code is Law: The Utopia of the Computer Code Supremacy Resulting in the Abolition of the Law*

1. *L. Lessig's Thought*

According to L. Lessig, there is a potential regulatory institution that represents a threat to freedoms in every historical era.⁷² The paradox in the present era, of cyberspace, is that we perceive neither the existence of regulation, nor the threat to freedoms that this regulation represents in this new space.⁷³ This is simply explained, according to L. Lessig, by the fact that we are used to equating our freedoms with freedom from government.⁷⁴ In cyberspace, in the absence of a state institution, who could threaten individual freedom? In reality, the regulator in cyberspace is computer code. L. Lessig makes it clear that code (or architecture) defines the conditions under which the life of cyberspace is experienced. As acknowledged by L. Lessig, code “*determines how easy it is to protect privacy, or how easy it is to censor speech. It determines whether access to information is general or whether information is zoned,*”⁷⁵ and so on. Once one understands the nature of the code, it is possible to realize “*the code of cyberspace regulates.*”⁷⁶

Yet, as L. Lessig pointed out in 2000, this regulation is changing—the code of cyberspace is changing. Cyberspace will evolve from a place that protects “*anonymity, free speech, and individual control, to a place that makes anonymity harder, speech less free*”⁷⁷ and reduces the autonomy of individuals to experts only. However, the code is not fixed. Since it is the code that determines what can be controlled or not, it would then be possible to build other data structures to make Internet use controllable. This control could be exercised either by identifying the user, in particular to guarantee the veracity of the information concerning him or her, or by characterizing the content (pornography, violent, racist, political speech, etc.).

Overall, in his article “*Code is Law,*” L. Lessig warns Internet users by explaining that coders, who determine the code, respond to the incentives they receive.⁷⁸ If neither the market nor the law provides

⁷² *Id.*

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.*

⁷⁶ Lawrence Lessig, *supra* note 69 (emphasis added).

⁷⁷ *Id.*

⁷⁸ *Id.*

them with proper incentives to protect privacy, they simply will not do so. This is the case in all areas where the code operates and where coders have to make choices.⁷⁹ Then, “*should we have a role in choosing this code, if this code will choose our values?*”⁸⁰ L. Lessig wonders whether we should interfere in designing the code, since the code determines our values.⁸¹ The question is acutely relevant in the current trend of non-intervention and general *laissez-faire* policy for the development of the Internet. The question is not who will decide how cyberspace is regulated, regulation is widely attributed to the coders. The only undecided issue is whether “*we collectively will have a role in their choice*” or whether the coders will “*select our values for us.*”⁸²

2. The Diversion from “Code is Law”

L. Lessig’s thesis was subsequently distorted in a somewhat extreme fashion.⁸³ Some programmers and other computer scientists who design and handle computer code firmly believe that code is law and is binding on all of us. They maintain that computer code should replace the law entirely and, more broadly, go beyond the law.⁸⁴ This motto derived from L. Lessig’s writings was echoed in the development of blockchain protocols and libertarian thinking. The idea is that “*a blockchain-based system’s software enforces its own rules in a manner analogous to the legal system.*”⁸⁵ Thus, in terms of regulation, the blockchain is often seen as a technology, capable of escaping the rules of law and the domination of governments. In other words, some programmers believe that what is computer coded represents the law between users.⁸⁶ It would then be impossible to modify the

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ *Id.*

⁸² *Id.*

⁸³ Samer Hassan & Primavera de Filippi, *The Expansion of Algorithmic Governance: From Code is Law to Law is Code*, 17 FIELD ACTIONS SCIENCE REPORTS [ONLINE] 88 (2017).

⁸⁴ *Id.* at 89.

⁸⁵ Kevin Werbach, *Trust, But Verify: Why the Blockchain Needs the Law*, 33 BERKELEY TECH. L.J. 489, 494 (2018) (emphasis added); see also *id.* at 524 (commenting on the cyber-libertarian flame: “*The blockchain is not just immutable; it is ‘censorship resistant.’ No higher authority can command a blockchain to do something any more than it can order around the Internet. There is no there to regulate. Regulation and the blockchain are antithetical.*”).

⁸⁶ See Werbach & Cornell, *supra* note 6, at 313-314; see also Aaron Wright & Primavera de Filippi, *supra* note 6, at 40 (on the Lex Informatica “by enabling or

implemented code, even in case of error. The libertarian approach, found at the origins of blockchain technology, believes that there is no need to have a specific governance since the only governance exists in computer language.⁸⁷ In this view, as soon as computer language is written and validated by a consensus process, it acquires the “force of law.”⁸⁸ Consequently, as soon as it would be written and validated by a consensus process, computer code would become law and would become binding on all users. It would be immutable, accessible to all, and incorruptible. Hence, and according to some programmers, the computer code used to build blockchain protocols would be sufficient to regulate and most importantly would be more suitable to regulate than the law is.⁸⁹ In this way, the code, in its absolute or unalterable version, can be assimilated to a tyrannical structure since any change is impossible.⁹⁰

The DAO case is often used to illustrate the belief in code supremacy, the apparent “tyranny” that can ensue. Indeed, and in contrast to what is frequently asserted, The DAO example shows the limits of this distorted interpretation. In May 2016, a decentralized autonomous organization called “The DAO,” was launched on the Ethereum blockchain, to raise funds for investors associated with the Ethereum blockchain.⁹¹ \$160 million dollars was raised in a short period of time. Then, due to a flaw in the computer code of The DAO, a hacker was able to capture 3.6 million ethers—the cryptocurrency of the Ethereum blockchain—the equivalent of \$50 million dollars at the time.⁹² The hacker had exploited an error in the computer code to divert this colossal sum of money.

restricting the type of actions that can be performed on a digital platform, Lex Informatica establishes a particular system of (technical) norms which are a direct expression not of the legislator’s will, but rather that of the person in charge of developing of such platform.”); *see generally infra* note 106.

⁸⁷ Celine Bondard et al., *Blockchain: Quelques utilisations actuelles de cet outil en droit des affaires* [Blockchain: Some current uses of this tool in business law], 36 JCP E 1471 (2017), http://bondard.fr/wp-content/uploads/2017/10/article_blockchain.pdf.

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ THE OPTIC REPORT, *supra* note 24, at 9.

⁹¹ Alyssa Hertig, *Ethereum’s Two Etheums Explained*, COINDESK (July 28, 2016), <https://www.coindesk.com/ethereum-classic-explained-blockchain> (Offering more information on the Ethereum split).

⁹² David Siegel, *Understanding The DAO Attack*, COINDESK (June 25, 2016) <https://www.coindesk.com/understanding-dao-hack-journalists>; *see also* Vitalik Buterin, *DAOs, DACs, DAs and More*, ETHEREUM BLOG (May 6, 2014),

A debate divided members of The DAO community, and more broadly the Ethereum community, as to how to react to this attack.⁹³ The dilemma, which turned into an ideological conflict, was whether to intervene in the computer code and modify it, to possibly restore justice by returning the stolen sums, or to respect the principle of immutability of the code and its legal force.⁹⁴ Only 10 percent of the community members maintained a purist and absolutist position defending immutability at all cost. This schism led to a split in the network. Today there are two Ethereum blockchains, the original one, which includes those who stole the 3.6 million ethers and are now known as “Ethereum classic” and the new one, in which the theft was wiped out, that is known as “Ethereum.”⁹⁵

Ultimately, consensus is at the heart of the diverted interpretation of *Code is Law*.⁹⁶ Since the consensus process validates the code, *i.e.*, the blockchain protocol, the code is considered to be legally binding. Everyone has approved it and agreed to abide by it. Since it is binding on all participants, it is consequently not possible to change this code: it is immutable.⁹⁷ However, the example of The DAO and the requirement for consensus, showcases that there is nothing preventing the change of blockchain’s operating code. In fact, as soon as a majority of participants accept the changes, the code can be then be modified.⁹⁸ The concept of immutability is only then apparent, revolving around the issue of consensus.

It is clear that L. Lessig’s comments were intended to alert and draw everyone’s attention to the fact that we are subject to the code by our inaction. In fact, code is “law” because it regulates cyberspace in the absence of any other regulation.⁹⁹ This does not mean that the Internet, and, *a fortiori* blockchain technology, could not or should not be, regulated. It is indeed impossible in practice to exclude the law.

<https://blog.ethereum.org/2014/05/06/daos-dacs-das-and-more-an-incomplete-terminology-guide/>.

⁹³ THE OPTIC REPORT, *supra* note 24, at 18; Werbach & Cornell, *supra* note 6, at 351

⁹⁴ THE OPTIC REPORT, *supra* note 24, at 19

⁹⁵ Alyssa Hertig, *supra* note 91.

⁹⁶ Lawrence Lessig, *supra* note 70.

⁹⁷ *Id.*

⁹⁸ THE OPTIC REPORT, *supra* note 24, at 19; See David Yermack, *Corporate Governance and Blockchain*, 21 OXFORD REV. OF FIN. 7, 10 (2017).

⁹⁹ Lawrence Lessig, *supra* note 70.

B. *The Practical Impossible Exclusion of the Law*

1. *The Necessary Recourse to Courts and Submission to the Rules of Law*

The vision of a world without laws that responds exclusively to the rules developed in open source, through the collaboration of more or less anonymous programmers, is a direct response to the libertarian vision previously outlined. It encompasses that no one needs states or institutions to regulate activities. In this system, the collaboration of each party is sufficient to set up a decentralized and distributed system that operates with full reliability thanks to the implementation of blockchain technology.¹⁰⁰ However, this notion, peculiar to the “crypto world,” is utopian.

Such an ideal is only worthwhile for those who are intimately convinced of it. Whenever a dispute arises, whether in the real world or in the virtual world, the natural response is to resort to the law, namely, to rules external to the parties. Those rules are most often determined by the dedicated and oldest third-party centralizing authority: the state. As such, the practice of law succeeds, as does technology, in the case of blockchains, to prove a party’s right. The example of The DAO discussed above, proves that in the absence of governance and designated authority, it is difficult to settle a dispute by reaching a solution that would be upheld by all network users. Although forms of decentralized courts have been set up on some blockchains,¹⁰¹ each of the contracting parties must agree to abide by them. In the event of disagreement or rejection of the decision in a specific case, how can

¹⁰⁰ THE OPTIC REPORT, *supra* note 24, at 16.

¹⁰¹ See for instance “Kleros,” a dispute resolution protocol which offers to arbitrate disputes on Ethereum based smart contracts. It relies on game theoretic incentives to have jurors rule cases correctly. Similarly, on the EOS Blockchain, an arbitration court (“ECAAF”) had been set up to settle disputes arising from the use of this blockchain. A disagreement led to the suspension of this arbitral body, but previous rulings as well as the Constitution and Rules of Dispute Resolution that governed those disputes are still available. Some scholars also propose to set up dispute resolution mechanisms on the blockchain itself, implemented into smart contracts. Such crypto dispute resolution could raise efficiency and represent a significant gain in time; see Craig Calcaterra & Wulf A. Kaal, *Crypto Transaction Dispute Resolution*, 73 THE BUSINESS LAWYER 109-152 (2018), https://www.americanbar.org/digital-asset-abstract.html/content/dam/aba/publications/business_lawyer/2018/73_1/article-crypto-transaction-201801.pdf; see also Falco Kreis & Marcus Kaulartz, *Smart Contracts & Dispute Resolution: a Chance to Raise Efficiency?*, 37 ASA BULLETIN 336-357 (2019).

the dissatisfied user be prevented from going to a physical court, which are subject to “real” law and not to the computer code? In a law-abiding state, it is not possible to deny recourse to traditional rules of law.¹⁰² As a matter of principle, everyone may invoke the rights granted to them by law and its constitutional rights to a fair trial and due process of the law. If a single blockchain user intends to challenge a blockchain transaction, they would thus be perfectly entitled to invoke the applicable rules of the law in order to seek specific performance or damages, if the legal conditions for their actions are met.

Thus, the computer code, which structures the blockchain, cannot replace the law, and nothing in the operation of blockchain protocols can prevent submission to the law. According to the non-lawyer advocates of the blockchain, algorithms are self-sufficient and constitute their own law.¹⁰³ However, without being pan-legal, a computer process that claims to be a financial, economic, or an administrative tool cannot exist outside the law.¹⁰⁴ The computer code cannot defy and supplant the substantive law which defines offences, lawfulness of transactions, contractual validity conditions, and so on.¹⁰⁵ Of course, it must certainly be recognized that code allows for the implementation of networks operating between users who accept its rules, but once again, there is no blockchain outside of the law.¹⁰⁶

¹⁰² See generally Werbach, *supra* note 85, at 496-497. (“The reason the blockchain needs law is that both the blockchain and the law are, at their core, mechanisms of trust.”); see also Blockchain Workshops, *Thinking Through Law and Code, Again - Lawrence Lessig - COALA's Blockchain Workshops - Sydney 2015*, YOUTUBE (Jan. 6, 2016), <https://www.youtube.com/watch?v=pcYJTtIbhYF0> (in essence, L. Lessig believes that not only blockchain cannot evade the law but also needs the law).

¹⁰³ M. MEKKI, *Droits et algorithmes [If Code is Law, then Code is Justice? Laws and Algorithms]*, Gaz. Pal. 2016.

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*

¹⁰⁶ However, some scholars think that traditional rules of law should not apply, but rather a new set of rules called the “Lex Cryptographia”, as a reference to the Lex Mercatoria used in international commercial law should. They believe that blockchain will lead to the creation of this new set of rules, which will be automatically enforced through smart contracts and decentralized autonomous organizations. See Aaron Wright & Primavera de Filippi, *supra* note 6, at 48-51. Specifically, they argue that blockchains allow individuals to build their own systems of rules, which are executed by the protocol of a chosen blockchain. These systems create an order outside the traditional rules of law thus enforcing a form of private regulation. Wright and de Filippi affirm: “Lex Informatica is viewed as a natural extension of Lex Mercatoria, a complementary toolkit for the regulation of online transactions through the establishment of technical norms, in addition to contractual rules. Just like Lex Mercatoria, Lex Informatica ultimately relies on self-regulation:

2. *The Intrusion of the Law: First Attempts at Regulation*

Many countries have begun to take an interest in the possibility of regulating activities implemented on blockchains,¹⁰⁷ and in particular in the status of “cryptocurrencies”¹⁰⁸ and the legal regime of Initial Coin Offerings (“ICOs”).¹⁰⁹ In fact, many initiatives relying on blockchain technology have already been subject to cease-and-desist orders or sanctions for non-compliance with the rule of law.¹¹⁰ ICO related litigations are already thriving. Once more, The DAO case created a precedent. On July 25, 2017, the Securities and Exchange Commission Division of Enforcement (“SEC”) issued a report of

it is a system of customary rules (or standards) and technical norms elaborated by online users for internal use by community members.” They rely on a foundational 1997 article by a Fordham law professor, Joel Reidenberg. Joel Reidenberg, *Lex Informatica: The Formulation of Information Policy Rules through Technology*, 76 TEX. L. REV. 553 (1997).

¹⁰⁷ For more information on attempt at regulation worldwide, a comprehensive report from the Global Legal Research Center of the Law Library of Congress surveys the legal and policy landscape surrounding cryptocurrencies around the world. See Law Library of Congress, *Regulation of Cryptocurrency Around the World* (Jun. 2018), <https://www.loc.gov/law/help/cryptocurrency/world-survey.php> (unpublished manuscript).

¹⁰⁸ Interestingly, the French Central Bank (« Banque de France ») considers that the term “cryptocurrency” is not appropriate and prefers the terms “crypto asset” or “digital asset”. This terminology choice emphasizes the dichotomy that exists with fiat currencies (being backed up by central banks). See BANQUE DE FRANCE, *L'émergence du bitcoin et autres crypto-actifs : enjeux, risques et perspectives*, FOCUS 16 (Mar. 5, 2018), https://publications.banque-france.fr/sites/default/files/medias/documents/focus-16_2018_03_05_fr.pdf (Fr.).

¹⁰⁹ ICOs are “cryptocurrency” fundraisers carried out using the blockchain. The bearers of an innovative project, most often based on a blockchain-based solution, launch a call to raise funds - not in euros or dollars, but in cryptocurrencies such as bitcoin or ether, for example. These projects are based entirely on trust and investors will obtain an economic interest in the future company or in the future project to be developed in exchange for the funds invested. There has therefore been a significant proportion of scams, but also problems of governance, with internal disagreements blocking any development of the project – without paying back the invested funds. See e.g., *In re Tezos Sec. Litig.*, 2019 WL 2183448 (N.D. Cal. Apr. 8, 2019). The company raised \$232 million in July 2017 before a class-action complaint was filed on the basis that Tezos allegedly violated U.S. securities laws and performed investor fraud.

¹¹⁰ See e.g. Order Instituting Cease-And-Desist Proceedings, Exchange Act Release No. 3-18304, SEC (Dec. 11, 2017); see also *United States v. Zaslavskiy*, No. 17-CR-647, 2018 WL 4346339, at *1 (E.D.N.Y. Sept. 11, 2018).

investigation¹¹¹ concluding that blockchain tokens¹¹² sold by The DAO were securities. The report emphasizes the applicability of US federal securities law to blockchain technology. Many cases followed confirming that the full weight of both the Securities Act of 1933 and the Securities Exchange Act of 1934 apply to issuance and trading of tokens. In one of its most recent cases, the SEC ordered the blockchain company Block.one to pay a \$24 million penalty for an unregistered ICO.¹¹³

In France, the French legislator has already enshrined blockchain's existence by introducing the definition of this technology into French law, by way of two ordinances dated April 28, 2016 and December 8, 2017.¹¹⁴ The first ordinance makes it possible to issue and sell a specific type of financial security in a "*shared electronic recording device for transaction authentication*," in other words, a blockchain.¹¹⁵ The second ordinance takes up the same idea by applying it more broadly to all unlisted financial securities.¹¹⁶ By doing so, France became the first country to recognize blockchain technology in the field of both listed and unlisted financial securities, allowing their registration directly into the blockchain.¹¹⁷ With regard to ICOs, France

¹¹¹ Report of Investigation Pursuant to Section 21(a) of the Securities Exchange Act of 1934: The DAO, Exchange Act Release No. 81207, SEC (July 25, 2017), <https://www.sec.gov/litigation/investreport/34-81207.pdf>.

¹¹² A token is a digital representation of value that can be digitally traded and functions as a medium of exchange, unit of account, or store of value. Virtual tokens or coins may represent other rights or interest as well. *Investor Bulletin: Initial Coin Offering*, "What is a virtual currency or virtual token or coin," U.S. SEC. AND EXCH. COMM'N OFFICE INV'R EDUC. AND ADVOCACY (July 25, 2017), https://www.sec.gov/oiea/investor-alerts-and-bulletins/ib_coinofferings.

¹¹³ Cease and Desist Order, Exchange Act Release No. 10714, SEC (Sept. 30, 2019).

¹¹⁴ *See* CODE MONÉTAIRE ET FINANCIER [MONETARY AND FINANCIAL CODE] art. L. 211-3, L223-12 (Fr.) (Dec. 27, 2018). <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT00003785246> (Décret 2018-1226 du 24 décembre 2018 relatif à l'utilisation d'un dispositif d'enregistrement électronique partagé pour la représentation et la transmission de titres financiers et pour l'émission et la cession de minibons) (Decree 2018-1226 of December 24, 2018 relating to the use of shared electronic recording device for the representation and transmission of financial securities and for the issue and sale of cash vouchers). An implementing decree was later adopted on December 24, 2018 describing the conditions under which such unlisted securities might be registered and transferred using blockchain.

¹¹⁵ *Id.*

¹¹⁶ *Id.*

¹¹⁷ *Blockchain & Cryptocurrency Regulation 2020 France*, GLOB. LEGAL INSIGHTS, <https://www.globallegalinsights.com/practice-areas/blockchain-laws->

has adopted a very proactive strategy to send a welcoming and securing message to the blockchain ecosystem, therein boosting innovation.¹¹⁸

Further, the PACTE Act, adopted on May 22, 2019, introduces a flexible and incentive-driven framework for ICOs.¹¹⁹ It creates an optional approval system that can be issued by the French equivalent of the SEC (« Autorité des marchés financiers » or « AMF ») to compliant players.¹²⁰ On December 18, 2019, the AMF announced that it had granted its first optional approval to an ICO for the French startup “French-ICO.”¹²¹ The PACTE Act also introduces minimum legislative constraints for setting up a ICO, such as the creation of a legal entity or the establishment of an escrow system. It thus allows investors to distinguish between legitimate and illegitimate actors. The PACTE Act undeniably places France as one of the first states to truly regulate ICOs.¹²² It also introduces new definitions, finally allowing

and-regulations/france (last visited Sept. 4, 2020).

¹¹⁸ See *Blockchain: Disruption et Opportunité*, ASSEMBLEE NATIONALE, https://www.economie.gouv.fr/files/files/PDF/Colloque_BlockchainV2.pdf (*Colloquium Blockchain: Disruption and Opportunities* held at the French Parliament on March 24, 2016. Many interventions insisted on the groundbreaking nature of blockchain technology and on the need to create a friendly legislative framework in France to prevent the flight of entrepreneurs abroad).

¹¹⁹ Loi n° 2019-486 du 22 mai 2019 relative à la croissance et la transformation des entreprises [LAW No. 2019-486 of May 22, 2019 on the Growth and Transformation of Companies].

¹²⁰ *Id.*

¹²¹ In a December 19, 2019 press release, the AMF especially explained that the approval is granted until June 1, 2020. The AMF however recalled that it does not in any way constitute an assessment as to whether or not it is appropriate to participate in the said ICO. The institution emphasized that it only means that in the context of this ICO, the issuer has provided the minimum guarantees required by law and that the white paper is complete and understandable to investors. *The AMF grants its first optional approval to an initial coin offering (ICO)*, AMF (Dec. 19, 2019), <https://www.amf-france.org/en/news-publications/news-releases/amf-news-releases/amf-grants-its-first-optional-approval-inital-coin-offering-ico>.

¹²² Nicholas Pongratz, *France to be Among First to Regulate ICOs*, BE IN CRYPTO (Nov. 17, 2018), <https://beincrypto.com/france-to-be-among-first-to-regulate-icos/>; see also Cours Crypto Monnaie, *La France première nation au monde à réglementer les ICO ? [Is France the First Nation in the World to Regulate ICOs?]* (June 1, 2018), <https://www.courscryptomonnaie.fr/actualite/france-premiere-nation-au-monde-a-reglementer-ico-amf/>.

lawyers to have a clear understanding of what is meant by “ICOs”¹²³ and “tokens.”¹²⁴

In the United States, while cryptocurrencies and ICOs have not been regulated nationally, the federal government’s attempts at regulating blockchain can be found at the agency and administrative levels. As previously highlighted,¹²⁵ the SEC has set important precedents with regard to the issuance and resale of crypto assets, and the applicability of securities law therein. Other agencies, such as the Financial Crimes Enforcement Network (“FinCEN”), the Federal Trade Commission (“FTC”), the Commodities and Futures Trading Commission (“CFTC”), and the Internal Revenue Service (“IRS”) are also prominently involved in regulating blockchain.¹²⁶ Overall, these agencies have recognized the great potential of blockchain technology¹²⁷ and

¹²³ An ICO “consists of an offer to the public, in any form whatsoever, to subscribe to tokens. An ICO does not include the offer of tokens for subscription by only a limited number of persons . . . acting on their own account.” CODE MONÉTAIRE ET FINANCIER [MONETARY AND FINANCIAL CODE] art. L. 552-3 (Fr.) (translated from French).

¹²⁴ A token is defined as “any intangible asset representing, in digital form, one or more interests that can be issued, registered, retained or transferred by means of a shared electronic recording device that makes it possible to identify, directly or indirectly, the owner of that asset.” CODE MONÉTAIRE ET FINANCIER [MONETARY AND FINANCIAL CODE] art. L. 552-2 (Fr.) (translated from French).

¹²⁵ See Report of Investigation Pursuant to Section 21(a), *supra* note 110 and accompanying text.

¹²⁶ Shelagh Dolan, *How the laws & regulations affecting blockchain technology and cryptocurrencies, like Bitcoin, can impact its adoption*, BUSINESS INSIDER (Mar. 3, 2020), <https://www.businessinsider.com/blockchain-cryptocurrency-regulations-us-global>; see also Darya Yafimava, *Blockchain And The Law: Regulations Around the World*, OPENLEDGER (Jan. 17, 2019), <https://openledger.info/insights/blockchain-law-regulations/> (NB openledger is a well-known actor in the blockchain space).

¹²⁷ See for example, William Hinman, SEC Director, Division of Corporate Finance, has stated that Blockchain technology has “the potential to share information, transfer value, and record transactions in a decentralized digital environment . . . There is real value in creating applications that can be accessed and executed electronically with a public, immutable record and without the need for a trusted third party to verify transactions. Some people believe that this technology will transform e-commerce as we know it. There is excitement and a great deal of speculative interest around this new technology.” William Hinman, *Remarks at the Yahoo Finance All Markets Summit: Crypto*, U.S. SECURITIES AND EXCHANGE COMMISSION (June 14, 2018) (transcript available at <https://www.sec.gov/news/speech/speech-hinman-061418>).

have pointed out the risk of over-regulating, at the expense of hindering the technology's growth. Multiple states have also adopted laws impacting the status of cryptocurrencies, the legal regime of ICOs or, more generally, of blockchain technology.¹²⁸ While it is unnecessary for the main purpose of this Article to detail all of the states' initiatives surrounding blockchain, we hope to demonstrate that blockchain technology has been the focus of much regulatory attention, and therefore exists within the jurisdiction of sovereign states,¹²⁹ and by extension, the law.

Some scholars consider that blockchain technology's impact will actually “*depend on its developers' ability to connect Satoshi Nakamoto's cryptoeconomic trust model with the formal structures and institutions of legal enforcement.*”¹³⁰ In this way, it is also the legal professions' complementary role to make sure that legal considerations are incorporated into the software from the very beginning.¹³¹ In the blockchain era, we argue that the future of the legal professions depends on nurturing the skills to incorporate legal considerations into blockchain's software and, going further, to use blockchain to advance the legal professions.

¹²⁸ See 12 V.S.A. § 1913 (2016); see also *infra* Section IV(A)(2)(a)(ii), *Blockchain-Based Evidence for IP Litigation*, for an overview of the State of Vermont Rules of Evidence admitting the evidentiary value of blockchain-based records; see also Aaron Wright & Primavera de Filippi, *supra* note 6, at 36-37; see also *infra* Section IV(A)(2)(b), *Blockchain's Registry Function and Digital Notary Services*, for a discussion on Delaware's blockchain amendments to the Delaware General Corporation Law.

¹²⁹ For more information about states' legislation, the National Conference of State Legislatures (“NCSL”) has come up with a useful summary of the said legislations. Heather Morton, *Blockchain State Legislation*, NAT'L CONF. OF ST. LEGIS. (Mar. 28, 2019) (“NCSL”), <https://www.ncsl.org/research/financial-services-and-commerce/the-fundamentals-of-risk-management-and-insurance-viewed-through-the-lens-of-emerging-technology-webinar.aspx> (last visited Sept. 3, 2020) (providing information on states' legislation on blockchain technology).

¹³⁰ See Werbach *supra* note 85, at 497 (emphasis added).

¹³¹ See Michèle Finck, *Blockchains and Data Protection in the European Union*, MAX PLANCK INST. FOR INNOVATION AND COMPETITION 31 (Nov. 30, 2017), <https://ssrn.com/abstract=3080322>, (Research Paper No. 18-01) (applying this reasoning with regard to the European data protection framework for the creation of blockchains respecting the principle of data protection by design).

IV. THE FUTURE OF THE LEGAL PROFESSIONS IN THE BLOCKCHAIN ERA

Since the law definitely plays a role to in the blockchain ecosystem, what will become of the legal professions? At the most basic level, the legal professions will retain their traditional functions of providing legal advice and representation. In this respect, it is interesting to note that many international law firms have created practices dedicated to blockchain technology, either as a separate department or as a subgroup of their technology, financial, or corporate divisions.¹³² These law firms promise to deal with the challenging legal and regulatory issues that accompany this technology's explosive growth.¹³³

One could also envision a more radical shift in the legal market, that goes beyond traditional provisions of legal expertise. On a smaller scale, it will first be a matter of improving existing legal professions by using blockchain technology. Going further, the innovation provided by blockchain will certainly take precedence over the simple optimization of performance and will result in the elimination of some of the existing legal professions, or the emergence of new ones. In these new paradigms, the legal professions may have a role to play for blockchain to truly become a widely embraced "*trust machine*."¹³⁴

¹³² See generally *Blockchain, An Introduction to one of the most significant technological developments in recent years*, FIELDFISHER, https://res.cloudinary.com/fieldfisher/image/upload/v1574346769/PDF-Files/PDFs%20from%20old%20website/blockchain-fieldfisher-insights-paper_hm4qox.pdf (last visited Nov. 7, 2020); *Blockchain and DLT*, HOGAN LOVELLS, <https://www.hoganlovells.com/en/service/blockchain> (last visited Nov. 7, 2020); *Blockchain and Distributed Ledger technology*, DENTONS, <https://www.dentons.com/en/issues-and-opportunities/blockchain-and-distributed-ledger-technology> (last visited Nov. 7, 2020); *Digital Currency + Blockchain Technology*, GOODWIN, <https://www.goodwinlaw.com/services/practices/digital-currency-and-block-chain-technology> (last visited Nov. 7, 2020); *Energy and Blockchain*, LINKLATERS, <https://www.linklaters.com/en/sectors/energy-and-utilities/energy-tech/blockchain> (last visited Nov. 7, 2020); and *The future of business enabled by blockchain*, EY, <https://blockchain.ey.com/> (last visited Nov. 7, 2020) (to cite only a few initiatives).

¹³³ See generally, *supra* note 132; *2018 Global Blockchain Survey | Findings and insights*, DELOITTE, <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-2018-global-blockchain-survey-report.pdf>

¹³⁴ See *The Trust Machine*, *supra* note 3.

A. *The Performance Objective: Optimizing The Existing Legal Professions*

1. *The “Augmented Lawyer”?*

Legal professions are beginning to grasp the importance of blockchain technology. Its increasingly widespread use appears to be inevitable. A comparison can be drawn with the field of artificial intelligence, where the “augmented intelligence”¹³⁵ approach proposes to combine the best of the human intellect and the best of machine learning.¹³⁶ This more generally appeals to transhumanist philosophy. Transhumanism is a class of philosophies that “differs from humanism in recognizing and anticipating the radical alterations in the nature and possibilities of our lives resulting from various sciences and technologies.”¹³⁷ It is thus also possible, to consider a collaborative approach between the legal market and blockchain technology. While some predict the disappearance of the legal professions, we rather envision blockchain as a time-saving tool, strengthening the lawyer’s range of expertise.¹³⁸

At a time when legal techs¹³⁹ are challenging the traditional legal professions, we must think of blockchain technology as an asset for

¹³⁵ IBM is particularly developing this approach by claiming to enhance individuals not replace them. *See e.g., Augmented intelligence in banking*, IBM INSTITUTE FOR BUSINESS, <https://www.ibm.com/thought-leadership/institute-business-value/report/client-centered-banking> (augmented intelligence at work in financial services) (last visited Feb. 8, 2020); *Watson Health*, IBM, <https://www.ibm.com/watson/health/> (last visited Feb. 8, 2020), (applications for healthcare professionals, where artificial intelligence is used to assist them assessing the best diagnosis).

¹³⁶ *See generally, supra* note 135.

¹³⁷ MAX MORE, TRANSHUMANISM: A FUTURIST PHILOSOPHY (1996) (unpublished manuscript), <https://web.archive.org/web/20051029125153/http://www.max-more.com/transhum.htm> (emphasis added).

¹³⁸ Aaron Wright & Primavera de Filippi, *supra* note 6, at 24.

¹³⁹ Legal technology, also known as “Legal Tech,” refers to the use of technology and software to provide legal services. In this respect, the American Bar Association’s Legal Technology Resource Center has recently released a comprehensive publication exploring how attorneys are using technology in their practices. *See ABA Releases 2019 TECHREPORT and Legal Technology Survey Report on Legal Tech Trends*, AM. B. ASS’N (Oct. 23, 2019), <https://www.americanbar.org/news/abanews/aba-news-archives/2019/10/aba-releases-2019-techreport-and-legal-technology-survey-report/>.

optimizing performance and legal services and not as a competitor.¹⁴⁰ By combining the very best of the lawyers' skills, in particular their *in concreto* analytical expertise, with the best of technology—from tamper-proof certification, time stamping of documents, to the use of smart contract—it would then be possible to offer significantly improved services to the parties involved. Practical blockchain-based use cases are already emerging in response to clearly identified problems.

2. *Practical Examples: Intellectual Property, Notary Services and Corporate Governance*

a. *Intellectual Property (“IP”)*

i. *Blockchain-Based Evidence for IP Cases Management*

Blockchain technology could be used to optimize IP management. Further, the technology may offer new services enabling anyone to register the proof of existence of their creation in the network (text, sketch, drawing, photo of a sculpture, etc.),¹⁴¹ any time and as many times as desired. In other words, blockchain technology makes it possible to protect each step of the creation journey on a daily basis, and the work's digital fingerprint recording is time-stamped.¹⁴² Consequently, the creation process can now be recorded as it progresses.

This service allows for responses to challenges of collaborative work, which is becoming more and more widespread (for example, in art or fashion schools).¹⁴³ It is indeed often necessary to keep track of

¹⁴⁰ Similarly, the use of artificial intelligence to predict the outcome of cases promises to disrupt the way lawyers handle litigation – not the entire legal industry.

¹⁴¹ In fact, many initiatives are blossoming in this field. To cite only a few: “Cognate” is a blockchain-powered trademark right protection platform that organizes and manages all trademarks and proof of use evidence. In France, the startup “Blockchain Your IP” offers to revolutionize the proof of existence of IP assets. More recently, “SIAE”, the Italian company for collective copyright management announced in December 2019 its partnership with “Algorand” for the development of a new open ecosystem for copyright management based on Algorand's blockchain platform.

¹⁴² Actually, the idea to time-stamp documents to authenticate ownership of IP rights was introduced earlier than blockchain technology. See Stuart Haber & W. Scott Stornetta, *How to Time-Stamp a Digital Document*, 3 J. OF CRYPTOLOGY 99 (1991). However, the blockchain-based process is much simpler, allowing timestamping to be carried out in a decentralized and immutable fashion.

¹⁴³ See M. Malaurie-Vignal, *Enjeux et défis de la blockchain en propriété intellectuelle*, [Stakes and challenges of blockchain in intellectual property] D. IP/IT 2018.531; see also Jason Bailey, *Art World, Meet Blockchain*, ARTNOME (Jul. 30,

everyone's contributions to the creative process. The time-stamping feature creates a paradigm shift and a chronological change as related to proof of creation. It is now possible to prove intellectual property rights at their inception, and not right before litigation, as has previously been the case. In a nutshell, evidence of creation can now supplement tangible evidence of completed work. This new tool allows IP lawyers to provide precise and indisputable proof of existence upon time stamping. Their work is thus not only simplified, the evidence being easily reportable, but also improved.¹⁴⁴ Indeed, until now, no one bothered to record proof of the existence of a creation via a step-by-step basis. The burden was too heavy for practical implementation. Now thanks to blockchain technology, each step can be recorded with great ease and at a very low cost. These registrations are made as a security measure, to prevent any risk of subsequent dispute. A new service is thus offered to the parties, all the while consolidating the pre-litigation phase.¹⁴⁵

ii. *Blockchain-Based Evidence for IP Litigation*

The presiding question, once the litigation phase has begun, is how can the judge be convinced of the concordance between the content of the information recorded in the blockchain with the corresponding files? In civil law jurisdiction, this could be done by seeking the services of a « *huissier de justice* »,¹⁴⁶ whose main mission is to enforce executory titles, such as court decisions or notarial deeds, using civil enforcement procedures. The « *huissier de justice* »'s affidavit is an authentic instrument, which has the force of an authenticated deed.¹⁴⁷ It could be used to demonstrate to the judge that the digital files presented to him correspond to their digital fingerprints recorded

2018). <https://www.artnome.com/news/2018/7/21/art-world-meet-blockchain> (The service, BLOCKCHAIN YOUR IP, is already in use at www.blockchainyourip.com).

¹⁴⁴ See generally *supra* note 143.

¹⁴⁵ *Id.*

¹⁴⁶ The *huissier de justice*, who has no equivalent in the common law system, is a public and ministerial officer, appointed by the Minister of Justice. He is the only legal professional competent to serve and enforce court decisions. The *huissier de justice* is also called upon to draw up a large number of official reports and affidavit at the request of private individuals or on the commission of the judge.

¹⁴⁷ See C. CIV. [CIVIL CODE] art. 1369-1371 (on the authenticated deed); see also (June 24, 2019), <https://www.service-public.fr/particuliers/vosdroits/F2158> (*Huissier de justice*, Service Public.FR, *Direction de l'information légale et administrative*) (Official website of the French Administration - Legal and Administrative Information Department).

in the relevant block registered in the concerned blockchain.¹⁴⁸ Therefore, the intervention of the « *huissier de justice* » will allow the judge to admit such evidence, as the civil law judge cannot carry out this consistency check himself. Indeed, it is the burden of the parties to ascertain the facts and bring all material evidence to the judge, who can only rule on the basis of the facts brought before him.¹⁴⁹

In common law systems, such verification would traditionally be conducted by expert witnesses having the scientific or technical knowledge to assist the trier of fact.¹⁵⁰ However, the question of the admissibility of blockchain based IP evidence may arise. Some authors have already suggested that such evidence would be qualified as (potentially inadmissible) hearsay.¹⁵¹ For this very reason, Vermont passed an Act¹⁵² providing that a blockchain record is admissible over hearsay objections as a record of regularly conducted business activity.¹⁵³ Overall, the Act recognizes the validity of blockchain records, as well as their admissibility in courts as self-authenticating,¹⁵⁴ as long as such records are accompanied by a written declaration of a qualified person made under oath.¹⁵⁵ Thus, instead of producing an expert witness to verify blockchain-based evidence, the party offering the evidence is able to produce a simple certification from a person with knowledge that the evidence is indeed authentic.¹⁵⁶

¹⁴⁸ See generally *supra* note 143.

¹⁴⁹ In French law, see CODE DE PROCEDURE CIVILE [C.P.C.] [CIVIL PROCEDURE CODE] ARTS. 4-8 (FR.), regarding the respective roles of the parties and the judge. Article 4(1) provides that “the subject-matter of the dispute shall be determined by the respective claims of the parties” [translated from French]. Articles 6 to 8 of the French Civil Procedure Code state that the parties shall prove all alleged facts and that the judge may invite the parties to provide explanations of fact which he considers necessary to resolve the dispute. He may in no case base his decision on facts which the parties have not themselves determined or proven.

¹⁵⁰ See FED. R. EVID. 702; FED. R. EVID. 104(a) (principle of admissibility of the said evidence).

¹⁵¹ James Ching, *Is Blockchain Evidence Inadmissible Hearsay?*, LAW.COM (Jan. 7, 2016), <https://www.law.com/sites/jamesching/2016/01/07/is-blockchain-evidence-inadmissible-hearsay/?slreturn=20180407185952>.

¹⁵² See 12 V.S.A. § 1913 (2016).

¹⁵³ *Id.* §1913(b)(2).

¹⁵⁴ *Id.* §1913(b)(1). The act especially provides that “digital record electronically registered in a blockchain shall be self-authenticating pursuant to Vermont Rule of Evidence 902, if it is accompanied by a written declaration of a qualified person, made under oath, stating the qualification of the person to make the certification”.

¹⁵⁵ *Id.* §1913(b)(1).

¹⁵⁶ 12 V.S.A. § 1913(b)(1) (2016).

This echoes to Rule 902 of the Federal Rule of Evidence (“FRE”), which was recently amended to permit self-authentication of certain digital evidence¹⁵⁷ and potential blockchain-based evidence.¹⁵⁸ Even more interestingly, the FRE 902’s advisory committee notes specifically contemplate that “*nothing in the amendment is intended to limit a party from establishing authenticity of electronic evidence on any ground provided in these Rules, including through judicial notice where appropriate.*”¹⁵⁹ One could consequently envision admissibility of blockchain based evidence as being judicially noticed under FRE 201(b)(2).¹⁶⁰

The question of a machine statement authentication was actually debated in *United States v. Lizarraga-Tirado*¹⁶¹ in the context of digital tacks labeled with GPS coordinates. The Court emphasized that “*a proponent must show that a machine is reliable and correctly calibrated, and that the data put into the machine . . . is accurate.*”¹⁶² The court then added that such burden could be met “*with a testimony from a . . . programmer or a witness who frequently works with and relies on the program*”¹⁶³ or “*through judicial notice of the program’s reliability.*”¹⁶⁴ Similarly to the GPS coordinates in *Lizarraga-Tirado*, it would make sense for a court to judicially notice a blockchain’s digital

¹⁵⁷ See Fed. R. Evid. 902(13) (admitting as self-authenticating “Certified Records Generated by an Electronic Process or System.”); FED. R. EVID. 902(14) (admitting “Certified Data Copied from an Electronic Device, Storage Medium, or File.”).

¹⁵⁸ See Fed. R. Evid. 902(14) advisory committee note (“Today data copied from electronic devices, storage media, and electronic files are ordinarily authenticated by ‘hash value.’ A hash value is a number that is often represented by a sequence of characters that is produced by an algorithm based upon the digital contents of a drive, medium, or file. If the hash values for the original and copy are different, then the copy is not identical to the original. If the hash values for the original and copy are the same, it is highly improbable that the original and copy are not identical. Thus, identical hash values for the original and copy attest to the fact that they are exact duplicates. This amendment allows self-authentication by a certification of a qualified person that she checked the hash value of the proffered item and that it was identical to the original. The rule is flexible enough to allow certifications through processes other than comparison of hash value, including by other reliable means of identification provided by future technology.” This seems to particularly echo to blockchain technology.”).

¹⁵⁹ Fed. R. Evid. 902(13) advisory committee note on 2017 amendment (2017) (emphasis added).

¹⁶⁰ Fed. R. Evid. 201(b)(2) (2011).

¹⁶¹ *United States v. Lizarraga-Tirado*, 789 F.3d 1107, 1108 (9th Cir. 2015).

¹⁶² *Id.* at 1110 (emphasis added).

¹⁶³ *Id.*

¹⁶⁴ *Id.* (emphasis added).

fingerprint to prove the existence of an IP right. The admissibility of such evidence is better understood for blockchain technology, than for GPS coordinates in *Lizarraga-Tirado*. In contrast to the technology involved in the *Lizarraga-Tirado* case, most blockchains have neither single point of control, nor are based on country need.¹⁶⁵ Blockchain technology is therefore much less vulnerable to possible internal manipulation or a geo-political bias. It is reliable and accurate by design. This technology's inherent characteristics speaks to the core substance of FRE 202. Upon blockchain mass adoption,¹⁶⁶ it would make sense to imagine a United States Patent and Trademark Office's blockchain, whose entries will automatically be judicially noticed in the course of IP litigations.

Ultimately, and once these issues of admissibility of blockchain based evidence will have been fully addressed, the use of blockchain technology by lawyers will enable a better protection of the litigant in intellectual property cases through improved evidence law resulting in a better judicial system.

b. Blockchain's Registry Function and Digital Notary Services

Blockchain technology could also be used for digital notary services. In France, the notary public profession is highly regulated and is one of the basic units of primary justice. *Notaires* are public officers appointed by the Minister of Justice to receive deeds and contracts to which the parties must or wish to give the authenticity attached to official records, and to record the date and keep the deposit of such

¹⁶⁵ By contrast, some experts and geographers affirm that Google Maps sometime draw border differently from one country to another. *E.g.*, Crimea (object of a dispute between Ukraine and Russia), appears as Russian territory on Google Maps Russia. See Matthew Sparkes, *Revealed: How Google Moves International Borders*, THE TELEGRAPH (U.K.) (Jun. 24, 2014), <https://www.telegraph.co.uk/technology/google/10922595/Revealed-how-Google-moves-international-borders.html>. See also Frédérique Schneider, *Google Maps : des frontières à géométrie variable*, LA CROIX (Jan. 21, 2020), <https://www.la-croix.com/Sciences-et-ethique/Sciences-et-ethique/Google-Maps-frontieres-geometrie-variable-2020-01-21-1201073047> (Fr.). Such an asymmetry would not be possible with a cross-border blockchain.

¹⁶⁶ For mass-adoption, State endorsement seems to be necessary. See, *e.g.*, Estonia. The Baltic country is already a leader in digital governance and is working with a number of companies to transfer medical record, governmental records, notary services, banking infrastructure and even e-voting system to blockchain. The argument about state endorsement is our analysis. For Estonia adoption of blockchain, see the PWC report, *Estonia – the digital republic secured by blockchain*, PwC, <https://www.pwc.com/gx/en/services/legal/tech/assets/estonia-the-digital-republic-secured-by-blockchain.pdf>.

documents.¹⁶⁷ Family law matters are the traditional field of their activity: marriage contracts, inter-vivos gifts between spouses, wills, etc. French notaries are also very active in the real estate area, where they traditionally intervene in negotiating the sale of real property or signing the contract and the deed.

Could the existence of French notaries be challenged by blockchain technology? Contrary to the United States, their role is not limited to processing information and recording deeds, but extends to certifying and validating the content of all documents on which they have affixed their seal.¹⁶⁸ In other words, French notaries have the unique function of verifying and ascertaining the statements contained in the deeds they establish or validate, as well as the full identity of the concerned parties. They are guarantors of the veracity of the deed. Because of such essential functions, in French law, notaries could not be supplanted by blockchains.¹⁶⁹

Blockchain technology could, however, help the notary by enabling him to process information more quickly and automate certain tasks, thus freeing up his time in order to provide better advice to his client. There are already proposals for the implementation of a consortium blockchain¹⁷⁰ in this sector.¹⁷¹ The notary's role will be to verify

¹⁶⁷ See Ordonnance n° 45-2590 du 2 novembre 1945 relative au statut du notariat [Ordonnance n° 45-2590 of November 2, 1945 relating to the status of the profession of notary public].

¹⁶⁸ See Vivien Streiff, *Blockchain et propriété immobilière: une technologie qui prétend casser les codes*, [Blockchain and Real Estate: A Technology That Pretends to Break the Codes], DROIT & PATRIMOINE, n°262 (Oct. 2016); see also Vivien Baufumé & Christophe Carminati, *La blockchain, un outil technologique... et juridique*, [The Blockchain: a technological... and legal tool], JCP N. 2020, n°30, 1162 (Jul. 24, 2020); see also Bayle et al. *supra* note 11, at 25-27.

¹⁶⁹ *Id.*

¹⁷⁰ In a consortium blockchain, several independent or even competing players control the network and determine the rules of governance and access rights to the network. Only certain participants validate transactions.

¹⁷¹ Since 2018, la Chambre des Notaires de Paris [the Paris Chamber of Notaries] has been developing a consortium blockchain with the aim of strengthening confidence in the exchanged documents and facilitating the verification of documents and identity control when signing a deed. A website (blockchain-notariale.fr) will soon be launched for public testing. This private blockchain will be operated by twelve miners equipped with a dedicated mining server. In 2020, the Paris Chamber of Notaries also plans to integrate the directory of unlisted public companies into its private or licensed blockchain, based on the Hyperledger Fabric. See Stephen Adler, et al., *TechNot2019 Conference*, YOUTUBE (Oct. 17, 2019), <https://www.youtube.com/watch?v=zZ11Q95JH1g>.

and attest to the veracity of the information, guaranteeing the integrity of the documents before they are even registered. The use of a blockchain will then make it possible to provide time stamping and appropriate guarantees thanks to the afferent digital fingerprint.¹⁷² These new features would allow French notaries to refocus their time on their advisory activities by relieving them of their certification duties, as opposed to authentication.¹⁷³ Similarly, the use of smart contracts would make it possible to automate certain phases of notarial contracts and certain notarial tasks.

In the United States, the roles of a notary are less extensive. Notaries public generally verify the ID of the document signer to prevent fraud and check for volition and awareness. They most commonly serve as a witness to the signing of documents before they record these acts in a ledger, serving as proof that documents were signed, witnessed and notarized between parties. Once more, the characteristics of blockchain promise to be a great asset to improve U.S. notary capabilities.¹⁷⁴ If blockchain's identity verification is still in its infancy, it is possible to imagine the creation of a blockchain-based ledger, which allows for the timestamp of documents while simultaneously recording them. This immutable database would greatly simplify the bookkeeping procedure. One could easily envision a national decentralized notarization system accessible and searchable by all parties.¹⁷⁵

c. Blockchain for Corporate Governance

Finally, another interesting blockchain technology use, resides in its potential to facilitate corporate lawyers' work as a new way for voting, trading corporate shares, and transferring ownership. Delaware has already embraced this potential to optimize corporate governance. This change stems from the inability of the current system to

¹⁷² *Id.*

¹⁷³ Interestingly, French notaries have expressed their views on such a distinction. They stated that blockchain is a certification technology, not an authentication technology. This is how the French Notary profession stands out and rises above this technology, as blockchain can only keep digital fingerprints of documents, and not (yet) effectively check the identity, capacity and powers of the parties when time-stamping documents. See Gaëlle Marraud des Grottes, *La blockchain : un secteur encore en phase d'exploration, mais très prometteur*, RLDI n°138, 39 (Jun. 2017) (Fr.).

¹⁷⁴ In fact, initiatives are already arising in this field. See for example: the startups "Blocknotary" or "STAMPD."

¹⁷⁵ *Id.*

accurately track in real time trading activity and shareholder voting, deficiencies, specifically acknowledged by Vice Chancellor Laster.¹⁷⁶ Not only did he suggest using blockchain technology to address these problems, but he also suggested relying on smart contracts for dividend payments and proxy statements,¹⁷⁷ which would reduce overall transaction costs.¹⁷⁸ Blockchain technology indeed appears to be the ultimate tool in defining voting permissions, all the while organizing innovative and instantaneous voting channels. Blockchain can encode consensus rules, making collective decision-making more efficient and transparent.¹⁷⁹ The Delaware General Corporation Law was thus amended¹⁸⁰ to allow Delaware's corporations to use "*distributed electronic networks or databases*" to set up and maintain corporate records¹⁸¹ and to allow the stock ledger to be administered using "*any information storage device, method, or one or more electronic networks or data bases.*"¹⁸² The delivery of shareholder notice by the distributed ledger platforms notice was also authorized.¹⁸³

Blockchain's potential to solve corporate governance issues was not only embraced by states, but also by private actors. Blockchain initiatives are progressively arising based on the model of decentralized autonomous organizations ("DAO"). In essence, a DAO enables the creation of decentralized decision-making structure, where

¹⁷⁶ J. Travis Laster, Vice Chancellor, Delaware Court of Chancery, *The Block Chain Plunger: Using Technology to Clean Up Proxy Plumbing and Take Back the Vote*, COUNCIL OF INSTITUTIONAL INVESTORS (Sept. 29, 2016), http://www.shareholderforum.com/access/Library/20160929_Laster-CII-speech.pdf.

¹⁷⁷ *Id.* at 20.

¹⁷⁸ See David Yermack, *supra* note 98, at 9.

¹⁷⁹ See Aaron Wright & Primavera de Filippi, *supra* note 6, at 36-37.

¹⁸⁰ See for an in deep analysis of the said amendments: Matthew J. O'Toole & Michael K. Reilly, *The First Block in the Chain: Proposed Amendments to the DGCL Pave the Way for Distributed Ledgers and Beyond*, HARV. L. SCH. FORUM ON CORP. GOV. (Mar. 16, 2017), <https://corpgov.law.harvard.edu/2017/03/16/the-first-block-in-the-chain-proposed-amendments-to-the-dgcl-pave-the-way-for-distributed-ledgers-and-beyond/>; see also Wonnie Song, *Bullish On Blockchain: Examining Delaware's Approach to Distributed Ledger Technology in Corporate Governance Law and Beyond*, HARV. BUS. L. REV. (Jan. 3 2018), <https://www.hblr.org/wp-content/uploads/sites/18/2018/01/Bullish-on-Blockchain-Examining-Delaware%E2%80%99s-Approach-to-Distributed-Ledger-Technology-in-Corporate-Governance-Law-and-Beyond.pdf>.

¹⁸¹ DEL. CODE. Tit. 8, §224 (Supp. 2017).

¹⁸² *Id.* (emphasis added).

¹⁸³ See *id.* §232(d)(1) to clarify the definition of electronic transmission. It now includes "any form of communication including the use of, or participation in one or more distributed electronic networks or databases."

shareholders are allowed to directly vote and contribute to projects based on their voting rights. Siemens AG was one of the first company to implement an internal DAO, named the “Decentralized Digital Organization” (“DDO”) in partnership with Slock.it.¹⁸⁴ The Siemens internal social network invited all employees to choose their favorite general purpose for the DDO. The employees voted for a project dedicated to helping socially disadvantaged children. Employees could then donate euros in exchange for company-owned tokens, before changing their coins into shares. Proposals for projects fitting the social purpose of the DDO could subsequently be submitted by each shareholder using the DDO framework. In turn, all shareholders could vote for or against these proposals, with a voting weight proportional to the number of shares in their possession.¹⁸⁵

Similar to Siemens, innovative organizations are gradually adopting more decentralized models for corporate governance. The general idea behind these blockchain-based corporate governance schemes, is that complexity is manageable when small teams are entitled to make autonomous on-site decisions, thus improving both the pace and the efficiency of corporate decision making.¹⁸⁶ Similarly, these models trigger greater stakeholder involvement, making them feel more invested in the daily life and governance of the company.

All in all, blockchain technology presents the potential to optimize corporate governance while improving corporate schemes transparency for relevant stakeholders. It allows corporate lawyers to focus on what matters and not on administrative deadlocks tied to the constraints of an outdated system.

¹⁸⁴ Steffen Kux, Heiko Burkhardt, & Stephen Tual, *Siemens AG Hutten-DDO: The first Fortune 500 company using the DAO Framework*, SLOCK.IT BLOG, <https://blog.slock.it/siemens-ddo-the-first-fortune-500-company-using-the-dao-framework-2fd970b0b138> (last visited Feb. 9, 2020).

¹⁸⁵ *Id.*

¹⁸⁶ See Henri Jacobs, *The future of corporate governance*, OER COMMONS INSTITUTE FOR THE STUDY OF KNOWLEDGE MANAGEMENT IN EDUCATION (Feb. 6, 2019), <https://www.oercommons.org/authoring/51844-essay-the-future-of-corporate-governance/view>.

B. Going further? Innovation in the Legal Professions

1. Toward an Evolution of the Legal Professions and of the Practice of Law

The downside is that digitization and use of blockchain protocols, could effectively suppress certain legal professions. It is easy to imagine the disappearance of court clerks issuing documents without any *in concreto* control. Generally speaking, any activity in the law market consisting of managing registers¹⁸⁷ or certifying that a document is in conformity with an original (or issuing a copy of an original thereof) could usefully be replaced by blockchain based services. We could thus envision the disappearance of notaries public in common law jurisdiction, once blockchain based identity verification protocols are accepted as reliable by the public.

The upside is that blockchain could lead to the creation of new businesses or the in-depth transformation of existing professions by refocusing on their added value. For example, the insurance industry could considerably reduce processing costs by automating the indemnification process when certain filing conditions are met.¹⁸⁸ Similarly,

¹⁸⁷ As previously emphasized, in France a decree was adopted on December 24, 2018, describing the conditions under which unlisted financial securities might be registered and transferred using blockchain. See CODE MONÉTAIRE ET FINANCIER [MONETARY AND FINANCIAL CODE] art. L. 211-3, L223-12 (Fr.). When created, the dedicated blockchain will then be a decentralized and distributed registry listing all transactions relating to the registered securities, eliminating the need for a securities account keeper. The risk of human error, such as forgetting to transcribe an operation would thus be completely eliminated.

¹⁸⁸ See, in particular the index based or parametric insurance sector. Based on weather data, these insurance solutions help to secure farmers' incomes. As soon as a meteorological anomaly is observed (based on a rainfall index or other selected criteria), compensation is triggered. The entire process could be planned on a blockchain basis using smart contracts, allowing automatic and immediate compensation of policyholders according to the terms of the smart contract deployed. "Fizzy" was the first French parametric insurance company based on the Blockchain. It was developed by Axa and it made it possible to automatically compensate an insured party in the event of a delayed flight. The project was terminated in 2019. The "B3i" initiative is currently working with industry partners to use and embed blockchain technology into various applications for the insurance market. A. Cohn, T. West, & C. Parker, *Smart after all: Blockchain, Smart Contracts, Parametric Insurance, and Smart Energy Grids*, 1 GEORGETOWN L. TECH REV. 273-293 (2017); see also AXA Goes Blockchain with Fizzy, AXA (Sept. 13, 2017), <https://www.axa.com/en/magazine/axa-goes-blockchain-with-fizzy>; this article explaining when the experiment ended: Miranda Wood, *AXA Withdraws Blockchain Flight Delay Compensation*

experts are working on solutions that would allow time-stamping the proof of existence of objects, at the time of their purchase, or of furniture in one's dwelling. This would allow simplified and almost immediate compensation in the event of theft or damage.¹⁸⁹ As previously outlined, and peculiar to the judicial realm, civil law « *huissiers de justice* »¹⁹⁰ could have a new role aimed at certifying that the evidence put forward is indeed on the blockchain. Even more innovative, it would be conceivable to program smart contracts to ensure the automatic enforcement of court decisions, provided that the enforcement could be done in a dematerialized way.¹⁹¹

2. *Smart Contracts for Smart Lawyers*

Smart contracts could present another opportunity for the legal professions. The term is, however, a double misnomer,¹⁹² as it is neither a *smart* program nor a *contract*.¹⁹³ By its design, a smart contract

Experiment, LEDGER INSIGHTS (Nov. 11, 2019), <https://www.ledgerinsights.com/axa-blockchain-flight-delay-compensation/>.

¹⁸⁹ See for example “Monuma”, a startup that offers to appraise, protect, value and preserve goods. Blockchain technology is used to have irrefutable time stamped proof of the existence of objects as well as their geolocation at a given time. Similarly, in the art industry, multiple companies are working on creating a digital database allowing to prove chain of custody and ownership of a piece of art. See for example “ArtChain Global.”

¹⁹⁰ See *Huissier de justice*, *supra* note 147 and accompanying text for a description of the « *huissier de justice* » profession in civil law countries and more particularly in France.

¹⁹¹ For example, by escrowing via a smart contract the sums requested in the dispute. This promises to raise a plethora of difficulties, to cite only the case of an adverse ruling of appeal, although the first ruling will have been automatically enforced using a smart contract.

¹⁹² And some prefer to call smart contracts “transactional scripts.” See Shaanan Cohny & David A. Hoffman, *Transactional Scripts in Contract Stacks*, U. OF PENN., INST. FOR L. & ECON. (Research Paper No. 20-08) (Jan. 22, 2020), <https://ssrn.com/abstract=3523515>. To be more precise: “A transactional script is a persistent piece of software residing on a public blockchain. When executed as a part of an exchange, the code effectuates a consensus change to the state of a ledger.” Thus, “transactional scripts sit at the core of the rapidly expanding group of things called ‘smart contracts,’ but do not encompass the whole field.” See *also id.* at 5.

¹⁹³ However, it is smarter than paper-based contracts. See Nick Szabo defines smart Contracts as “a set of promises, including protocols within which the parties perform on the other promises. The protocols are usually implemented with the programs on a computer network, or in other forms of digital electronics, thus these contracts are “smarter” than their paper-based ancestors. No use of artificial

allows the autonomous performance of obligations. In other words, it is just a smart way of managing a contract in the computational understanding of the term. However, and from a lawyer's perspective, smart contracts can be used as the digital emanation of "regular" legal contracts. They are easily perceived as a means for automated performance on a blockchain of a pre-existing contract. In order to achieve such a result, it must be ensured that the legal terms of the contract are faithfully transcribed with the same meaning in the computer code.¹⁹⁴

Problematically, smart contracts are computer programs that are intelligible neither to lawyers, nor to laypersons, as they are written in "computer language" and not in a natural language, such as English.¹⁹⁵ Thus, translation is essential to the use of smart contracts. But lawyers and computer coders do not always understand the other's jargon, which can lead to errors in the translation process and when encoding actions that the contracting parties had not agreed upon. It is certain that if lawyers want to maintain a crucial role in drafting contracts while keeping up with innovation, they will have to familiarize themselves with coding and blockchain mechanics. The translation issue is definitely one that needs to be addressed.

Another issue arises when considering the question of the link between the virtual, decentralized world and the real physical world. The performance terms in smart contracts, can refer either to terms of date or other entries in the blockchain. The contract is then programmed to check that these entries exist—or that the performance deadline has passed. They can also refer to external information. However, the smart contract is not itself able to search for the necessary information outside the blockchain where it is implemented. To that extent, one could say that smart contracts are blind; they can only receive information, not ask for it. It is necessary then to rely on a trusted third party to transmit the extrinsic information triggering the smart

intelligence is implied." *Smart Contracts Glossary*, ALAMUT, http://www.alamut.com/subj/economics/nick_szabo/smartC_gloss.html (last visited Feb. 8, 2020).

¹⁹⁴ J. G. ALLEN, *Wrapped and Stacked: "Smart Contracts" and the Interaction of Natural and Formal Languages*, 14 *EUROPEAN REVIEW OF CONTRACT L.*, 307-343 (2018); S. Farrell, H. Machin & R. Hinchliffe, *Lost and found in smart contract translation - considerations in transitioning to automation in legal architecture*, 33 *J. OF INT'L BANKING L. & REG.*, 24-31 (2018).

¹⁹⁵ See Intermediate coding languages then make it possible to link the level of processing operated by the computer and that of the programming languages themselves. See GARAPON & LASSÈGUE, *supra* note 50, at 35; see *infra* 1) *The impossible direct access to blockchain protocols: the computer code barrier*.

contract. These special entities are called “oracles.”¹⁹⁶ They can be “*real-time data feeds that deliver things like weather data, currency exchange rates, airline flight information, and sports statistics to smart contracts.*”¹⁹⁷ This third-party oracle is in charge of reliably entering the information into the blockchain so that the contract could be executed correctly. The primary challenge relating to smart contracts is in succeeding to ensure the reliable transmission of extrinsic information. Otherwise its successful implementation would be compromised.

Could legal professions renew themselves as oracles? Private companies are already blossoming in the field, providing trusted digital third-party services with technical oracles transmitting information sourced outside the blockchain.¹⁹⁸ That being said, the legal professions have always been the classic trusted third-party, qualified to certify the veracity of information. They could very well position themselves as oracles to enable certain smart contracts’ pre-defined conditions to be met.

In civil law countries, it is possible to think of notaries,¹⁹⁹ who would provide the necessary data for smart contracts performance, while guaranteeing their reliability. In the case of testamentary dispositions in the form of a smart contract, a notary digital affidavit could

¹⁹⁶ Vitalik Buterin, *Ethereum and Oracles*, ETHEREUM BLOG (July 22, 2014), <https://blog.ethereum.org/2014/07/22/ethereum-and-oracles/>; see also Stefan Thomas & Evan Schwartz, *Codius Whitepaper*, GITHUB (July 17, 2018), <https://github.com/codius/codius/wiki/blob/master/White-Paper.md> (introducing the concept of “smart oracle” as “trusted or semi-trusted entities that can both provide information about the outside world and execute the code to which the contracting parties agreed.”).

¹⁹⁷ Mike Orcutt, *Blockchain Smart Contracts are Finally Good for Something in the Real World*, MIT TECH. REV. (Nov. 19, 2018), <https://www.technologyreview.com/s/612443/blockchain-smart-contracts-can-finally-have-a-real-world-impact/> (Oracles can also be individuals designated to transmit the necessary information from the physical world to the smart contract) (emphasis added).

¹⁹⁸ See for example “Decentralized Information Asset” or “DIA” an open-source, data and oracle platform especially validating and delivering trusted financial data; see also “Chainlink” which connects smart contracts to off-chain real world events information.

¹⁹⁹ See Ordonnance n° 45-2590 du 2 novembre 1945 relative au statut du notariat [Ordonnance n° 45-2590 of November 2, 1945 relating to the status of the profession of notary public]; see also *infra* Section IV(A)(2)(b), *Blockchain’s Registry Function and Digital Notary Services*, for a description of the notary’s profession in civil law countries and more particularly in France.

for instance certify the death of an individual, thus triggering the distribution of crypto assets. In the real estate industry, the notary could certify the completion of the renovation work as a condition precedent to the sale. One could also envision the certification of a marriage to allow the entry into force of the spouses' marital agreement in the form of a smart contract. Similarly, « *huissiers de justice* »²⁰⁰ could just as well play the role of a trusted digital third party, given their historical role of certifying facts that have occurred in real life. They could act as guardians of the digital viability of the data entry. This can be done both when designing the smart contract and during its subsequent execution. « *Huissiers* », as delegates of the state authority, enable the guarantees provided on the technical level to be legally anchored.

Projects are being developed to implement smart contract standards,²⁰¹ which will allow lawyers to indicate the parameters that meet the specifications of the contracts that they want to code. While such a solution would make it possible to code common and fairly standard contracts, it would not allow for refined customization, as is often necessary. It might then be necessary to go further and develop real computer coding skills and knowledge of blockchain protocols among lawyers. Technical and legal mastery of the blockchain ecosystem seems critical in order to allow the legal profession to rapidly evolve and tackle their clients need, or even anticipate them. If the lawyers of tomorrow are coding lawyers, there is no doubt that the legal professions will be able to count among blockchain technology's their next building block.

²⁰⁰ See *Huissier de justice*, *supra* note 147 (The *huissier de justice*, who has no equivalent in the common law system, is a public and ministerial officer, appointed by the Minister of Justice. He is the only legal professional competent to serve and enforce court decisions. The *huissier de justice* is also called upon to draw up a large number of official reports and affidavit at the request of private individuals or on the commission of the judge); see *infra* Section IV(A)(2)(a)(ii), *Blockchain-Based Evidence for IP Litigation*, for a description of the *huissier de justice* profession in civil law countries and more particularly in France.

²⁰¹ See, e.g., the Common Accord aims to convert traditional contracts into computer code and, in the long term, to automate the drafting of legal documents by using a model of codified texts; see also Openlaw and Monax, both projects working on developing digital contracts including code that are automatically generated and can be automatically performed; see also the initiative led by Linklaters UK in partnership with Accord Project to connect key players in the world of smart contract technology, blockchain and legal tech companies so that ideas and formats can be shared across the industry.

V. CONCLUSION: LEGAL ENGINEERING AND TOMORROW'S
LAWYERS

As observed by R. Gellman, “*in contemplating the social, political and economic effects of networks, it is important to understand what is being changed and how existing institutions are likely to be affected.*”²⁰² Blockchain technology will undoubtedly lead to profound social change that will not leave the legal professions unscathed.

We have shown that although blockchain amounts to a form of deinstitutionalization, there is not a total disintermediation. After the rise of intermediate platforms between the protocol and the user,²⁰³ trusted third parties are reappearing as oracles for smart contracts.²⁰⁴ In other words, blockchain does not lead to the disappearance of trusted third parties, but to a redeployment of their role, as well as to the genesis of new intermediaries replacing traditional institutions. The need to use oracles appears to be a real obstacle to total disintermediation, but all the while, there remains a unique opportunity for lawyers to take their professions to new paradigms.

Blockchain needs the law and the legal professions need blockchain. As we have outlined, this technology has already been the focus of much regulatory attention. While blockchain technology will have the effect of eliminating certain legal professions, it would most definitely lead to a profound transformation of existing ones. Blockchain offers a whole new avenue to IP litigation, handling and storing of evidence or corporate governance and so many other possibilities in terms of legal engineering. At the dawn of this new era, tomorrow's lawyers will be those who have learned how to code and how to understand the technicalities of blockchain protocols.

The 2019 Gartner Hype Cycle²⁰⁵ for Blockchain Technologies²⁰⁶ shows that blockchain is still five to ten years away from reaching its

²⁰² Gellman, *supra* note 27, at 7-8 (emphasis added).

²⁰³ *See supra* note 69 and accompanying text.

²⁰⁴ *See generally supra* note 198 and accompanying text.

²⁰⁵ The Gartner hype cycle for technology adoption is a graphical and conceptual presentation of the maturity of emerging technologies through five phases. It was developed by the technology research and advisory company Gartner. Overall, it describes that a technology generally faces a period of hype accompanied by a peak of inflated expectations, followed by a period of disillusion, before the technology finally reaches its transformational impact.

²⁰⁶ *Hype Cycle for Blockchain Technologies*, GARTNER RESEARCH (July 11, 2019), <https://www.gartner.com/en/documents/3947355/hype-cycle-for-blockchain-technologies-2019>.

plateau of productivity. For blockchain to become mainstream, users should not have to struggle between choosing “*the right platform, the right smart contract language, the right system interfaces, or the right consensus algorithms.*”²⁰⁷ In the meantime, it is up to the legal professions to embrace change and innovation, to envision tomorrow’s practice. Going further, the legal professions could very well become a driving force in blockchain technology’s mass adoption. If the legal professions, our traditional trusted third-parties, endorse this technology, it would demonstrate to the world that blockchain offers a real avenue for progress.

²⁰⁷ Avivah Litan, *Top Trends in Blockchain Technology; inching towards Web 3.0*, GARTNER BLOG NETWORK (Sept. 19, 2019), <https://blogs.gartner.com/avivah-litan/2019/09/19/top-trends-blockchain-technology-inching-towards-web-3-0/> (emphasis added).