Blockchain and smart contracts: a game changer in mediation?

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BLOCKCHAIN AND SMART CONTRACTS: A GAME CHANGER IN MEDIATION?

Abstract:

In light of accelerating technological innovation and shifts in dispute resolution paradigms, this article elucidates the transformative potential of blockchain technology and smart contracts in mediation. The paper posits that these advancements offer an innovative framework for dispute avoidance and a more efficient, transparent process for resolving conflicts, particularly in commercial settings. The article critically assesses the inherent challenges and argues that overcoming these obstacles necessitates a multi-stakeholder approach, encompassing legislative measures, educational initiatives, and technological enhancements. It ultimately contends that blockchain and smart contracts hold the capacity to significantly reshape the landscape of mediation.

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I. Introduction

1 Mediation is a common approach for resolving disputes in which an impartial third party facilitates discussion and negotiation between disputing parties to achieve a mutually acceptable agreement. Historically, mediation was performed in person or over the phone, but with the development of digital technology and the COVID-19 pandemic as a catalyst, it is increasingly conducted online.[1]

1 For the development and regulation of online mediation under the COVID-19 in China and the US, see Carrie Shu Shang, Wenli Guo & Charles Ho Wang Mak, "Two Paths Leading to the Same End?

2 The advent of blockchain technology, a decentralised (sometimes centralised), distributed ledger that enables the safe storing and transfer of data, introduces an innovative dimension to mediation. This technology, particularly when paired with smart contracts, has the potential to redefine not only how disputes are resolved but also how they can be pre-emptively avoided, particularly in the realm of commercial enterprises.

3 Blockchain technology with smart contracts can rewrite how disputes are resolved and how that resolution is recorded. This article provides a brief explanation of blockchain technology and smart contracts. It explores two distinct ways in which distributed ledger technology ("DLT") and smart contracts can be useful tools for dispute avoidance and mediation. In relation to dispute avoidance, this article argues that an early thoughtful use of blockchain and smart contracts has the potential to avert many a dispute that often plague commercial enterprises. Concerning the use of mediation, this article makes a distinction between emerging legal frameworks for blockchain – smart contract disputes on one hand, and how the technology can assist in the resolution process on the other. In relation to the latter, this article argues that when disputes arise, the platform or solution offered by blockchain and smart contracts can be used to initiate, organise, execute, record, and enforce mediation outcomes in an efficient manner with limited human intervention.

II. Blockchain technology and smart contracts

4 In its simplest form, a blockchain is a "structured collection of information", a kind of database used to track transactions.[2] It has been described as "a sophisticated bookkeeping product that securely and reliably stores data on a network".[3] Its main selling point is its ability to ensure data integrity and identity authentication.[4] The above functions of the

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A Discussion of Development and Regulation of Online Mediation under the Covid-19 in the People's Republic of China and the United States" (2020) 13(1) *World Arbitration and Mediation Review* 101.

2 Jean Bacon *et al*, "Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers" (2018) 25(1) Rich JL & Tech 1 at 6.

3 Pierluigi Cuccuru, "Beyond Bitcoin: An Early Overview on Smart Contracts" (2017) 25 *International Journal of Law and Information Technology* 179. See also Nathan Fulmer, "Exploring the Legal Issues of Blockchain Applications" (2019) 52(1) *Akron Law Review* 161 at 164.

4 Pierluigi Cuccuru, "Beyond Bitcoin: An Early Overview on Smart Contracts" (2017) 25 *International Journal of Law and Information Technology* 179. See also Nathan Fulmer, "Exploring the Legal Issues of Blockchain Applications" (2019) 52(1) *Akron Law Review* 161 at 164.

blockchain are possible because of the use of encryption or cryptographic functionality.[5] Despite its relatively recent emergence,[6] blockchain technology has been described as "a tsunami-like phenomenon, slowly advancing and gradually enveloping everything in its way by the force of its progression".[7] It has been called a "foundational technology" capable of being incorporated into many industries.[8] Its potential as a trusted and immutable record-keeping tool with huge prospect for automation and elimination of human intervention or agency has endeared it to both private businesses and public organisations. The utility of blockchain technology finds its most popular expression in its use in cryptocurrency trading.[9] The technology is also used in the financial markets, insurance, contract management, property transfers and healthcare.[10] For instance, in the supply chain management industry, smart contracts can trigger a dispute resolution procedure automatically in case of a supplier's failure to deliver goods on time. The real estate sector, too, can use smart contracts to verify legal ownership and sales conditions, resulting in faster property transfers. From employment disputes to consumer complaints, smart contracts can be leveraged to resolve a wide range of disputes.

5 As a database or ledger, blockchains may be centralised or decentralised.[11] The latter means that the data is stored across a peer-to-peer network in a distributed manner.[12] This is what is often referred to as DLT.[13] This process secures the data by making it difficult for a

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5 Pierluigi Cuccuru, "Beyond Bitcoin: An Early Overview on Smart Contracts" (2017) 25 *International Journal of Law and Information Technology* 179. See also Nathan Fulmer, "Exploring the Legal Issues of Blockchain Applications" (2019) 52(1) *Akron Law Review* 161 at 164.

6 See James A Cox, "Introduction to Blockchain Technology" in *Blockchain for Business Lawyers* (James A Cox & Mark W Rasmussen eds) (American Bar Association, 2018) at pp 185 and 187–192.

7 William Mougayar, *The Business Blockchain: Promise, Practice, and Application of the Next Internet Technology* (Wiley, 2016) at p 17.

8 Stephanie Alexander & Tripp Scott, "How Bitcoin will bring about a Legal Practice Revolution" *TRIPP SCOTT* (4 June 2014) <https://web.archive.org/web/20230118053515/https://www.trippscott.com/newsroom/6-how-bitcoin-will-bring-about-a-legal-practice-revolution> (accessed 7 September 2023).

9 Morgan N Temte, "Blockchain Challenges Traditional Contract Law: Just how Smart are Smart Contracts?" (2019) 19(1) *Wyoming Law Review* 87 at 90.

10 Morgan N Temte, "Blockchain Challenges Traditional Contract Law: Just how Smart are Smart Contracts?" (2019) 19(1) *Wyoming Law Review* 87 at 90. See also Nathan Fulmer, "Exploring the Legal Issues of Blockchain Applications" (2019) 52(1) *Akron Law Review* 161 at 172.

11 See Vitalik Buterin, "On Public and Private Blockchains" *Ethereum Foundation Blog* (7 August 2015) <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/> (accessed 22 August 2023) where the author, the founder of ETHEREUM, identifies three different types of blockchains namely: public, consortium and fully private blockchains

12 For more on a down-to-earth explanation of how blockchains are created and how they function, see Jean Bacon *et al*, "Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers" (2018) 25(1) Rich JL & Tech 1.

13 Jean Bacon *et al*, "Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers" (2018) 25(1) Rich JL & Tech 1.

single entity to take over and make alterations. Bitcoin and other cryptocurrencies use this type of blockchain infrastructure.

6 Comparatively, centralised ledgers, often private platforms, rely on single highly trusted entities, and are less costly in the sense that the process of generating consensus protocols by miners is limited.[14] Buteran[15] named five characteristics of such blockchains. Firstly, blockchains with centralised control can be flexible – they can change the governing rules, reverse, and modify transactions. "Write" permissions are restricted by default, and "read" permissions may or may not be so restricted. Secondly, the validators (nodes creators and miners) are known. Further, transactions are cheaper since the verification process is limited to a few nodes. Also, faults can easily be fixed manually. Lastly, they can have a relatively high level of privacy. Buteran suggests that centralised blockchains are suitable for institutions.[16] Dispute resolution professionals and institutions who want to benefit from the distinct features of blockchain and smart contract technologies and maintain privacy, control and some level of flexibility could consider using a centralised or private blockchains. Alternatively, and depending on the reason for adopting a particular technology, a decentralised or public blockchain can also offer its own peculiar advantages. This does not imply that a decentralised system cannot be considered but such an option will have its peculiar strengths and weaknesses.

7 The boundless potential of blockchain technology is attributed to the emergence of smart contracts and its inherent self-executing capabilities.[17] Smart contracts have the potential to reduce human intervention in transactions.[18] It takes "the static ledger [blockchain technology] and turns it into a dynamic system capable of executing the business logic of

14 See Vitalik Buterin, "On Public and Private Blockchains" *Ethereum Foundation Blog* (7 August 2015) <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/> (accessed 22 August 2023). See also Jean Bacon *et al*, "Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers" (2018) 25(1) Rich JL & Tech 1 at 29.

15 See Vitalik Buterin, "On Public and Private Blockchains" *Ethereum Foundation Blog* (7 August 2015) <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/> (accessed 22 August 2023). See also Jean Bacon *et al*, "Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers" (2018) 25(1) Rich JL & Tech 1 at 29.

16 Vitalik Buterin, "On Public and Private Blockchains" *Ethereum Foundation Blog* (7 August 2015) <https://blog.ethereum.org/2015/08/07/on-public-and-private-blockchains/> (accessed 22 August 2023).

17 Pierluigi Cuccuru, "Beyond Bitcoin: An Early Overview on Smart Contracts" (2017) 25 *International Journal of Law and Information Technology* 179.

18 Pierluigi Cuccuru, "Beyond Bitcoin: An Early Overview on Smart Contracts" (2017) 25 *International Journal of Law and Information Technology* 179.

a contractual agreement".[19] What then are smart contracts? Christie and Mante[20] observed that the definitions of smart contract fall into three categories. Firstly, those which conceptualise smart contract as a self-executing computer programme or a computer code.[21] Definitions in this category tend to de-emphasise the legal nature of smart contracts. They argue that a smart contract does not refer to a legal contract. They are computer programmes which execute specified actions according to a set of pre-specified rules.[22] To this view, smart contracts are essentially computer programmes designed to execute the provisions of a contract automatically. This automation can greatly facilitate transactions and contracts by ensuring that terms are executed precisely as specified, thereby decreasing the likelihood of disputes and misunderstandings. This category of definitions amplifies the form and practical functions of the technology, but not its essence.[23] Absence of human intervention, immutability and self-execution are some characteristics which are often highlighted.[24]

8 The second category of definitions focuses on the legally binding nature of smart contracts.[25] This view is held mainly by authors with legal leanings. Then there are definitions which straddle the technical and the legal aspects of the concept.[26] Another finding one can glean from the literature is the persistence of the debate as to the true nature of smart contracts. Are they computer codes that execute instructions or do they qualify as contracts in the legal sense? The English Law Commission, in advice to the UK Parliament

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19 Nathan Fulmer, "Exploring the Legal Issues of Blockchain Applications" (2019) 52(1) *Akron Law Review* 161 at 165.

20 David Christie & Joseph Mante, "Smart Contracts and Payment in the UK Construction: The Legal Framework" in *Blockchain for Construction* (Theodoros Dounas & Davide Lombardi eds) (Springer, 2022) at pp 167–184.

21 Theodoros Dounas & Davide Lombardi, "Blockchain Technologies in Construction" in *Blockchain for Construction* (Theodoros Dounas & Davide Lombardi eds) (Springer, 2022) at p 3.

22 Jean Bacon *et al*, "Blockchain Demystified: A Technical and Legal Introduction to Distributed and Centralised Ledgers" (2018) 25(1) Rich JL & Tech 1 at 46.

23 David Christie & Joseph Mante, "Smart Contracts and Payment in the UK Construction: The Legal Framework" in *Blockchain for Construction* (Theodoros Dounas & Davide Lombardi eds) (Springer, 2022) at pp 167–184; Kevin T McCarthy, "Unanswered Legal Issues: Blockchain 'Smart Contracts'" (March 2018) 60(3) *For the Defense* 12 at 13.

24 David Christie & Joseph Mante, "Smart Contracts and Payment in the UK Construction: The Legal Framework" in *Blockchain for Construction* (Theodoros Dounas & Davide Lombardi eds) (Springer, 2022) at pp 167–184; Kevin T McCarthy, "Unanswered Legal Issues: Blockchain 'Smart Contracts'" (March 2018) 60(3) *For the Defense* 12 at 13.

25 Max Raskin "The Law and Legality of Smart Contracts" (2017) 1 Geo Law Tech Rev 304 at 305–306; *Smart Contracts: Call for Evidence* (Law Commission, December 2020) (please note the significant change the Commission has made to its approach by using the term "smart legal contract" instead of "smart contracts").

26 See Morgan N Temte, "Blockchain Challenges Traditional Contract Law: Just how Smart are Smart Contracts?" (2019) 19(1) *Wyoming Law Review* 87.

following a call for evidence on the subject, opted for the term, "smart legal contracts" instead of "smart contracts". The former term, the Commission noted, refers to "a legally binding contract in which some or all of the contractual terms are defined in and/or performed automatically by a computer program".[27] It is viewed as a type of smart contract, which the Commission defined as "computer code that, upon the occurrence of a specified condition or conditions, is capable of running automatically according to pre-specified functions".[28] In this article, the term "smart contract" refers to what the Commission referred to as "smart legal contracts".

II. Disputes no more?

9 The process of formulating smart contracts can be seen as a crucial step towards dispute avoidance. Initially, parties should agree on terms and conditions in natural language, creating a foundation for the agreement. The specifics of these terms are then translated into a programming language by a trusted third party, generating the smart contract's code. Various coding languages could be used for this purpose, including source code, machine code, object code and assembly code, *etc*. Ensuring the accurate translation of the initial agreement into code is essential; the coded smart contract must reflect the parties' intentions without ambiguity. This translation process should be rigorous and possibly involve multiple validation steps, to ensure the final product is as flawless as possible and adequately mirrors the agreed terms.

10 Simple binary transactions seem to benefit most from smart contract arrangements, as they usually involve "if/then" scenarios that can be readily coded. These transactions, primarily guided by clearly defined conditions and outcomes, are ideally suited to the deterministic nature of smart contracts. However, as technology evolves and the coding process becomes more sophisticated, we may see an expansion in the types of contracts that can benefit from this arrangement. Eventually, even complex transactions requiring the exercise of discretion or incorporating more complex "if/then/else" structures may be encoded into smart contracts. These advancements could dramatically increase the range of commercial

27 See Morgan N Temte, "Blockchain Challenges Traditional Contract Law: Just how Smart are Smart Contracts?" (2019) 19(1) *Wyoming Law Review* 87 at para 1.2.

28 *Smart Legal Contracts: Advice to Government* (Law Commission, November 2021) at pp vii and 1.

transactions managed via blockchain, reducing the need for traditional human interactions and associated disputes.

11 Smart contracts on a blockchain have ushered in a new transactional paradigm. Due to their deterministic nature, these contracts have the potential to reduce disputes substantially. They leave little room for interference and ambiguity due to their decentralisation, as they effectuate the agreement only when certain conditions are met. This does not, however, render them immune to disputes. Unforeseen occurrences, coding errors and attempts at exploitation by malignant actors are all realities of this technology's evolution, which could result in disagreements.

IV. Emerging legal framework for resolving smart contract disputes

12 As the use of smart contracts in domestic and international transactions becomes more widespread, there is a growing need to devise effective methods for resolving prospective disputes. Alternative dispute resolution ("ADR") mechanisms, such as mediation, arbitration, and expert determination, remain pertinent in the context of blockchain technology.[29] Not only are these mechanisms necessary to resolve contractual disputes regardless of the type and context in which they arise, but also to manage events such as coding errors and hacking. In actuality, the development of these resolution mechanisms is ongoing. A peculiar difficulty lies in ensuring the legality of these digital contracts and establishing a mechanism that is mutually accepted for resolving any disputes that may arise from their execution. This highlights the continual need for progress in this area to ensure that smart contracts can be utilised effectively on a global scale.

13 Several initiatives are underway to provide a framework for resolving smart contract-related disputes. Two such initiatives related to smart contracts are discussed below:

A. JAMS smart contract protocol

29 For more information on blockchain arbitration as a new form of dispute resolution, see Maxime Chevalier, "From Smart Contract Litigation to Blockchain Arbitration, A New Decentralized Approach Leading Towards the Blockchain Arbitral Order" (2021) 12(4) *Journal of International Dispute Settlement* 558.

14 On blockchain-related disputes, JAMS, an institutional ADR provider, has developed protocols to facilitate the use of ADR in disputes deriving from blockchain activities, such as smart contracts.[30] A closer examination of these new rules reveals a valiant effort to adapt existing rules on commercial arbitration and mediation to the peculiarities of smart contract transactions. There is evidence that the JAMS rules are gaining traction in practice. For instance, in *Chechetkin v Payward Ltd*,[31] an English trader on a cryptocurrency platform and the owners of the platform adopted the JAMS Comprehensive Arbitration Rules & Procedures.[32] The creation of protocols designed for disputes related to blockchain and smart contracts not only recognises the increasing frequency of smart contracts but also guarantees its significance and efficiency in settling conflicts in this emerging digital realm. It must be noted that the JAMS rules, although about smart contract disputes, do not suggest that the technology will be deployed as part of the resolution process. Nevertheless, this demonstrates the continuing significance of the interaction between traditional contracting approaches and smart contracts.

B. The Digital Dispute Resolution Rules

15 In April 2021, the UK Jurisdiction Taskforce ("UKJT") introduced the Digital Dispute Resolution Rules[33] ("UKJT Rules") in an effort to provide a framework for an efficient and timely resolution of blockchain-related disputes.[34] These rules provide a framework for the expeditious resolution of legal disputes arising from blockchains, smart contracts and other digital relationships. The UKJT Rules have several significant features, including swift resolution of disputes by arbitrators or experts, on-chain implementation of decisions by arbitrators or experts using a private key and optional anonymity for parties. Then there is what is known as the "automatic dispute resolution process", which allows for the automatic selection of a panel, person, or an artificial intelligence agent to resolve disputes and implement outcomes.[35] Parties can incorporate these rules into their digital contracts.

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30 "JAMS Smart Contract Clause and Rules (DRAFT)" *JAMS* <https://www.jamsadr.com/rules-smart-contracts> (accessed 8 June 2023).
31 [2022] EWHC 3057 (Ch)
32 Effective 1 June 2021.
33 LawTechUK, 2021.
34 UK Jurisdiction Taskforce, *Digital Dispute Resolution Rules* (LawTechUK, 2023) <https://lawtechuk.io/insights/ukjt-digital-disputes-rules> (accessed 8 June 2023).
35 UK Jurisdiction Taskforce, *Digital Dispute Resolution Rules* (LawTechUK, 2023) <https://lawtechuk.io/insights/ukjt-digital-disputes-rules> (accessed 8 June 2023).

The UKJT Rules represent a significant advancement in the development of a dispute framework for on-chain transactions. Unlike others, there is evidence that the drafters adapted traditional dispute resolutions rules to on-chain transactions and also made an effort to use the technology to foster the resolution process. While remedies for dispute resolution involving smart contracts are still being developed, the introduction of these rules by JAMS and the UKJT represents a significant stride forward.

V. Integration of blockchain and smart contracts technology in mediation

16 Integrating blockchain technology and smart contracts into traditional mediation practices offers a new and innovative approach to dispute resolution. As demonstrated below, the unique features of blockchain, such as its decentralised ledger technology, provide a transparent and immutable record of transactions. Such features ensure fairness and eliminate the possibility of tampering. When combined with the automation and contractual certainty provided by smart contracts, which automatically execute contractual obligations when pre-set conditions are met, these features minimise the potential for disagreements and allow for quicker resolution. This novel approach to dispute resolution offers numerous advantages, including increased transparency, security, and efficiency. Mediation can be transformed into a more effective and streamlined process by leveraging the strengths of blockchain and smart contracts.

A. Facilitative and evaluative mediation

17 Mediation offers a range of styles and approaches to dispute resolution, each with its own unique characteristics. These include facilitative, evaluative and transformative mediation. Facilitative mediation, the most commonly used form, is characterised by the mediator guiding the process while allowing the parties to retain control over the outcome. This approach gives the parties greater freedom to explore creative solutions within the boundaries established by the mediator. The mediator's role in facilitative mediation is to ask questions that help the parties articulate their underlying interests and motivations, enabling them to understand each other's perspectives better and find common ground.

18 Evaluative mediation is a style of mediation in which the mediator plays a more active role in guiding the process. In this approach, the mediator offers opinions on the strengths and weaknesses of each party's case and controls how and when the parties interact. This style of mediation can be particularly useful in cases where there is an uneven power dynamic between the parties. By providing an objective assessment of the situation and facilitating communication between the parties, the mediator can help to level the playing field and promote a fair and equitable resolution.

19 In this article, the authors use both facilitative and evaluative mediation styles to illustrate how blockchain and smart contract can be integrated into the processes.

B. Mediator selection

20 Blockchain technology has the potential to enhance facilitative and evaluative mediation at every stage of the process. For example, during mediator selection, the blockchain can be used to maintain a decentralised database of certified mediators, including information about their qualifications, experiences and past performances. It can be used to select mediators with expertise on a particular subject. Parties can sign on for the automatic selection of a mediator with certain characteristics. This will promote transparency and make it easier for the parties to select a mediator that meets their needs. Additionally, the integration of smart contracts at the agreement signing stage can streamline the mediation process. With the terms and conditions of the mediation agreed, the different rights, obligations and series of activities can be coded. Each activity can be triggered by agreed verified steps.

C. Mediation process

21 Moreover, blockchain technology can play a valuable role throughout the mediation process by providing a secure and transparent means of recording and tracking all proceedings. Communications between the parties, proposed settlements and the final agreement can all be timestamped and stored on the blockchain, ensuring complete transparency and non-repudiation. This means that all parties can have confidence in the

integrity of the process and the outcome. By leveraging the unique features of blockchain technology, mediation can be transformed into a more secure, efficient and transparent process.

22 In evaluative mediation, smart contracts can play a valuable role in ensuring fairness and transparency. In addition to all the benefits listed in the preceding paragraph, the mediator's recommendations or evaluations can be written into a smart contract, creating an immutable record of their assessment. This transparency helps to ensure that the mediator is not showing any undue bias or favouritism towards one party over the other.

23 Smart contracts can also be used to create an escrow service in the context of mediation. In cases where there are disputed funds, the smart contract can securely hold these funds until the mediation process concludes. Once an agreement has been reached, the smart contract can automatically disburse the funds to the rightful party based on the agreed terms. This eliminates the need for a traditional third-party escrow service and reduces the risk of fraud or error.[36] By leveraging the unique features of smart contracts, evaluative mediation can be transformed into a more secure and transparent process, promoting fairness and equity in the resolution of disputes.

24 Platforms like Ethereum can provide decentralised dispute resolution mechanisms that can resolve disputes arising from mediation agreements quickly and efficiently.[37] These blockchain-based mechanisms have the potential to outperform traditional legal processes in terms of cost-effectiveness, making them an attractive option for parties seeking to resolve disputes in a timely and cost-effective manner.

25 Blockchain technology can also be used to securely store digital evidence in the context of mediation. By providing a secure and unalterable repository for digital evidence, the blockchain ensures that mediators and parties have easy access to uncorrupted data and evidence. This enhances the credibility and accuracy of the evidence used in the mediation process, promoting fairness and equity in the resolution of disputes.

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36 Riikka Koulu, "Blockchains and Online Dispute Resolution: Smart Contracts as an Alternative to Enforcement" (2016) 13(1) SCRIPTed 40 at 50.

37 " Welcome to Ethereum" *Ethereum* <https://ethereum.org/en/> (accessed 8 June 2023).

26 In conclusion, the integration of blockchain technology with smart contracts in mediation holds the promise of increased efficiency, security and transparency in the mediation process. However, the implementation will depend on the specific needs and demands of each mediation practice. It is also crucial to consider the complexities involved in co-ordinating regulatory frameworks across jurisdictions in the evolving crypto-asset ecosystem. The need for global co-ordination in this regard is clear, given the unique features of the underlying technology and the limitless opportunities it presents.

D. Future directions: Multi-step blockchain-based dispute resolution

27 The blockchain infrastructure proposed could be adaptable to a multi-step resolution process. Parties who integrate blockchain and smart contract technology into mediation need not worry about what happens next should the mediation fail, and the need arises for a dispute to be escalated to arbitration. The same infrastructure or a variant of it, namely the blockchain-based online multi-step dispute resolution process, such as the one proposed by Rabinovich-Einy and Katsch,[38] will facilitate a smooth transition from the mediation process to an online arbitration process. Platforms such as Kleros can be used as a reference, which allows for a smooth transition from mediation to arbitration by utilising smart contracts. These platforms can automatically enforce rulings and distribute tokens among jurors as incentives for fair voting at the arbitration stage.[39] Such platforms streamline the conflict resolution process and add levels of openness, efficiency and justice, which aligns nicely with the fundamental values of the different types of dispute resolution processes.[40]

28 Flowing from the preceding paragraph on the use of multi-tiered online dispute resolution processes, it is ultimately plausible that online resolution of disputes can be decentralised. Although still in their infancy, decentralised dispute resolution systems are set for expansion in light of the growing number of digital transactions and the shifting nature of

38 Orna Rabinovich-Einy & Ethan Katsch, "Blockchain and the Inevitability of Disputes: The Role for Online Dispute Resolution" (2019) 2 *Journal of Dispute Resolution* 1 at 61.

39 Orna Rabinovich-Einy & Ethan Katsch, "Blockchain and the Inevitability of Disputes: The Role for Online Dispute Resolution" (2019) 2 *Journal of Dispute Resolution* 1 at 61.

40 Orna Rabinovich-Einy & Ethan Katsch, "Blockchain and the Inevitability of Disputes: The Role for Online Dispute Resolution" (2019) 2 *Journal of Dispute Resolution* 1 at 61; Luis Bergolla, Karen Seif & Can Eken, "Kleros: A Socio-legal Case Study of Decentralized Justice & Blockchain Arbitration" (2022) 37(1) *Ohio State Journal on Dispute Resolution* 56.

the global economy.[41] That said, it is worth noting that regardless of claims of efficiency and a market-based approach to the settlement of disputes, decentralised dispute processes also pose major problems regarding communal deliberation and the common interest. As Aouidef, Ast and Deffains noted, the very features that make blockchain a tool for disintermediation could also be its limitations, especially when collective action requires compromise rather than distributed consensus.[42] These ever-evolving systems require a rethink of legal practices as they raise concerns about how distributed justice might provide shared good and a sense of justice for the community.[43]

VI. The advantages of smart contracts in mediation: A blockchain revolution

29 The preceding section has highlighted a number of benefits that the use of blockchain and smart contracts will bring to parties in mediation. These include efficiency, less human intervention in the process and transparency. Other benefits include secure record keeping, effective management of the mediation process including the appointment of mediators, memorialising important aspects of the process in real time and enforcement of the outcome of the process. These have the potential to streamline the process through automation of tasks such as data collection, document creation and contract execution. Disputes can be resolved more quickly and efficiently, bringing a new level of speed and convenience to the process, reduce time for the process, improve trust and reduce risk of bias, error and fraud.

30 Cost savings are a tangible advantage of smart contracts through the removal of intermediaries and automation of processes. Dispute resolution will become more accessible and cost-effective for small enterprises and individuals with limited financial resources. The accessibility of smart contracts will be further enhanced, allowing parties to resolve disputes remotely, making it convenient for individuals unable to visit a physical site, especially in different countries or regions.

41 Yann Aouidef, Federico Ast & Bruno Deffains, "Decentralized Justice: A Comparative Analysis of Blockchain Online Dispute Resolution Projects" (March 2021) 4 *Frontiers in Blockchain* 1.

42 Yann Aouidef, Federico Ast & Bruno Deffains, "Decentralized Justice: A Comparative Analysis of Blockchain Online Dispute Resolution Projects" (March 2021) 4 *Frontiers in Blockchain* 1.

43 Yann Aouidef, Federico Ast & Bruno Deffains, "Decentralized Justice: A Comparative Analysis of Blockchain Online Dispute Resolution Projects" (March 2021) 4 *Frontiers in Blockchain* 1.

31 Finally, blockchain and smart contracts technology provide a secure and private environment for dispute resolution, making it ideal for delicate or high-stakes disputes. With smart contracts in mediation, the future of dispute resolution looks bright and promising.

VII. Challenges of blockchain-based smart contracts

32 While the potential advantages of integrating blockchain technology and smart contracts into mediation processes are manifold, it is crucial not to overlook the challenges and obstacles that this transition might bring. Technological innovation, despite its transformative potential, does not come without its share of difficulties.

33 One of the most prevalent challenges is the legal ambiguity surrounding smart contracts. In numerous countries, the legal standing of smart contracts is not fully defined, which can pose significant problems for their use in mediation. For instance, if a dispute arises in the execution of a smart contract, it is uncertain how a court would handle it given the lack of established legal frameworks and precedents. On this issue, the work done by the English Law Commission is illuminating. It attempts to bring some clarity to this question by distinguishing “smart contracts” from “smart legal contracts”. The latter will be regarded without question as legal contracts. They will be expected to meet the basic requirements of a valid contract under English law. In other words, parties using blockchain and smart contract technology to resolve disputes must know that the process will carry legal implications.

34 The enforceability of these agreements also becomes an issue in jurisdictions where the legal status of smart contracts is unclear. This uncertainty can deter parties from choosing to use smart contracts in mediation, fearing the potential legal complexities that could arise.

35 Another challenge is getting parties to sign on to use this technology. Since the use of blockchain and smart contracts in mediation is still relatively new, not all parties may be comfortable or agreeable to using this technology. They might be hesitant to step away from traditional methods of mediation that they are familiar with. This reluctance could be

due to a lack of understanding of the technology, or it could stem from concerns about the perceived security risks associated with blockchain technology. Therefore, acceptance and adoption of the technology by all parties involved in the mediation process is a significant hurdle that needs to be addressed.

36 Moreover, a considerable challenge lies in the technical difficulties associated with developing and using smart contracts. The creation and execution of smart contracts require specific technical skills and infrastructure, which might not be readily available. The technology is complex, and any errors in the code can lead to significant issues down the line. Additionally, the use of smart contracts requires a certain level of digital literacy, which might not be prevalent among all users. Parties to mediation and the mediator may agree on the terms and how the process is to proceed. However, they may not have the digital literacy to translate their agreement into the required computer programming language. They may have to rely on technical experts who may be knowledgeable in coding but not in law. A likely issue in that instance may be aspects of the parties' agreement being lost in translation literally and idiomatically. These technical difficulties can present a significant barrier to the widespread adoption of smart contracts in mediation.

37 Privacy concerns also pose a substantial challenge. Mediation often involves the exchange of sensitive information. Using blockchain technology and smart contracts raises questions about data privacy and compliance with relevant laws and regulations. For instance, how can the technology ensure that sensitive information is protected? How does it comply with data protection regulations like the General Data Protection Regulation[44] ("GDPR") in the EU? Addressing these privacy concerns is vital to building trust and confidence in the technology, which is critical for its successful adoption in mediation.

38 Questions about the scalability of smart contracts pose another challenge. While blockchain and smart contracts have shown promise in smaller-scale applications, it is unclear whether they can handle larger-scale disputes efficiently and cost-effectively. As the number of transactions and the complexity of smart contracts increase, so do the computational resources required to process them. This can lead to increased costs and slower transaction

44 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

times, which might not be acceptable in mediation contexts where timely resolution is often crucial.

39 In conclusion, while the integration of blockchain-based smart contracts in mediation has significant potential benefits, it is essential to recognise and address the associated challenges. Doing so will not only help to ensure the successful adoption of this technology but also improve the efficiency, transparency and fairness of the mediation processes. It is a complex journey, but one that has the potential to revolutionise the world of mediation.

VIII. Possible solutions

40 On the issue of the nature of smart contracts, it is crucial that legislation or regulation clearly defines the legal standing of smart contracts. This can involve comprehensive legal frameworks that recognise and enforce these digital contracts. The work of the English Law Commission on this is a first step. English law has taken the stand that current laws could be adapted to these technological innovations. There is also the conviction that the common law, by nature, will incrementally develop the rules in this new area. An example of such adaption is seen in electronic transactions via emails and websites. Whilst countries that follow the common law may find some wisdom in this approach, many which are aligned with the civil law tradition may prefer a clear codification of rules on this subject. Furthermore, laws can also provide guidelines on the use and interpretation of smart contracts, which can in turn provide parties with the certainty needed to embrace this technology.

41 On the point of hesitation to adopt new technology, education about said technology can help to alleviate attendant concerns. This could involve providing information about the benefits and risks of the technology, how it works and the measures in place to ensure security. For example, explaining the concept of decentralisation, encryption and how blockchain networks are secured against fraudulent activities can be part of this education. It is also important to highlight the track record of blockchain technology and smart contracts in providing secure and efficient solutions in various sectors.

42 Digital illiteracy on blockchain can be a significant barrier to entry, as it requires resources and expertise that many parties may not have. Providing resources and support for parties

to develop these skills and infrastructure can help to overcome this challenge. This could include providing training programs, guides and support services that can help parties to develop and implement their own smart contracts. Government and educational institutions can play a vital role in this regard by offering courses and workshops on blockchain technology and smart contracts. Again, a comparison can be drawn between when the internet was first introduced and how, over the years "internet literacy" has expanded.

43 On data privacy concerns, implementing robust data privacy measures and ensuring compliance with relevant laws and regulations is crucial. This can involve the use of advanced encryption techniques to protect data stored on the blockchain, as well as measures to ensure that only authorised parties can access and modify this data. Compliance with data protection laws, such as the GDPR in the EU, is also crucial.

44 Lastly, regarding the issue of scalability of the technology as the use of blockchains and smart contracts grows, it is crucial that the technology can scale to handle an increasing volume of transactions without the current cost associated with that process. This can involve improving the efficiency of blockchain networks, *eg*, through the use of more efficient consensus algorithms. It can also involve developing off-chain solutions, which can process transactions off the main blockchain, thereby reducing the load on the network. Further, a smaller, centralised network with trusted experts in charge can be the starting point for those who may want to experiment with the blockchain and smart contract technology. When the benefits become obvious, it will be easier for these users to scale up to a decentralised system. Continuous research and development efforts are crucial in this regard to ensure that the technology can meet the growing demand for it.

IX. Conclusion

45 The integration of blockchain technology and smart contracts into mediation presents both exciting opportunities and unique challenges, but it is promising due to its potential benefits, including increased transparency, faster dispute resolution, cost savings, enhanced accessibility and superior security. Overcoming these challenges requires a collective effort from various stakeholders like legislators, educators, technology providers and users, and can be addressed through clear legal frameworks, education, support for skill and infrastructure development, robust data privacy measures and continuous scalability

improvements. Despite the potential hurdles, blockchain-based smart contracts, once properly harnessed, hold transformative potential for the future of mediation.