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TOWARDS ANALYSING GOVERNANCE AND LEGAL ISSUES RELATED TO DECENTRALIZED AUTONOMOUS ORGANIZATIONS, AWAITING FOR FURTHER LEGISLATIVE INTERVENTION

di Giorgio HASSAN*.

The purpose of this paper is to dwell on the main issues regarding decentralized autonomous organization, arising both in terms of corporate governance and legal theory/regulation, and provide a critical analysis thereof; what I mean to show, other than my perspective of the numerous governance and legal matters related to DAOs, is, ultimately, the intrinsic bond connecting such numerous (and different) matters altogether.

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Abstract

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SUMMARY: 1. Introduction. – 2. The agency problem, in short. – 3. How does the agency problem relate to decentralized autonomous organizations? – 4. When a manager orders workers what to do: “hierarchical” working structure within a firm. – 5. When workers decide for themselves: “democratic” working structure within a DAO. – 6. Addressing the controversial “democratic” implant of DAO. – 7. The power of blockchain providers in times of emergency: towards analysing the events following the “DAO attack”, from a legal perspective. – 8. Not Kelsen not Schmitt: the hard fork as a democratic sort of reaction (?) – 9. Kelsen again: the treath of blockchain technology and DAO by-laws to the legal order. – 10. DAO regulation in Wyoming. – 11. Conclusion.

1. Introduction.

Among the numerous applications backed by (or based on) Blockchain technology, “decentralized autonomous organization (DAO)” is rapidly growing in interest and popularity, as one of the main features of Metaverses and d-apps in general, other than a potential resource for businesses and institutions for the near future.

A common-shared definition of “DAO” is yet to be provided. Vitalik Buterin, when developing the first application of blockchain supporting smart contracts, namely, Ethereum, both set the frame and conditions for decentralized autonomous organizations to run, providing them of the definitions that follow.

In Ethereum's white paper¹, he refers to DAO as a “virtual entity that has a certain set of members or shareholders which, perhaps with a 67% majority, have the right to spend the entity's funds and modify its code”. He also states that those same shareholders should decide “on how the organization should allocate its funds”, with methods such as “bounties, salaries or (...) internal currency to reward work”.

In a former paper², Buterin first imagined the existence of a DAO, by showing how the main features of a societal organization of any sort (corporations, non-profit organizations, ecc....) could be automatized with the help of modern-days technologies: that happens by developing a contract, both encoded and inviolable. that (a) autonomously generates revenue and allocates resources, and (b) finds a hardware for itself to run on. As mentioned above, decisions on investments or resource allocation are taken by a majority of voters; decentralized control against hacks is ensured with a cryptographic technique called “secure multiparty computation”.

For our purposes, and notwithstanding the numerous applications of a DAO structure throughout the universe of decentralized finance, the main features of decentralized autonomous organizations are now clear: it is a blockchain-based organization, owned and controlled by the holders of tokens representing shares of its property, and run through operations deliberated with democratic voting and, possibly, automatically executed by blockchain-supported smart contracts.

Numerous issues lie under the nature, structure and operative features of decentralized autonomous organization (DAO), both in terms of corporate governance and legal theory. This paper aims to analyse both sorts of issues, and is set as follows:

a).It will dwell on the main features of DAO governance, for their relation to certain governance models and theories: specifically, that of the agency problem and those relating to worker productivity.

¹ V. BUTERIN, Ethereum Whitepaper, <https://ethereum.org/en/whitepaper/>

² V. BUTERIN, Bootstrapping A Decentralized Autonomous Corporation, in Bitcoin Magazine, 2013

b) It will address the controversially “democratic” governance implant and governance structure of DAOs: such controversies, as I mean to show, arise both in theory and in exceptional real life events, such as the well-known DAO attack

c) By referring to the afore-mentioned features of Blockchain governance, I will examine the existing similarities between Blockchain governance and renowned legal theories: that of Kelsen’s notion of a positivist legal order, for its similarity with “ordinary” on-chain governance; that of Schmitt’s notion of “sovereignty” for resembling the events following the controversial “DAO attack” and its impact on Blockchain governance

d) By re-assessing the relation between Kelsen’s view and Blockchain governance from another perspective, I mean to show the impellent need for legal intervention regulating Blockchain technologies, with specific reference to decentralized autonomous organization; such regulatory intervention, I will emphasize, is lacking basically all over the world; or, rather, everywhere but in Wyoming, USA.

In accordance to this scheme, I aim to proceed by introducing the main governance model opposing to DAO’s governance features: that is, the agency problem.

2. The agency problem, in short.

The pioneering work of Jensen and Meckling³ has stimulated a stream of research focusing on a specific aspect of corporate governance, namely, the “agency problem”. In Jensen and Meckling, an agency relationship is defined as follows:

We define an agency relationship as a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent. If both parties to the relationship are utility maximisers, there is good reason to believe that the agent will not always act in the best interests of the principal⁴.

³ M. Jensen and W. Meckling, *Theory Of The Firm: Managerial Behavior, Agency Costs And Ownership Structure*, in *Journal of Financial Economics*, 1976

⁴ *Ibidem*.

Therefore, an agency problem emerges as the result of the separation of ownership (entitled to shareholders) and control (entitled to managers), implying a conflict of interest between the two parties, with the shareholders acting as the principal(s) and the manager acting as the agent(s): managers control the firm, and can therefore realize private benefits of control that are unavailable to the company's shareholders.

To align the interests of managers and shareholders, and to prevent related inefficiency in terms of value maximization, incentives are to be provided to managers for making decisions oriented to seeking value instead of private benefit. These incentives represent the so-called bonding costs. Monitoring costs, on the other hand, represent the costs borne by the principal for controlling the agent's actions/decisions. The net reduction in welfare coming from the impossibility of fully aligning the interests of the two parties, notwithstanding the principal's expenditure in terms of bonding and monitoring costs, is referred to as residual loss. Agency costs arise as a sum of all three.

Also, given the impossibility of contracting for every future state of nature – so to control the manager in everything he does – the aim shall not be to annul residual loss, but to achieve an optimal level of contracting with a given level of residual loss; in other words, a trade-off arises between overly constraining management and providing them with the discretion to pursue their own self-serving corporate policies.

3. How does the agency problem relate to decentralized autonomous organizations?

In a decentralized autonomous organization, the amount of transaction costs in terms of “agency costs” is minimized. That is because the first, undeniable requirement for an agency problem to arise, for (almost) any given application of DAO, is missing: the line separating ownership and control is labile, if not absent at all.

Many DAOs, for various aspects of their governance, are ruled through decisions that are put forward in the form of proposals, ideated by a token holder and voted by the whole community; such proposals will be automatically given execution if, and when, a defined majority of members will vote accordingly. In this case, for the sort of decisions for which the DAO promotes governance through direct voting, there is no separation between

management and ownership: owners, on account of the value of their tokens, “manage” the firm by voting on the operative proposals they esteem (/not) to produce value. As a result, problems deriving from an agency relationship are prevented, for the lack of intermediaries (managers) acting as agents: the resulting amount of transaction costs is therefore null.

Nonetheless, one could even build a DAO with executive bodies operating within it, through a specific mechanism governing the structure of a DAO, namely, liquid democracy. Liquid democracies, essentially, work as a vote delegating scheme: token holders delegate their votes to some directors, who then delegate their votes to a certain director, embodying a special committee, who consequently delegates his vote(s) to an executive body⁵; the executive is entitled to its inherent powers due to the delegated voting rights they are given.

Still, whether executives exist or not, one thing is for sure: delegators and delegates are members of one unifying community, that of their DAO, and will be therefore interested in promoting it by maximizing its value; the circumstance that value maximization could be precluded for the misalignment of the interests of “principal” (meaning, token holders) and “agent” (meaning, executives) is improbable.

This dynamic and democratic managing structure may be, in many ways, optimal for pursuing efficiency: given the authority of token holders, delegates directing and managing a DAO, if existent, will be solely oriented on value maximization.

Still, value maximization shall not be intended as the sole value under which members may successfully nominate, control or even exercise management for themselves; moreover, the participation of value-oriented members to managing and – most importantly – working tasks is value-maximizing not because of the member/manager/worker’s aim to make value-oriented choices, but rather for the degree of competence he possesses for carrying out that same task. That is, in short, the main issue of the – controversially “democratic” – working structure of a DAO, and the standpoint from where to analyse critically its relation to other governance theories⁶ I aim to address next.

⁵ R. LEOHARD, *Corporate Governance on Ethereum's Blockchain*, 2017 Available at SSRN: <https://ssrn.com/abstract=2977522> or <http://dx.doi.org/10.2139/ssrn.2977522>

⁶ R. COASE, *The Nature of The Firm*, 1937

4. When a manager orders workers what to do: “hierarchical” working structure within a firm.

Back in 1937, Nobel Memorial Prize winner Ronald Coase, in his very first published paper⁷, aimed to find the purpose of the existence of firms; apparently, he found it in one specific component which DAOs aim to eliminate: the hierarchical employer/worker relationship. The Coasian view finds that re-allocation of working force within the hierarchical structure of firms (meaning, the fact that one worker moves from one place to another because his supervisor told him to do so) comports less transaction costs comparing to market reallocation, which requires a wage differential for drawing the worker to move.

Coase, in there, presumes that the very existence of the structure of a firm makes administrative decisions cheaper than market reallocation; this assumption, for itself, is weak and not supported by else than the author’s speculations: still, it can be put in terms of information⁸

What is presumed by Coase is that managers know better, or believe, what workers could provide, in terms of productivity, when ordered to execute a certain task instead of others: contrarily from Hayek, Coase neglects the emphasis put on the price system for its centrality in generating information; if anything, he draws a managerial figure that is meant to supplant the price system for these same informative purposes.⁹

5. When workers decide for themselves: “democratic” working structure within a DAO.

On the contrary, it appears that a DAO exalts such comparative-informative advantage with no need of a hierarchical structure as the one of a firm: members, being only interested in value maximization, will “try to spend their time and skills on more productive and value-adding tasks”¹⁰. When evaluating other members’ proposals, or judging the directors’ or

⁷ *Ibidem*.

⁸ G. PRIEST, *The Rise of Law and Economics*, 2020, Edited Book - Taylor and Francis Book Edition, pp. 36-37

⁹ *Ibidem*.

¹⁰ W. KAAL, *Blockchain Solutions for Agency Problems in Corporate Governance*, 2019, *Economic Information to Facilitate Decision Making*, Edited Book, Editor- K. Balachandran, World Scientific Publishers (2019), U of St. Thomas (Minnesota) Legal Studies Research Paper No. 19-05

executives' operations, they will consider their past activity performances, or contribution to succeeding in a certain task or project¹¹.

The point is that, both in cases of voting certain proposals or participating to certain tasks, what is presumed is that token holders know what is better to do for seeking value maximization; nonetheless, further issues, cealed within the scheme of DAOs, which ultimately reveal that this last assumption may as well be false.

First, the emphasized advantages of DAO governance, mainly in terms of informational symmetry, may be ruled out as inherent to the immature and limited perspectives DAOs have as of today.

In other words, informative advantages are due to the restricted scope of “missions” or “purposes” a DAO embodies: when it comes to deciding or evaluating proposals which mainly (or solely) concern short-term investments, on-chain projects or similar purposes, the benefit in terms of information does not depend on the structure of the organization, but rather on the characteristic of the operation itself.

Proposals of these kind, indeed, imply the possibility of having a visible and short-term account of their success rate, regardless of the sort of organization; a DAO, if anything, emphasizes the advantages coming with such informational background by making it possible to decide accordingly by voting, and by drawing a structure which relies on a flexible (or inexistent) principal/agent relationship.

The issue is whether this sort of organization still provides such benefits outside the scope of such use cases, when it comes to evaluating proposals that are inherently complex and related to the real world: the need for competence, real life intermediaries, long-term planning and return are inherent factors of a IS wide sort of complex operations, which make the democratic and flexible structure of a DAO unfit for their management.

Arguably, a DAO is manageable and efficient to the extent that the class of operations it carries out are needless of specific competence, automatically executable by smart contracts and, preferably, not that complex. These requirements, for the very least, make it possible to exploit a comparative advantage in terms of information: voters will consider past

¹¹ *Ibidem*.

performances as the standard for valuing the reliability of a proposal or his proposer; that standard, given the inherent simplicity of the subject operation, may as well fit the requirements needed to make a value-oriented choices/votes.

In other words, the democratic implant of a DAO may ultimately fail to promote value and pursue efficiency for the reason that complex issues require competence for evaluating and deciding upon different proposals, or directly executing them, up to a level that a voter/token-holder, though being a value maximiser for his own speculative interest, may not catch up to.

Competence, rather than managerial information¹², is the hallmark for achieving productive inputs, coming from competent workers, and profitable decisions, carried out by competent and aligned managers. It is argued – and widely shareable, indeed - that internal competence of a firm/organization is, for itself, an extremely relevant factor for understanding its competitive market position¹³.

Democratic proposing/voting, together with owners' direct contribution as “working force” for certain tasks, appears to find a limit, in terms of efficiency, when issues require for powers to be exercised by a competent delegate, or expert workers, instead of (literally) every given member.

The reliance on managers or external workers falls short of the expectances coming with the advent of DAO, as the innovative features it was meant to promote, both in terms of democratic participation and horizontal worker/employer relationship, are inevitably resized.

DAOs, at this point, remain “decentralized” for being not yet regulated and “autonomous” to the extent that members can take care for themselves; meaning, when matters are – again - needless of specific competence, automatically executable and not that complex.

¹² R. COASE, *The Nature of The Firm*, 1937. *Supra*, note 6.

¹³ See, e.g., N. FOSS, C. KNUDSEN, *Towards a Competence Based Theory of the Firm*, 1996, Edited Book

6. Addressing the controversial “democratic” implant of DAO.

Not only the democratic structure of decentralized autonomous organizations is controversial when related to working structure: more generally, the democratic implant of DAO governance, based on the participation and decision-making power of token holders through a proposal/voting scheme, turns out to be very weak. Given the complexity of algorithms, chain processes, informatic devices underlying a DAO, core teams of developers or providers have much more power than they should; also, problems in the democratic distribution of power result from the labile equilibrium between the majority and minority of voters.

The first issues on these terms arise when the organization is yet to be running: that is, when the core team of developers is still working to provide an organization for members to enter, interact and propose/vote in a democratic fashion. At that point, even regardless of whether members already exist, many of the functionalities characterizing a DAO are suspended, for the need of the contextual structure surrounding it to be lastly implemented in full¹⁴.

This eventuality, apparently inevitable, implies a major issue putting in danger the very democratic implant a DAO is founded on: until when the DAO starts running autonomously, the core team of providers acts as a “benevolent dictator”, as it exploits its powers for building a framework in which the democratic rights of users, in terms of voting and participation, are actually exercisable.

Secondly, issues may arise when – and if – DAO members nominate a board of directors, thus separating ownership and control; this circumstance, through merely eventual, may imply that the required majority of token holders ultimately decides to entitle one (or more) director(s) of voting powers regardless of the opinion of the minority: that “violates the principle of corporate governance requiring for the board to act as an entity”¹⁵,

Note that the number of votes required for achieving valid consensus (that is, the majority) is chosen by the creator(s) of the DAO: for him/them, I believe, a trade-off arises in terms of choosing what is preferable between democratic voting and fast and efficient decision-

¹⁴ See, as an example, the “Swarm City Case” in R. BECK and C. MUELLER-BLOCH, *Governance in the Blockchain Economy: A Framework and Research Agenda*, 2018, in *Journal of the Association for Informational System*

¹⁵ R. LEOHARD, *Corporate Governance on Ethereum's Blockchain*, 2017. *Supra*, note 5.

making processes; meaning, what is preferable between the requirement for a larger majority or, rather, for a simple majority.

At last, emergencies may arise so that it is necessary for the developers of the chain the DAO rests upon to intervene to assess those certain matters; the ecosystem of a Blockchain, indeed, may be threatened by external attacks, malfunctions or problems of any sort which require for solutions to be implemented by a centralized core team. And one thing is for sure: for any application of a Blockchain, the goals of (full) decentralization, (complete) security and (optimal) scalability cannot be pursued altogether. Meaning, when issues that concern (most frequently) scalability and (most importantly) security occur, an intervention of the founders or providers of the chain precludes, in some way, the philosophical and practical objective of full decentralization and autonomy of the blockchain.

Not only this last matter represents an issue for pursuing democratic and autonomous governance of a DAO, as the sovereignty of token holders is overrun by the decisions of the blockchain developers and providers: the implications of an such events, as I mean to show below, directly relate to certain relevant aspects concerning theoretical legal doctrine.

7. The power of blockchain providers in times of emergency: towards analysing the events following the “DAO attack”, from a legal perspective.

The most famous event that required for the blockchain developers to intervene for treating an emergency is, arguably, the well-known “DAO attack”: that is, a hack of a DAO platform (known as “the DAO”) for which 14% of the total Ether invested in the DAO – meaning, 14% of 150 million dollars – was stolen by an anonymous attacker¹⁶.

Our focus, in here, does not regard security issues and errors in developing the DAO which made it possible for the hackers to complete their attack; on the contrary, the matter I mean to analyse, where governance and legal issues inevitably intertwine, is the “hard fork” that came next. That is, in plain meaning, the software update the Ethereum Foundation implemented to return the Ether stolen by the hackers to their legitimate holders, which led

¹⁶ See, for an overview, Q. DUPONT, *Experiments in Algorithmic Governance: A history and ethnography of “The DAO,” a failed Decentralized Autonomous Organization*, in *Bitcoin and Beyond: Cryptocurrencies, Blockchains and Global Governance*, Edited Book, Editor – M. Campbell-Verduyn

to two different Ethereum blockchain applications to run contemporaneously: the original non-updated and the new updated chain.

The decision of forking the Ethereum ledger was inevitably surrounded with huge controversy, as many felt that the standpoint of full decentralization and autonomy which a DAO – and a blockchain itself – should rely upon was compromised.

The events following the DAO attack stimulated a stream of research analysing their implications under the lens of legal doctrine: more specifically, the hard fork of the Ethereum platform has been used as an example relating to the historic debate between Hans Kelsen and Carl Schmitt¹⁷, for determining whether a blockchain ecosystem, resembling a legal order, can be “self-sustaining”, in a decentralized and autonomous fashion, or “whether it depends on decision-making by a sovereign authority”¹⁸;

For our purposes, Kelsen’s perspective will be emphasized with direct references to his “pure theory of law”¹⁹; more specifically, to the notions that: laws are valid to the extent that they are enacted through the legislative procedure appointed by a superior norm (1); “validity”, intended as in point 1, absorbs the “context independent”²⁰ notion of “legitimacy”: a norm is legitimate to the extent that it is formally valid, regardless of whether it conforms to morals, ideals or standards of justice which are external of positive law (2); such legal order is “closed” and pure as, at the upper level of the formal hierarchy of sources of law, one higher norm (known as “Grundnorm”) is assumed to refer to the primary source of the legal system, which obtains, as a result, formal validity (3).

Schmitt’s ideas²¹, for our purposes, have ground here with regards of his critique of Kelsen’s notion of a legal order, which he portrays as a *machine that runs for itself* (4): that is, for Schmitt, Kelsen’s system, for it neutralizes sovereignty, human judgement and moral standards in the name of “formal validity”. Still, he admits that such machine may work in “normal conditions” (5), but nonetheless he affirms that, in times of exception, decisions are made and carried out by a sovereign (6), acting with unlimited authority and regardless of the legal

¹⁷ W. REIJERS *et al.*, *Now the Code Runs Itself: On-Chain and Off-Chain Governance of Blockchain Technologies*. *Topoi* 40, 821–831 (2021). <https://doi.org/10.1007/s11245-018-9626-5>

¹⁸ *Ibidem*.

¹⁹ H. KELSEN, *Pure Theory of Law*, 1960

²⁰ K. HART, *The Concept of Law*, 1994

²¹ See, for one, C. SCHMITT, *Political theology: four chapters on the concept of sovereignty*, 1922

system that he now governs – and which he will supersede until when norms are enacted for limiting his authority²².

The ground where this similarity rests upon is, indeed, the notion of on-chain governance, which resembles Kelsen's notion of a legal order: the protocol rules of a DAO, or of a blockchain platform in general, act as a (superior) norm which the nodes and members of the chain are obliged to comply with; a blockchain consensus or decision-making protocol automatically works through a process of verification which is inherent to the blockchain's (superior) protocol rules. In any case, those operations depend on the higher norms referring to them: those same protocol rules²³.

Blockchain, indeed, relies on code-based structures not only for the regulation of participants' behaviour, but also for the introduction of changes to the infrastructure within which participants operate: those changes, again, are formally valid for being (sometimes, automatically) appointed accordingly to protocol rules.

Also, the blockchain-based system does not itself contain a rule that prescribes it, but still it participants act accordingly to those rules: Kelsen would say that the legitimacy of those same rules is due to an assumed "Grundnorm", which confers formal validity to the system's highest norms (: protocol rules). The blockchain is, therefore, "closed" within a pure, formally appointed – and, therefore, legitimate – system.

Note that compliance to protocol rules does not (primarily) depend on their content, but rather on their formal hierarchical superiority: further human-made/automatically-executed processes of a blockchain are carried out accordingly to protocol rules because of the inevitable dependency binding further operations to the rules of "the code", regardless of their content or moral "legitimacy".

This brief account on blockchain, analysed with the lens of Kelsen, explains how in such ecosystem "the code runs for itself" just as Kelsen's legal order is – Schmitt says - "machine that runs for itself"²⁴: it is based on superior norms (protocol rules) that ensure formal validity of related verification processes underlying the consensus mechanism of a blockchain,

²² W. REIJERS *et. al.*, *Now the Code Runs Itself: On-Chain and Off-Chain Governance of Blockchain Technologies*. *Supra*, note 15.

²³ *Ibidem*.

²⁴ *Ibidem*.

notwithstanding their content and precluding for human intervention to change it in any way that differs from formally appointed “revision”.

That being said, Kelsen’s theory has always found in Schmitt himself one of its most radical opposers. Schmitt’s critique of Kelsen’s view finds, indeed, confirmation within the set of events that followed the DAO attack.

First, a “formally valid” (and automatically executed) blockchain ecosystem is manageable accordingly to Kelsen’s view only in normal conditions (5): that is what Schmitt would have remarked, and what the “DAO attack” reveals to be true²⁵.

Second, the hard fork itself, being carried out by the developers and providers of the Ethereum platform, is a pregnant example of how a sovereign (that same team) exploits some sort of extra-ordinem decision-making power (by forking the chain) for governing an exceptional state of things (the hack): again, real-life events appear to occur in accordance with Schmitt’s idea of how a sovereign acts in an emergency²⁶.

8. Not Kelsen not Schmitt: the hard fork as a democratic sort of reaction (?)

Regardless of the parallelisms with Schmitt’s view, further details show that the Ethereum foundation acted in a way that obeys nor to Kelsen’s nor to Schmitt’s idea; to my impression, it rather complies with certain principles characterizing how modern democracies carry out decisions in times of emergency as of today. Those principles appear to be: (a) the willingness to act for restoring the status quo ante: meaning, the aim to give tokens back to their legitimate holders, as at the time before the attack; (b) the promotion of some sort of democratic engagement of the “society” (that is, Ethereum’s community) in the decision-making process: that happened, indeed, when the community was required to vote for authorizing the fork to be implemented (with approximately a 90% consensus); (c) carrying out operations that are meant to pursue socially-optimal states of things, accordingly to socially-optimal rules.

²⁵ *Ibidem*.

²⁶ *Ibidem*.

One could provide counter-arguments for intending voting (b) as being not that democratic, as the members' decision was to be heavily influenced by the risk of having the price of their Ether to fall. Still, it is inevitable that, in times of emergency, decisions have to be made when stakes are at the highest.

Long story short, nor Kelsen's nor Schmitt's view of a legal order appear to correctly embrace the mechanism of Blockchain governance: its features, especially in times of emergencies, apparently resemble the decision-making processes that – frequently, in our times – happen in modern democracies when exceptional actions for governing emergencies and providing security are required.

Nonetheless, it has to be remarked that the intervention of the Ethereum foundation, yet embracing a democratic sort-of reaction, drastically neglected the philosophical standpoint where Blockchain technology rested upon: that of achieving full decentralization for not relying on third parties' trust and, ultimately, annulling related transaction costs.

From this perspective, one could even see the hard fork as a Coup d'Etat, carried out in the form of a 51% attack, and determining the advent of a new "legal order", not based anymore to pursuing full decentralization for any given state of things, but rather admitting the intervention of a "sovereign" centralized authority in times of emergency; thus, Schmitt's ideas come again to our mind (5) (6).

Therefore, the "DAO attack" may be ruled out as a democratic sort-of reaction – as it appears to be to me – or, rather, as a Schmitt sort-of reaction depending on the importance one gives to the aim of preserving full decentralization in a Blockchain. If full decentralization is intended as the axiological paradigm of what a Blockchain technologies should pursue, the "hard fork" is for sure a Schmitt-like sovereign act; if it is not, that same fork, yet uncommon, is ultimately "legitimate", and put in a democratic fashion, for the aim and procedure through which it was carried out.

9. Kelsen again: the treath of blockchain technology and DAO by-laws the legal order.

Recalling, once again, Kelsen's view of a legal order, and by intending Blockchain not as resembling Kelsen's legal system, but rather as an entity which is clearly separated by the legal system itself, further problems arise. That is because Blockchain foundations are co-responsible for the phenomenon of "externalization" of legislative functions, that is particularly harmful for a legal system that – as intended by Kelsen - is meant to be "closed" and "pure".

Blockchain applications are, indeed co-responsible for the pervasive spread of "soft laws"; these are laws ("by-laws", for DAOs) that are not enacted by the competent legislator, but rather by private parties – Blockchain providers, in our case -, and whose "binding force" is ensured by the compliant behaviour of participants and members of a blockchain community; in other words, the rules governing a blockchain, or a blockchain-based DAO, are laws that are effective as the laws of a legal system and which, nonetheless, are not enacted in accordance to the rules of the legal system itself: this is, in plain meaning, the pervasive phenomenon of externalization of legislative functions.

This feature precludes Kelsen's system to work for its pathological "openness"²⁷: outside the scheme of validly enacted law and regulations, a set of "invalid" by-laws exists and influences the participants' behaviour, inquinating a self-referencing legal system that was meant to be "closed" and "pure".

As I remarked, this perspective requires to intend Blockchain ecosystems not as compared or equated to the concept of a Kelsen-like "legal order"; contrarily, it appears as an entity living "out of the system", acting as a centripetal force for leading to the externalization of legislative functions.

An entity which, moreover, pretends to act as its own ruler, requiring no one else to interfere with a machine that, for most of the time, "runs for itself".

²⁷ M.P. GOLDING, *Kelsen and the Concept of Legal System*, 1961, in *Archiv für Rechts- und Sozialphilosophie*, Vol. 47, pp. 355-386.

What I mean by saying that Blockchain applications, or their members, pretend to act as if “they were their own rulers”, I mean to show with an example. Back at the time of the DAO attack, the “Attacker” himself claimed that he exploited a feature (not an error!) of the DAO programming, which was to be kept fully decentralized. This claim underlines the idea that “the code is the law”: meaning, that a Blockchain makes up rules for itself and works, autonomously and with no central intervention, as a “machine that runs for itself”. The incompatibility between this philosophical utopia and reality exalts the need for legislative intervention relating to Blockchain technologies and, for our purposes, to decentralized autonomous organization.

It is impelling, for this reason, to address the issue of how and if DAOs are intended under the legal framework of national legal systems; that is, indeed, a factor that helps revealing the “trait d’union”²⁸ between legal systems and “decentralized entities” such as DAOs, and ultimately assess to what extent the latter are “autonomous”.

Nonetheless, the only State that, as of today, has explicitly recognized, defined and regulated the entity of DAO is Wyoming, US. To my knowledge, any other State both in USA and in Europe reveals a legal loophole on the matter: as a result, DAOs remain “decentralized” basically all over the world.

10. DAO regulation in Wyoming.

W.S. 17-31-101 to W.S. 17-31-116 directly refers to “decentralized autonomous organizations”, specifying that DAOs are intended as Limited Liability Companies (LLCs) whose articles of organization contain a statement that the company is a decentralized autonomous organization”.

Therefore, the Wyoming Limited Liability Act applies to DAOs when not inconsistent with the provisions particularly intended for this sort of LLC.

Specifically, differences between DAOs and typical LLCs arise as a result of: (a) distinct governance systems, as DAOs can be rather member managed or “algorithmically managed”

²⁸ B. CAMPAGNA, *Metaverso e Blockchain: nascita di una nuova economia di internet?*, in *Questa Rivista*.

by smart contracts; (b) the rights of members in a decentralized autonomous organization may differ materially from the rights of members in other limited liability companies; smart contracts, articles of organizations and operating agreements of a DAO may, indeed, restrict fiduciary duties, transfer of ownership interests, return of capital contributions, withdrawal, resignation from and dissolution of the subject organization; (c) members have no rights nor obligations in regard of inspecting and copying records (as in W.S. 17-29-410) for typical LLCs) or furnishing information about the DAOs activities, so long as the DAO rests on an “open blockchain”(W.S. 34-29-106), for them being transparent and publicly accessible.

For what concerns the rest of the world, numerous proposals have been made for defining and ruling decentralized autonomous organizations. For sure, and notwithstanding the liberal thrust promoting autonomy of DAOs under Wyoming State Law, the very fact that legal acts exist to frame a decentralized organization within the scope of legal regulation is delusional for the ones that truly believe that “the code is the law”.

11. Conclusion.

Unfortunately, I have no ground for further proceeding on examining DAO regulation elsewhere, for the pervasive lack thereof; yet, as I remarked, the need for setting a legislative framework for Blockchain technologies and applications to run into is impellent for the own sake of national legal systems.

At this point, a critical overview of the main governance and (theoretical) legal issues relating to DAOs has been set out, and is in need to be summarised.

First, I examined the main features of DAO governance in light of the “agency problem”, underlining the impracticability of such problems – and related costs – to arise because of the common shared, aligned, value-oriented interests of any member of a DAO community.

Putting emphasis on value-maximization, I tried to establish to what extent value-oriented members can make their contribution effective in a DAO: not only as managers – for the arguable informative component they may have -, but even as workers; by underlining the need for competence, rather than value-orientation, for promoting worker productivity, a

first breach within the controversial democratic structure of DAOs shows up; meaning, the democratic working structure of a DAO is, in many ways, inefficient.

Later, I have provided clear examples of how, regardless of its impact on working structure – and productivity –, the democratic structure of a DAO is, for itself, very weak: the events surrounding the “DAO attack” guide us into having it clear.

Relating to the “DAO attack” itself, I have examined various legal instances which relate to it: Kelsen’s perspective for addressing on-chain governance; Schmitt’s concept of sovereignty for explaining the DAO attack and what came next; my personal view for re-assessing the matter.

By recalling Kelsen’s perspective, I had grounds to show how the controversial relation between legal systems and decentralized finance may have ground within the frame of legal doctrine: if anything, Kelsen’s studies emphasize the impellent need for regulation of DAOs and other Blockchain applications, for the own sake of national legal systems; that is, undoubtably, a need that real-life events continue to express.

Eventually, the topics around which all these issue connect altogether are now revealed: DAO’s democratic structure, for one, impacts both the managing and working schemes of DAO governance, both in terms of (preventing) the agency problem and (providing) the ideal frame for maximizing worker productivity; the failure of DAO’s democratic purpose, exemplified by the hard fork repairing the infamous DAO attack, is directly related to the legal theories of Kelsen and Schmitt; by re-assessing Kelsen’s own view of a legal system, the need for DAO/Blockchain regulation arises for the interest of (preserving) the legal order itself.

Around these three aspects, perhaps, a path arises – connecting the remaining others; given the absence of other regulatory sources for further implementing my analysis, I believe such path now comes to an end.