# Towards total decentralisation through non-adjudicative methods

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## Abstract

*It is well known that the raison d'etre of Distributed Ledger Technology (DLT) is to enable peer-to-peer transactions that do not require Trusted Third Parties (TTP). Commercial security is a major concern for users in this new era: intermediaries are increasingly seen as security holes and removed from protocols as a result of a growing desire to maintain control over transactions. The need for independence from TTPs has evolved into a counterculture that moves blockchainers away from central authority, the courts and the world as we know it.*

*To date, all existing online dispute resolution (ODR) processes in DLT and related tools such as smart contracts do not reflect the vision of blockchain as a counterculture. They exclusively use adjudicative methods involving one or more TTPs deciding via on-chain incentivised voting systems. This paper aims to present empirical evidence on why non-adjudicative methods have a cultural priority over adjudicative ones, showing why they might be preferred by blockchainers due to risk management and distrust concerns. Furthermore, we propose Aspera, a non-adjudicative ODR model in which users can have total control over the outcome of the dispute in a TTP free environment.*

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# Introduction

Distributed Ledger Technologies (DLT) have evolved into something beyond a mere scientific innovation embodying an ideal: they represent a true independence movement[5], the beginning of what could be called the cultural revolution of blockchain enthusiasts. Auinger and Riedl pointed out that the blockchain and its applications such as Bitcoin are not pure technical systems[6]; rather, they are socio-technical ones. The idea that technology is not just a neutral tool, but something deeper, is not new. Heidegger argued that the essence of technology is by no means anything technological, but intended it as "the way of revealing"[7].

Back in 1997, eleven years before the release of the Bitcoin white paper, Davidson and Rees-Mogg, in their work "*The Sovereign Individual: How to Survive and Thrive During the Collapse of the Welfare State*" - recognised by many as a true premonition - wrote about a "revolution of power which is liberating individuals at the expense of the twentieth-century nation-state". Through a comparative analysis of the various economic-political transitions over centuries, they describe the rise of the so-called "fourth stage of human society" centred on the denationalization of individuals and the consequent break from states and centralised powers[8].

Technological utopians might argue that 2008 was - in Heidegger's words - the "revelation" year; what seemed to be a futuristic novel finally became reality. The rise of Bitcoin unveiled a need that many perceived but few were aware of: to be virtually free from Trusted Third Parties (TTP). The possibility of moving from a central authority trust model to a new form of "trust-free"[9] autonomous governance has given rise to an ecosystem, a culture, or rather, a counter-culture: the realm of millennials and gen-Z, who live in the idea of being beyond the state and beyond the law, who organise and communicate via anonymous accounts on networks like Discord or Reddit and who feel a strong distrust towards the traditional approach of doing things. It is a new way that does not ask for permission, self-financing through Initial Coin Offerings (ICOs) without the need for anyone, creating decentralised Decentralized Autonomous Organizations (DAOs) that belong to everyone and no one simultaneously. What happens in the blockchain creates a lot of interest for those on the outside, while those on the inside do not consider what they say out of crypto. "The blockchain philosophy is not only an expression of technology, but also a clear political and

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[5] *See* De Filippi, P. and Wright, A. (2018). "Blockchain and the Law", *Cambridge, Mass.* and Finck, M. (2018). "Blockchain Regulation and Governance in Europe*"*, *Cambridge*. and Werbach, K. (2018). "The Blockchain and the New Architecture of Trust*"*, *Cambridge, Mass*.

[6] Auinger, A. and Riedl, R. (2018). "Blockchain and trust: refuting some widely-held misconceptions", *Paper Presented at 39th International Conference on Information Systems*. p. 5.

[7] "Technology comes to presence in the realm where revealing and unconcealment take place, where aletheia, truth, happens." *See* Heidegger, M. (1997). "The Question Concerning Technology and Other Essays*", trans. by William Lovitt, Basic Writings, New York: Harper and Row*. p. 48.

[8] *See* Davidson, J.D. and Rees-Mogg, W. (1997). "The Sovereign Individual: How to Survive and Thrive during the Collapse of the Welfare State", *Simon & Schuster.*

[9] Beck, R., Czepluch, J., Lollike, N. and, S. and Malone (2016). "Blockchain—the gateway to trust-free cryptographic transactions," *in ECIS 2016 Proceedings. AIS Electronic Library: Association for Information Systems (AIS)*. Available at: https://aisel.aisnet.org/ecis2016_rp/153/ , last accessed [15.02.2021].

libertarian vision"[10]. In this sense, from a purely legal perspective, the same ideology may also appear hostile to law as a mere product of state power[11].

In a nutshell, "blockchain is actually revolutionary because it makes the anarchist utopia a more realisable dream than has ever before been possible."[12]Specifically, "the founding principles of the crypto-anarchist movement focus on opposing and inevitably weakening state power and institutions, neglecting the existence of laws, except for those expressed and enforced by computer codes"[13]. Even if this movement remains vaporous since it has never really materialised except beyond the province of libertarian dystopias[14], it cannot be ignored by the careful eye of the legislator.

This exaltation of technology[15] indirectly opens up numerous necessary considerations on what are the correct practices of dispute resolution and doubts on what is the right course to take for decentralised justice[16]. Ast and Deffains have been pioneers in asking whether - on a cultural level - users can perceive decentralised justice as a fair method of resolving disputes[17]. The current re-enactment of the ideals of scientism[18] may change the traditional perception of Alternative Dispute Resolution (ADR) models. The way blockchainers see the world also influences the way they are willing to solve their problems. Chase, in his masterpiece "*Law, Culture, and Ritual: Disputing Systems in Cross-Cultural Context*", presented empirical evidence on a deep and reflexive connection between culture and disputing processes. He shows how disputing practices mirror society: the way in which conflicts are resolved influences and changes in relation to the fundamental beliefs, values and symbols of the specific cultural context in which they operate. He directly addresses policymakers suggesting that "any proposal to borrow procedures from another society should prompt a cultural inquiry".[19]

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[10] Poncibò, C. (2020). "Il Diritto Comparato e la Blockchain", *Edizioni Scientifiche Italiane (ESI). Memorie del Dipartimento di Giurisprudenza dell'Universita` degli Studi di Torino No. 14.* p. 19.

[11] *Ibid. See also* Post, D. and D. Johnson, D. (1996). "Law and Borders: The Rise of Law in Cyberspace", *in Stanford Law Review*. and D. Post. (1995). "Anarchy, State, and Internet: An Essay on Making Law in Cyberspace" in *Journal of Online Law art 3.* Available at: www.temple.edu/lawschool/dpost/Anarchy.html, last accessed [28.09.2020].

[12] Markey-Towler, B. (2018). "Anarchy, Blockchain and Utopia: A theory of political-socioeconomic systems organised using Blockchain", *The Journal of the British Blockchain Association*. p. 2.

[13] Poncibò, C. (2020). "Il Diritto Comparato e la Blockchain". p. 18.

[14] Ortolani, P. (2019). "The impact of blockchain technologies and smart contracts on dispute resolution: arbitration and court litigation at the crossroads", *Uniform Law Review*, *Volume 24, Issue 2,* p. 432.

[15] Poncibò, C. (2020). "Il Diritto Comparato e la Blockchain". p. 33.

[16] See Bergolla, L. and Seif, K. and Eken, C. (2021). "Can, Kleros: A Socio-Legal Case Study Of Decentralized Justice & Blockchain Arbitration" *Ohio St. J. on Disp. Resol. 1* . and Schmitz, A.J. Colin, R. (2019). "Online Dispute Resolution for Smart Contracts". *Journal of Dispute Resolution 103*. pp. 104-125.

[17] Ast, F. and Deffains, B. (2021). "When Online Dispute Resolution Meets Blockchain: The Birth of Decentralized Justice" *Stanford Journal of Blockchain Law & Policy*. p. 17.

[18] "Scientism is the particular intellectual attitude of those who believe that the only valid knowledge is the physical and experimental sciences, and therefore devalue any other form of knowledge that does not accept the methods of these sciences" *See* Poncibò, C. (2020). "Il Diritto Comparato e la Blockchain" p. 21. *See also* De Ridder, J. and Peels, R.and Van Woudenberg, R. (2020). "Scientism: Prospects and Problems". *Oxford University Press*.

[19] Chase, O. (2005). "Law, Culture, and Ritual: Disputing Systems in Cross-Cultural Context", *NYU Press*. p. 48.

In the following pages we will argue that the above-mentioned "cultural inquiry" has never been investigated before and that the current landscape of blockchain dispute resolution processes does not act in accordance with the cardinal principles of this technology and its related socio-technical system.

Section I) will analyse how this cultural revolution of blockchain enthusiasts plays a primary role in the choice of the most appropriate Online Dispute Resolution (ODR) system, arguing that non-adjudicative methods have a cultural priority over adjudicative ones as they might be preferred by users for commercial security concerns. Section II) will present the private companies currently operating in the smart contract dispute resolution market and the reflections proposed by the existing literature on on-chain incentivised voting systems. Finally, Section III) will propose an alternative to the adjudicative methods for smart contract disputes: Aspera Anonymous Dispute Resolution[20], a Startup currently pre-incubated at I3P (Incubatore Imprese Innovative Politecnico Torino)[21].

[20] Aspera Anonymous Dispute Resolution. Available at: https://aspera.rocks/
[21] I3P. Available at: https://www.i3p.it/

## I) - Independence movement and non-adjudicative methods

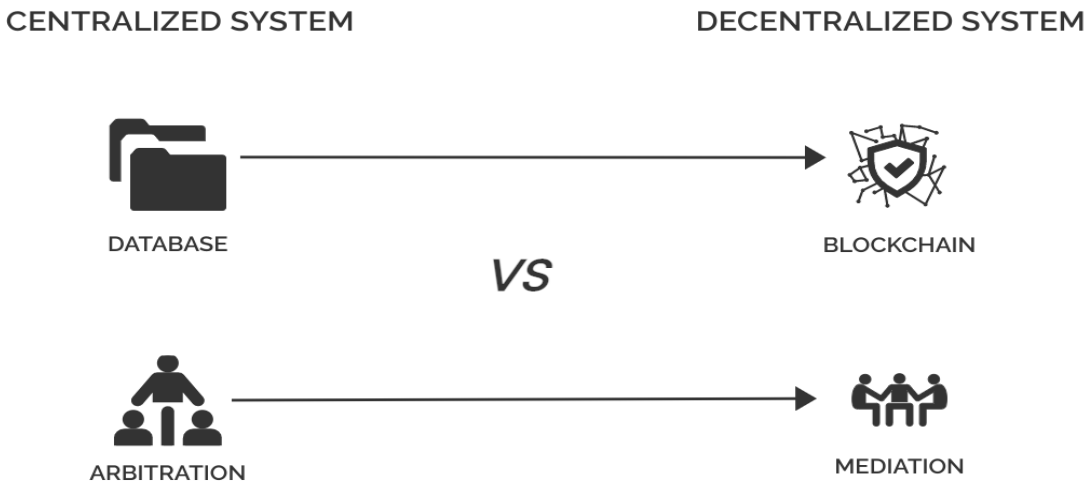
Adjudicative methods are not suitable for a world marked by distrust of third-parties and are not a reflection of a counterculture that is distancing from the central authority day by day. Considering that users do not want to be dependent on the control of TTPs (such as banks) during their transactions, with a little creative effort it can be argued that they are probably not inclined to entrust a decision on a dispute arising from the same transaction to another third-party. With non-adjudicative methods there will not be an arbiter nor a judge as a decision-maker, which means blockchainers can keep their transaction completely decentralized even in the event of a dispute.

All existing dispute resolution processes in DLT and related tools such as smart contracts are exclusively adjudicative. This approach does not fit with the ideals of decentralization and independence from third-parties as the decision-making power always remains in the hands of one or more TTPs.

We already know that these specific target users do not want to be controlled. For this reason, the possibility to have total control over the outcome of the process and the possibility to manage their disputes independently and autonomously without intrusion of external decision-makers could be the success factors for the widespread adoption of amicable dispute resolution practices such as mediation in this specific socio-technical system.
Although a third-party will always be needed to maintain the rule of law, there are many reasons to argue that non-adjudicative methods deserve to be available as they might be preferred by users for concerns of risk management and distrust.

The cultural priority of non-adjudicative methods is represented in the following figure by comparing the two most currently used ADR instruments, namely mediation and arbitration:

FIGURE 1.. Parallelism between centralised and decentralised ADR instruments



It is well known that the database represents a centralised system, whereas the blockchain reflects the users' need for decentralisation. The same parallelism can be promoted by comparing adjudicative and non-adjudicative approaches. Arbitration through TTP is clearly a centralised system: an arbiter making a binding decision on the dispute is as close as one can get to the idea of a third-party hostile to blockchain users. In contrast, mediation fits perfectly with the need for decentralisation as it does not involve TTP, leaving decision-making power to the parties and implicitly granting them the full control they have long desired.

FIGURE 2. Differences between the judicial process and the main ADR instruments[22]

| CATEGORY | JUDICIAL PROCESS | ARBITRATION | MEDIATION |
|---|---|---|---|
| Speed | Slower/ long-drawn process. | Relatively faster, Time-bound process. | Speedy resolution. |
| Costs | Increased litigation costs for longer durations in addition to Court fees. | Reduced costs as time bound. | Relatively inexpensive |
| Control over Costs | Limited as Court fees determined by Rules. | Fees of arbitrators can be pre-determined by parties. | Court-fee returnable, parties can decide fees of mediator. |
| Appointment of decision-making authority. | No control of parties-only judicial officers. | Experts from specific field can be appointed by the parties, with pre-determination of fees.. | Parties can appoint mediator of choice. |
| Procedure for conduct of proceedings | Settled as per law. | Parties have authority to decide. | As per parties' convenience, not settled. |
| Evidence and Submissions | As per the law of evidence and CPC. | Parties can determine their own procedure. | Not bound by rules of evidence-flexible. |
| Forum Selection | Beyond control of parties. | Parties can exclude/ limit or confer jurisdiction on forum of choice. | Mediator is appointed on selection by the parties. |
| Privacy | Public proceedings. | Proceedings held in private. | Proceedings in private. |
| Appeal | Decision is appealable, as a matter of right. | Very limited grounds for appeal. | Settlement acceptable to both the parties is final and is not appealable. |

The blockchain ideal is projecting us into a market of the future in which users increasingly want to be at the centre of their own transaction and want as much control over it as possible, without having to delegate decision-making, validation or control powers to anyone else. Specifically, Nick Szabo, in his famous *"Trusted Third Parties are Security Holes",* argues that "a TTP that must be trusted by all users of a protocol becomes an arbiter"[23]; he also claims that the use of a third-party model "creates a bottleneck which imposes continuing high costs and risks on the end user"[24].

An idea of technological individualism that could oxymoronically create in users a communitarian spirit focused on the common enemy, the intermediaries, is slowly taking shape. This is not something new, but a historical prediction from the past; according to Chase, mediation emerged

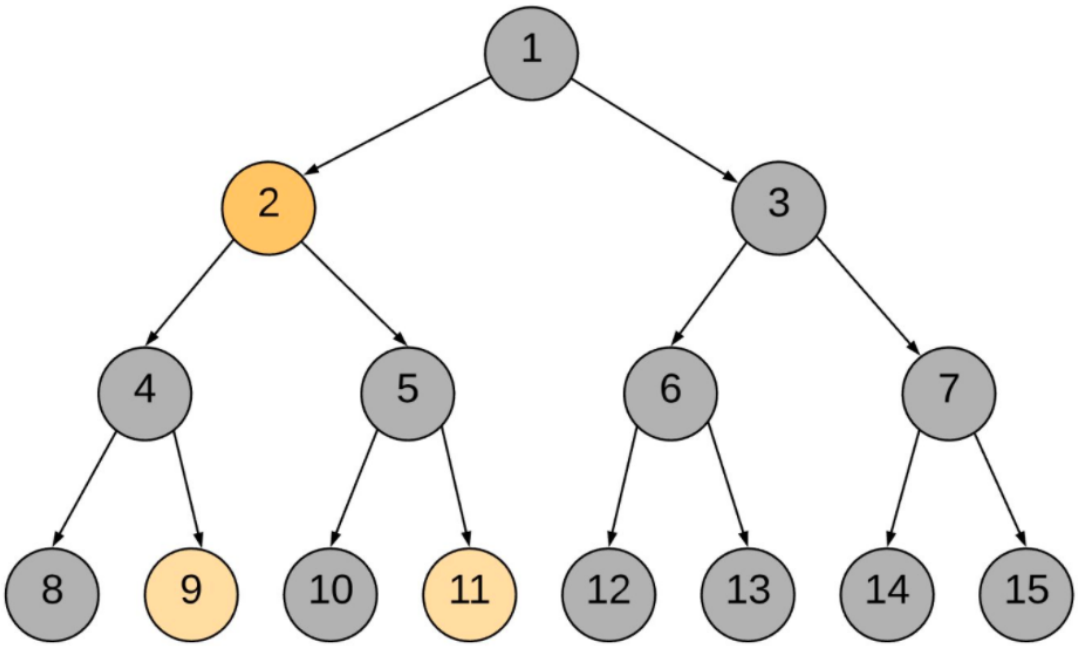
[22] IlearnCanada. Available at: *http://www.ilearncana.com/details/Alternative-Dispute-Resolution-ADR/1451*last accessed [02.07.2021].
[23] Szabo, N. (2001). "Trusted Third Parties are Security Holes", *Satoshi Nakamoto Institute*. Available at: https://nakamotoinstitute.org/trusted-third-parties/, last accessed [07.07.2021].
[24] *Ibid.*

thanks to a decisive influence of the social context evocative of Woodstock and Haight-Ashbury in which traditional attitudes and authorities were challenged and shaken[25]. The concerns of anti-authoritarianism and self-actualisation reflected in the idea of "power to the people" of those years are not far removed from the ideals of "power to the pseudo-anonymous users" of this era. Similar scenarios could be repeated in similar social contexts.

In this direction, users will be more likely to mediate problems in a fully decentralised manner, keeping total control over the process[26], rather than passively accepting a decision imposed on them from someone they do not trust and from which they run away.

To support this argument, we quote an interesting perspective from the world outside of law. Balaji Srinivasan, former CTO of Coinbase, recently made a series of tweets that perfectly embody this need for control and independence. The topic was dispute resolution tools in social networks. He defined them as a combination of anarchy (people yelling) and tyranny (arbitrary de-platforming) and proposed an alternative approach based on a global moderator hierarchy. In the event of dispute, the lowest common ancestor mediates.[27]

FIGURE 3. Global moderator hierarchy - Lowest Common Ancestor for Node 9 and Node 11 is Node 2




[25] Chase, O. (2005). "Law, Culture, and Ritual: Disputing Systems in Cross-Cultural Context". p. 109.
[26] *See* De Palo, G. and Trevor , M. B. (2012). "EU Mediation Law and Practice" *Oxford University Press.* and McRedmond, P. (2018). *"*Mediation Law*" Bloomsbury Professional.*
[27] Srinivasan, B. (2021). Twitter post. Available at: https://twitter.com/balajis/status/1415650556375232515, last accessed [27.08.2021].

The vision of mediation as a way to escape from “tyranny” becomes clearer between the lines of the following Srinivasan's tweet:

“*A seemingly paradoxical idea is that greater decentralization may allow greater centralization. If you can exit at any time, you may be more willing to delegate control on a daily basis to a centralized actor. Trust because you don't have to trust*”[28]

The mediator has no binding decision-making power and therefore, even if it is a third-party, it is a decentralized one that certainly does not represent a “security hole”. Through non-adjudicative processes such as mediation, users literally have the possibility to “exit at any time” by choosing if, how and when to resolve their dispute. The mediator is certainly a third-party, a third-party that acts as facilitator, that helps the disputants to work on their negotiation margins, but remains in any case a decentralised one that can never represent a risk concern for users. In Srinivasan's words, they might trust mediation because they do not have to trust.

For this reason, such an approach is more peer-to-peer and so more blockchain-friendly compared to purely adjudicative solutions. In a market of the future oriented towards “individual sovereignty” and “individual autonomy”, tools such as mediation could reawaken in users a desire for independence that they already have - otherwise they would not have found themselves in the blockchain - but of which they are not yet aware.

[28]Srinivasan, B. (2021). Twitter post. Available at: https://twitter.com/balajis/status/1415655705634238468, last accessed [27.08.2021].

## II) - Blockchain ODR Start-ups and security holes

The reason why the above-mentioned "cultural inquiry" has never been investigated by anyone is that in this lawless land the dispute resolution processes currently used come mainly and inevitably from the private sector. The inevitability of the on-chain privatisation of dispute resolution processes is again a logical consequence of the growing distrust against traditional courts and classic ADR methods. Many blockchainers will not be inclined to return to the centralised side after trying the decentralised one,[29] which is why they try to solve their problems on-chain, by relying on a number of ODR start-ups from the private sector, known to be profit-oriented rather than culturally sensitive.

There are a number of companies that arbitrate disputes using anonymous TTPs. The following table shows some of the start-ups currently operating in this sector. The columns in red indicate the adjudicative models, while in green is Aspera Anonymous Dispute Resolution, a non-adjudicative process which will be described in the next section.

TABLE 1. Blockchain dispute resolution projects

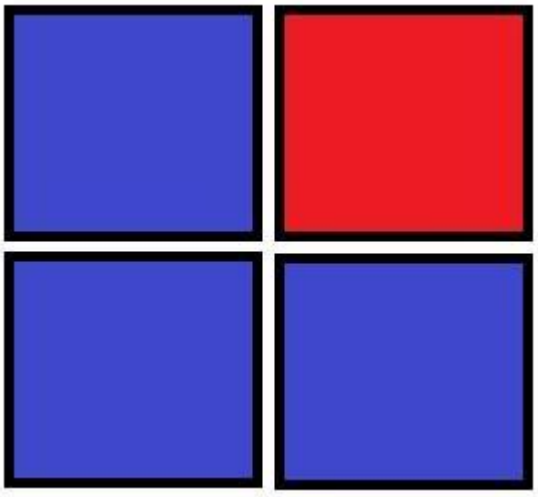
| | **Aspera** | **Kleros** | **Aragon** | **Jur.io** |
|---|---|---|---|---|
| **Dispute Resolution Method** | Mediation | Arbitration | Arbitration | Arbitration |
| **Modality** | Plug and play | Plug and play (crowdsourced) | Plug and play (crowdsourced) | Embedded in Smart contract |
| **Automatic** | Yes | No | No | No |
| **Vote method** | No Need | Schelling | Schelling | Schelling |
| **Working** | Testing | Yes | Yes | Yes |
| **Blockchain** | Agnostic | Agnostic | Ethereum | VeChain |

[29] Metzger, J. (2019). "The current landscape of blockchain-based, crowdsourced arbitration". *Macquarie Law Journal, 19*. p. 87.

Existing solutions allow to maintain this concept of individual sovereignty and isolation from central control by choosing the arbiters (jurors, guardians, etc.) through a crowdsourcing process that guarantees decentralisation using a random draw of decision-makers. The latter are incentivised to act correctly with a system that assures group behaviour in tacit coordination, i.e. the Schelling point [30](actually used by the main dispute resolution providers operating in the blockchain market).

This approach guarantees decentralisation as it allows a common solution to a problem among different anonymous users (the arbiters), who do not know each other and therefore cannot communicate directly between them. An example from the world outside the blockchain is given as an illustration:

FIGURE 4. Representation of the Schelling point application out of chain.



Suppose two users have a panel in front of them with four squares, three blue and one red. They both win a prize if and only if they select the same square and they cannot talk to each other to ask the other user which square he/she is going to select. Reasonably, both will select the red square: it is not a better square than the others, it is just the square that, in a sense, stands out. The key idea taken up by Kleros, Aragon or Jur is that if a set of arbiters votes consistently, then the majority of this set will probably propose the correct solution to the dispute. In a sense, uniformity is rewarded.

In Kleros[31], the number of arbiters is 1, 3 or 5. Anyone can play this role, but in order to participate it is necessary to stake a chosen amount of Pinakion (the Kleros token). The higher the number of tokens in stake, the greater the probability of being selected as a decision-maker. The selected arbiters propose their solution to the dispute, and at the end of the process those who voted for the

[30] *See* Abramowicz, M. B. (2019). "The Very Brief History of Decentralized Blockchain Governance", *GW Law School Public Law and Legal Theory Paper No. 14.* p. 6.
[31] *See* Kleros White Paper. (2019). Available at: https://kleros.io/whitepaper.pdf, last accessed [25.06.2021].

most proposed decision receive an amount of Pinakion in return, while arbiters who did not vote uniformly with the others are penalised.
Similarly, the same operational model can be found in the Jur Open Layer[32]: potential arbiters must stake the JUR token and will be drawn to resolve disputes with a certain probability proportional to the tokens invested. Specifically, "the system rewards voters who stake JUR Tokens in support of the majority position at the expense of those who stake in support of the minority position"[33].
Again, the functioning of Aragon is based on the same principle: the most voted ruling outcome wins. "For example if there are 9 guardians and 4 vote "Allow", 2 vote "Block" and 3 vote "Refuse to vote", the winning outcome of that round would be "Allow", because that outcome received the most votes out of the available options"[34].

This new form of adjudicative process is certainly a better fit than traditional methods as it delegates the central authority of the judicial system to the blockchain people. Although this approach certainly represents an interesting cop-out for proponents of the blockchain enthusiasts' cultural revolution, there are issues that have not gone unnoticed by several academics and legal professionals. Buchwald emphasises the existence of current flaws and inherent weaknesses in on-chain incentivised voting[35]. The existing literature has strongly criticised the decision-making process exercised by jurors. The first problem is the impossibility of guaranteeing reliable quality standards for decision-makers. Emmert's words in this regard are particularly representative, "Kleros is inviting anybody - regardless of professional background or legal expertise - to become a "juror" in its system and participate in decentralized dispute settlement"[36] Or again, "what is the relevance of such a vote by a random number of anonymous jurors, none of which are lawyers, let alone judges, one may ask"[37].

Decentralised justice based on Schelling's game carries a high price to pay in terms of quality of service. Even if jurors are incentivised to act in a fair manner, they remain anonymous in any case, and this prevents guaranteeing standards of competence. The delicate role of choosing what is right and what is wrong is attributed to individuals with unknown decision-making capacities. Specifically, to become a juror in Kleros no personal information is required and there is no registration process, thus making it potentially possible for anyone to become an arbiter and to be potentially dangerous with his/her decisions[38].

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[32]Jur White Paper. (2021). p. 9. Available at: https://jur.io/wp-content/uploads/2021/03/jur-white-paper-v.3.0.0.pdf, last accessed [20.07.2021].
[33] *Ibid.*
[34] Aragon user guide. (2021). Available at:https://help.aragon.org/collection/1-aragon-user-guide, last accessed [21.08.2021].
[35] See Buchwald, M. (2020). "Smart Contract Dispute Resolution: The Inescapable Flaws of Blockchain-Based Arbitration*"*, *168 U. Pa. L. Rev. 1369.* pp. 1370 - 1423.
[36] Emmert, F. (2019). "A Critical Review of the Kleros "Dispute Revolution". Available at: https://www.researchgate.net/publication/335715800_A_Critical_Review_of_the_Kleros_Dispute_Revolution/link/5d777776299bf1cb80954c5c/download, last accessed [05.05.2021].
[37] *Ibid.*
[38] *See* The Kleros Juror Starter Kit. Available at: https://blog.kleros.io/the-kleros-juror-starter-kit/, last accessed [23.03.2020].

Again referring to Kleros, Murphy criticises the use of what he calls the 'self-professed experts'. "In a normal court, expert witnesses are expected to be able to prove why they should be acceptable to the court. This is based on educational and professional qualifications. There is no reason why this should be the case for Kleros. In fact, it could be argued that as the jurors are both bidding for work and getting paid for their arbitration, their skills should be provable and recorded"[39].

This kind of reflection also involves Aragon, whose functioning has been analysed by Kaal and Calcaterra. According to them, the adoption of an anonymous popular vote and a system of economic incentives may call required notions of effective, non-arbitrary, and fair dispute resolution mechanisms into question[40]. Jur partly avoids quality concerns as it provides a *Community layer*[41] that only allows certain professionals organised in groups called Communities to vote. Even if this represents an important step forward, it is necessary to point out that anyone - any JUR token holder - can create a community and decide on the members of the community, which does not entirely solve the problems of anonymity and the relative competence of the decision-makers.

These new forms of crowdsourced judicial systems have been exposed to criticism that goes beyond the quality standards of jurors but extends more generally to the application of Schelling's point for dispute resolution purposes. The popular opinion does not necessarily represent the correct opinion, that is why this model "incorrectly shifts to incentivise a juror to vote for an outcome that diverges from the 'right' legal result"[42]. Specifically, the decision-maker is selfishly interested in not losing the stake and predicting how the co-jurors will vote rather than thinking about the well-being of the disputants. A profit-oriented approach that distances itself from the interests of the litigants represents a fallible dispute resolution process in all those disputes that are economically unattractive. "Supposedly, a lazy juror would be punished because he would be too often out of sync with the majority and lose his deposit too many times. But what if all or most jurors become lazy because the cases are just not worth any real effort? It seems at least possible that the system would become one of "first impression" voting...".[43] Ethicality - intended as "the ability of the system to be perceived as fair by the community"[44] - seems to be a major concern for decentralised justice.

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[39] Murphy, I. (2018). "Would You Use The Justice Protocol from Kleros?", *Enterprise times*. Available at: https://www.enterprisetimes.co.uk/2018/01/23/use-justice-protocol-from-kleros/, last accessed [06.07.2021].

[40] Kaal, W.A. and Calcaterra, C. (2017). "Crypto Transaction Dispute Resolution", *The Business Lawyer, 2018, U of St. Thomas (Minnesota) Legal Studies Research Paper No. 17-12*. p. 9.

[41] Jur White Paper. (2021). Available at: https://jur.io/wp-content/uploads/2021/03/jur-white-paper-v.3.0.0.pdf, last accessed [14.06.2021].

[42] Buchwald, M. (2020). "Smart Contract Dispute Resolution: The Inescapable Flaws of Blockchain-Based Arbitration". p. 1405.

[43] Emmert, F. (2019). "A Critical Review of the Kleros "Dispute Revolution". Available at: https://www.researchgate.net/publication/335715800_A_Critical_Review_of_the_Kleros_Dispute_Revolution/link/5d777776299bf1cb80954c5c/download, last accessed [05.05.2020].

[44] *See* Ast, F. and Deffains, B. (2021). "When Online Dispute Resolution Meets Blockchain: The Birth of Decentralized Justice". p. 17. and Dimov, D. V. (2017). "Crowdsourced Online Dispute Resolution". *Leiden University Center for Law and Digital Technologies, SIKS Dissertation Series No. -17.* p. 122.

The final flag regarding these forms of on-chain arbitration concerns the absence of discovery compulsion mechanisms. While in off-chain forms of arbitration it is possible to compel production of documents or testimony, in on-chain ones this cannot happen because of pseudonymity, which implies a lack of access to and power over the parties and their assets[45]. The Juror exercises decision-making power by assessing only two types of evidence. On the one hand, he/she will have at his disposal elements in favour of the party submitting the material; on the other hand, elements aimed at discrediting the other party. Buchwald points out that limiting the decision based solely on these two sources is not sufficient as all the evidence that inflicts self-harm is omitted. "On-chain, this third source of information falls into oblivion. Even in the simplest of disputes, the proverbial "smoking gun" disappears behind a wall of blockchain pseudonymity, presenting major opportunities for deceitful-but not impermissible-omissions"[46].

The risk of running into an incompetent juror that could be called "trusted" within the limits of their unknown skills, with the risk of suffering a decision whose logic is far from the interests of the litigants and which may not consider essential evidence due to the impossibility of having discovery compulsion mechanism, exponentially increase the possibility of inserting a decentralized security hole in the transaction.

Non-adjudicative methods gloss over this set of problems, as possible security holes can be avoided by not delegating decision-making power to third-parties, who lack legal expertise and who may make questionable decisions by carrying the heavy burden of justice. Eventually, the idea of "exit at any time" suddenly becomes more attractive.

In conclusion, while Chase's cultural inquiry has not been explored by the private sector, the result of a little reflection on it may be of interest to users interacting with these platforms. Metzger highlights the presence of economic barriers to entry: "the Kleros curated token list court currently requires that prospective jurors stake 80,000 PNK, with a value as of this writing of over $600 AUD, for the possibility of being selected as a juror. Even though the majority of that stake is likely to be returned to any juror (whether in the majority or minority of a decision), it is still a large investment in tokens that must precede participation"[47]. If we consider the countries where cryptocurrency use is most common, i.e. in Africa, Southeast Asia and Latin America[48] - where average monthly salaries are well below what is required to become a juror - then decentralized justice risks becoming an oligarchy of rich millennials from advanced countries. For many, this could be even more unpleasant than the central control from which blockchainers instinctively flee.

[45] Buchwald, M. (2020). "Smart Contract Dispute Resolution: The Inescapable Flaws of Blockchain-Based Arbitration". p. 1400.
[46] *Ibid*.
[47] Metzger, J. (2019). "The current landscape of blockchain-based, crowdsourced arbitration". p. 101.
[48] World Economic forum. (2021). "These are the countries where cryptocurrency use is most common". Available at: https://www.weforum.org/agenda/2021/02/how-common-is-cryptocurrency, last accessed [15.02.2021].

## III) - Aspera Anonymous Dispute Resolution Process

Aspera provides a service designed for smart contract dispute resolution service through an interactive mediation process based on artificial intelligence systems. The Aspera Mediation Clause is pluggable and potentially available for any smart contract. Both parties have the possibility to activate the clause and start the mediation process with a simple click on the website https://aspera.rocks/.

The process is organised in three phases in order to ensure a sufficient level of flexibility. Specifically, it is assumed that simpler disputes will be resolved in *phase 1* or *phase 2* without the need for human support, while more complex disputes will be resolved in *phase 3* through a professional mediator and specific guarantees provided through Artificial Intelligence systems.

Suppose two parties, A and B, have a trade transaction through a smart contract. B is the buyer, while A is the owner of the contract. B starts a first transaction, sending an amount of cryptocurrency to the contract in exchange for a service provided by A. However, the buyer, after having paid, is not satisfied by the service. B can interact again with the contract, activating a specific function that starts the Aspera Mediation Clause. The clause management process can be divided in several steps:

**Capital Freeze**: When a user interacts the first time with the smart contract, a sum representing a fraction of the value of that transaction is automatically frozen. A and B cannot recover the frozen sum until they end the dispute or a certain period of time passes. This step is necessary because it discourages parties from running away with money and at the same time discourages them from activating the clause for futile reasons.

**Chatbot Communication**: After the blocking of the funds, chatbots, (i.e., Artificial Intelligence) come into play. Chatbots can be used to perform a list of predetermined questions to the two parts, in order to acquire more information about the dispute. As the process progresses, more advanced chatbots will be introduced and programmed with the ability to learn over time: the more they will interact with parties, the higher the number of disputes, and so the smarter they will become. Subsequently, chatbots send the collected pieces of information to specific datasets, whose size will grow over time.

Once sufficient information has been obtained from both parties, Aspera uses a two-pronged approach to produce the mediation proposal. Specifically, a first analysis is carried out using the Failure Mode, Effects, and Criticality Analysis (FMECA) and then a second using Machine Learning (ML) algorithms:

**Failure Mode, Effects, and Criticality Analysis (FMECA)**: FMECA is a qualitative methodology mainly used in the domain of plant engineering during design phases[49]. It highlights the failure modes of components that could compromise the functionality of the system to identify and carry out corrective actions to address the most serious concerns. Our intention is to grasp the techniques and methodology of FMECA analysis and apply them to our situations, in which the plant design is replaced with the intrinsic structure of the transaction, which could be the delivery of a fragile object or the discomforts experienced in a hotel room.

**Machine Learning and Mediation reframing**: In this kind of approach, ML algorithms will be performed on the pieces of information previously collected on the dataset, in order to define an agreement for the parties that is highly likely to be accepted. It is expected to get better mediation proposals as the time passes, since ML algorithms perform better when the number of data is higher. The aforementioned dataset is also used by specific algorithms in order to present a "Mediation Reframing" to each of the parties in a reciprocal manner. This is a technique of reframing the viewpoints of the disputants through changes in words or syntax, aimed at modifying the way a thought is presented so that it retains its fundamental meaning by emptying it of conflicting elements, thus achieving an optimal environment for dispute resolution.

In order to protect the confidentiality of our customers and the principles of blockchain our AI will perform on non-personal data (NDP), our chatbots will not ask personal questions. The interest is exclusively in understanding the context of the dispute and the margins for improvement on conflicting positions.

Having reached this stage, parties A and B have two options (*phase 1*). On the one hand, they can accept the mediation proposal; in this case the agreement accepted by the parties will be binding for them since the smart contract will be automatically instructed and consequently the blocked funds will be released. On the other hand, they can reject the mediation proposal and therefore disagree with ML: in this case, chatbots will interact again with the parties requesting information on the reasons that led the parties to reject the first proposed agreement, as well as additional specific questions. The information obtained from this additional round of chatbots will be transferred into the dataset. The solution proposed will then be communicated to the parties. This new proposal can again be accepted or rejected (*phase 2*). If it is accepted, the agreement reached by the parties will be binding for them as it will automatically instruct the smart contract and consequently the blocked funds will be released.
If the second agreement is also rejected, the parties will agree on a date to access the Aspera Virtual Camera for anonymous mediation (*phase 3*).

**Aspera Virtual Camera for Anonymous Mediation**: In this last phase, it is possible to mediate the dispute “face to face” with a human mediator but in complete anonymity in accordance with the

[49] *See* Lipol, S.L. and Haq, J. (2011). “Risk analysis method: FMEA/FMECA in the organizations”. I*nternational Journal of Basic & Applied Sciences IJBAS-IJENS Vol: 11*, pp. 74-82.

principles of blockchain. This system allows users to meet in virtual rooms where privacy is guaranteed through artificial intelligence systems. Specifically, the AI 'masks' the physiognomy of the face and voice of those who connect, making them unrecognisable. The mediator, by accessing this room, will be able to help the anonymous parties to reach an agreement more efficiently, as he will have at his disposal the answers of the chatbots as well as the two previously rejected agreements, useful to organise a winning strategy starting from a context of the dispute that is already well defined and clear. Through live deep fakes, it is possible to change the user's face to someone else's in real time video applications:

Figure 5. A deepfake example. Source: https://github.com/alew3/faceit_live3


This live mediation will have an exclusively facilitative purpose. Phase 3 will conform to the general principles provided by the Directive 2008/52/EC[50]. In order to ensure flexibility we intend to adopt the "Fiverr" business model. This approach will ensure an ecosystem of professionals providing mediation services at various price ranges accessible to all budgets, from a fresh graduate student with a focus on ADR who will ask for low mediation fees, to a certified mediator with multiple years of experience who will certainly ask for a larger sum. The only constraint imposed - in addition to minimum competence requirements assessed on a case-by-case basis - will be that of transparency, each mediator who applies to register with Aspera will have to attach a CV that is accessible to all users, the veracity of which will be certified by us. Users will be able to choose a mediator according to the price they ask and the skills they have.

For users who do not embrace decentralisation and do not want to mediate disputes then it is inevitable to be exposed to the risky and intrusive judgement of a TTP. This is why there is a (phase

[50] Directive 2008/52/EC of the European Parliament and of the Council of 21 May 2008 on certain aspects of mediation in civil and commercial matters. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32008L0052&from=en, , last accessed [10.02.2021].

4) of arbitration, which we hope will be perceived by blockchainers as an *extrema ratio* for the reasons stated above. The same operational criteria will be applied here as in phase 3. Similarly to the process described for mediators, we will ensure specific standards of quality and transparency with CVs easily available on our website. However, unlike phase 3, users will not be able to request a specific professional. They will be able to request an arbitration service but they will not know which arbiter will decide their dispute as the latter will be selected randomly from the list of available professionals. Users will know that an arbiter registered with Aspera will decide their dispute, but they will not know specifically which one, in order to avoid anonymous users trying to contact the decision-maker separately to influence his decision. In the long term - through cryptography - it will be possible to reveal the identity of the arbiter after the dispute has been resolved, proving that it was that specific professional who decided in phase 4.

In a user-side perspective, the added values that our users would get from including the Aspera Mediation Clause in their smart contracts are as follows:

**Cost savings:** The combined use of chatbots and Machine Learning algorithms allows us to produce mediation proposals for phases 1 and 2 at almost zero cost, guaranteeing a dispute resolution process with a highly competitive pricing policy.

**Informal approach/ Confidentiality**: We do not ask our users to submit documents to prove their positions in order to establish who is right or wrong. Moreover, no witnesses or legal expertise are required. One of the main reasons why users prefer blockchain is anonymity, asking for documentation as proof does not fit their need for privacy

**Faster outcome:** Thanks to an automated process, once users have answered the chatbot's questions we are able to produce a mediation proposal within an hour, without having to wait for the human third-parties.

**Total control over the outcome and risk management:** With Aspera our users can choose whether to accept the mediation proposal or not.

**Anonymity protection:** We guarantee the anonymity and privacy of our users with the latest technology. In phase 3, Artificial Intelligence systems are used specifically for this purpose.

**Preserve relationships:** Through Aspera the dispute is resolved amicably, with an agreement accepted by both parties. This is particularly useful in the business world where it is important to maintain a good commercial relationship with clients even in case of a dispute.

**Independence from third-parties:** Decentralisation is the real added value of Aspera. Users are in the blockchain because they do not trust third parties and do not want to be controlled. This is why in Aspera there are no third parties deciding for them.

**Possibility to feel heard:** Chatbots allow users to feel heard and to express their personal views on the dispute. Users' responses are the central element for us and they are sure to be actively considered.

**Multiple choice:** Our users will be able to choose between three mediation agreements that will be proposed during the three phases of the process. Specifically, they will be able to choose if, when and how to resolve their dispute.

**Customisation of the agreement:** The use of a 3-step process permits the customisation of agreements. If the first mediation proposal is not considered "fair" by the users, they can explain why they did not accept it, and the second one will be readjusted according to the negotiation margins of the parties.

**High quality standards:** Phase 3 mediators will not be anonymous and will guarantee demonstrable standards of quality and professionalism.

**Rating:** Users will be able to assess the quality of the process and the skills of the person who handled their dispute.

**Mediation Audit:** We will provide an audit process based on a survey of practising mediators in the Aspera ecosystem.

**Service available on a 24/7 basis:** At any time of day or night, our users can activate the clause and immediately talk to the chatbot.

From a purely legal perspective, we deal with cross-border disputes using multi-language processes. As of 2021, blockchain disputes resolved by major players are related to digital identity (proof-of-humanity protocol[51]), decentralized social media, freelance services, token minting and transfer.

For those unwilling to reveal their identity, the accepted agreement will be made self-enforceable on-chain. For those who are willing to step out of pseudonymity, it will be possible to make mediation agreements enforceable in countries that have ratified the Singapore Mediation Convention[52] - similarly to what is currently done in the blockchain market with arbitration awards made enforceable under the New York Convention[53].

[51]Proof of Humanity. Available at: https://www.proofofhumanity.id/, last accessed [14.06.2021].
[52] United Nations Convention on International Settlement Agreements Resulting from Mediation, Available at: https://www.euro-arbitration.org/resources/en/nyc_convention_en.pdf, last accessed [10.02.2021].
[53] United Nations Convention on International Settlement Agreements Resulting from Mediation (the “Singapore Convention on Mediation”), Available at: https://uncitral.un.org/sites/uncitral.un.org/files/singapore_convention_eng.pdf, last accessed [05.02.2021].

## Conclusion

Commercial disputes arising in this particular socio-cultural context cannot be resolved by readjusting the dispute resolution operating modes applicable out of the blockchain world – mostly adjudicative. New approaches are needed that strongly consider blockchainers as atypical subjects, different from the ordinary user personas. Specifically, it is necessary to design ODR systems that are a reflection of the disputes they aim to resolve, their cultural framework and the particular relational dynamics of an increasingly peer-to-peer world. The currently available adjudicative solutions may eventually turn into new forms of unexpected decentralised security holes. On the contrary, non-adjudicative methods are far from all the problems that inevitably face decentralised justice and are the perfect expression of this specific counterculture that rebels against external impositions.

This user-centred view of blockchain cannot be ignored while designing an ODR system. The need for independence and the commercial security concerns of this new era could be useful tools that legislators could exploit to promote the widespread adoption of the amicable dispute resolution methods that they have long been trying to achieve out of chain. Independence requires cooperation of the oppressed against the oppressor and mediation can be the symbol of this new independence movement. Non-adjudicative processes can bring us closer to a future where everyone manages their own transactions and cooperates in a TTP free business friendly environment. This is why it is possible to achieve total decentralisation through non-adjudicative methods, finally bringing trust in a no(t)-trust(ed) technology.