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Editors

Blockchain, Law and Governance

Blockchain and Comparative Law

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1. Introduction

The Chapter contains a preliminary exploration of the notion and functioning of blockchain technology (hereinafter 'blockchain') in the light of comparative law and specifically the theories of legal formants (Sacco 1991) and transnational law and global law (Siems 2018, 303-331; Michaels 2016; Husa 2015, 55).

The Chapter argues that blockchain networks can be fruitfully conceptualised according to the categories of comparative law (Michaels 2016; Husa 2015, 55; Calliess and Zumbansen 2012). In particular, transnational law refers to any law that transcends state laws (Jessup 1956, 2). The conceptual framework of such a theory includes, for example, the shift from regulation to co-ordination, the hybridisation of private and public regimes, the relationship between soft law and hard law, and, finally, the establishment of regimes capable of legislating and enforcing their norms (Calliess and Zumbansen 2012, 96 fs.). Here the point is that public and private blockchains, while very different (Konashevych 2019), show to have all these characteristics that are proper of transnational law regimes.

Blockchain technology enables the creation of decentralized currencies, self-executing digital contracts and intelligent assets that can be controlled

over the Internet. This technology also enables the development of new governance systems with more democratic or participatory decision-making, and decentralized (autonomous) organizations that can operate over a network of computers without any human intervention (Lianos, Hacker, Eich and Dimitropoulos 2019). These applications have led many to deem that the blockchain will shift the balance of power away from centralized authorities in the field of communications, business, and even politics or law (Finck 2018; De Filippi and Wright 2018).

Blockchains, in fact, consist of a series of nodes, miners and programmers that affect the overall architecture of the chain of blocks, acting in cooperation on the networks. In essence, such a system comes ex ante to the regulation of user conduct, through a series of system settings, similarly to what could happen in the physical world through architectural choices that affect the physiognomy of buildings and the structuring of roads. Thus, it is self-effective because it finds its effectiveness in the very fact of its existence and efficiency.

Having in mind this, we argue, they are private regimes that operate in the digital environment and, consequently, they tend to rely on self-produced rules (i.e. the code) and, thus, are conceptually in search of autonomy from domestic legal systems. Additionally, we underline that the code and the law are subject to a process of hybridisation. Our point is that blockchains are governed by different forces: code, law, but also market and social norms. We also note that smart contracts play a central role within these digital networks not only to support trade, but also to govern the blockchains.

Thus, the aforementioned argument (i.e. the conceptualisation of blockchains in terms of transnational law regimes) obviously has relevant

consequences. Analysing blockchains as private regimes helps us to highlight three fundamentals of this emerging technology.

Firstly, blockchain networks are discussed here as private powers of the digital environment, grounding on the architecture and using the language of the web, namely coding and, precisely, *the lex cryptographia* (De Filippi and Wright 2018). In particular, the Chapter questions the well-known expression 'the code is law' with the view of clarifying its boundaries and considering its relationship with state-based law.

Secondly, blockchains have a transnational dimension. This is to say that comparative lawyers may consider the code as a case of global law by assuming that computer scientists use the common language of maths and algorithms across legal systems.

Finally, our arguments show that smart contract plays a regulatory function in governing blockchains. Specifically, we argue that, in blockchain ecosystems, contracting is not merely a transaction tool, but also a fundamental part of the architecture and governance of the system. Put it differently, we argue that smart contracts are contributing to govern the networks by definitively bridging the technical and the legal perspectives.

In conclusion, our analysis confirms the process of hybridisation of law and code that characterises contemporary legal systems, while stressing the need to acknowledge these changes and deal with them to cope with the challenges posed by innovation to the law.

2. Blockchains as Transnational Law Regimes

Legal scholars widely explored the crisis of State as a source law (Michaels 2016; Husa 2015, 55; Calliess and Zumbansen 2012) and,

consequently, the emergence of various forms of (self)-regulation coming from particular 'social subsystems' of an economic and technological matrix. In particular, Teubner discussed the topic to elaborate the concept of an autopoietic system that is capable of reproducing and maintaining itself (Teubner 1992). In essence, these are forms of self-regulation that stand alongside the State to respond to the irrepressible need for rapidity and efficiency in managing the transnational private activities that are specific to a global society (Teubner 2004, 59). Following the plots of this approach, it is easy to note that law making is moving from states – institutionally appointed to legislate – to private regulators. This process of private regulation occurs by the agreements entered into by global players, such as multinationals companies and the world standardization organisations, just to mention a few (Teubner 2004). Private regulation is central also in the Internet as we note bellow (Lessig 1999b).

Given this background, the Chapter points out that blockchains may be fruitfully conceived as global private regimes according to Teubner's theory. It is also important to note that they show very peculiar characteristics with respect to the classical theory of transnational law (Michaels 2016; Husa 2015, 55; Calliess and Zumbansen 2012).

Firstly, they belong to the digital world, rely on the *lex cryptographia*, and allow nodes to operate without borders and across national borders (see the Section 'Global Law'). In this regard, it may be useful to clarify that blockchains operating in the digital world are organized into three most common forms (Konashevych 2019). First, there are public blockchains that are purely peer-to-peer, decentralized and permissionless. In such a case, any miner can access the network to add, verify or validate data without restrictions at any time. Secondly, we can observe private blockchains, namely a chain of block that is permissioned and controlled

by a central authority, which grants permission to pre-selected people who can add and verify records. Additionally, it is also possible to distinguish consortium blockchains that are also formed as permissioned and where a group of nodes governs all transactions. An author believes, for example, that private blockchains, where the requirement of decentralization fails, cannot be conceptually configured as real blockchains (Konashevych 2019).

Secondly, digitalisation and its more recent developments - blockchains - have had far from secondary consequences with respect to space, time and emancipation. On the one hand, this has strengthened the 'a-spatial dimension' of economic-social relations. In this sense, it is possible to argue that transnational blockchains create a set of jurisdictions other than state without a territorial basis. It makes little sense to try to replicate in this case the forms of regulation of States, making an emerging and decentralized law rather necessary, but converging towards common rules for mutual coordination. On the other hand, blockchain ideology determined the removal of the hierarchy in intersubjective relationships that are occurring in a sort of 'a-temporality'. It promotes an emancipatory right from below, non-state, whose purpose is coordination and not subordination. It is a right that arises in the context of self-determination and is conceived as autonomous, not hierarchical, and governed by contract.

Notwithstanding the variety of their forms and structures, blockchains as global private regimes of the digital world are generally developed rules and practices expressed in the language of informatics (i.e. the code). We mean that the code is produced freely, autonomously in the network and it is based on cooperation and autonomy. These are experiences that are currently limited, niche proposals, even if today they represent a new

organisational model. Thus, the code has been adopted by the actors of the networks (coders, miners), who, despite being deprived of a central authority, are capable of regulating the activities of the actors of blockchains (Teubner 2004; Wright and De Filippi 2018).

On such basis, the Chapter stresses that the aforementioned process of 'emptying' state sovereignty towards sector social subsystems has found in the evolution of digital technology, that is to say blockchains, its greatest propulsive support. The process shows in recent times a more intense acceleration due to the 'digital revolution', which created an instant connection method between the various users of the global blockchains networks. For example, for Teubner, modern law has failed as a regulator of social behaviour and as a composer of conflicts. He believes that the origin of the crisis of law must be sought in the inadequacy of law itself (and in particular of positive law) to face the complexity of society in terms of social structures and systems interacting with each other (Teubner 2004). This analysis offers an extraordinary tool for understanding the blockchain phenomenon. Indeed, the law is unable to deal with blockchains.

In light of the foregoing considerations, it is clear that the structure of blockchains poses an extremely complex task for the researcher in comparative law, who is called to examine the dynamics of the very different legal formants of the blockchain.

3. Legal Formants and the Blockchain

With reference to our case, the retreat of the directive action of the states is confirmed by the rise of forms of a regulation which is internal to the dynamics of the blockchains and, sometimes, comes directly from the

evolution of the technique. A precise confirmation of this perspective can be found in the context of cyberspace, the creation and development of which represents an almost exclusive expression of the technology (Lessig 1999, 1999b). Clearly, such direction subverts the traditional conception of the law, as an expression of the sovereignty of the state and of the effectiveness of the 'proper' legal norm, finding in the programming code the main disciplinary factor of these networks.

The new 'law' evokes the image of a self-produced law that would be more democratic that the old 'law'. A similar mystification regards the representation of a sort of 'crypto-legal system'. In the case of blockchains, the snapshot of a soft and polycentric network is placed on the top-down portrait of a private regime symbolically represented by a horizontal network of nodes. Thus, the problems underlying the discipline of the blockchains are part of a wider context that has seen the process of economic and commercial globalisation determine the decline of political power as the main source of regulation of human conduct (Brownsword, Scotford and Yeung 2017). For the philosopher Severino, technology is not handmaiden of the forces that govern the world, but itself governs the destiny of humanity. Indeed, technology continues its path knowing that it will not encounter any obstacles and no impassable limits (Irti and Severino 2001 and 2006). In his words: "The great forces of the Western tradition have the illusion then of availing of the technique to achieve their purposes: the power of technique has become in fact, or has already started to become, their fundamental and primary purpose" (Severino 2009, 8-9).

Unlike the law which - as traditionally understood - constitutes the expression of a specific ideological system and tends to achieve a precise model of society, technology is conceptually neutral and devoid of a

teleological perspective. It is placed on an eminently 'functional' plan and operates the same as a mechanistic criterion (Tien 2004). In essence, it is exhausted in its own functioning, allowing the explanation of certain behaviours and inhibiting others, whose selection must be considered the result of an evaluation performed on the basis of rules of economic efficiency.

In this sense, technology constitutes an essential tool for the emergence of globalization, allowing to overcome the legal fragmentation deriving from the diversity of individual national laws. Interestingly, it is not implemented in a normative way, but on a functional basis (Creutzfeldt, Mason and McConnachie 2020).

Here, an analogy with the theory of legal formants of a system (Sacco 1991) only hold to a certain point in our case, but it helps us in understanding basic blockchain governance structure. The 'legal formants' of blockchain systems are the code, the law, when available and relevant, the social norms and the market forces (Lessig, 1999, 1999b).

The first tool is the most interesting for the purposes of this paper: Lessig indicated the term 'architecture' in his studies about the governance of the web. It represents a criterion and form of organization of the environmental context in which the behaviour of several individuals who operate therein are expressed and developed, and whose configuration and structuring, from an eminently 'technical' point of view, in the sense of allowing or inhibiting the performance of certain actions (Lessig 1999).

With reference to blockchains, by grounding on Lessig's framework, two authors developed the idea that the widespread deployment of blockchains will lead to the expansion of a new subset of laws, which they called *lex cryptographica* or code (as before mentioned) consisting of

'rules administered through self-executing smart contracts and decentralized (autonomous) organizations' (Wright and De Filippi 2015). In this context, it is possible to understand Wright and De Filippi's statement - code is law - regarding the governance of blockchains (De Filippi and Wright 2018). To clarify, the authors have taken up Lessig's thoughts on the fundamental role of the technology (ie. informatics in our case) in governing the web and applied such ideas to blockchains (Lessig 1999, 1999b). In this sense, it is possible to say in a provocative way that blockchains are crypto private regime of the digital world interacting with the law of the real world.

Thus, one may argue that the core developers of the blockchain are like the legislative power of the blockchain system. Actually, they have the power to develop the code and add it to the core repository, but they do not have the power to put it into effect. Instead, full nodes have that power. An author notes: "Full nodes are like the judicial branch of blockchains. While the legislative branch can make as many laws as they want, the judicial branch can choose not to implement those laws if it finds them to be unlawful" (Maddrey 2018, 3).

The second formant is law, which continues to play an important role, being able to direct the disciplinary scope of the other factors, stimulating, directly or indirectly, above all the market structures and the configurations of the technique.

The third tool consists of social norms, which, although devoid of the character of coercibility, are capable of affecting the behaviour of affiliates, through a mechanism of psychological conditioning that manifests itself in social reprobation towards those who violate those rules, based on ethical, civil and moral aspects of a given human consortium.

The third instrument is the market, which requires a flexible regulation system that self-generates on a customary basis, on the basis of competitive criteria based on the demand-offer relationship, and which, due to its global dimension, is capable of conditioning the economic and regulatory policies of States indirectly and, consequently, guiding the conduct of social groups and individuals.

Thus, the aforementioned legal formants, although operating autonomously, can interact, by converging - albeit in different ways - in the disciplinary result, thus tracing possible functional connections between them, which find in the regulation of blockchains one or more of their own elective areas (Lessig, 1999b).

Interestingly, as noted before, the computer programmer is the source of the code, the legislator of blockchains. Moreover, there is no doubt that there is a substantial 'concentration' of the latently directive power among those who define the architecture of the web, consisting in the elaboration of the technical rules, and of the (substantial) application of the same, without any guarantee that allows to limit their scope to respect super-individual rights (Teubner 2012). This because coding and standards are increasingly included in blockchains and manage the networks. Therefore, the problem that arises relates to the democracy of the process of elaborating the code and, in particular, to the correct expression of the control power that resides therein. Clearly, those involved in the design could structure it in such a way as to allow the breach of fundamental rights and freedoms (Teubner 2012). Thus, it is possible to argue that, not surprisingly, blockchains as transnational law regimes seem capable to develop their own set of legislative and adjudicative solutions by relying on the architecture and the code. The formulation of such architecture is

left to the decisions taken by programmers in the absence of an authority (Walch 2019).

In fact, the technical rules are endowed with self-executive capacity (and, therefore, also self-sanctioning), in the sense that they find immediate application, with the further consequence of not being open to interpretation, in consideration of the main characteristics of the specific case. The entire disciplinary system operates automatically and ex ante, because of the rigid mechanistic schemes of the binary system, presenting itself, in its degenerative perspective, as potentially functional to the breach of fundamental freedoms, for example. These considerations highlight the risk of sliding the self-regulation of the blockchains as global private regimes of the Internet towards the drift, not already or not only of the arbitrariness, but of the functionality to the global affirmation of a technocracy. A system dedicated to the use of multimedia code for the pursuit of particular economic interests, ultimately dictated by the utilitarian and speculative logics of the market.

In this latter context, the relationship established between the law of state source and the architecture of blockchains is particularly interesting, given that, on the one hand, the former can impose the adoption of certain technical choices, which affect the structural configuration of the web, indirectly regulating the conduct of network users.

On the other hand, the latter acts in a virtual system whose environmental contours are entirely the result of a design that is capable ex ante and independently of regulating the behaviour of users of the network. Thus, it achieves objectives potentially coinciding with those pursued by the political-institutional power (Solum, Chung 2004).

Consequently, the code implies an evident control power of the chains of blocks, representing the means by which they can allow or inhibit certain

actions by users, substantially orienting their behaviour in a way that may be functional to the disciplinary purposes of a private regime (Lessig 1999, 511).

Thus, the importance and indispensability of the directive role of state legislation emerges which - by limiting the operating margins of the implicit principle of technological neutrality - would impose the transparency of the architectural configuration processes of the blockchain.

4. Global Law

The issues related to the regulation of the web have given rise to an intense legal debate, where authors have invented expressions such as *lex electronica* or *lex informatica* (Reidenberg 1998; Lessig 1999), which until recently were the above mentioned *lex cryptographia* (De Filippi and Wright 2018).

All expressions advanced the idea that the normative activity should be oriented towards the imposition of eminently technical solutions, the whole of which should condition and, therefore, govern the conduct of the users of the network, without going into detailed positive regulations, consequently solving the root problem of the uniformity of the different national legal systems.

Here our point is that, for a comparative lawyer, the *lex cryptographia* could be conceptualised as 'a global law without a state' (Teubner 2004) that is commonly shared by coders and blockchains across borders (Cassese 2013, Teubner 1997). What follows is that the global dimension of the code (that is based on informatics and maths) that allows the connection and the simultaneous exchange of data between users

located all over the world and is subjected to different disciplines clashes with the localistic nature of state regulations. Accordingly, we observe the rise of a paradoxical situation, whereby the activity of a blockchain user could be legitimate in the territorial context of a given State, but at the same time be prohibited and sanctioned in another jurisdiction.

For the sake of clarity, we mean that these networks operate across national borders so that they tend to remain scarcely regulated under domestic and supranational laws, with the exception of blockchains where cryptocurrencies are traded (Finck 2018).

Our argument (i.e. the code is a global law) would find its own justifying rationale in considering at least three aspects of the *lex cryptographia*, strictly connected to the fact that it consists in eminently technical solutions.

The first profile that is taken into consideration relates to the determination of the jurisdictional context in which the rules of conduct can be applied with effective results. In this regard, it is a peaceful fact that most of the digital activities are transnationally based, occurring between users or between users and websites located in different parts of the planet, and individually submitted to the authority of different countries. Thus, laws could provide for divergent disciplines, considering the fact that they should be implemented in territorial contexts subject to the sovereignty of other states.

In addition, the *lex cryptographia*, which consists of rules and options of a technological nature, pertains to the configuration of the digital world and the setting of network protocols and software, and it does not meet the jurisdictional limit of the national physical borders. The realm (or improperly the jurisdiction) in which such rules apply is the entire global network, so that they would allow to overcome the structural

fragmentation of state-derived standardization (Reidenberg 1998, 578 and Finck 2018).

The second qualifying profile of the concept relates to the flexibility of the technical provisions which would allow the laws to better adapt to the disciplinary need for transnational activities, increasing the level of certainty of the applicable regulatory regime, thus, promoting the development and extension of flows of online information and, in particular, of digital market.

This objective, which in a strict sense in the legal context is pursued through the deregulation of economic activities and the expansion of the areas of intervention of contractual autonomy, leaves the task of developing transactional regulation criteria to commercial practice. Therefore, blockchains recognise a wide margin of personalization of the various system configurations on behalf of the user or of the technical options that govern the operation of network protocols and software, restricting or expanding the access and circulation of digital information.

The third profile of the *lex cryptographia* that is taken into consideration concerns the enforcement regime of the rules of the code. In real environments, the law - in particular with regard to sanctions - finds later application in the conduct they want to repress. However, this fact renders them substantially ineffective in the context of the blockchains, both because they are often not executable towards a person who has his physical headquarters in a jurisdictional area under the authority of another State, and because of the difficulty of identifying the user who has committed a specific offence.

On the contrary, *lex cryptographica* would present the possibility of adopting technical solutions that in advance (*ex ante*) are able to assess the conformity of the actions that the user can perform with a specific legal

system, allowing or inhibiting them in a preventive way (De Filippi and Wright 2018). Furthermore, and consequently, these are rules that are capable of self-execution, operating automatically, without the need for a third-party authority to intervene ex post to ensure their application.

Interestingly, the emergence of the code makes us remember the Lex Mercatoria of the medieval socio-economic context and its subsequent developments. This was intended as a set of common rules, emerging from practice, and aimed at creating a disciplinary system capable of increasing the sense of trust and security in commercial operators. The Lex Mercatoria overcomes the localistic fragmentation of regulatory statutes - as such functional to the development of international transactions (Berman and Kaufman 1994). Put it differently, the Lex Mercatoria *ex machina* (i.e. *lex cryptographica*) leads us to draw comparisons with the medieval age, a return to the ancient and medieval model of jus commune among merchants from different places. That is to say, we may observe a sort of digital medievalism (Grossi 2017, 101).

This considered, it is undeniable that the blockchains are characterized by an intense profile of disciplinary uncertainty, caused by the non-existence of a uniform regulation applicable with homogeneity. In other words, the state of ineffectiveness of national laws tends to result in the substantial anarchy of blockchains that claim to be able to assure the efficiency of cross-border transactions (with regard to the Lex Mercatoria) through modern technologies that increase speed and eliminate the physical barriers inherent to determining the spatial context of operation.

In the face of this, legal scholars considered that a solution cannot be reasonably identified in the use of traditional disciplinary instruments of state matrix, but in the recognition of the regulatory potential that resides in the same technique. Particularly, the code governs the blockchain

system, which impose rules of conduct on users, suitable to rise to the rank of substantial sources of regulatory production (De Filippi and Wright 2018).

In other words, it is believed that precise rules of conduct for users can derive from the preparation of technical choices aimed at affecting the functioning of the network. The rules here mentioned were capable of governing the flows of information and data, summed up in a lex computer capable of overcoming the particularisms deriving from the legislation of state source and of ensuring a global self-regulation of the blockchains with a wide margin of flexibility and sharing.

The basic theoretical principle on which the *lex cryptographica* is based is that by which coding, in addition to allowing a huge implementation of commercial activities through the acceleration and intensification of information flows, presents in itself characteristics suitable for avoiding - through the adoption of planning measures - a regime of anarchy, dissolved by any objective regulation of behaviour (Finck 2018). The various architectural models of the blockchains could also be subject to promotion by national legislators, through the adoption of regulatory measures aimed at using coding for the pursuit of specific political and institutional (Finck 2018).

In summary, these are technological solutions based on the self-discipline of the blockchain, which by focusing on the architectural approach of the digital environment, allow the enucleation of a series of rules of conduct suitable to govern the action of the subjects of the network in advance. Substantially, blockchain operates in a uniform way and also opens up forms of self-empowerment for users, called to cooperate on how to manage their rights and on the levels of protection they need to be provided.

From the foregoing observations it emerges that the fragmented nature of national laws constitutes in itself an irremediable limit for an efficient discipline of these networks, whose a-temporal and a-spatial connotations (as before mentioned) make it substantially detached from any attempt at regulation, which can be considered endowed with the characteristics of effectiveness and transactional uniformity.

These considerations are at the basis of the reflections of legal scholars, which has identified in the *lex cryptographica* the most suitable tool for regulating blockchain networks across borders. They argue that it has a high degree of flexibility, which makes it compatible with the structural and functional peculiarities of the network (De Filippi and Wright 2015). Therefore, in such a context, the Chapter argues that domestic legislators should trace the principles and guidelines aimed at protecting the fundamental rights of the users, but through a minimalist approach. In summary, we suggest that regulatory flexibility by the state and the customization of technical tools should essentially converge towards forms of accountability to protect fundamental rights within these global private regimes of the digital environment.

5. Regulatory Contract Law

Our point is that the rules governing blockchains have been adopted by private self-regulation and, specifically, by coordination among users. Additionally, it appears that the coordination is pursued by relying on a quite peculiar example of regulatory contract law (Collins, 2012).

This situation inevitably leads to a subversion of the constant conception of the sources of law, which, from the original setting according to which the legal system finds its validity exclusively in compliance with the

procedures for the formation of standards, comes to recognize its main factor of innovation. In such a context, the contract takes over the role traditionally reserved to the law in the direction of socio-economic phenomena by assuming a regulatory function (Cutler and Dietz 2017).

Private autonomy is the humus from which norms sprout: this is par excellence in the hypothesis of contractual norms, but this concerns customary norms, as ascribable to the same subjects who observe them. As an author observes with respect to the Lex Mercatoria, contract law is the medium for excellence for trading across borders (Ferrarese 2006). In particular, scholars have clearly recognised the role of contractual governance from an historical perspective (Cutler and Dietz 2017, 9).

Here the point is that the reliance on contract and contracting in governing blockchains remains, in any case, a common and central element to the networks (Taskinsoy 2019). Alongside the contract, which assume particular forms in blockchains, there are additional factors, such as conventions, customs, effectiveness (Bobbio 1942, 101). In the words of an author, in blockchains "the legal framework is essentially pushed down to the level of the contract". The goal is "not lawlessness and anarchy, but that legal frameworks become more granular and personalized to the situation" (Swan 2015).

Specifically, blockchains grounds on the concept of rough consensus. In particular, Lessig notes "We reject kings, presidents and voting. We believe in rough consensus and running code" (Lessig, 2005, 55). Now, in blockchains, 'consensus' means that the nodes on the network agree on the same state of the chain, in a sense making it a self-auditing ecosystem. Specifically, consensus protocols allow a blockchain to be updated, while ensuring that every block in the chain is true as well as keeping participants incentivized.

Thus, nodes, developers and others govern blockchains by agreement. This 'rough consensus' is primarily used, for example, to achieve the necessary agreement on a single data value or a single state of the network among distributed processes or multi-agent systems, such as cryptocurrencies.

Interestingly, consensus decision-making is a creative and dynamic way of reaching agreement between all members of a group. Instead of simply voting for an item and having the majority of the group get their way, a group using consensus is committed to finding solutions that everyone actively supports, or at least can live with.

This consensus is algorithmic because it represents a process in computer science used to achieve agreement on a single data value among distributed processes or systems. Interestingly, users agree because they rely on the code itself, namely the technology.

In brief, consensus mechanisms are protocols that make sure all nodes (a device on the blockchain that maintains the blockchain and, sometimes, processes transactions) are synchronized with each other and agree on which transactions are legitimate and are added to the blockchain.

In this sense, it is possible to note that smart contracts play a fundamental role within the blockchain, and specifically they represent a new means of transacting among nodes and developers, and, more important, contribute to a new paradigm of coordination among nodes, miners and coders with respect to traditional forms of governance and management (Davidson, De Filippi and Potts 2018). Legal scholars pointed out that a smart contract is a computer program that directly controls the transfer of digital currencies or assets between parties under certain conditions. These programs are stored on blockchain technology and, upon the circumstances of the case, they may (totally or partially) contain binding

obligations and amount to a binding contract (Di Matteo, Cannarsa and Poncibò 2019).

Indeed, some scholars imagine a future where commerce will take place exclusively using smart contracts, thereby avoiding current activities such as contract drafting, judicial intervention, opportunistic behaviour and the inherent ambiguities of written language. Others highlight the elimination of reliance upon trust-based intermediaries made possible by hosting self-executing contract code on distributed systems, and the potential for commercial activity to take place between the decentralized autonomous organizations (DAOs) without any need for human interaction or intervention (Werbach 2018).

It is clear that the physiognomy of law is changing around the wishes of the new sovereigns, the programmers exposing such an algorithmic consensus in trading, and managing the blockchains. Therefore, the clear features of the law (hinged in the state legal systems) fade into soft law, the a-typical nature of contract law, the flexibility of rules created and managed privately, and the dismissal of the paradigm of validity and the rise of the criterion of effectiveness.

As a result, the law as the product of a process of political integration in the context of a democratic-pluralistic state system is subject to the right of a contractual matrix born in a-territorial and digital blockchains. The subrogation takes place primarily through the direct occupation of the spaces of political law, both in the sense of overlap with existing norms and as colonization of virgin territories. In the hypothesis of the overlap, there is a sort of de facto de-application of rules belonging to the state, supranational or international hard law, in favour of the (auto) rules produced by the code programmers.

First, the existing law results to be inadequate or inconsistent with the priorities of the new digital horizon, an inadequacy that we can define as political and which results in a provision of political law.

The second hypothesis concerns the 'beauty of speed' (Marinetti 1909) or to the image of the digital blockchain as hyperactive time; scientific-technological evolution is driving a race with impetuous rhythms, which redraws the boundaries of the economy, politics and society. Hard law rules are not suitable for the new rhythms and the coders impose their own understanding of economy and society.

It is the right of the dictatorship of the present, where the normative force of the fact only tells us that the status quo is legitimate. In the light of the concept of law explained above, it is always a question of law, albeit an undemocratic law, without aspirations of justice, but rather dominated by efficiency aimed at effectiveness.

Therefore, the terrain of the clash with the law opens up: recognizing the effectiveness as a source of law does not mean to accept its rampant subordination to technology. While blockchains users may reach a disenchanted awareness of the status quo, they cannot ignore the defence of the law as being democratic, emancipated and anchored to constitutional values. In other words, effectiveness arises as a criterion of legitimacy in blockchains, thus creating a legal vacuum and corroding the spaces of the law (Bobbio 1942).

The question is whether we should recognise the obsolescence of the law in the face of disruptive innovation. The question is whether coders, private subjects, are entitled to attribute or deny a right regardless of democratic legitimacy and refractory to any control from the state (Teubner 2004).

Indeed, we observe the rise of contract law that is flexible, rapid and transnational by nature and particularly the fundamental role of such a 'software and contract' (ie. the smart contract) of the governance of blockchains. This process could also be understood given that the contract is able to manage a set of horizontal relationships of users, while abandoning vertical relationships among them.

Indeed, discussing the decentralization of blockchains does not mean thinking of a right that comes from below, created through a democratic and equal sharing and sharing in legal production. This is rather the result of a fragmented and shattered right, prey to the subjects who have the power to appropriate it for their own use and consumption: developers, coders, and programmers. The history of the Internet would seem to confirm this assumption. The Internet, the network born to be a space of freedom, ended up being an oligopoly of data.

In any case, it is clear that the medium (technology, coding) is becoming the aim, the end of communication. In the light of this reflection, the famous phrase 'the medium is the message' immediately becomes understandable: the means transforms the messages it conveys, and often, in the post-modern era, becomes the end (McLuhan 1994).

This also implies that, by virtue of coding, the contract occurring within blockchains takes on completely different connotations with respect to the conception of this institution that belongs to the real world. In some cases, it will not even be possible to speak of a contract, but of the mere automatic execution of a contract already concluded. (Werbach 2018).

In his book, Werbach outlines four different 'trust architectures'. The first is peer-to-peer trust. It corresponds to morals and reputational systems according to which people come to trust each other. The second is leviathan trust, which corresponds to institutional trust. You can see this

working in our system of contracts, which allows parties that do not trust each other to enter into an agreement because they both trust that a government system will help them resolve disputes. The third is intermediary trust. A good example is the credit card system, which allows untrusting buyers and sellers to engage in commerce. The fourth trust architecture is distributed trust. This trust applies to the security system that is blockchain.

To clarify, what blockchain does is shift some of the trust in people and institutions to trust in technology. You need to trust the cryptography, the protocols, the software, the computers and the network. In brief, you need to trust them as a whole, because there are often single points of failure.

The medium (the blockchain) transforms the bargaining rules, as we know them. Nodes enter contracts without trusting, nor even knowing, the other party or parties. The code executes contracts in an automatic way with no flexibility at all.

Furthermore, the courts and tribunals ensure the force of the law in the real environment. In blockchains, the enforcement is incorporated into the writing of a code that makes the contractual clauses executable algorithmically. In doing so, the programmer jointly exercises functions that, in the real world, are comparable to both legislative and jurisdictional ones.

6. The interplay of Law and Code

Our analysis is both descriptive and normative with respect to blockchain. The sections
above underline how there is an undoubted attempt on behalf of 'global technology' to engulf the old state-owned law and highlight

how there is currently no prevalence of a model. Instead, we can see the coexistence of two regulatory structures (law and technology), which appear to be destined to interplay in the future.

Also important is the analysis carried out so far which highlights the need to think about the question not so much in terms of opposition between law and code, but more in terms of interaction and, perhaps, cooperation. Our reconstruction clashes with the two main positions in scholarship that are usually opposing each other. One focuses on the liberal conception of the blockchain (namely, cyber-libertarianism), while the other applies a paternalistic conception to blockchains (namely, cyber-paternalism). In the first case, the code would be the only regulatory source of the blockchains, while in the second case, the law should be imposed in order to prevail over the code through the regulation of the networks. In other words, the law should limit the environment of these digital private regimes, while clashing against its transnational dimension, just to provide an example.

Otherwise, the foregoing considerations tend to establish a regime between code and state rules, tending to interact in governing blockchains. The intensification of such interplay is at present the only way to develop blockchain technology with the aim of promoting its implementation from infancy to a mature technology. It especially has a potential for managing private and commercial transactions across borders that surely deserves our efforts. Having considered the above, the Chapter favours the adoption of regulatory interventions characterized by an intense margin of flexibility and self-regulation within the networks, while fixing principles also by the law. Otherwise, the enthralling rhythm of technological evolution - which constantly finds more complex and faster forms for the circulation of information flows - and the accentuation of the profiles of a-

territoriality and a-temporality of the blockchain will tend to marginalize the scope of the state and supranational law even more (Irti 2009, X). In our view, the law should assume an indispensable role: it must protect the respect of our shared fundamental values within blockchains and when they interplay with the real world. As an author notes, human dignity is not negotiable also within digital private regimes (Teubner 2004, 126-127). In this respect, the code risks to favour the affirmation of merely commercial interests - similarly, to what happened with the Lex Mercatoria (Teubner 2004, 126).

The Chapter points out this intense mixture of legal and extra-legal tools for regulating blockchains and the difficult search of a point of equilibrium in these transnational law regimes to promote the evolution of the blockchain and, at the same time, the protection of fundamental values of our societies. In the words of an author, "Technology is now deeply intertwined with policy. We are building complex socio-technical systems at all levels of our society. (...) Surviving the future depends in bringing technologists and policymakers together" (Schneier 2019).

7. Conclusion

Our conclusion follows: the blockchain subverts the traditional configuration of comparative law that is based on a territorial conception of the law (Siems 2018, 303-331; Michaels 2016; Husa 2015, 55). Indeed, scholarship in philosophy (Deleuze and Guattari 1972) and social sciences (Teubner 2012) has revealed the decline in the role of territory as an organizing principle (i.e. the doctrine of 'deterritorialization').

In this Chapter, we argue that alongside the legal systems, other 'normative regimes' have come into existence in digital environments:

they flow from a set of independent normative sources, such as the code, and ultimately the social norms of the nodes, the miners and the core developers (Schrepel 2019). Thus, code developers, nodes and thinkers (ie. legal scholars) are capable of playing part (or all) the functions of legal formants beyond the rigid limits of the law in a formal sense (Sacco 1991). Our claim is that comparative law is called to explore these new legal spaces (Hofmann and Botzem 2010, 18). Indeed, it must be noted that the creation of blockchains that allow the simultaneous interaction of a number of users located all over the planet has inevitably contributed to the development of these transnational law regimes of the digital environment.

We observe the elevation of technology, as noted in the introduction, to the rank of global authority, producer of its own rules intended to favour the efficiency of international commerce and capable of orienting (*rectius*: determining) the economic and social policy decisions of states, towards affirmation of special interests (David 1976; Galgano 2005). A question follows on whether our case could be considered an example of global law (Siems 2018, 331).

This process, which has already been in place for some time, has marked the retreat of the directive action traditionally carried out by national laws - the fragmented nature of which represents an obstacle to the functionality of transnational blockchains. Clearly, the affirmation of blockchains and their rules - is weakening the control capacities of national politics and has challenged the regulatory functionality of the legislation in a formal sense. It is therefore true that state law is not very flexible for efficient international commerce, the validity of which is subordinated to its derivation from a hierarchy of sources of law, legitimated by a political

constitution, which governs the bodies responsible for enacting it and it related training procedures (Galgano 2005).

In blockchains, that are characterized by the above-mentioned a-spatial and a-territorial dimension of the digital world, a new Lex Mercatoria emerged, which operated in a reality characterized by fragmented jurisdictions: the *lex cryptographica*. In other words, the case here considered confirms the trend towards 'deterritorialization', a term which is meant to refer specifically to detachment of regulatory authority from a specific territory.

The Chapter conceived blockchain networks in terms of transnational law regimes at the crossroad of the digital and the real environments. In particular, blockchains overcome their discontinuity from the legal systems by relying on the code, the forces of the market and the enucleation of common rules (ie. social norms, such as forking). The latter, through their repeated observance, were elevated to the rank of uniform 'norm' destined to find application on a universal scale, exceeding the limits set by the 'particular' law of the national systems (Irti 2005). Having noted the above, the fascinating expression the 'code is law' demonstrates how technological architectures contain normative languages, that are linked to maths and algorithms of self-organization that establish and control the rules of blockchains (De Filippi, Wright 2018).

Therefore, the distinctive profiles of blockchain as transnational regimes also emerged in their 'digital' and 'global connotation' as opposed to the local character of the state-based law. Moreover, blockchain relies on the concept of a 'software and contract' (ie. smart contract) because of its rapidity, and adaptability to changes in reality in contrast with the rigidity of the laws. Indeed, contracting within blockchains open up forms of

agreement (rectius of personalization) in defining specific regulatory structures and sanctions (Galgano 2005).

Additionally, the code deals with the shortcomings of law with regard to blockchains: the slowness in the regulatory processes of technology is an example. Innovation runs too quickly compared to the legislators' ability to come up with a solution (Schrepel2019).

The consequence of this is the aforementioned process of interplay between law and code, which represents a great challenge for legal scholars. It also represents a food for thoughts for comparative law scholars questioning whether the code may represent a case of global law (Twining 2000). Finally, the Chapter highlighted how the contract plays a central role in managing international commercial transactions and contributes to governing blockchain networks. Of course, the contract takes on new connotations because of the 'medium' blockchains, so much so that this institution seems to be distorted with respect to its traditional definition and regulation in national systems. In particular, the reliance on the notion of 'rough consensus' and the new architecture of trust just provides an example of how much blockchain users are redesigning our common understanding of contracts and contracting.

8. References

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