ARBITRATION, BLOCKCHAIN AND ARTIFICIAL INTELLIGENCE

Luís de Lima Pinheiro
Full Professor at the Law School of the University of Lisbon [*]

INTRODUCTION

The subject of this essay is *complex*; it relates to *technologies with which the vast majority of jurists are not familiar* and whose understanding by people who are not technical experts in these technologies is necessarily limited. Even though my knowledge of these technologies is also limited, I will try to explain how they work to the best of my ability.

Although the topic concerns arbitration, it is inevitable to examine *alternative dispute resolution methods specific to Blockchain* (BDRs) which, in my opinion, cannot be qualified as arbitration, in order to understand the justification and specificity of these procedures and distinguish them from true arbitration.

On the other hand, given the complexity and vastness of the subject, it is necessary to delimit it by focusing my analysis on a couple of applications that I think are particularly relevant to *Blockchain* technology: *smart contracts* and *Decentralized Autonomous Organizations* (DAOs).

For the same reason, I will not go into particular issues raised by the arbitration of consumer disputes.

Although many general issues raised by online arbitration are of interest in this topic, I cannot delve into these general issues because the topic requires a focus on the specific aspects of *Blockchain-related* arbitration.

Finally, *artificial intelligence* (henceforth AI) can also be applied to Blockchain-related dispute resolution, so I will include some notes on the use of AI in these dispute resolution methods.

I will therefore begin with an introduction to Blockchain, smart contracts and DAOs, then examine alternative dispute resolution methods related to Blockchain and end by outlining some future prospects. Regarding Arbitration Law, particular attention will be devoted to Transnational Arbitration Law, the UNCITRAL Model Law on International Commercial Arbitration (henceforth Model Law) and the Portuguese Arbitration Act (Law no. 63/2011, of 14/12).

[*] - In charge, after retirement, of Ph.D. and Master courses.

I. INTRODUCTION TO BLOCKCHAIN, SMART CONTRACTS AND DAOS

Blockchain is the main distributed ledger technology. *Distributed ledger technology* consists of digital records that are shared simultaneously by a participating network. They are distributed because the record is held by each of the network operators (or nodes) and each copy is simultaneously updated with new information. Distributed ledger technology uses a consensus technique to ensure that each node agrees with the ledger ([1]).

It is a *shared, decentralized digital database* ([2]), which distinguishes it from traditional databases that are managed by a central entity ([3]).

Blockchain platforms can be open and accessible to everyone, or they can be private and only accessible by authorized persons. In this regard, we talk about *permissionless Blockchains* and *permissioned Blockchains* ([4]). There is also reference to public and private Blockchains, although these classifications don't always coincide ([5]). In the following exposition, I will use the terms "public" and "private" to refer, respectively, to platforms that are open to everyone and platforms that are limited to a group of people.

On *public Blockchain platforms*, anyone can create an "account", getting a public address (public key) and a password (private key). To carry out a transaction, a user of the platform searches for the public key of another user and enters his or her private key. In this way the transaction is "authenticated", as it cannot be denied by the party who entered his or her private key ([6]).

Users may use *pseudonyms*, which makes it difficult or even impossible to know their personal identity on certain platforms or in certain types of transactions ([7]). In any case, it should be noted that in many cases the use of pseudonyms does not make it impossible to personally identify the parties ([8]).

Blockchain enables the digital representation of values or rights that can be transferred and stored electronically. A *cryptoasset* then arises, which is controlled by the

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1 - Ver ISDA and Linklaters – "Whitepaper Smart Contracts and Distributed legal – A Legal perspective", 2017, 7, www.isda.org/2017/08/03/smart-contracts-and-distributed-ledger-a-legal-perspective/; LAW COMMISSION – *Advice to Government*. *Smart Legal Contracts*, 2021, nos.2.22 et seq.

2 - According to Art. 1(2) of Directive 96/9/EC, a 'database' is a collection of independent works, data or other materials arranged in a systematic or methodical way and individually accessible by electronic or other means.

3 - Cf. LAW COMMISSION – *Advice to Government*. *Smart Legal Contracts*, 2021, nos. 2.23-2.24.

4 - See Primavera DE FILIPPI and Aaaron WRIGHT – *Blockchain and the Law: The Rule of Code*, Cambridge, Massachusetts, 2018, 31 et seq.

5 - See LAW COMMISSION – *Advice to Government*. *Smart Legal Contracts*, 2021, nos. 2.34 et seq.

6 - See *Cardozo Blockchain Project "Smart Contracts" & Legal Enforceability*, 2018, *in* https://cardozo.yu.edu/sites/default/files/2020-01/smart_contracts_report_2_0.pdf, 2.

7 - Cf. LAW COMMISSION – *Advice to Government*. *Smart Legal Contracts*, 2021, nos. 3.19 et seq.; ANA PERESTRELO DE OLIVEIRA – *Smart Contracts, Risco e Codificação da Desvinculação ou Modificação Negocial - Os Falsos Dilemas da Interrelação Lei-código nos Contratos Empresariais*, Coimbra, 2022, 47 et seq.

8 - See Cemre KUMTEPE – "Defining Boundaries of Due Process in *Blockchain* Arbitration", *in Transforming Arbitration: Exploring the Impact of AI, Blockchain, Metaverse and Web3*, ed. by Maud PIERS, Sean MCCHARTY and Matthias LEHMANN, 2025 (available on https://books.radbouduniversitypress.nl/index.php/rup/catalog/book/transforming-arbitration), 47-48.

Blockchain platform and can be transferred on it (see definition contained in Art. 3(1)(5) of EU Reg. 2023/1114, MICA Regulation).

One type of cryptoasset is cryptocurrency, such as *bitcoin*. Central electronic currencies, issued and controlled by central banks, can also be cryptoassets. Another type of cryptoasset are financial instruments, namely securities, or they are similar to financial instruments, issued and traded on Blockchain platforms.

These cryptoassets are determined by their general characteristics and can therefore be replaced by other cryptoassets with the same general characteristics. They are categorized as fungible cryptoassets.

Other cryptoassets, such as digital art, are unique and unfungible. These are called NFTs [Non-Fungible Tokens]. There are also cryptoassets that digitally represent unique, non-fungible services or tangible things.

This is not the time to deal with the complex issues raised by the characterization, regime and legal nature of all of these cryptoassets, which are only mentioned in this study to make the subject matter more intelligible. In fact, the applications of Blockchain technology are largely the result of this possibility of controlling and transferring cryptoassets on their respective platforms, and this possibility is also very important for examining the alternative dispute resolution methods that are associated with Blockchain.

Smart contracts are one of the applications of distributed ledger technology, especially Blockchain.

There are many definitions of smart contract that have been adopted by the legal profession and in some national legislations.

According to the most widespread concept, a *smart contract* is *a computer program that operates on the basis of a distributed ledger technology*, namely *Blockchain, and which allows the automatic performance of given obligations when certain facts occur* ([9]).

Understood in this sense, smart contracts can be used either to perform contractual obligations, or part of them, or to provide compensation in the event of non-compliance with a contract or other voluntary or involuntary obligations.

For example, a smart contract can be used to automatically compensate passengers for a canceled or delayed flight. In this case, the software can be designed in such a way that, once the cancellation or delay has occurred, the affected passengers are identified, and the amount of compensation is transferred to their bank accounts. This not only saves the resources needed to manage complaints, but also makes it easier to obtain compensation ([10]).

Smart contracts have also been widely used for complex financial transactions, such as loans made by banking consortia and derivatives, as well as for copyright license contracts.

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9 - See *Cardozo Blockchain Project "Smart Contracts" & Legal Enforceability*, 2018, *in* https://cardozo.yu.edu/sites/default/files/2020-01/smart_contracts_report_2_0.pdf, 4-5; Pedro de MIGUEL ASENSIO – "Smart contracts", *Blockchain*, derechos de autor y Derecho internacional privado, *Blog 19/6/2019*. See further Hugo RAMOS ALVES – "Smart contracts: entre a tradição e a inovação", *in FinTech II. Novos Estudos sobre Tecnologia Financeira*, ed. by António Menezes Cordeiro, Ana Perestrelo de Oliveira and Diogo Pereira Duarte, Coimbra, 2019, § 5.1.

10 - See also Feliu REY – "Smart contract: conceito, ecossistema e principais questões de direito privado", *Redes - Revista Eletrônica Direito e Sociedade* 7/3 (2019) 96.

As a contractual instrument, a *smart* contract offers the advantage of eliminating or reducing the risk of default, since the performance of the contract no longer depends on human intervention.

When a smart contract is used as a contractual instrument, it presupposes that the parties agree on the contractual clauses they have raised ([11]). This agreement can, in general terms, be formalized in both natural language and machine language (also known as a "*hybrid agreement*"), i.e. computer code, or only in machine language. On the other hand, the agreement can be entered into before the clauses are inserted into the distributed ledger platform *(off-chain smart contract*) or it can be entered into the platform itself *(on-chain smart contract*) ([12]).

In other words, as a contractual instrument, a smart contract can be used to enter a contract into a distributed ledger platform or as an act of performance of a contract entered into natural language, where the insertion of the clauses on a distributed ledger platform is already part of the performance of the contract (as long as the construction of the parties' agreement does not point otherwise).

In the event of a *dispute*, the parties will have to reach an *amicable agreement*, such as a settlement, or resort to a *dispute resolution procedure*. In both cases, it may be necessary to reverse some of the effects of the smart contract, for example by restituting automatically performed payments. This reversal can be done through a new computer program *(reverse transaction*) and therefore automatically*(on-chain*), or through acts carried out outside the distributed ledger platform and therefore non-automatically *(off-chain*).

What distinguishes a contract based on a *smart* contract from a traditional contract is the fact that the clauses of the contract, or part of them, are transcribed in machine language and that the performance of the contract, or part of it, does not depend on human performance. While in a traditional contract parties can fail to perform the contract, or suspend its performance, and are naturally subject to the consequences of non-compliance, in a contract supported by a *smart contract* the performance is computer-programmed, and the program is executed by the operators of the distributed ledger platform ([13]).

Finally, the *smart contract* can cover the entire performance of the contract, which is called *on-chain*, or involve non-automatic performance, which is called *off-chain*.

To obtain the information needed to run the program, *smart contracts* use so-called *oracles*. Oracles are external data sources that transmit information to a computer program.

Oracles can be of three types:

- *software* oracles that allow you to extract information online (for example, weather information).
- *hardware* oracles that allow you to track objects in the physical world (for example, the arrival of an aircraft); and

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11 - See Dieter MARTINY - "Virtuelle Währungen, insbesondere Bitcoins, im Internationalen Privat- und Zivilverfahrensrecht", *IPRax* 38 (2018) 553-565, 555.

12 - See Mateja DUROVIC and André JANSSEN – "Formation of Smart Contracts under Contract Law", *jn The Cambridge Handbook of Smart Contracts, Blockchain Technology and Digital Platforms*, ed. by Larry DIMATTEO, Michel CANNARSA and Cristina PONCIBÒ, Cambridge, 2019, § 4.3.

13 - see also *Cardozo Blockchain Project "Smart Contracts" & Legal Enforceability*, 2018, *in* https://cardozo.yu.edu/sites/default/files/2020-01/smart_contracts_report_2_0.pdf, 4-5.

- oracles associated with natural or legal persons who verify the occurrence of certain facts (for example, a smart contract in which the sale price of a car is paid when it is delivered without defects, and the mechanical assessment is entrusted to a specialist) ([14]).

In a broader sense, a *smart contract* can be understood as the whole of the contract and the computer program used to perform it.

DAOs are also an application of Blockchain technology, which relies on smart contracts.

According to one of the first definitions of a DAO, "[it is] a particular type of decentralized organization that is neither run nor controlled by any one person, but entirely by code". It can be based on one or more smart contracts, but is usually based on a set of smart contracts ([15]). This definition is not entirely precise, but it can serve as a starting point.

What distinguishes a DAO from a mere smart contract is the fact that a DAO has some form of organization, whether internal or external ([16]).

When the DAO operates on the Blockchain, it is also based on a decentralized computer program that operates on the Blockchain and that allows the smart contracts on which the DAO is based to be programmed ([17]).

It is often assumed that a DAO is not managed by one person or a limited group of people, given the fact that all decisions are made by its members via a code protocol. In fact, the management of most DAOs is decentralized. However, this is not the case, or not entirely, for all DAOs.

DAOs are very heterogeneous. They can pursue different purposes, carry out different activities and have different types of organization.

Firstly, they can have completely different purposes. They usually pursue an economic purpose, but they can also pursue a non-economic purpose. The economic purpose can be a distributable profit resulting from a common activity, strictly speaking, or, more broadly, a direct economic advantage for the parties involved.

The activity of DAOs often has a certain degree of permanence, but can also be limited to a specific act, such as raising funds for an investment project or a charitable action ([18]).

Their organization can be internal or external, at least according to the visibility of the organization by third parties.

From a legal point of view, DAOs can, under certain foreign legal systems, be incorporated as a legal person with the intervention of public bodies belonging to a State, and then registered, or unincorporated, as is the case in most situations.

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14 - See REY (fn. 10) 109 and Josep Horrach ARMO – "Los Smart Contracts y la tecnología *Blockchain* en el ámbito del Derecho internacional privado", *in Nuevos Escenarios del Derecho Internacional Privado de la Contratación*, ed. by Pilar Jiménez Blanco e Ángel, Espiniella Menéndez, 683-708, Valencia, 2021, 686.

15 - Cf. DE FILIPPI/WRIGHT (fn. 4) 148.

16 - See also Florence GUILLAUME and Sven RIVA – "*Blockchain* Dispute Resolution for Decentralized Autonomous Organizations: The Rise of Decentralized Autonomous Justice", *LSN Negotiation & Dispute Resolution eJournal*, Vol. 23 No. 48, 06/22/2022, 3-4.

17 - See Biyan MIENERT – *Dezentrale autonome Organisationen (DAOs) und Gesellschaftsrecht*, Tübingen, 2022, 33-34.

18 - See DE FILIPPI/WRIGHT (fn. 4) 148; Alex ANDERSON – *DAO - Decentralized Autonomous Organizations for Beginners: The Ultimate Beginner's Guide*, 2021, 20-21; MIENERT (fn. 17) 56 e segs., mentioning several examples and types of DAOs.

Since the objectives and activities of DAOs are very diverse, they can correspond to traditional types of organizations that have the same type of purpose and carry out the same type of activity ([19]).

DAOs also involve different categories of actors. Let us consider the most relevant ones for our analysis.

A DAO is often promoted by a group of *developers* who create the code for the smart contracts on which it is based.

Stakeholders become *members of the DAO* by acquiring a digital representation of their participation, a certain type of cryptoasset, usually referred to as a *token*. These *tokens* can be of different types and confer different powers.

Thirdly, we have *validators*, which operate by validating nodes and maintain the network by creating new blocks to be added to the chain ([20]).

Finally, we can also have a *person or entity entrusted with managing the Blockchain infrastructure* and administering its protocol.

The ideal DAO operates only within a Blockchain platform, even when its activity includes the supply of goods and services to third parties. However, if the smart contracts on which the DAO is based include performance outside the Blockchain, there is a need for human intervention ([21]). In addition, there may be other circumstances that require human intervention in addition to the members making decisions according to the code protocol, such as changes to the code to correct programming errors or prevent or reverse illegal exploitations of code vulnerabilities.

It is sometimes claimed that Blockchain's automation prevents *legal disputes*. It may undoubtedly reduce the number of such disputes, but it will not eliminate them ([22]). In particular

- programming errors may occur;
- other problems with the validity of the contract may arise;
- divergent interpretations of computer programs may arise;
- there may be vulnerabilities in the software that allow illicit detour of assets within the platforms;

19 - Mathias AUDIT – "Le droit international privé confronté à la *Blockchain*", *R. crit.* (2020/4) 669, 69, remarks that it does not need either of employees; ANDERSON (fn. 18) 83; MADALENA PRERESTRELO DE OLIVEIRA, António GARCIA ROLO, João VIEIRA SANTOS and ANA NUNES TEIXEIRA – "Decentralised Autonomous Organisations (DAO): conceito, enquadramento legal e desafios", *Boletim da Ordem dos Advogados 35 (2022)* 66-69, 66.

20 - Through consensus mechanisms of *proof-of-work* or, increasingly, *proof-of-stake* – see Michael SCHILLIG – "Decentralized Autonomous Organizations (DAOs) under English Law", *LSN Transnational Litigation/Arbitration, Private International Law, & Conflict of Laws eJournal*, Vol. 9 No. 55, 11/01/2022, 6. These validation nodes are, thus, *mining nodes* in the sense referred by Matthias ARTZT and Thomas RICHTER (eds.) – *Handbook of Blockchain Law: A Guide to Understanding and Resolving the Legal Challenges of Blockchain Technology*, Alphen aan den Rijn, 2020, 152-154. On the mining process, see further COLIN *in Les Blockchains et les smart contracts à l'épreuve du droit*, ed. by Andra COTIGA-RACCAH, Hervé JACQUEMIN and Yves POULLET, Brussels, 2020, 19.

21 - See also ANDERSON (fn. 18) 34-35.

22 - See ANA PERESTRELO DE OLIVEIRA (n. 7) 47 et seq.; Florence GUILLAUME and Sven RIVA – "*Blockchain* Dispute Resolution for Decentralized Autonomous Organizations: The Rise of Decentralized Autonomous Justice", *in Blockchain and Private International Law*, ed. by Andrea BONOMI, Matthias LEHMANN and Shaheeza LALANI, 550-641, Leiden and Boston, 2023, 570-572.

- there may be a change in circumstances not foreseen by the parties and not programmable, as a result of which automatic performance leads to undesirable results;
- otherwise automatic enforcement may lead to manifestly abusive results;
- a decision by the majority of the members of a DAO may violate the rights of minority members.

Therefore, dispute resolution methods are needed.

II. ALTERNATIVE DISPUTE RESOLUTION METHODS ON BLOCKCHAIN PLATFORMS

A) General aspects

The possibility of controlling and transferring cryptoassets on *Blockchain* platforms creates favorable conditions for *dispute resolution methods that operate on these platforms independently of the intervention of an external court or tribunal*. Decisions made within the framework of these dispute resolution methods are enforced automatically, also dispensing with enforcement by State courts ([23]).

We will see, however, that this does not exclude the possibility of intervention by State courts, particularly in the final resolution of the dispute ([24]). In any case, it seems that this rarely happens.

The truth is that *resorting to State courts to resolve disputes arising from Blockchain is often problematic*.

As I have already pointed out (I), platform users often act under pseudonyms, and it can be difficult or even impossible to identify them personally and know where they have their domicile, habitual residence or registered office. In certain cases, it is not possible to bring a civil action against them or determine the competent courts ([25]). In other cases, this may be possible, but very difficult.

Even if it is possible to bring the action to a State court, difficulties arise due to the *judges' lack of technical knowledge* and the fact that *it is difficult or even impossible to coercively enforce the decision on the Blockchain platform on the defendant's cryptoassets* ([26]).

On the other hand, based upon the "*digital identity"*, it is possible to determine which cryptoassets are in the wallet of the responsible party and, therefore, *a dispute resolution method operating on the Blockchain platform may be in a position to satisfy the injured party's claim*.

Blockchain-specific dispute resolution methods (BDRs) have thus emerged.

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23 - See Pietro ORTOLANI – "Recognition and Enforcement of the Outcome of Blockchain-Based Dispute Resolution", *in Blockchain and Private International Law*, ed. by Andrea BONOMI, Matthias LEHMANN and Shaheeza LALANI, 642-669, Leiden and Boston, 2023, 648 et seq.

24 - See, namely, KUMTEPE (fn. 8) 43 et seq.

25 - See GUILLAUME/RIVA (fn. 22) 582-583; ANA PERESTRELO DE OLIVEIRA (fn. 7) 47 et eq., remarks that sometimes there is a pseudoanonymity in which the personal identification is technically possible.

26 - See ANA PERESTRELO DE OLIVEIRA (fn. 7) 47 et seq.; Marta BOURA and Sofia DAVID – "Smart contracts e arbitragem: perspetivas atuais", *RDC* (2023/1) 105, 112 et seq.; GUILLAUME/RIVA (fn. 22) 588 et seq.; and Hong TAN – "*Blockchain* 'Arbitration' for NFT-Related Disputes", *LSN Negotiation & Dispute Resolution eJournal*, Vol. 25 No. 6, 02/14/2024, 154 et seq.

In this study, I will focus on dispute resolution methods in which the decision is entrusted to a third party, noting only that mediation mechanisms have also emerged, that are aimed at reaching an agreement between the parties, which work, in principle, on a Blockchain platform and also use artificial intelligence technologies ([27]).

Nor will I deal with disputes that do not concern operations carried out on the Blockchain, but relationships that are established solely in connection with those operations, namely relationships between users and entities administering Blockchain platforms ([28]).

Lastly, certain parties to disputes arising from the Blockchain may be characterized as consumers for the purpose of applying special legal regimes regarding contracts and the resolution of disputes arising from them. As I pointed out in the Introduction, I will not be going into the impact that these regimes may have on our subject.

B) Blockchain Dispute Resolution Mechanisms

The most common Blockchain-specific dispute resolution methods, sometimes referred to as *BDRs* or "*Crowd Arbitration*", are very different from traditional arbitration and, as we will see later, should not be considered arbitration. However, there are also methods of resolving *Blockchain-related* disputes that are arbitral in nature.

Let us start with the *most common dispute resolution methods*, such as those offered by the *Kleros* and *Aragon Court* platforms ([29]).

The first general characteristic of these methods of regulating disputes is that they are *based on smart contracts or platform computer protocols which, in principle, allow the decision to be automatically enforced on the Blockchain platform* ([30]).

A second general characteristic is its *celerity*, which is unparalleled in traditional State court and arbitration proceedings, and which is all the more justified given that the value of cryptoassets is likely to change very quickly ([31]).

Thirdly, in most of these BDRs the parties only have to use their "*digital identity"* (public key).

Fourthly, *the parties only present their arguments in writing*, and there are no hearings for evidence or oral arguments.

On the other hand, in the most common form of dispute resolution, *the decision is made by "jurors"* who are users of the platform under pseudonymity and who acquire the right to vote in favor of one of the parties by purchasing one or more cryp-

27 - See CRISTINA PONCIBÒ, Andrea GANGEMI and Giulio RAVOT – "*Blockchain* Justice: Exploring Decentralising Dispute Resolution Across Borders", *LSN Smart Contracts & Legal Aspects of Blockchain eJournal*, Vol. 2 No. 5, 02/10/2025, 27 et seq.

28 - See, on the alternative resolution methods for these disputes, Nino SIEVI and Viola DONZELLI – "Crypto Arbitration – Is It Really a Thing?" *in Transforming Arbitration: Exploring the Impact of AI, Blockchain, Metaverse and Web3*, ed. by Maud PIERS, Sean MCCHARTY and Matthias LEHMANN, 2025 (accessible on https://books.radbouduniversitypress.nl/index.php/rup/catalog/book/transforming-arbitration).

29 - See GUILLAUME/RIVA (fn. 22) 602 et seq. and 614 et seq.; Narges Keshavarz BAHADORI – "Due Process Requirements in *Blockchain*-based Arbitration", *Yb. PIL* 24 (2022/2023) 165 et seq.; and Jamilya KAMALOVA – "Exploring *Blockchain*-Based Alternative Dispute Resolution: Limitations of Traditional Methods and Prospects for Further Research", *LSN Cyberspace Law eJournal*, Vol. 27 No. 154, 05/22/2023, 22 et seq.

30 - See GUILLAUME/RIVA (fn. 22) 602 et seq.; KUMTEPE (fn. 24) 41.

31 - See TAN (fn. 26) 154 et seq.

toassets*[tokens*]. These cryptoassets are "frozen" until the vote is concluded. When the process is completed, the "jurors" who voted in the majority regain control of the cryptoassets they invested plus a certain amount of cryptoassets that had been acquired by "jurors" who were in the minority.

It is usually possible to appeal against the decision thus rendered, with decisions being made on appeal by a larger number of "jurors" ([32]).

The party that gets the most votes automatically receives the amount of cryptoassets in dispute in its wallet on the *Blockchain* platform.

There are some variations in these dispute resolution methods, in particular the requirement for certain qualifications on the part of users wishing to act as "jurors" and for a reasoned vote. In most cases, these requirements are not made.

Finally, these BDRs still generally only allow *"binary" decisions*, i.e., for example, whether or not to enforce a contractual provision or whether or not to approve a financing proposal by a DAO. They hardly allow for more complex decisions, which are often necessary in disputes that require several partial issues to be decided. An evolution in this direction is, however, conceivable ([33]).

The best justification I can find for this dispute resolution method is that the "jurors" express the values and aims of the community of users and, therefore, this method of dispute resolution is a *manifestation of collective self-determination* ([34]). However, this model has limitations and does not escape criticism, including that it cannot be qualified as arbitration.

According to dominant conceptions in modern States governed by the rule of law, there is a *right of access to independent courts* (Art. 20 of the Portuguese Constitution, Art. 6 of the European Convention on Human Rights and Art. 47 of the Charter of Fundamental Rights of the European Union), which is related to the principle of the division of powers and the reservation of jurisdiction. I will not go into the constitutional issues involved, but I can say that these conceptions postulate that law should govern those aspects of life in society that require legally binding regulation, through general and, in principle, abstract rules, and that it is up to the courts to settle disputes, in principle, by applying these rules.

The resolution of disputes through the *decision of a circumstantial majority of representatives of a particular infra-state or para-state community* does not match this conception of jurisdictional function ([35]).

On the contrary, it could be argued that, in certain relationships, such as contractual obligations, parties can authorize an *ex aequo et bono award or judgment*. This is generally accepted where the dispute is covered by an arbitration agreement (Art. 28(3) of the Model Law and Arts. 39 and 52(1) of the Portuguese Arbitration Act). According to Portuguese law, this is also allowed in the case of State courts (Art. 4 of the Civil Code). However, even if this *ex aequo et bono* award or judgment is understood in the

32 - See TAN (fn. 26) 149 et seq.

33 - See GUILLAUME/RIVA (fn. 22) 602 et seq. and 626 et seq.

34 - For an examination of the possible grounds for this model, see GUILLAUME/RIVA (fn. 22) 614 et seq., Yueh-Ping YANG – "The Crowd's Wisdom in Smart Contract Dispute Resolution: Is Crowdsourced Dispute Resolution Arbitration?", *LSN Cyberspace Law eJournal*, Vol. 27 No. 152, 05/16/2023, 182 et seq.; and TAN (fn. 26) 159 et seq.

35 - See further GUILLAUME/RIVA (fn. 22) 614 et seq.

sense of a purely individualizing solution, which is not subject to the rules of law in force, this decision must be made by an impartial and independent tribunal or court ([36]).

This impartial and independent tribunal court must decide on the basis of an assessment of the more just solution in the particular case within the limits set by the fundamental values and principles of the legal system or, in the case of transnational relations, those common to the legal systems involved. Even in this case, therefore, the situation is different from when the dispute is decided by representatives of a particular community of users of a Blockchain platform whose remuneration depends on the outcome of the case. The system of remuneration for the "jurors" encourages them to decide in the direction of the most likely majority and not in the direction of the most just decision ([37]).

Finally, it could be argued that arbitration often laws allow *the parties to delegate the appointment of all arbitrators to a third party* (Art. 11(2) and (4)(c) of the Model Law and Art. 10(1) of the Portuguese Arbitration Act). Even in this case, however, the arbitrators are appointed indirectly by the parties and are subject to checks on their independence and impartiality, which is not the case with "jurors", who can take on this task of their own free will, provided they are users of the platform and acquire the required cryptoassets.

Therefore, regardless of the question of whether other requirements of the arbitration agreement, of an *ex aequo et bono* decision, of the arbitration procedure and of the arbitral award are met, I believe that this *is not arbitration* ([38]). It follows that the decision does not have the effects of a jurisdictional act: it does not become *res judicata* nor is it enforceable as a jurisdictional decision.

For the same reason, I believe that *the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards* (henceforth New York Convention) *does not apply to these decisions*. This Convention does not define "arbitration" or "arbitral award". However, according to the best opinion, "award" means a definitive decision on a matter submitted to voluntary arbitration ([39]).

The common meaning of "arbitral award", which also corresponds to the purpose of the Convention, is that of a *decision made by arbitrators to whom the parties have assigned the task of issuing a decision with jurisdictional force* ([40]). The attribution of this jurisdictional power depends on recognition by a relevant State legal order ([41]).

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36 - See further ORTOLANI (fn. 23) 655 et seq.

37 - See GUILLAUME/RIVA (fn. 22) 626 et seq.; BAHADORI (fn. 29) 173 et seq. and 185 et seq.; YANG (fn. 34) 182 et seq.; TAN (fn. 26) 159 et seq.; and PONCIBÒ/GANGEMI/RAVOT (fn. 27) 25-26.

38 - See also ORTOLANI (fn. 23) 655 et seq. Cp. MIENERT (fn. 17) 247 et seq.

39 - See, with more development, namely regarding the decisions of incompetence rendered by the arbitral tribunal, Jean-François POUDRET and Sebastien BESSON – *Droit comparé de l'arbitrage international*, Zurique, 2002, no. 884; Herbert KRONKE, Patricia NACIMIENTO, Dirk OTTO and Nicola PORT (eds.) – *Recognition and Enforcement of Foreign Arbitral Awards. A Global Commentary on the New York Convention*, Austin et al., 151 and 158; Reinmar WOLFF (ed.) – *New York Convention*, München, 2012, Art. I nos. 21 et seq.; and SAMPAIO CARAMELO – *O Reconhecimento e Execução de Sentenças Arbitrais Estrangeiras. Perante a Convenção de Nova Iorque e a Lei da Arbitragem Voluntária*, Coimbra, 2016, 27 et seq.

40 - As I argued elsewhere – LIMA PINHEIRO – *Direito Internacional Privado*, vol. III, tomo II – *Reconhecimento de Decisões Estrangeiras*, Lisboa, 3rd. ed., 2019, § 104 D, it is not a question of whether the decision has jurisdictional or merely obligational effect under the law of the country of origin, but whether the parties wanted to submit the dispute to real arbitration or assign a third party a mere contractual role, as is the case in so-called "contractual arbitration". Of course, in order to interpret the parties'

If the decision is made by "jurors" who do not have the status of arbitrators, and does not have jurisdictional force at least under the law of one of the States that have a significant connection with the arbitration, nor under the procedural law of the State of recognition and enforcement, I do not think that the applicability of the New York Convention can be defended ([42]). This is even if other difficulties resulting from the recognition regime established in the Convention could be overcome ([43]).

Does this mean that the decision, although automatically enforced, has no legal value?

I think that would be a hasty conclusion.

On the one hand, it could be said that *BDRs are an alternative dispute resolution method* (ADR), different from the more common methods ([44]), but in the absence of a specific legal regime, there is the problem of characterization in relation to the legal regimes in force. The problem of determining whether there is a gap and of filling it would only arise in the absence of a directly applicable regime.

On the other hand, *BDRs are a form of online dispute resolution* (ODR) ([45]), so the specific issues arising from this should also be considered, as already pointed out in the Introduction.

Could the decision be considered a *settlement* ([46]), an agreement by which the parties resolve the dispute on the basis of reciprocal concessions (see namely Art. 1248 of the Portuguese Civil Code? Regardless of other requirements, the premise of the parties' agreement is missing.

Nor are the "jurors" acting as *mediators of an agreement between the parties*, and therefore this is not an agreement reached through mediation.

Rather, the situation seems to correspond to a case of *the contractual role of a third party*. Just as the determination of the contractual obligation can be entrusted to a third party (see namely Art. 400(1) of the Portuguese Civil Code), the power to decide the dispute *on behalf of the parties* can also be entrusted to a third party, *with the decision taken being valid as a contractual agreement entered into by the parties* ([47]). In this

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agreement, it may be necessary to take into account the legal culture of the country where the "arbitration" takes place, especially when both parties are part of that socio-cultural environment.

41 - See Luís de LIMA PINHEIRO – *Arbitragem Transnacional. A Determinação do Estatuto da Arbitragem*, Lisboa, 2005, § 43.

42 - For the same view, Matthias LEHMANN – "The New York Convention's Borderline. *Blockchain* Arbitration and Artificial Intelligence", ", *in Transforming Arbitration: Exploring the Impact of AI, Blockchain, Metaverse and Web3*, ed. by Maud PIERS, Sean MCCHARTY and Matthias LEHMANN, 2025 (accessible on https://books.radbouduniversitypress.nl/index.php/rup/catalog/book/transforming-arbitration), 75 et seq.

43 - See, about these difficulties, Dominique LEGEAIS – "A la recherche d'un mode de règlement des litiges adapté à la *Blockchain* et ses applications", *in Mélanges Loic Caidet*, 893-903, Paris, 2023, 902; and LEHMANN (fn. 42) 74-75.

44 - See Federico AST, William GEORGE, Jamilya KAMALOVA, Abeer SHARMA and Yann AOUIDEF – "Decentralized Justice: State of the Art, Recurring Criticisms and Next Generation Research Topics", *LSN Cyberspace Law eJournal*, Vol. 27 No. 151, 05/12/2023, 36 et seq.

45 - In this sense, KUMTEPE (fn. 24) 40.

46 - In this sense, YANG (fn. 34) 197.

47 - See Ernst MEZGER– "The ICC Rules for the Adaptation of Contracts", *in* HORN (ed.), *Adaptation and Renegotiation of Contracts in International Trade and Finance*, 1985, 205-216; Peter SCHLOSSER– *Das Recht der internationalen privaten Schiedsgerichtsbarkeit*, 2nd ed., Tübingen, 1989, 25 et seq.; Karl Heinz SCHWAB and Gerhard WALTER – *Schiedsgerichtsbarkeit. Kommentar*, 7th ed., München, 2005, 8 et seq.; Andreas BUCHER – *Die neue internationale Schiedsgerichtsbarkeit in der Schweiz*, Basel and Frankfurt-am-Mein, 1989, 23 et seq.; Karl LARENZ – *Lehrbuch des Schuldrechts*,

case, the third party does not act as an arbitrator, because it does not exercise jurisdictional power, but rather as a joint agent of the parties ([48]). Its decision binds the parties *contractually* and not *jurisdictionally* ([49]).

This, in my opinion, is the value of a decision by "jurors". *The validity of this decision depends on the same requirements as the validity of the parties' agreements* and, in particular, regarding Portuguese law, on respect for mandatory rules and public order (Art. 280 of the Portuguese Civil Code).

Thus, under Portuguese law, *the decision can be declared null and void by a State court and can be replaced by a decision made by the same court*. Of course, this presupposes that the parties can be personally identified.

If enforcement is not entirely automatic, it seems that *the judicial enforceability of the decision of the "jurors" is not absolutely excluded*, but under Portuguese law, I think that the formal requirements of procedural law would be very difficult to meet.

Authenticated documents are private documents confirmed by the parties, before a notary or other entity authorized to do so (Art. 363(3) of the Portuguese Civil Code; Arts. 35(3) and 150(1) of the Portuguese Notarial Code; Art. 38(1) of Decree-Law no. 76-A/2001, of 29/3). Private documents must be signed by their author, or by someone else on their behalf, if the person making the request does not know how or cannot sign (Art. 373(1) of the Portuguese Civil Code).

Private documents can be electronic. An electronic document is any content stored in electronic format, namely text or a sound, visual or audiovisual recording (Art. 3(35) of Regulation (EU) No. 910/2014). Art. 3 of Decree-Law no. 12/2021, of 9/2, states that an electronic document meets the legal requirement of written form when its content can be represented as a written statement (para. 1), and that affixing a qualified electronic signature to an electronic document is equivalent to the autograph signature of documents in written form on paper (para. 2) ([50]).

The decision of the "jurors" could be represented as a written statement. Adjustments would already be necessary, at least in computerized technical conditions, in order that the "jurors" could sign the declaration electronically. Confirmation of the declaration before a legally qualified entity does not seem at all feasible without legislative adjustments. In any case, this would not be compatible with cases where the "jurors" are anonymous.

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vol. I – *Allgemeiner Teil*, 14th ed., München, 1987, 83; Dieter MEDICUS and Stephan Lorenz – *Schuldrecht I*, 19th ed., München, 2010, no. 226; SINDE MONTEIRO – "Pactos familiares, perícia contratual e avaliação de empresas", *CJ* (2002-III) 5-29, 10 no. 4.

48 - For the same view, LOPES DOS REIS – *Representação Forense e Arbitragem*, Coimbra, 2001, 93 fn. 179.

49 - For the same view, LIMA PINHEIRO (fn. 41) Introdução V; SAMPAIO CARAMELO – "Litígios em contratos de construção de grandes infraestruturas - Especificidades e meios de resolução", *Rev. Dir. Civ.* 2 (2017) 281, 300, 302 and 307 et seq., in respetct of *dispute boards*; SIZA VIEIRA – "Expert Determination", *Rev. Int. Arbitragem e Conciliação* 10 (2017) 226, 231 et seq.; and MARIANA FRANÇA GOUVEIA e CAROLINA INVERNO BRANCO – "Adjudication: The Missing Piece in the Portuguese (And Portuguese-Speaking Countries) ADR Landscape", *in Estudos de Arbitragem em Homenagem a Manuel Gonçalves*, 529-547, Coimbra, 2021, 537, speaking of "*adjudication*". See further Dário MOURA VICENTE – "Convenção de arbitragem, perícia contratual e avaliação vinculante - An Ac. STJ de 21/1/2003", *Cadernos de Direito Privado* 8 (2004) 44-56, 56. It does not concern, however, in my opinion, the situation governed by Art. 400(/1) of the Civil Code that only covers the contractual role of a third party in the determination of the contractual obligation.

50 - See also Art. 26 of do DL no. 7/2004, of 7/1.

There are other BDRs that are closer to arbitration, for example through so-called "*multi-signature smart contracts"*, in which certain operations on cryptoassets depend on the use of the private keys of both parties or of one of the parties and a third party. In certain types of disputes between the parties, the third party can act as an arbitrator, or something similar, and its decision is automatically enforced ([51]).

I cannot elaborate on this possibility here, so I will just say that while I do not rule out the possibility of this technique being used in Blockchain-based arbitration, it will at least run into many of the difficulties that arbitration can encounter (*infra* C).

In any case, it is important not to forget that *the relationships established on the Blockchain are often transnational*, since they have relevant contacts with more than one sovereign State. In certain cases, such as DAOs, this transnationality should even be presumed (*infra* III.A).

As the relationship is transnational, there is a *problem of determining the law applicable to the third party's contractual role and the effects of its decision as a legal act* which, in principle, has to be resolved on the basis of *the choice-of-law rules applicable to contracts*. In the absence of a valid and effective arbitration agreement, these choice-of-law rules are provided in EU Regulation no. 593/2008 - *Rome I Regulation*).

C) Blockchain Arbitration

With regard to arbitration concerning disputes arising from the *Blockchain,* we need to distinguish between *arbitration that takes place off-chain* and *arbitration that takes place, in principle, on-chain*, i.e. on a *Blockchain* platform ([52]).

With regard to *off-chain arbitration*, I am aware that different *Blockchain* platforms use the services of institutionalized arbitration centers, such as the International Chamber of Commerce and the Singapore International Arbitration Centre ([53]). There are also arbitration centers that offer specific services for disputes arising from the Blockchain, such as JAMS ([54]), or that are even specialized in these disputes, such as the *Arbitral Tribunal of the Blockchain and New Technologies Chamber of Commerce*, based in Poland ([55]).

The following lines focus *on on-chain arbitration*, which is the one that can move furthest away from the traditional arbitration model.

Dispute resolution methods are being developed which, although arbitral in nature, are based on Blockchain platforms, seeking to combine the advantages of the specific methods mentioned above, namely speed, reliability of evidence, cost reduction and automatic enforcement of the decision, with the advantages of arbitration, namely the jurisdictional force of the arbitral award ([56]).

To this end, it is necessary, in most cases, for *the arbitral tribunal to act as an oracle under a smart contract and for a smart contract to allow for automatic enforce-*

51 - See A. J. SANTOS- "Recognition of Blockchain-Based Multisignature E-Awards", *ArXiv Preprint ArXiv:1911.12968,* 2019; ANA PERESTRELO DE OLIVEIRA (fn. 7) 47 et seq.; MIENERT (fn. 17) 247 et seq.; BAHADORI (fn. 29) 173 et seq.; TAN (fn. 26) 166 et seq.

52 - See BAHADORI (fn. 29) 173 et seq.; and KUMTEPE (fn. 24) 53 et seq.

53 - See further KUMTEPE (fn. 24) 44 et seq.

54 - Which has a model arbitration clause for *smart contracts* and draft arbitration rules for disputes arising from the *Blockchain- https://www.jamsadr.com/smartcontracts?tab=overview*.

55 - Https://www.*Blockchain*tribunal.org/.

56 - See ORTOLANI (fn. 23) 648 et seq.; LEGEAIS (fn. 43) 898 et seq.

ment of the award. In the event of a dispute occurring before the contract is fully performed, a party can trigger the suspension of the contract's performance and the intervention of the arbitral tribunal ([57]). The award can trigger the resumption of the previously programmed performance or be converted into a modification of the automatic performance program.

In order for the award to be automatically enforced, *a smart contract must have control over the cryptoassets that are to be transferred to the winning party*, for example, cryptoassets that are held in an *escrow wallet* on the *Blockchain* ([58]).

In cases where automatic enforcement of the arbitral award is not warranted, legislative measures have been suggested to allow or facilitate the enforcement on the Blockchain of arbitral awards that lack it ([59]).

It is also conceivable that a national legal system could institute a procedure for registering arbitration awards relating to disputes arising from the Blockchain on a Blockchain platform that automatically verifies the origin of the award. Going one step further, a procedure of this kind could be organized by an international convention, at a supranational level, facilitating the international recognition and enforcement of the awards rendered in these arbitrations ([60]).

In 2021, the *UK Jurisdiction Taskforce* published the *Digital Dispute Resolution Rules*, which aim to allow the parties to stipulate ways of resolving disputes related to Blockchain, mainly through arbitration. The guiding idea is the incorporation of these rules into a contract, a digital asset or a system of digital assets, which can be done in computer code (paragraph 3). As an alternative to arbitration, the parties can stipulate an "*expert determination*" relating either to expert evidence or to the contractual role of a third party as described above.

The rules grant the arbitral tribunal the power to control any cryptoasset relevant to the dispute or to order the parties to perform acts relating to it (paragraph 11) and determine that the legal seat of the arbitration is in England and Wales. These are, therefore, rules that can be used for Blockchain-based arbitration, but which cannot in themselves ensure that the arbitration is entirely Blockchain-based.

The practical application of Blockchain-based arbitration faces some difficulties. I will just mention some of the most obvious practical issues under Portuguese law.

Firstly, *the use of pseudonyms by the parties can be a problem*, as it does not seem possible under the Model Law, nor under Portuguese law, to have an arbitral procedure and award in which the parties are not personally identified ([61]). From the outset, the validity of the arbitration agreement presupposes the parties' capacity which can only be ascertained if the parties are personally identified. As has already been pointed out, the use of pseudonyms often does not prevent the possibility of identifying the parties, but I believe that it is not enough for the parties to be identifiable: they must be identified ([62]).

Next, under the Model Law, Portuguese law and the New York Convention, *there must be an arbitration agreement in writing, understood in the broadest sense* (Art.

57 - See MIENERT (fn. 17) 247 et seq.
58 - See TAN (fn. 26) 166 et seq.
59 - See KUMTEPE (fn. 24) 59 et seq.
60 - See also ORTOLANI (fn. 23) 666 et seq.
61 - See mention made by ANA PERESTRELO DE OLIVEIRA (fn. 7) 47 et seq.
62 - For a different view, KUMTEPE (fn. 24) 47-48.

7(2)-(4) of the Model Law, Art. 2 of the Portuguese Arbitration Act and Art. 2 of the Convention). This can be problematic when the agreement is only entered into computer code and not in natural language. It seems that in business-to-business relationships, conclusion in machine language will be enough ([63]). This should also apply to the arbitration clause contained in smart contracts on which a DAO is based, in relation to disputes between the members of the DAO or between them and the DAO, with limits that may be specific to corporate disputes *(infra* III.D) ([64]).

Arbitrator status cannot be acquired through the purchase of tokens, nor is it compatible with anonymity ([65]).

In fact, arbitrators must be chosen by the parties or by another method chosen by the parties (Arts. 11(2) of the Model Law and Art. 10(1) of the Portuguese Arbitration Act). The number of arbitrators cannot be indeterminate: there will be 3 arbitrators if there is no other number defined by the parties (Art. 10(2) of the Model Law and Art. 8 of the Portuguese Arbitration Act) ([66]).

Additionally, the identity of the arbitrators must be known or knowable, at least by the parties and the other arbitrators (Arts. 10 to 15, 31 and 34 of the Model Law and Arts. 8 to 17, 42 and 46 of the Portuguese Arbitration Act).

Under both the Model Law and Portuguese law, *the parties, or, failing that, the arbitrators, must determine the place of arbitration* (Art. 20(1) of the Model Law and Art. 31 of the Portuguese Arbitration Act). The place of arbitration must be stated in the arbitral award, and, for all effects and purposes, the award is deemed to have been made in that place (Art. 31(3) of the Model Law and 42(4) of the Portuguese Arbitration Act). The place or seat of arbitration is the criterion adopted in most national legislations, including Portugal (Art. 61 of the Portuguese Arbitration Act), to delimit the spatial scope of application of the respective arbitration legislation.

Although national laws differ to some extent in the relevant concept of the seat of arbitration ([67]), it seems that *in all online arbitration the seat of arbitration must be the conventional seat*, i.e. the seat determined independently of the location of the parties, the arbitrators or any in-person proceedings.

In practice, *it is highly advisable for the parties to stipulate the seat of arbitration directly or by reference to certain rules* (see also Art. 6 of the Portuguese Arbitration Act). If they fail to do so, the arbitrators will have to determine the seat after hearing the parties, which requires an *off-chain* communication. However, the consequences of the arbitrators not determining the seat of arbitration raise some doubts.

If the seat of Blockchain arbitration is not determined, it becomes problematic to determine the applicability of a national law based upon the Model Law, as well of the Portuguese Arbitration Act, which presuppose that the place of arbitration is located in the territory of the enacting State (Art. 1(2) of the Model Law and Art. 61 of the Portu-

63 - See MIENERT (fn. 17) [245 et seq. See further GUILLAUME/RIVA (fn. 22) 614 et seq. Cp. Jai CHAUHAN – "Transformation of Dispute Resolution: Technological Innovations in Dispute Resolution and Its Effect on the International Law", *LSN Transnational Litigation/Arbitration, Private International Law, & Conflict of Laws eJournal*, Vol. 10 No. 4, 01/25/2024, 8 et seq.

64 - See further GUILLAUME/RIVA (fn. 22) 610 et seq.

65 - See Naufal SHIDDIQ, Danrivanto BUDHIJASNTO and Mursal MAULANA – "*Blockchain* Arbitration in Confidentiality and Impartiality Principles: Lex Digitalis Arbitri: Lex Digitalis Arbitri", *Unram Law Review(ULREV)* 8/1 (2024) 11-12.

66 - See further ORTOLANI (fn. 23) 655 et seq.

67 - See LIMA PINHEIRO (fn. 41) 401 et seq.

guese Arbitration Act). As a matter of fact, in *on-chain* arbitration, the arbitral procedure *itself* has no relevant spatial connections with a particular State. This will not affect the applicability of a national law based upon the Model Law or of the Portuguese Arbitration Act if there is no evidence of relevant connections of the arbitration as a whole (including, therefore, the location of the parties and arbitrators) with other States. Otherwise, a gap arises, and it is conceivable that the abovementioned national laws apply when there is a close connection with the enacting State and a closer connection with another State that considers its national law applicable is lacking.

If a national law is based upon the Model Law, it is not clear whether the failure to determine the arbitration seat constitutes grounds for setting aside the arbitral award. It could be argued that it is a violation of a mandatory rule on the arbitral procedure relevant under Art. 34(2)(a)(iv) of the Model Law ([68]). However, not only does the characterization of the rule on the determination of the seat of as a provision on the arbitral procedure raises doubts, but also this solution does not seem justified by the purpose of the law. In face of the Portuguese Arbitration Act, the contrary view stems from Art. 46(3)(a)(vi), that excludes the relevance of the requirement of mention to the arbitration seat in the arbitration award for setting aside purposes.

Recognition and enforcement of an arbitral award made under these conditions is more problematic.

In the case of an arbitration governed by a national law based upon the Model law, as well by the Portuguese Arbitration Act, it seems arguable that this does not constitute grounds for refusal of enforcement in the enacting State.

Another problem is the recognition and enforcement of the arbitral award made in another State. This issue is often governed by the New York Convention, but can also be subject to other international convention that bind the recognition and enforcement State, and also, outside their scope of application, to the domestic regimes (see namely Art. 55 of the Portuguese Arbitration Act).

The applicability of the New York Convention depends, firstly, on the arbitral award having been made in another State (Art. 1(1)). The applicability of the Portuguese domestic regime, outside the scope of international conventions, depends on the award being rendered in arbitration located abroad (Art. 55 of the Portuguese Arbitration Act).

Although worded differently, these provisions must be understood in the same way: it is *the seat or place of arbitration that is decisive* ([69]). Awards resulting from arbitrations "located" abroad require recognition wherever the award was signed. Conversely, awards resulting from arbitrations "located" in Portugal do not require recognition even if they were signed abroad ([70]). If the arbitral proceedings take place in more than one State or if the arbitration takes place at distance, the conventional seat of the

[68] - Cp. BÖCKSTIEGEL/KRÖLL/NACIMIENTO/KRÖLL/SACHS/LÖRCHER (fn. 39) § 1043 nos. 4 and 6.

69 - Cf. ISABEL DE MAGALHÃES COLLAÇO – "L'arbitrage international dans la récente loi portugaise sur l'arbitrage volontaire", *in Droit international et droit communautaire, Actes du colloque. Paris 5 et 6 avril 1990* (Fundação Calouste Gulbenkian, Centro Cultural Português), 55-66, Paris, 1991, 65, and António MARQUES DOS SANTOS – "Revisão e confirmação de sentenças estrangeiras no novo Código de Processo Civil de 1997 (alterações ao regime anterior)", *in Aspectos do novo Processo Civil*, 105- 155, Lisboa, 1997, 114.

70 - See LIMA PINHEIRO (fn. 40) § 104.A.

arbitration must be taken into account: the award is deemed to be made in the place indicated by the parties or the arbitrators ([71]).

However, this assumption of the application of the recognition regime must be understood in the sense that *the arbitral award rendered in an arbitration that is not governed by the Portuguese Arbitration Act is necessarily subject to a recognition process* and not in the sense that an award of indeterminate origin cannot be recognized. In other words, this regime should also be applied to "stateless" awards, i.e. those neither governed by the Portuguese Arbitration Act nor "locatable" in a particular foreign State ([72]).

The understanding that the New York Convention would not apply to "anational" awards, i.e. those not subject to a specific national arbitration law ([73]), could only lead, in my opinion, to the applicability of the domestic regime. In any case, I do not share this view, which seems to me hardly compatible with the applicability of the Convention to arbitral awards that are not considered national in the State in which their recognition and enforcement are sought (Art. 1(1)2nd sentence) and not justified in the light of the purposes pursued by the Convention ([74]).

However, some countries, including Portugal, made the reservation provided for in the first part of Art. 1(3) of the New York Convention, according to which the Convention shall only apply to awards made in the territory of another Contracting State. Therefore, *the application of the rules of this Convention presupposes demonstrating that the arbitration took place in another Contracting State to the Convention*.

In any case, *the lack of such a demonstration does not prevent recognition and enforcement on the basis of a domestic regime* (see namely Arts. 55 and 58 of the Portuguese Arbitration Act).

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71 - In face of the Portuguese law, however, if the arbitral proceedings take place essentially in a country other than that in which the place indicated by the parties or the arbitrators for arbitration is located, with the express or tacit consent of the parties, the award must be considered as rendered in that country.

72 - See Philippe FOUCHARD, Emmanuel GAILLARD and Berthold GOLDMAN – *Traité de l'arbitrage commercial international*, Paris, 1996, nos. 257 and 1168; LIMA PINHEIRO (fn. 41) § 30 and (fn. 40) § 104 F, with more references. See further, for a convergent view, *ICCA Guide on the New York Convention*, 2nd ed., 2024, 20 et seq.; BÖCKSTIEGEL/KRÖLL/NACIMIENTO (fn. 39) General Overview no. 146; BÖCKSTIEGEL/KRÖLL/NACIMIENTO/KRÖLL (fn. 39) § 1061 no. 15; Gary BORN – *International Commercial Arbitration*, 4th ed., Alphen aan den Rijn, 2024, § 11.03 B fn. 110, not excluding generally the application of the Convention to arbitral awards in which the arbitration seat was not determined; § 22.02; Rui MOURA RAMOS – "Arbitragem estrangeira e reconhecimento de sentenças arbitrais estrangeiras no novo direito português da arbitragem", *in Est. António Barbosa de Melo*, 839-859, Coimbra. 2013, 473-474; SAMPAIO CARAMELO (fn. 39) 15-16; Christophe SERAGLINI e Jérôme ORTSCHEIDT– *Droit de l'arbitrage interne et international*, 2nd ed., Paris, 2019, no.1008.

73 - For this view, A. J. VAN DEN BERG – *The New York Arbitration Convention of 1958. Towards a Uniform Judicial Interpretation*, Deventer et. al., 1981, 37 e segs.; Id. – "Non-domestic arbitral awards under the 1958 New York Convention", *Arbitration International* 2 (1986) 191-219, 211 et seq., but taking the view that the party opposing recognition bears the burden of proving that the award was made in an arbitration not subject to a national arbitration law [cp. Id.- – "The New York Convention: Its Intended Effects, Its Interpretation, Salient Problem Areas", *in The New York Convention of 1958*, ASA Special Series (1996) No. 9, no.4, 12; SCHWAB/WALTER (fn. 47) Kap. 41 no. 21; POUDRET/BESSON (fn. 39) n.º 881; Bernhard BERGER and Franz KELLERHALS – *International and Domestic Arbitration in Switzerland*, 4th ed., 2021, no. 2035; WOLFF/EHLE (fn. 39) Art. 1 no. 110.

74 - This provision is primarily aimed at arbitrations submitted to a foreign arbitration law, but its interpretation should not exclude other cases in which the recognizing state does not consider the award to be "national". See also FOUCHARD/GAILLARD/GOLDMAN (fn. 73) nos. 257 and 1168; ICCA Guide (fn. 73) 20 e segs.; BORN (fn. 73) § 22.02; and SAMPAIO CARAMELO (fn. 39) 15-16.

On the other hand, it seems acceptable in this context that the arbitration was seated and that the award was made in the place indicated in the arbitral award (see also Art. 31(3) of the Model Law and Art. 42(4) of the Portuguese Arbitration Act).

If the party opposing recognition invokes certain grounds for refusing recognition (Arts. 5(1)(d) and € of the New York Convention and Arts. 5(1)(a)(iv) and (v) of the Portuguese Arbitration Act), the failure to determine the arbitration seat may give rise to doubts and difficulties. Here also, it seems acceptable that the arbitration was seated and that the award was made in the place indicated in the arbitral award. If this indication is also missing, it seems that the preferable solution is to refuse recognition only if the party opposing it demonstrates that the arbitration has a close connection with the country invoked under those provisions.

With regard to the *arbitral procedure*, it is necessary, at the very least, *that the parties are treated equally and that each part has the full opportunity to present his case* (Art. 18 of the Model Law and Art. 30 of the Portuguese Arbitration Act).

In the absence of an agreement by the parties to the contrary, proceedings may be conducted on the basis of documents alone, without a hearing of evidence or oral arguments (Art. 24(1) of the Model Law and Art. 34(1) of the Portuguese Arbitration Act). However, either party may request hearings, unless the parties have previously waived them. In the absence of a stipulation by the parties to the contrary, hearings can be held online ([75]), but it does not seem possible to qualify a procedure held on a Blockchain platform as a hearing. Thus, for the arbitration to be conducted solely on the Blockchain, the parties must have waived this option.

The immutability of the Blockchain guarantees the integrity and authenticity of the records it contains, facilitating digital evidence. However, the arbitral tribunal must have access to this evidence. If it is necessary to produce evidence that depends on the will of one of the parties or a third party and is not voluntarily offered by them, recourse to a state court is inevitable (Art. 27 of the Model Law and art. 35 of the Portuguese Arbitration Act). The fact that the disputed relationship is established on the Blockchain conditions the intervention of State courts for reasons already mentioned, namely the difficulty of identifying the party and/or the third party ([76]).

Although the arbitrators do not have to meet to deliberate the arbitral award, there must be a deliberation. For my part, I believe that the arbitrators must consider the parties' arguments and communicate with each other, orally or in writing, to discuss the case and express and justify their vote, even if the parties waive the requirement to state reasons for the award (Art. 31(2) of the Model and 42(3) of the Portuguese Arbitration Act). For this reason, it seems to me that *off-chain* communication can hardly be dispensed with if there is a plurality of arbitrators.

The requirement that the arbitral award be in writing and signed by the arbitrator or a majority of the arbitrators must be respected (Art. 31(1) of the Model Law and Art. 42(1) of the Portuguese Arbitration Act). Although one can envision an award written in machine language, electronic signatures and other technological resources, it seems more practical for the arbitrator or arbitrators to formalize the award in a natural lan-

75 - See also CATARINA SALGADO – "Breves notas sobre a arbitragem em linha", *RFDUL* 61/2 (2020) 181-203, 191 et seq.

76 - See also BAHADORI (fn.. 29) 185 e segs.; PONCIBÒ/GANGEMI/RAVOT (fn. 27) 26.

guage document with all the formal requirements, if only because the award may have to be invoked before other courts or tribunals, other authorities or third parties.

This is particularly the case when the parties wish to invoke the exception of *res judicata*, or wish to enforce the judgment or part of it *off-chain*, as well as when they wish to have the judgment recognized and enforced under the New York Convention (Art. 4 of the Convention) or a domestic recognition and enforcement regime (namely Art. 57 of the Portuguese Arbitration Act). It is important to remember that enforcement is *off-chain* whenever it concerns assets that are not cryptoassets ([77]).

The confidentiality of arbitration (required namely by Art. 30(5) and (6) of the Portuguese Arbitration Act) may also come into tension with free access to data on activities carried out on public Blockchain platforms ([78]). Naturally, the parties can waive these requirements, but the desire for confidentiality may be a reason to prefer *off-chain* arbitration.

Finally, and without any claim to completeness, *the need to deposit crypto-assets in an escrow wallet can be discouraging for parties who may have or will have high-value disputes*, as they are deprived of the possibility of disposing of these assets for a period that may not be as short as in non-jurisdictional modes of dispute resolution.

D) Artificial Intelligence and Alternative Dispute Resolution on Blockchain platforms

Artificial intelligence (AI) *systems*, with their increasing responsiveness and efficiency, can certainly act as an auxiliary tool for human arbitrators and the parties or their representatives. In solving certain problems and performing certain tasks, AI systems already surpass human capabilities.

An AI system is defined by the European AI Regulation (EU Reg. No. 2024/1689, henceforth IA Act) as "a machine-based system that is designed to operate with varying levels of autonomy and that may exhibit adaptiveness after deployment, and that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments".

Natural or legal persons who, as part of a professional activity, use an AI system under their own authority in the context of an arbitration, are qualified by this regulation as deployers (Art. 3(4)) ([79]).

Generative AI tools, i.e. those that produce new content from patterns learned from large volumes of data, such as *Chatgpt*, *Gemini* or *Copilot*, are now used in the daily lives of most legal professionals, but there are many other, more specialized AI tools that can be used in arbitration.

First and foremost, AI systems can be linked to arbitration in cases where *the arbitration clause is contained in a contract entered into with the intervention of one or more AI systems*. Contracting through AI systems is, in principle, permitted (regarding Portuguese law, see Art. 33(1) of Decree-Law 7/2004, of 7/1, within the more general framework of contracting between computers) ([80]), but specific issues may arise regard-

77 - See GUILLAUME/RIVA (fn. 22) 632 et seq.

78 - See KAMALOVA (fn. 29) 17-18.

79 - See, in general, Paul VOIGT and Nils HULLEN – *Handbuch KI-Verordnung. FAQ zum EU AI Act*, Berlim, 2024, no. 1.3.2.

80 - See PAULO MOTA PINTO – "'Agentes de software inteligentes' e negócio jurídico. Alguns

ing the formation and formal validity of the arbitration clause, which I will not deal with in this study.

Next, *the analysis by one of the parties of the viability of their claim* is now one of the fields of application of certain AI tools ([81]).

In the arbitration process, *AI systems can be used as auxiliary tools*, namely to help choose arbitrators, to carry out procedural tasks such as sending notices, organizing, translating, analyzing and summarizing documents, and, more generally, processing large volumes of data, scheduling hearings, organizing virtual hearings, drawing up minutes, providing, summarizing and analyzing bibliographical and case law elements and legal arguments for the pleadings and the award, helping to draft the award and processing the costs of the case. At least in certain cases, they can replace the secretary of the arbitral tribunal ([82]).

Going further, *the arbitral procedure itself can be globally automated*, based on an AI system, without excluding the human intervention of the parties and human arbitrators.

Naturally, *arbitrators must respect the parties' lawful and timely agreed upon provisions on procedural matters* (Art. 19(1) of the Model Law and Art. 30(2) of the Portuguese Arbitration Act). If the parties fail to do so, *the arbitral tribunal may conduct the arbitration in any manner it considers appropriate, within the limits set by the law* (Art. 19(2) of the Model Law and Art. 30(3) of the Portuguese Arbitration Act). This includes *the use of new technologies*, provided that the arbitrators exercise the required degree of diligence ([83]), which includes sufficient knowledge of the technology they are using ([84]), and conformity with the fundamental rules and principles laid down in the Constitu-

problemas", *in Est. Maria Helena Brito*, vol. II, Coimbra, 2022,109, 127 et seq.

81 - See Björn LAUKEMANN – "Alternative Dispute Resolution and Artificial Intelligence", *in Comparative Procedural Law and Justice. Part IX - The Digital Revolution*, 2024, nos. 208 et seq.; and Marco GIACALONE – "AI and the Future of Private Dispute Resolution Mechanisms", *LSN Artificial Intelligence - Law, Policy, & Ethics eJournal*, Vol. 9 No. 25, 03/14/2025, II.B and III, with more references.

82 - See Horst EIDENMÜLLER e Gerhard WAGNER – *Law by Algorithm*, Tübingen, 2021, 191 et seq.; MARIA JOÃO MIMOSO – "Artificial Intelligence in International Commercial and Investment Arbitration", *International Investment Law Journal* ,Volume 3, Issue 2, July 2023, 162 et seq.; Elizabeth CHAN, Nasir GORE and Eliza JIANG – "Harnessing Artificial Intelligence in International Arbitration Practice", *LSN Transnational Litigation/Arbitration, Private International Law, & Conflict of Laws eJournal*, Vol. 10 No. 2, 01/11/2024, 267 et seq., 273 et seq. and 288 et seq.; LAUKEMANN (n. 82) nos. 199 et seq.; Amy SCHMITZ – "Chapter 1. Responsible Use of AI in Civil Dispute Resolution", *LSN Negotiation & Dispute Resolution eJournal, Vol. 25 No. 28, 07/31/2024*, 3 et seq., and "Foundational Considerations for Using Technology in Dispute Resolution and Application to the Civil Resolution Tribunal", *LSN Artificial Intelligence - Role & Applications in Law eJournal*, Vol. 2 No. 1, 01/09/2025, 8 et seq.; Reddy JEERI and Vinita SINGH – "Soft Law, Hard Justice: Regulating Artificial Intelligence in Arbitration", *LSN Law & Society: International & Comparative Law eJournal, Vol. 19 No. 98, 12/05/*2024, 196 et seq.; Mohamed KAMAL – "Artificial Intelligence and International Arbitration", *in* Abbas Poorhashemi (ed.) – *Artificial Intelligence and the Future of International Law*, Cham, 2024, 47 et seq.; Terry RAUCH – "I in IA : To What Extent and Capacity Can Artificial Intelligence Assist in International Arbitration Procedures and Proceedings?", *LSN Comparative Law & Trans-National Studies eJournal*, Vol. 24 No. 18, 02/10/2025, nos 2 and 4; GIACALONE (fn. 82) II.A, with more references.

83 - See also Marta ZAMORSKA – "Artificial Intelligence -Supported Arbitral Awards – A Pandora's Box or the Future of International Commercial Arbitration?", *Yb. PIL* 24 (2022/2023) 193, 198; CHAN/NASIR/JIANG (fn. 83) 286; and Daniel SCHNABL – "Künstliche Intelligenz als Schiedsgericht – Schiedsgerichtsbarkeit aus dem Automaten?", *SchiedsVZ* (2024) IV.2.

84 - See *SVAMC Guidelines on the Use of Artificial Intelligence in Arbitration* (2024), Guidelines 1 and 6-7; *AAA ICDR Principles Supporting the Use of AI in Alternative Dispute Resolution* (2024), principle of competence (1).

tions, in international and European instruments, applicable national arbitration law and with the regime applicable to the use of these technologies, without prejudice to the margin of appreciation allowed to the arbitrators in the realm of transnational arbitration (*infra* III.C and D).

The overriding issue, however, is whether *AI systems can replace human decision-makers*, moving from ADRs to AIDRs. Technically, it seems possible to build AI systems that perform this function in a reasonably sophisticated way ([85]). However, is this acceptable from a legal point of view (linked, of course, to an ethical perspective)?

The adjudication of disputes arising from the Blockchain, in dispute resolution methods that operate on the Blockchain, by AI systems, would mean that, without forgetting the intervention of the parties in the triggering and unfolding of the procedure, a high degree of automatism would be achieved: the decision would be automatic and its execution *on-chain* would also be automatic. If a method of dispute resolution could be validly stipulated by AI systems, we could have an automatically stipulated procedure, which would lead to an automatically enforced decision.

Before answering the question posed, it is important to *mention some of the advantages and disadvantages that have been pointed out by authors regarding the use of AI in arbitration*.

The use of AI contributes to the speed and cost reduction of the arbitration procedure and to procedural efficiency, namely by reducing human error, and can even provide more objective and impartial decisions ([86]).

Among the disadvantages are the discriminatory bias against certain groups or categories of people, which can result from the selection of data that has been provided for the system learning; the limitations of current systems in deciding complex cases; the impossibility of taking into account decision criteria that are not contained in data provided to the system, which are mainly limited to those arising from legal rules or published case law, when and to the extent that they are relevant to future cases; the impossibility, or at least difficulty, of explaining and therefore justifying decisions; the difficulty of understanding human interactions in all their dimensions, namely their emotional and cultural context, as well as aligning their results with ethical and legal values and principles; the possibility of the results produced by the system being misleading, namely in connection with what are known as "hallucinations"; concerns about the protection of personal data; and the difficulty in assuring the confidentiality of the process ([87]).

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85 - See Jack KIEFFABER, Kimo GANDALL and Kenny MCLAREN – "We Built Judge. AI. And You Should Buy It", *LSN Law & Society: Private Law - Contracts eJournal*, Vol. 10 No. 11 03/31/2025, II-III.

86 - See SOARES PEREIRA e JOANA COSTA LOPES – "A inteligência artificial e a decisão arbitral", *Rev. Int. Arb. Conc.* 16 (2021) 1, no. 3.3.; Matthias LEHMANN – "The New York Convention's Borderline. *Blockchain* Arbitration and Artificial Intelligence", *in* Transforming Arbitration: Exploring the Impact of AI, *Blockchain*, Metaverse and Web3, ed. by Maud PIERS and Sean MCCHARTY, Nijmegen, 2025, 80-81; GIACALONE (fn. 82) II.C, with more references.

87 - See SOARES PEREIRA/JOANA COSTA LOPES (fn. 87) n.º 3.2; MAFALDA MIRANDA BARBOSA – "Do juiz árbitro ao software juiz-árbitro: uma evolução possível?", *Rev. Int. Arb. Conc.* 16 (2021) 11, no. 3; Kathrin EIDENMUELLER, Conor MCLAUFGHLIN e Horst EIDENMUELLER – "Expanding the Shadow of the Law: Designing Efficient Judicial Dispute Resolution Systems in a Digital World — An Empirical Investigation", *LSN Cyberspace Law eJournal, Vol. 28 No. 28, 07/15/*2024, 35-36 (regarding State courts); LAUKEMANN (fn. 82) nos. 211 et seq.; SCHMITZ (fn. 83 [2024]) 5 et seqs. and (fn. 83 [2025]), 11 et seq.; JEERI/SINGH (fn. 84) 202 e segs.; KAMALOVA (fn. 29) 12; Victoria

Certainly, the evolution of AI systems and certain precautions and measures that may be taken by the actors involved and by the regulators could overcome, or at least limit, these disadvantages ([88]). These measures must, in particular, *enable the pursuance of the legal principles and values widely recognized in the international community and prevent the new risks created by the development of AI systems, without unjustifiably hampering the dynamics of this development.*

Regulation can to some extent be ensured by autonomous sources, such as rules of arbitration centers, complemented by codes of conduct, guidelines and good practice guides adopted voluntarily by arbitral institutions ([89]), by the arbitrators or by the parties ([90]).

However, certain aspects, such as the prevention of certain risks and the protection of certain fundamental rights, make public regulation necessary, which should be supranational and global as far as possible. Given the difficulties of unifying law on a universal scale, it is inevitable that certain instruments will be adopted on a regional and national scale. Even in this case, unification techniques such as model laws can be useful. Although they are adopted voluntarily by States, they allow for a certain degree of international unification ([91]).

This does not mean that, in jurisdictional dispute resolution methods, decision-makers can or should be completely replaced by AI systems ([92]). AI systems assist the proceedings, they can contribute to the decision ([93]), but *human control of the decision is necessary, at least by way of appeal*. Notwithstanding the fact that according to some

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HENDRICKX – "The Judicial Duty to State Reasons in the Age of Automation? The Impact of Generative AI Systems on the Legitimacy of Judicial Decision-Making", *LSN Artificial Intelligence - Law, Policy, & Ethics eJournal, Vol. 9 No. 17, 02/12/2025*, no. 4.3 (regarding State courts); LEHMANN (fn. 87) 80-81; RAUCH (fn. 83) nos. 2 and 4; e Mimi ZOU e Ellen LEFLEY – "Generative Artificial Intelligence and Art. 6 of the European Convention on Human Rights: The Right to a Human Judge?", *LSN Artificial Intelligence - Law, Policy, & Ethics eJournal, Vol. 9 No. 16, 02/11/2025*, 14 et seq.., with more references

88 - See *European Ethical Charter on the use of artificial intelligence (AI) in judicial systems and their environment* (CEPEJ, 2018); LAUKEMANN (fn. 82) nos. 227 et seq.; RAUCH (fn. 82) no. 5; ZOU/LEFLEY (fn. 88) 9 et seq.; GIACALONE (fn. 82) V, with more references.

89 - See, namely, *SVAMC Guidelines on the Use of Artificial Intelligence in Arbitration* (2024); *AAA ICDR Principles Supporting the Use of AI in Alternative Dispute Resolution* (2024).

90 - See also Art. 95 IA Act.

91 - See also CHAN/NASIR/JIANG (fn. 83) 282 et seq.; SCHMITZ (fn. 83 [2024]) 14 et seq.; JEERI/SINGH (fn. 83) 213 et seq., advocating regulation by *soft law*, but including in this concept model laws and the rules arbitration centers; KAMAL (fn. 83) 58; SCHNABL (fn. 84) V.

92 - See recital 61 of the IA Act; *European Ethical Charter on the use of artificial intelligence (AI) in judicial systems and their environment* (CEPEJ, 2018), Principles of the respect for human rights (1) and of "under user control" (5), and *Appendix I - In-depth study on the use of AI in judicial systems, notably AI applications processing judicial decisions and data*, nos. 113 et seq.; *SVAMC Guidelines on the Use of Artificial Intelligence in Arbitration* (2024), Guideline 6; *AAA ICDR Principles Supporting the Use of AI in Alternative Dispute Resolution* (2024), principle of the independence (5)]; MARIA JOÃO MIMOSO (fn. 83) 164-165; Fabrizio MARRELLA e Patricio BARBIRITTO – "Arbitrato internazionale e plattaforme telematiche: alcune riflessioni sul ruolo dell'intelligenza artificiale", *Rivista dell'Arbitrato* (2023/1) 202-203; JEERI/SINGH (fn. 83) 222; Cristina FLORESCU – "The Interaction between AI (Artificial Intelligence) and IA (International Arbitration): Technology as the New Partner of Arbitration", *Revista romana de Arbitraj* (2024/1) 3-4, but not excluding this possibility with the technological development; SCHNABL (fn. 84) III.3; see further SOARES PEREIRA/JOANA COSTA LOPES (fn. 87) nos. 3.2 and 4.2; for a different view, see EIDENMÜLLER/WAGNER (fn. 83) 220 et seq.; and ANA COIMBRA TRIGO and Gustavo BACKER – "Podem os 'árbitros-robôs' proferir sentenças exequíveis? Consenso e desafios à luz da Convenção de Nova Iorque e à Lei Modelo da UNCITRAL", *Rev. Int. Arb. Conc.* 16 (2021) VI.

93 - See also SCHNABL (fn. 84) IV.2 and LEHMANN (fn. 87) 81-82.

national arbitration laws it is understood that legal persons can be selected as arbitrators, the provisions of the Model Law regarding the arbitrators only seem suited for human persons (Arts. 10-15 of the Model Law) ([94]). The Portuguese Arbitration Act is particularly clear regarding the human nature of arbitrators (Art. 9(1)).

Human control has to be effective. Arbitrators take responsibility for the award, and cannot just sign off on a decision made by the AI system. Nor can this decision be recorded as an arbitral award on agreed terms (Art. 30 of the Model Law and 41 of the Portuguese Arbitration Act), since the premises of a settlement are not met *(supra* II.B) ([95]).

Nor are the contracting states of the New York Convention obliged to recognize and enforce decisions made by AI systems, since the concept of arbitration that should be relevant to this Convention presupposes that the parties have attributed to arbitrators, in the ordinary sense of the term, the power to render a human decision with jurisdictional force *(supra* II.C) ([96]).

This point, however, is not settled in other legal systems ([97]). Even if certain national legal systems admit or will admit automated arbitral awards, this does not oblige other States to recognize and enforce such awards under the New York Convention. On the other hand, this Convention does not prevent them from recognizing and enforcing such awards on the basis of their domestic regime (Art. 7(1)), but this possibility may be excluded or limited by fundamental rules or principles of domestic source or by other international obligations of the State of recognition.

The requirement of human control over the decision must be considered as a materialization of the right of access to justice and a fair trial, enshrined in the aforementioned Art. 20 of the Portuguese Constitution, Art. 6 of the European Convention on Human Rights and Art. 47 of the Charter of Fundamental Rights of the European Union, and, as such, as object of fundamental rights ([98]).

This applies both *de iure condito* and de *iure condendo*: only human intervention can assure that the solution of the case pursues, as far as possible, the aim of justice within the framework of all the coordinates of the legal system, through a process of

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94 - See also BÖCKSTIEGEL/KRÖLL/NACIMIENTO/NACIMIENTO/ABT/STEIN (fn. 39) § 1035 no. 9. For the contrary view, see EIDENMÜLLER/WAGNER (fn. 83) 215-216 and 221, not excluding the possibility of awards made by IA systems under de Model Law. In general, on the admission of the nomination of legal persons as arbitrators, see LIMA PINHEIRO (fn. 41) 146, and BORN (fn. 73) §§ 2.02[E] and § 12.04[B]. Even if the nomination of legal person is admitted, it is generally understood that the decision is taken by human persons appointed by the legal persons.

95 - See also LEHMANN (fn. 87) 84.

96 - See also LEHMANN (fn. 87) 81-82 e 84-85; for a different view, see EIDENMÜLLER/WAGNER (fn. 83) 209 et seq. and 221. The position adopted seem compatible with the opinion, expressed by BORN (f. 73) §§ 2.01[A][1] and 2.02[E], according to which there is an obligation of recognition of awards rendered in cases where legal persons were nominated as arbitrators. On the contrary, in principle, there is no obstacle to the duty to recognize awards made in arbitrations in which AI was only used as a working tool.– see also LEHMANN (fn. 87) 83-84.

97 - See Bennett MARROW, Mansi KAROL and Steven KUYAN – "Artificial Intelligence and Arbitration: The Computer as an Arbitrator — Are We There Yet?", accessible on ssrn.com, 72 et seq., admitting that some adaptations in the rules of the *US Federal Arbitration Act* may be required; Imre SZALAI – "Stranger Disputes: When Artificial Intelligence Turns Arbitration Upside Down", *LSN Artificial Intelligence - Role & Applications in Law eJournal, Vol. 1 No. 8, 10/16/2024*, II.B e III, defending before the same law the admissibility of decisions taken by AI systems, basically in business-to-business relationships, with more references.

98 - SCHNABL (n. 83) III.3 envisages here a materialization of the principle of human dignity.

interpretation-application inspired by a human feeling of what is just, and not a mere statistical probability obtained by inference from a set of data ([99]).

In a Blockchain arbitration, this requirement is reinforced by the risks involved in the automatic enforcement of an award.

The situation seems different in non-jurisdictional methods of dispute resolution specific to Blockchain, such as those that can be traced back to the aforementioned contractual role of a third party *(supra* II.B). This is even if, in the case of a decision by an AI system, one cannot strictly refer to a "third party" ([100]). In fact, *just as the parties can be bound by contractual statements issued by AI systems to which they have assigned this function, they can also be bound by decisions with contractual effect taken by these systems within the limits indicated above* (*supra* II.B).

Even in this case, however, *the binding nature of such dispute resolution presupposes that the parties are informed that the decision is taken by an AI system*. Empirical studies show that parties generally prefer human decision-makers ([101]).

The very use of AI systems as an auxiliary tool of the arbitral tribunal, when it may significantly influence an arbitral decision, must be implemented with an appropriate degree of human supervision, and arguably, must be communicated to the parties ([102]).

Naturally, the duty to communicate only concerns the use of AI systems that may significantly influence the arbitral award, and does not extend to the use of any technologies that use AI (for example, a simple search engine), and the circumstances in which the AI system is used or intended to be used will be relevant in determining the manner and content of the communication. IA systems are increasingly powerful tools that can have a huge impact on the outcome of an arbitration and, in particular, the parties should be made aware of the influence that these tools may have in the arbitration proceedings and in the arbitral award in order to be in a position to exercise their procedural rights and, in some cases, they should be able to use the same or equivalent tools and/or of controlling or participating in the control of its use.

In this respect, it could be preferred a general case by case approach, but it seems that for the sake of avoiding doubts and uncertainties it is advisable to communicate any use or intended use of AI systems that may significantly influence the arbitral award. This should be done in a way that does not open the door to additional procedural acts or that otherwise delays the proceedings.

Under the *AI Act*, applicable as a rule from 2 August 2026 (Art. 113), certain "AI systems intended for the administration of justice and democratic processes should be classified as high-risk, considering their potentially significant impact on democracy, the rule of law, individual freedoms as well as the right to an effective remedy and to

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99 - See, for a convergent view, LEHMANN (fn. 87) 81-82; see further Christoph ENGEL, Yoan HERMSTRÜWER and Alison KIM – "Human Realignment: An Empirical Study of LLMs as Legal Decision-Aids in Moral Dilemmas" *LSN Artificial Intelligence - Role & Applications in Law eJournal, Vol. 2 No. 15, 04/17/2025*.

100 - For a convergent view, see SCHNABL (fn. 84) III.3 e IV.3, arguing that it does not constitute formally a contractual function of a third party, because the IA system is not a third party.

101 - See EIDENMUELLER/MCLAUFGHLIN/EIDENMUELLER (fn. 88) 35-36 and 43 (regarding State courts).

102 - See *infra* references to Arts. 14, 26 and 86 of the IA Act and to Art. 22 of the GDPR, that only within a limited extent impose these duties; ZAMORSKA (fn. 84) 213-214; LAUKEMANN (fn. 82) 229-230; JEERI/SINGH (fn. 83) 220 et seq.; for an apparently different view, *SVAMC Guidelines on the Use of Artificial Intelligence in Arbitration* (2024), Guideline 3, point boards a case by case approach, but see Guideline 7.

a fair trial. In particular, to address the risks of potential biases, errors and opacity, it is appropriate to qualify as high-risk AI systems intended to be used by a judicial authority or on its behalf to assist judicial authorities in researching and interpreting facts and the law and in applying the law to a concrete set of facts" (Recital 61).

"AI systems intended to be used by alternative dispute resolution bodies for those purposes should also be considered to be high-risk when the outcomes of the alternative dispute resolution proceedings produce legal effects for the parties. The use of AI tools can support the decision-making power of judges or judicial independence, but should not replace it: the final decision-making must remain a human-driven activity. The classification of AI systems as high-risk should not, however, extend to AI systems intended for purely ancillary administrative activities that do not affect the actual administration of justice in individual cases, such as anonymisation or pseudonymisation of judicial decisions, documents or data, communication between personnel, administrative task" (Recital 61).

Thus, according to Art. 6(2) of the AI Regulation, Annex III *qualifies as high-risk systems* "AI systems intended to be used by a judicial authority or on their behalf to assist a judicial authority in researching and interpreting facts and the law and in applying the law to a concrete set of facts, or to be used in a similar way in alternative dispute resolution" (paragraph 8/a) ([103]).

The expression "applying the law" corresponds, in the German version, to *Anwendung des Rechts*. It seems that the references to "lei" and "loi", in versions such as the Portuguese and French, should be understood in the broad sense of law, which encompasses all sources of law. The Portuguese version itself begins by referring to the "interpretation of facts and law" [*interpretação dos factos e do direito*]. We see no reason why a system used to interpret and apply non statutory legal rules or principles should not be qualified as high risk.

Although the reference to dispute resolution proceedings that "produce legal effects for the parties" could suggest the inclusion of all alternative dispute resolution methods, not only the criterion of the literal meaning ("systems to be used in a similar way" to that of a judicial authority), but also the context of this reference, seem to indicate that the effects in view must be jurisdictional effects, and not mere contractual or reflexive effects. From the point of view of teleological criteria, there is also no reason to extend to non-jurisdictional proceedings a solution that is primarily designed for jurisdictional proceedings.

On the other hand, Art. 6(3) of the AI Act *rules out the classification of such a system as high-risk* "where it does not pose a significant risk of harm to the health, safety or fundamental rights of natural persons, including by not materially influencing the outcome of decision making.". This applies where any of the following conditions are met:

- the AI system is intended to perform a narrow procedural task;
- the AI system is intended to improve the result of a previously completed human activity;
- the AI system is intended to detect decision-making patterns or deviations from prior

103 - On the definition of high risk systems and the purpose of their regulation, see, MARTA BOURA – "Regulação de Sistemas de Inteligência Artificial de Risco Elevado", *in AI Act - O Novo Regulamento de Inteligência Artificial Europeu*, ed. by Alfar Rodrigues, João Almeida and João Luz Soares, 227, Coimbra, 2025, no. 2.

decision-making patterns and is not meant to replace or influence the previously completed human assessment, without proper human review; or

- the AI system is intended to perform a preparatory task to an assessment relevant for the purposes of the use cases listed in Annex III.

Therefore, an AI system used in the interpretation-application of law will only be considered high-risk if it significantly influences the decision of the case ([104]).

High-risk AI systems are also subject to a set of general requirements, which include *quality criteria for training data sets* (Art. 10) and the *duty to design and develop them in such a way that humans can oversee their operation, ensure that they are used as intended and that their impacts are addressed throughout the system's lifecycle* (Recital 73 and Art. 14) ([105]).

Users of high-risk systems are subject to certain obligations, namely:

- ensuring human supervision of the systems in order to prevent or minimize certain risks (Arts. 14 and 26(2)) ([106]); and

- when making decisions or helping to make decisions relating to natural persons, informing natural persons that they are subject to the use of the high-risk AI system (Art. 26(11)) ([107]).

In the event that a decision is taken on the basis of the results of a high-risk AI system and which produces legal effects or similarly significantly affects that person in a way that they consider to have an adverse impact on their health, safety or fundamental rights, *the user of the system has a duty to provide clear and meaningful explanations of the role of the AI system in the decision-making procedure and the main elements of the decision taken* (Art. 86(1)) ([108]).

According to Recital 171, such explanation should be clear and meaningful and should provide a basis on which the affected persons are able to exercise their rights and the right to obtain an explanation should not apply to the use of AI systems for which exceptions or restrictions follow from Union or national law and should apply only to the extent this right is not already provided for under Union law.

Art. 22(1) GDPR establishes the general rule that the "data subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her". This provision does not require, like Art. 86 of the AI Act, that the decision affects the individual to a significant degree, but only applies when it is a decision taken on the basis of automated processing of personal data to which a natural person is subject, which is not required by Art. 86 of the AI Act.

Furthermore, Art. 22(2) GDPR excludes, in principle (see paragraph 4), the right to explanations, namely in cases where the decision is necessary for the entering into or performance of a contract between the data subject and a controller or is based on the

104 - See, on general, VOIGT/HULLEN (fn. 80) no. 3.1.

105 - See VOIGT/HULLEN (fn. 80) no. 3.2.

106 - See VOIGT/HULLEN (fn. 80) nos. 3.2.7 and 3.4; Melanie FINK – "Human Oversight under Art. 14 of the EU AI Act", accessible on ssrn.com, no. 5.

107 - Being also applicable Art. 13 of Directive (EU) 2016/680 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA, which is not relevant for this essay. See further VOIGT/HULLEN (fn. 80) no. 3.4.8.

108 - See VOIGT/HULLEN (n. 80) no. 1.7.2.

explicit consent of the data subject. In such cases, the controller shall take appropriate measures to safeguard the rights and freedoms and legitimate interests of the data subject, including, at least, the right to obtain human intervention on the part of the controller, to express his or her point of view and contest the decision (paragraph 3).

It follows from the above that *jurisdictional decisions cannot, in principle, be automated*. It could be thought that these rules are relevant, as far as the subject of this study is concerned, to decisions with contractual effect. However, regarding the AI Act, it also follows from the aforementioned that *only systems used in jurisdictional dispute resolution methods seem to qualify as high-risk systems*. I will not examine here whether or not these rules could also be relevant to decisions of the arbitral tribunal which, despite having only procedural effects, could have a significant influence on the outcome of the case.

In the future, the *Council of Europe Framework Convention on Artificial Intelligence and Human Rights, Democracy and the Rule of Law* (2024), already signed by the European Union, will also have to be taken into account (namely the general obligation of transparency and supervision contained in Art. 8).

In transnational arbitration in which AI tools are used, *determination of the law applicable to the merits of the case* shall be based on the general criteria that will be examined below *(infra* III.C and D), although specific issues arise, such as the determination of the seat of arbitration and the choice of rules of law made with the intervention of AI systems.

Parallel problems can arise with regard to *determining the law applicable to non-jurisdictional dispute resolution methods*, namely those that can be directly or analogously traced back to the contractual role of a third party *(supra* II.B).

I will not be dealing with these problems and their solutions here.

It is also necessary to take into account the *spatial scope of application claimed by certain regimes*, in particular Art. 2 of the AI Act ([109]).

III. TRANSNATIONAL DISPUTES AND RULES OF LAW APPLICABLE TO THE MERITS

A) Transnationality of Blockchain relationships

Smart contracts fall under Private International Law when they have *relevant contacts with more than one sovereign State*. The Internet, in general, is characterized by its ubiquity and a high rate of transnational relationships. Nevertheless, the fact that the Internet is a global network does not mean that all contracts entered into over the Internet or that use platforms for their automatic performance are international.

This transnationality is reinforced in Blockchain networks by the multiple localization of the nodes ([110]). The relevance of storing records or the location of operators of the distributed ledger platform in different countries can, therefore, raise doubts. Ac-

109 - On the taking into consideration of the supranational directives by the arbitrators, see LIMA PINHEIRO (fn. 41) § 58.

110 - Cf. AUDIT (fn. 19) 678, stresses the immateriality and the decentralization specific of the Blockchain.

cording to some authors, since Blockchain is essentially transnational, any relationship based upon Blockchain is transnational ([111]).

However, only certain contacts with States are relevant for the purposes of Private International Law. Furthermore, it is today commonly understood that the location of the servers is not relevant for choice-of-law purposes regarding relationships established through the Internet. Also, the multiple localization of the nodes does not trigger the transnationality of the relationships based upon Blockchain, because they do not have an objective connection with the parties nor do they convey specificity to the performance of the contract ([112]).

I believe that the most relevant internationality criterion for smart contracts is a subjective one: the location of the parties in different countries. The internationality of the contract can also result from the place of performance. The automatic performance of the contract does not mean that all acts are carried out online and, therefore, internationality can also result from the place of performance. Internationality may also result from a close connection between the smart contract and a multi-localized contract or from the fact that it is an operation that is carried out in an international market, as is often the case with financial operations on derivatives.

In any case, bearing in mind the difficulty in determining the location, and even the identity of parties, I believe that *the internationality of the smart contract can be presumed*.

The same must be said regarding most DAOs. In effect, difficulty in determining the residence, nationality or seat of the members of a DAO, and even their identity, should be taken into account. Therefore, the *transnationality of a DAO* that does not limit its membership to persons located in the same State should also be presumed. The location of the developers or of the managing representatives or external entity can also be relevant as a transnational factor. The same can be said of a close connection with an international market, namely financial markets. Furthermore, the place of incorporation can be of some relevance, but it may not be enough if all the elements of the DAO are clearly localized in one State.

There is some *specificity in choice-of-law problems regarding DAOs*.

On one hand, the pseudonymity of a DAO's members can make it difficult or even impossible to materialize connecting factors related to their location ([113]).

On the other hand, members may voluntarily submit to the provisions codified in the network computer code that the members expressly or implicitly accept by participating in the network ([114]).

The legal nature of the provisions codified in Blockchain networks depends on their object and sources. The code provisions can be formulated not only by the person or entity administrating the Blockchain infrastructure, but also by the developers or by an entity managing the DAO. Even if the members only adhere to these provisions, they

[111] - Cf. Florence GUILLAUME– "Aspects of private international law related with Blockchain transactions", *in Blockchains, Smart Contracts, Decentralised Autonomous Organisations and the Law*, ed. by Daniel KRAUS, Thierry OBRIST and Olivier HA, Cheltenham (UK) and Northampton (MA, USA), 2019: 59; AUDIT (fn. 19) 672.

[112] - For a different view, see Tom BRAEGELMANN and Markus KAULARTZ – *Rechtshandbuch Smart Contracts*, 2019, § 12 nos. 5 and 13.

[113] - See Jonas DRÖGEMÜLLER – *Blockchain-Netzwerke und Krypto-Token im Internationalen Privatrecht*, Baden-Baden, 2023, 36.

[114] - See DRÖGEMÜLLER (fn. 114) 114-115, regarding Blockchain networks in general.

display important differences in relation to traditional standard clauses where these also govern the relations between the members of the DAO that have accepted them. This can be of relevance to the applicability of legal rules for standard clauses and to the determination of their legal nature. It is also conceivable that the code provisions are formulated by representatives chosen by the DAO's members, and are, therefore, an expression of their collective autonomy.

I any case, standard clauses applicable to Blockchain networks can provide a basis for development of trade usages and even, eventually, of customs.

Like all international contracts, the *international smart contract* poses specific problems of *determining the competent jurisdiction*, *determining the applicable law* and, eventually, *recognizing foreign judgments and awards*.

B) Lex cryptographia?

Regarding the law applicable to contracts in the context of Blockchain platforms, it has been argued that these platforms are an independent legal space of a new type and that they are governed by the rules of their computer code, regardless of any national law, a *lex cryptographia* ([115]).

This is in an obvious parallel to previous theses favorable to the *new lex mercatoria* as an autonomous law of international business ([116]), and to the *lex informatica*, as an autonomous law of Internet relationships. However, here there are some additional factors of autonomy:

- transactions automatically performed in Blockchain platforms, namely transactions based upon certain smart contracts, do not require the conduct of a party or court enforcement for their performance;
- the disputes involved can, up to a certain point, be settled by dispute resolution mechanisms operating within the framework of a Blockchain platform;
- State control of Blockchain platforms and transactions is particularly difficult.

Some of the arguments opposed to this opinion do not strictly concern the contractual relationship and do not take into account the different degrees of State regulation required by business-to-business relationships and by business-to-consumer or non-professional investors relationship [(117)]. Other arguments, such as the limitation of the scope of these rules, would not prevent them from operating in coordination with State rules that are applicable to issues outside their scope.

Although I believe that the determination of the rules applicable to smart contracts and DAOs have to be mainly based upon the choice-of-law rules in force for State courts and arbitration tribunals, I think that we should pay attention to the autonomous processes of rule creation that can occur in Blockchain platforms, and that we should not completely exclude the possibility of these rules being chosen by the parties to the merits of a dispute submitted to arbitration and that falls under their scope.

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[115] - See Franz MAYER – "Recht und Cyberspace", *NJW* (1996) 1782-1791, 1790; GUILLAUME (fn. 112) 71 et seq.; DE FILIPPI/ RIGHT (fn. 4) 193 et seq.

[116] - See Luís LIMA PINHEIRO – *Direito Internacional Privado*, vol. I – *Introdução e Direito de Conflitos/Parte Geral*, 4th. ed., Lisboa, 2025, § 6, with further references.

[117] - See namely AUDIT (fn. 19) 676-677; DRÖGEMÜLLER (fn. 114) 347-348. Liability regarding third parties of external organizations or insolvency matters do not fall within the scope of the law applicable to the contract.

Deference to autonomous rules has advantages, namely from the point of view of the restraint required in the exercise of States' jurisdiction to prescribe, in order to avoid regulatory conflicts or conflicts of duties for the addresses of such regulations.

Furthermore, there is the possibility of the parties agreeing to an *ex aequo et bono decision* (Art. 28(3) of the Model Law and Arts. 39(1) and 52(1) of the Portuguese Arbitration Act). This agreement allows the arbitrators to take into consideration all of the circumstances of the particular case without being bound, in principle, by the rules of law in force. Within the limits set by the fundamental values and principles of international and transnational law, or common to the national systems involved, as well as by the clauses stipulated by the parties, the arbitrators may fully rely on autonomous rules and principles.

The mere fact that the parties have engaged in a smart contract, or established other relationship on the *Blockchain*, however, does not amount to permission for an *ex aequo et bono award* ([118]). The parties' permission must be explicit and cannot result from a general reference to the rules of an arbitration center or of a *Blockchain* platform ([119]).

C) Arbitration choice-of-law rules regarding smart contracts

Transnational arbitration is the normal mode of dispute resolution in international business. Recourse to State courts is marginal. The advantages of resorting to arbitration with respect to international smart contracts are largely common to those found in relation to other international contracts ([120]).

With regard to smart contracts, there is also the possibility of using arbitration as an oracle which, in the face of controversies arising from relevant facts, allows for the suspension of its automatic performance and the introduction of modifications to the performance program (*supra* II.C) ([121]).

Where there is a valid and effective arbitration agreement, the determination of the law applicable to the merits of the case should, in principle, rely on specific choice-of-law rules, different from the rules addressed to State courts. Since most of the Blockchain Dispute Resolution mechanisms do not have a jurisdictional nature (*supra* II.B), in case of intervention of State courts, general choice-of-law rules apply.

Arbitrators enjoy broad autonomy in the *determination of the law applicable to the merits of the case*, namely because the control by State courts of the law applied by arbitrators is quite limited and the main systems, when they do not abdicate from issuing

[118] - See also ORTOLANI (fn. 23) 655 et seq.

[119] - See Luís de LIMA PINHEIRO – "Direito aplicável, equidade e composição amigável na arbitragem", *in Homenagem ao Professor José de Oliveira Ascensão*, *RFDUL* 64 (2023) 1427-1448, II; and ORTOLANI (fn. 23) 655 et seq.

[120] - Regarding these advantages, see LIMA PINHEIRO (fn. 41) Introdução I.

[121] - See Samuel BOURQUE and Sara Fung LING TSUI – "A Lawyer´s Introduction to Smart Contracts", *in Scientia Nobilitat. Reviewed Legal Studies*, 4-23, 2014, https://github.com/joequant/scms/blob/master/doc/pdfs/A%20Lawyer%27s%20Introduction%20to%20Smart%20Contracts.pdf, 10; MATEJA DUROVIC – "Law and Autonomous Systems Series: How to Resolve Smart Contract Disputes - Smart Arbitration as a Solution", University of Oxford – Faculty of Law, Blog 1/6/2018, https://www.law.ox.ac.uk/business-law-blog/blog/2018/06/law-and-autonomous-systems-series-how-resolve-smart-contract-disputes; and Ibrahim SHEHATA – "Smart Contracts & International Arbitration", *LSN Transnational Litigation/Arbitration, Private International Law, & Conflict of Laws eJournal*, Vol. 6 No. 3, 01/14/2019, 9-10.

any directive on the determination of the applicable law by the arbitrators, fully enshrine the principle of freedom of choice and provide, in the absence of a designation of the applicable law by the parties, flexible criteria for the determination of the applicable law that leave a wide margin of appreciation to the arbitrators.

Furthermore, transnational arbitration courts are not exclusively subject to a particular national system ([122]). Arbitrators are not bound to exclusively apply the choice-of-law rules of a given State.

The combination of these factors results in the determination of the law applicable to the merits of the case being mainly governed by rules and principles specific to Transnational Arbitration Law ([123]). Solutions adopted by the consulted national systems interact with these autonomous rules and principles and can only be properly understood in their light.

Hence, it is justified, in this matter, to start by studying Transnational Arbitration Law solutions and then assessing to what extent their application is limited by State directives ([124]).

Solutions provided by the Transnational Arbitration Law result mainly from the practice of arbitral tribunals, which have embodied certain principles that are now part of the legal conscience of the arbitral community, and from the rules of institutionalized arbitration centers, which employ criteria for determining the applicable law that are different from those generally followed by State courts and adopted in national choice-of-law systems.

Thus, within the framework of this Transnational Law, the *principle of freedom of choice* is understood as allowing the parties to refer to State law, to Public International Law, to *lex mercatoria*, to regulation models such as the UNIDROIT Principles of International Commercial Contracts, to "general principles" or to *ex aequo et bono* considerations ([125]). In the practice of arbitral tribunals, the use of non-State decision criteria is relatively frequent.

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[122] - See LIMA PINHEIRO (fn. 41) 29 et seq. and 234 et seq., with further references. For the same view, Francesco GALGANO and Fabrizio MARRELLA – *Diritto del commercio internazionale*, 2nd. ed., Milano, 2007, 264, and Maria HELENA BRITO – "As novas regras sobre a arbitragem internacional. Primeiras reflexões", *in Est. Miguel Galvão Teles*, vol. II, 27- 49, Coimbra, 2012, 43. The authors that advocate the subjection of arbitration to the law of the State of its seat hold a contrary view – see references in LIMA PINHEIRO [*loc cit.*], to which shall be added Peter MANKOWSKI – "Schiedsgerichte und die Verordnungen des europäischen Internationalen Privat-und Verfahrensrechts", *in FS Bernd von Hoffmann*, 1012-1028, Bielefeld, 2011, 1013 et seq.

[123] - This conception, that I already advocated in *Contrato de Empreendimento Comum (Joint Venture) em Direito Internacional Privado*, Coimbra, 1998, 630 et seq., was adopted by the Supremo Tribunal de Justiça in its ruling of 11/10/2005, proc. 05A2507 [at *www.dgsi.pt*]. See also HELENA BRITO (fn. 123) 43-44.

[124] - See further Luís de LIMA PINHEIRO – *Direito Internacional Privado*, vol. II – *Direito de Conflitos/Parte Especial*, tomo II, 5th ed., Lisboa, 2023, § 77.

[125] - Cf. the case law referred by Felix DASSER – *Internationales Schiedsgerichte und Lex mercatoria. Rechtsvergleichender Beitrag zur Diskussion über ein nicht-staatliches Handelsrecht* (Schweizerischen Studien zum Internationales Recht vol. 59), Zürich, 1989, 180 et seq., and, namely, Peter SCHLOSSER – *Das Recht der internationalen privaten Schiedsgerichtsbarkeit*, 2nd ed., Tübingen, 1989, 532-533; Filip DE LY – *International Business Law and Lex Mercatoria*, Amsterdam et al., 1992, 290; Ursula STEIN – *Lex Mercatoria. Realität und Theorie*, Frankfurt-am-Main, 1995, 138; Yves DERAINS – "Transnational Law in ICC Arbitration", *in The Practice of Transnational Law*, Klaus Peter Berger, 43-51, The Hague, London and Boston, 2001, 41; Nigel BLACKABY and Constantine PARTASIDES – *Redfern and Hunter on International Arbitration*, 7th. ed., Oxford and New York, 2023, nos. 3.124 et seq. See also Preamble of the UNIDROIT Principles on International Commercial Contracts and respective

The choice of the rules of law applicable to the merits of the case is particularly important with respect to smart contracts (B). The greater freedom allowed by the choice-of-law rules of arbitration increases the possibilities of choosing the most appropriate decision criteria for smart contracts, including the possibility of conflictual references to certain rules that develop within the platforms on which they are entered into and/or performed.

As pointed out above (B), provisions that develop in the context of Blockchain platforms will, in certain cases, constitute mere standard contractual clauses, but in other cases they may be the expression of collective autonomy or constitute usages or even customs that may be relevant as objective law. It is in this second case that a conflictual reference to these rules seems plausible.

Naturally, the choice of fragmentary rules that do not govern all aspects of the contract does not dispense with the use of other decision criteria that are necessary in deciding the dispute.

Consent of the parties to the designation of the applicable rules of law can be explicit or implied. This possibility, which is stated in general choice-of-law rules (Art. 3(1) of the Rome I Regulation), shall also be admitted in the face of Art. 28(1) of the Model Law ([126]). Art. 33(1) of the Portuguese Arbitration Act of 1986 also adopted this solution, and it must be maintained in the face of Art. 52(1) of the Portuguese Arbitration Act of 2011. Participation in a Blockchain network subject to a certain law or governed by certain autonomous rules that are relevant as objective law can be an important indication of a choice of these rules for the decision of the dispute.

The parties' reference to State law shall be understood, in the absence of an indication to the contrary, as a reference to the substantive law of that State. In this sense, Art. 28(1) of the Model Law and Art. 52(1) of the Portuguese Arbitration Act. Of course, nothing prevents the parties from making a global reference to the law of a State, which includes its choice-of-law rules (as expressly results from the aforementioned provisions).

Choice of law by the parties of a smart contract should be strongly recommended. However, an *off-chain* agreement seems to be required ([127]) or, at least, a complement by commentaries in natural language ([128]).

In the absence of a parties' choice of law, there are no clearly established rules of Transnational Arbitration Law for determining the applicable law.

The most significant trend that has been displayed in arbitration case law and in arbitration center rules adopts the *rules of law most appropriate for the dispute approach*.

This trend is echoed in French, Dutch and Spanish legislation, according to which the dispute must be decided in accordance with the rules of law that the arbitrator considers appropriate (Art. 1511(1) of the French CPC, Art. 1054 of the Dutch CPC and Art. 34(/2) § 2 of the Spanish Arbitration Law). The same was true, in the Portuguese

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comment no. 4a. My opinion, already advocated in Contrato de Empreendimento Comum (Joint Venture) em Direito Internacional Privado (fn. 124) 1020 et seq., was adopted by the Supremo Tribunal de Justiça in its ruling of 11/10/2005, proc. 05A2507 [at www.dgsi.pt]..

[126] - Cf. BÖCKSTIEGEL/KRÖLL/NACIMIENTO/KRÖLL/SCHMALTZ (fn. 39) § 1051 nos. 17 et seq.

[127] - For this view, BRAEGELMANN/KAULARTZ (fn. 113) § 12 n. 17.

[128] - See *Law Commission*, *Advice to Government. Smart Legal Contracts*, 2021, nos. 7.71 et seq.

legal order, according to the Portuguese Arbitration Act of 1986, which provided for the application of the most appropriate law to the dispute (Art. 33(2)) ([129]).

The idea of appropriation allows for a balance of interests and consideration of the specific content of the legal issues to be resolved ([130]). In determining the applicable law, the arbitrators must take into account the links that the disputed relationship establishes with the different countries, but they can also consider the content of the respective laws ([131]).

Assessment of the content of the laws in question should not be based on the subjective preference of the arbitrators. The idea of appropriateness for the dispute postulates an objective assessment of the content of the laws in question, depending on the existence of legal rules applicable to the case, the degree of development of this legal regime and its suitability in view of the current needs of the trade ([132]), its correspondence to the legal culture that most influenced the contract in dispute and the consequences of its application on the validity of the contract.

Arbitral tribunals cannot be governed solely by autonomous rules and principles. They must take into account the *directives for determining the applicable law issued by States that have particularly significant links with arbitration or where the award may foreseeably have to be enforced*.

The Model Law, as well as Portuguese law, provide a special regime for determining the applicable law in international arbitration (Art. 28 of the Model Law and Art. 52 of the Portuguese Arbitration Act).

The Model Law defines international arbitration in very broad terms, which even includes the mere agreement of the parties on the relation of the subject matter of the arbitration agreement with more than one country (Art. 1(3)). Under Portuguese law, international arbitration is understood to be that which, taking place in Portuguese territory (Art. 61 of the Portuguese Arbitration Act), "puts international business interests at stake" (art. 49 of the Portuguese Arbitration Act). This seems to be a more appropriate approach to the specificity of international commercial arbitration.

Art. 28(1) of the Model Law and Art. 52(1) of the Portuguese Arbitration Act *allow parties to choose, without any restriction, the "rules of law" to be applied by the arbitrators to the substance of the dispute*.

The replacement of "law", which appeared in the 1986 of the Portuguese Arbitration Act, by "rules of law", aligns Portuguese law with Model Law, and cannot be deprived of a useful meaning. Indeed, this reference to "rules of law" has been understood as not limiting the broad freedom conferred to the parties by Transnational Arbitration Law ([133]). This expressly adopts the solution that I defended under the Portuguese Arbitration Act of 1986 ([134]).

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[129] - See Henri BATIFFOL – "La loi appropriée au contrat", *in Études Berthold Goldman*, 1-13, Paris, 1982, and Emmanuel GAILLARD – "Droit international privé français – Arbitrage commercial international – Sentence arbitrale – Droit applicable au fond du litige*", in J.-cl. dr. int.*, 1996, no. 133.

[130] - See ISABEL DE MAGALHÃES COLLAÇO (fn. 70) 64.

[131] - See BATIFFOL (fn. 130) ; GAILLARD (fn. 130) no. 133, and FOUCHARD/GAILLARD/GOLDMAN (fn. 73) 889-890.

[132] - Cp. the critical remarks of Rui MOURA RAMOS – *Da Lei Aplicável ao Contrato de Trabalho Internacional*, Coimbra, 1991, 578 et seq.

[133] - For the same view, Rui MOURA RAMOS – "A arbitragem internacional no novo Direito português da arbitragem", *BFDUC* 88 (2012) 583-604, 595; HELENA BRITO (fn. 123) 44; Dário MOURA VICENTE – "A determinação do Direito aplicável ao mérito da causa na arbitragem internacional à luz ,

In the absence of a designation by the parties, Art. 28(2) of the Model Law provides for *application of the law determined by the conflict of law rule that the arbitral tribunal consider applicable*. Some authors understand this provision in the sense of applying the conflictual solution common to the legal systems of the States involved or in force in a particular national system of Private International Law. In the lack of a common solution, the arbitral tribunal would have to choose the most appropriate choice-of-law rule in order to determine, through this rule, the applicable substantive law ([135]). According to other opinion, which seems preferable, the arbitrators may formulate the choice-of-law rule that they consider most appropriate, regardless of the national systems of Private International Law ([136]).

Art. 52(2) of the Portuguese Arbitration Act, provides that, in the absence of designation by the parties, the arbitral tribunal applies the law of the State with which the object of the dispute presents a closer connection. This solution approximates the Portuguese law to the Model Law, but represents a step backwards in relation to the provisions of the 1986 of the Portuguese Arbitration Act, which followed the trend in which Transnational Arbitration Law was evolving, determining the application of the law most appropriate to the dispute (Art. 33(2)).

The new solution does not seem to meet the needs of international trade. Indeed, the provision does not allow arbitrators to designate non-State law nor to take into account the substantive content of the national laws at stake ([137]).

The disadvantages of this solution also seem clear when it comes to smart contracts. The possibility that, in determining the law applicable to the merits of the case, arbitrators could take into account the content of the laws in question and apply non-State rules is important in the case of a new and complex matter, which is only subject to specific regulation in a few State systems.

Links relevant to establishing the closest connection, such as the location of the parties and the place of performance of the contract, are difficult, or even impossible to determine in Blockchain relationships ([138]).

In borderline cases where it is not possible to determine which State has the closest connection with the object of the dispute, Portuguese choice-of-law rules of arbitration do not offer a solution. It seems particularly clear that *it is preferable to apply the law*

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da nova lei portuguesa da arbitragem voluntária", *Rev. Int. de Arbitragem e Conciliação* 5 (2012) 37-50, 45-46; Manuel Pereira BARROCAS – *Lei da Arbitragem Comentada*, Coimbra 2013, Art. 52 n. 4; and Mário ESTEVES DE OLIVEIRA (ed.) – *Lei da Arbitragem Voluntária Comentada*, Coimbra, 2014, Art. 52 n. 4]. Cp. António MENEZES CORDEIRO – *Tratado da Arbitragem. Comentário à Lei 63/2011, de 14 de dezembro*, Coimbra, 2015, Art. 52 nos. 30 and 115.

[134] - Cf. LIMA PINHEIRO (fn. 41) § 19 D.

[135] - See Howard HOLTZMANN e Joseph E. NEUHAUS – *A Guide to the UNCITRAL Model Law on International Commercial Arbitration*, The Hague, 1989, 769-770; see further António FERRER CORREIA – "Do Direito aplicável pelo árbitro internacional ao fundo da causa", *BFDC* 77 (2001) 1-11, 8 et seq.

[136] - Cf., apparently, Maria ÂNGELA BENTO SOARES e Rui MOURA RAMOS – *Contratos Internacionais. Compra e Venda. Cláusulas Penais. Arbitragem*, Coimbra, 1986, 403; Emmanuel GAILLARD – "Aspects philosophiques du droit de l'arbitrage international", *RCADI* 329 (2007) 49-216, 162. See further Yves DERAINS – "L' application cumulative par l'arbitre des systèmes de conflit de lois intéressés au litige", *R. arb.*(1972) 99-121.

[137] - For the same view, HELENA BRITO (fn. 123) 46; MOURA VICENTE (fn. 134) 47; and ESTEVES DE OLIVEIRA (ed.) (fn. 134) Art. 52 n. 6-7. For a different view, MENEZES CORDEIRO (fn. 134) Art. 52 n. 115.

[138] - See also GUILLAUME/RIVA (fn. 22) 582-583.

most appropriate to the dispute rather than resorting simply to the forum substantive law.

If we accept that, in cases where it is *impossible to determine the closest connection*, there is a *gap* in both general choice-of-law rules and arbitration choice-of-law rules, this gap should be filled according to the methodology prescribed by the law and adopted by legal science. Normally, there is a margin of appreciation that allows for the search for appropriate solutions.

Pursuant to Art. 10 of the Portuguese Civil Code and main Portuguese authors, the first resort should be made to legal analogy, secondly, to general principles and, lastly, to a solution created "within the spirit of the system". It seems that the analogy with Art. 348(3) of the Portuguese Civil Code that concerns cases where it is impossible to determine the content of the applicable foreign law, is limited. In particular, it does not seem justified where there are solutions that are more appropriate to the issue of impossibility of connecting factor materialization from the point of view of choice-of-law justice.

General choice-of-law principles do not provide a solution to the gap in this particular case. However, there are system values that can be relevant for the creation of a solution "within the spirit of the system", namely, in the present case, the *appropriateness*. This value is inherent in the idea of connecting justice and, more widely, to all choice-of-law justice and requires that, in the determination of applicable law, due account is taken of the legal matter concerned and of the circumstances of the case ([139]). Therefore, it is arguable that applying the rules most appropriate to the issue is a sound solution also from a *de iure condito* point of view.

Even if the law designated by the parties or, in the absence of this designation, chosen by the arbitrators, is a State law, it constitutes a rule adopted by the international unification of Transnational Arbitration Law, by the rules of arbitration centers and by the arbitral case law that *the arbitral tribunal, in contractual matters, must always take into account the provisions of the contract and trade usages*. The Model Law, as well as Portuguese, German, French and Spanish law, expressly establishes the autonomous relevance of usages in "international commercial arbitration" (Art. 28(4) of the Model Law, Art. 52(3) of the Portuguese Arbitration Act, Art. 1051(4) of the German Code of Civil Procedure, Art. 1511(2) of the French Code of Civil Procedure and Art. 34(3) of the Spanish Arbitration Law). Therefore, *practices generally observed in Blockchain platforms should be taken into account regardless of the law applicable to the merits of the case, as long as compatible with mandatory rules of this law*.

General choice-of-law rules, contained mainly in the Rome I Regulation, are applicable to arbitrations that, having legally relevant contacts with more than one State, are not "international" in the sense of Art. 49 of the Portuguese Arbitration Act, i.e., they do not put international business interests into play ([140]). This is the case of arbitration of disputes arising from international contracts with consumers. This understanding was adopted in Art. 14 of L no. 144/2015, of 8/9, which transposed Directive 2013/11/EU on Alternative Dispute Resolution for Consumer Disputes into the Portu-

[139] - See Luís de LIMA PINHEIRO – "Choice-of-Law Justice", 2020, on ssrn.com (Portuguese version *in Direito Internacional e Comparado: Trajetória e Perspectivas. Homenagem aos 70 anos do Professor Catedrático Rui Manuel Moura Ramos*, Campos Monaco/Loula (eds.), vol. I, 411, 2021, III.C.

[140] - Cf. ISABEL DE MAGALHÃES COLLAÇO (fn. 70) 60 *in fine* e seq. See further MENEZES CORDEIRO (fn. 134) Art. 52 no 111.

guese legal order. Indeed, this provision, based on Art. 11 of the Directive, refers to Art. 5 of the Rome Convention on the Law Applicable to Contractual Obligations and Art. 6 of the Rome I Regulation.

D) Arbitration choice-of-law rules regarding DAOs

Since DAOs have both a contractual and an organizational dimension, the law applicable to contractual issues may be different from the law applicable to corporate or other organizational issues.

Before the choice-of-law rules applicable in lack of an arbitration agreement, there is a clear distinction between the rules applicable to contracts (namely Rome I Regulation) and the rules applicable to legal persons (namely Arts. 33 and 34 of the Portuguese Civil Code and Art. 3(1) of the Portuguese Commercial Corporations Code). However, this distinction is not drawn by the choice-of-law rules applicable by arbitral tribunals, and it is not clearly established if they apply only to contractual issues or also, in principle, to other arbitrable matters.

According to the prevailing trend in comparative law and in legal literature, *corporate disputes are, in principle, arbitrable, subject to certain limitations or to the applicability of specific rules* ([141]). In particular, specific rules may be required for the arbitration of disputes concerning the validity, voidance or nullity of the members of a company's resolutions ([142]). This applies also to Portuguese law since disputes involving an economic interest or in matters in which a settlement is admissible are arbitrable (Art. 1(1) and (2) of the Portuguese Arbitration Act) ([143]), although taking into consideration that, in principle, the arbitral award only binds the parties who have entered into the arbitration agreement or have adhered to it (Arts. 1, 2 and 36 of the Portuguese Arbitration Act) ([144]).

The question that then arises is whether the determination of the rules applicable to the merits of corporate issues should be based on the specific rules and approaches provided for arbitration or if the common choice-of-law rules applicable in the absence of an arbitration agreement should also apply when there is such an agreement.

This is a very controversial issue ([145]). Most national arbitration laws that contain choice-of-law rules on the law applicable to the merits, as well as most authors, omit any mention of limitation to the scope of application of those rules on any arbitrable matters. This does not necessarily mean that those limitations do not exist, but it can be

[141] - See Bernard HANOTIAU 2002 – "L'arbitrabilité", *RCADI* 296 (2002) 29-253, 157 et seq. ; Id. – "L'arbitrabilité des litigies en matière de droit des sociétés", *in Liber Amicorum Claude* Reymond, Paris, 2004, nos. 4 et seq.; Raúl VENTURA – "Convenção de arbitragem", *ROA* 46 (1986) 289-413,340 et seq.; António SAMPAIO CARAMELO – "Arbitragem de Litígios Societários" (2001), *in Temas de Direito da Arbitragem*, Coimbra, 2013, 341 et seq.; LIMA PINHEIRO (fn. 41) § 8; BÖCKSTIEGEL/KRÖLL/NACIMIENTO/DUVE/WIMALASENA (fn. 39) nos. 9 and 11 et seq SERAGLINI/ORTSCHEIDT (fn. 73) no. 146.

[142] - See SAMPAIO CARAMELO (fn. 142) 375 et seq.; Id. "Critérios de Arbitrabilidade dos Litígios. Revisitando o Tema", *in Temas de Direito da Arbitragem*, Coimbra, 2013, 287 et seq.; BÖCKSTIEGEL/KRÖLL/NACIMIENTO/DUVE/WIMALASENA (fn. 39) nos.20 et seq.; MENEZES CORDEIRO (fn. 134) Art. 1. nos. 55 et seq.

[143] - See SAMPAIO CARAMELO (fn. 142) 344 et seq. and (fn. 143) 287 et seq.; MENEZES CORDEIRO (fn. 134) Art. 1 nos. 64 et seq.

[144] - For a partially different view, see SAMPAIO CARAMELO (fn. 142) 369 et seq.

[145] - See different positions in LIMA PINHEIRO (fn. 125) § 77 C.

reasonably understood in the sense that, in principle, those rules are also applicable to non-contractual disputes ([146]).

Even in the realm of general choice-of-law rules applicable by State courts, freedom of choice of the applicable law has been extended to many non-contractual matters and, regarding voluntary arbitration, this is further justified by the fact that it is based on an arbitration agreement and that, in principle, the arbitral award only binds the parties that entered into or have adhered to this agreement.

This is also my understanding in the light of Art. 28 of the Model Law and of Art. 52 of the Portuguese Arbitration Act ([147]). Namely, any limits to the freedom of choice of the applicable law must be carefully justified by the law's interpreter ([148]). Naturally, non-arbitrable issues raised as preliminary questions or arbitrable issues that do not put into play interests of international business are outside the scope of Art. 52 of the Portuguese Arbitration Act and fall under the general choice-of-law rules (*supra* C).

In my opinion, the arbitrators are bound by the parties' choice of the rules applicable to the merits of the dispute, even if this choice concerns corporate or other external organizational issues between the parties. This is grounded both on Transnational Arbitration Law stemming from the rules of the arbitration centers and from the case law of the arbitral tribunals, and on Art. 28 of the Model Law and Art. 52(1) of the Portuguese Arbitration Act. As I have pointed out, the choice is not limited to a State law and can even fall upon rules which are not legally binding in strict terms (*supra* C). On the same grounds, the parties can also agree on an *ex aequo et bono* ruling of the dispute.

Other *mandatory rules* are only applicable insofar as their claim to applicability must be accepted by the arbitrators according to a balance of the typical and legitimate interests of the parties and the legitimate and reasonable interests of the States involved. The aims of the world society in formation and the values of the transnational public policy may also be relevant. The concept of a *transnational public policy specific to*

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[146] - See references loc. cit. previous fn. and also Radicati DI BROZOLO – "International Commercial Arbitration" (accessible on ssrn.com) 2015, § 16.8.1; Id. – "Applying the Rules Governing the Merits in International Commercial Arbitration: What Role for Inherent Powers" (accessible on ssrn.com), 2018, n.º 4; BERGER/KELLERHALS (fn. 74) no. 1380. For a different view, see references loc. cit. previous fn. and also BÖCKSTIEGEL/KRÖLL/NACIMIENTO/DUVE/WIMALASENA (n. 39) no 137; BORN (fn. 73) § 19.04-19.05; and Giuditta CORDERO-MOSS – "Limitations on Party Autonomy in International Commercial Arbitration", *RCADI* 372 (2015) 178 et seq., alleging that the possibility for the parties to choose the applicable law does not extend to matters that may affect third parties' interests, and that a serious breach of company law rules may represent a violation of public policy. However, since, in principle, the arbitral award only binds the parties, this reasoning does not seem to apply to arbitration, without prejudice to public policy as far as relevant on these proceedings, in the terms referred below in the text. Regarding this last point, see also SERAGLINI/ORTSCHEIDT(fn. 73) no. 146.

[147] - See Exposição de Motivos da Proposta de Lei n.º 34/IV [*Diário da Assembleia da República* II s. n.º 83, de 2/7/86], no. 7; ISABEL DE MAGALHÃES COLLAÇO (fn. 70) 62; LIMA PINHEIRO (fn. 124) 363 et seq., with more references; António MARQUES DOS SANTOS – "Nota sobre a nova lei portuguesa relativa à arbitragem voluntária – Lei n.º 31/86, de 29 de Agosto", *Rev. Corte Esp. Arb.* (1987) 15-50, 47; Id. – "Algumas considerações sobre a autonomia da vontade no Direito Internacional Privado em Portugal e no Brasil", *in Est. Isabel de Magalhães Collaço*, vol. I, 379-429, Coimbra, 2002, 397, at least concerning the "disputes relating to extracontractual obligations"; and Maria HELENA BRITO – *Direito Internacional Privado sob influência do Direito Europeu* (report), Lisbon, 2015, 135-136. Cp., in the sense of restraining the freedom of choice of the applicable law to the contractual obligations, Dário MOURA VICENTE – *Da arbitragem comercial internacional. Direito aplicável ao mérito da causa*, Coimbra, 1990, 133, and "Applicable law in voluntary arbitrations in Portugal", *Int. Comp. L. Q.* 44 (1995) 179-191, 188.

[148] - Cf. ISABEL DE MAGALHÃES COLLAÇO (fn. 70) 62.

transnational arbitration, which integrates essential propositions deriving from public international law and transnational sources, as well as certain fundamental "principles" common to the national systems involved, is often invoked in this context ([149]).

I have remarked that in the absence of a parties' choice, the most representative trend displayed in the arbitral case law and in the rules of the arbitration centers takes the very flexible approach of the rules most appropriate to the dispute, but that Art. 28(2) of the Model Law and Art. 52(2) of the Portuguese Arbitration Act are more restrictive, providing that, in the absence of a parties' choice, the arbitral tribunal applies the law determined by the conflicts rule that it considers applicable or of the State with which the dispute is most closely connected (*supra* C).

In any case, in what concerns DAOs with legal personality or other external organization, the most appropriate rules to a corporate or other organizational dispute will often be the rules of the State most closely connected with the dispute as well as the rules designated by the general solutions applicable in the absence of an arbitration agreement ([150]).

General choice-of-law rules on legal persons pursue not only the interests of the members of the DAO and of the legal person itself, but also the interests of third parties dealing with the DAO and of the legal transactions in general. These choice-of-law rules are applicable to the acquisition of personality; capacity; internal affairs; liability of the DAO, as well as of its organs and members regarding third parties; "representation" of the DAO by its organs; and the transformation, dissolution and extinction of a DAO.

They do not cover contractual or tort liability regarding third parties, which are governed by the laws applicable to contractual and non-contractual obligations.

The main solutions provided by these choice-of-law rules are *incorporation theory*, which subjects the legal person to the legal order according to which it was incorporated, and *seat theory*, which subjects the legal person to the law of the place of the seat of its administration. With regard to incorporation theory, as it is understood in Common Law countries, the decisive factor is the place where public bodies perform the acts that trigger the acquisition of legal personality.

Portuguese law adopts seat theory (Art. 33 of Portuguese Civil Code), but does not only give relevance to the registered seat regarding commercial companies (Art. 3(1) of Portuguese Commercial Companies Code), as it is also advocated that it should be presumed that the administration seat is located in the place of the registered seat, which normally coincides with the place of incorporation ([151]). Furthermore, incorpora-

[149] - See LIMA PINHEIRO (fn. 41) §§ 47, 57 e 62; Id. "The Confluence of Transnational Rules and National Directives as the Legal Framework of Transnational Arbitration", *in Towards a Universal Justice? Putting International Courts and jurisdictions into Perspective*, ed. by Dário Moura Vicente, 383-431, Leiden and Boston, 2016, e *LSN Comparative Law eJournal*, Vol. 17 No. 25, 04/19/2017 (accessible on ssrn.com), III.B; and Id. (fn. 125) § 77 B, with more references.

[150] - See, on these solutions, Luís de LIMA PINHEIRO - "Laws Applicable to International Smart Contracts and Decentralized Autonomous Organizations (DAOS)", *in Decentralised Autonomous Organisations (DAO) Regulation. Principles and Perspectives for the Future*, ed. by Madalena Perestrelo de Oliveira and António Garcia Rolo, 249-284, Tübingen, 2024 (= *LSN Comparative Law eJournal*, Vol. 22 No. 121, 06/13/2023(=*Transnational Litigation/ Arbitration, Private International Law, & Conflict of Laws eJournal*, Vol 9 No.80 6/13/2023), *Law & Society: Private Law - Contracts eJournal*, Vol 8 No. 18 6/12/2023, *International Journal of Cryptocurrency Research* 3/1 (2023) 16-39, *LSN: CIDP Research Paper Series* Vol. 2 No. 1, 05/30/2024) (accessible on ssrn.com), VI, with more references.

[151] - See LIMA PINHEIRO (fn. 125) § 59 B and D, with further references.

tion theory applies to foundations (Arts. 2(1) and 5 of Portuguese Foundations Law) ([152]).

In romangermanic family systems, the doctrine prevails that *entities without legal personality that have an external organization* are subject directly or by analogy to choice-law rules on legal persons. Regarding Portuguese law, the best opinion seems to be that these choice-of-law rules apply analogically where there are sufficient reasons for this to occur, and to the extent that is justified by the analogy ([153]).

In my opinion, these solutions can also be relevant for the determination of the law applicable to the merits of the case in arbitration, but only in the absence of a parties' choice of the applicable rules of law and with some additional flexibility.

General choice-of-law rules on contracts play a role regarding DAOs, not only when they do not have an external organization, but also, according to the best opinion, even if these DAOs are directly or by analogy subject to choice-of-law rules on legal persons ([154]). In my opinion, *they are applicable to the contract of common purpose underlying the DAO* ([155]), without prejudice to mandatory rules concerning the contract provided by the law applicable to the DAO's organization.

These choice-of-law rules are, in principle, applicable to the formation, validity, interpretation, gap filling and obligations created by the contract and consequences of non-performance. Regarding disputes covered by an arbitration agreement, the law applicable to these issues shall be determined by the arbitration choice-of-law rules (*supra* C).

As previously mentioned, with regard to smart contracts (C), the choice of law by the parties involved is strongly recommended. However, abstracting of the possibility of an implicit submission to code rules relevant in arbitration, an *off-chain* agreement seems to be required or, at least, a complement by commentaries in natural language.

As previously stated, in the absence of a valid choice of law by the parties, both the general choice-of-law rules and the choice-of-law rule contained in the Portuguese Arbitration Act provide for the *application of the law of the State with which the contract is most closely connected* (Art. 4(3) and (4) Rome I Regulation, up to a certain point Art. 42(1) of the Portuguese Civil Code and Art. 52(2) of the Portuguese Arbitration Act). Art. 28(2) of the Model Law can also be interpreted in a convergent manner. Determining the closest connection with the contract is highly problematic in most DAOs in which the members are located in multiple States or in cases where it is difficult or even impossible to know where they are located.

Links that can be used to establish the closest connection do not only consist of members' habitual residence or seat that can be cognoscible through reasonable diligence by other members, but also:

- the habitual residence or seat of a person or entity that has some power of administration of the DAO;
- the place of incorporation of the incorporated DAO;
- the registered address or seat of a registered representative of the DAO;

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[152] - Adopted by Law no. 24/2012, of 9/9.

[153] - See LIMA PINHEIRO (fn. 125) § 58 B.

[154] - See LIMA PINHEIRO (fn. 151) V.

[155] - Cp. MIENERT (fn. 17), assuming that in most cases DAOs are external organizations; and in general, regarding the relationship between the participants in a Blockchain network, DRÖGEMÜLLER (fn. 114) 113 et seq.

- the habitual residence or seat of the developers;
- the seat of the entity that administers the Blockchain infrastructure;
- the language of the underlying contract entered into natural language; and
- the reference to a law, particular provisions or concepts of a law contained in any off-chain agreement or on the website of the developers that, however, does not amount to a valid choice of law by the parties.

If these links are not available or do not allow for the determination of the closest connection because they do not point clearly to a given State, as can often happen, it has been held that Portuguese Private International Law will lead to the application of the *lex fori* (by analogy with Art. 348(3) CC of the Portuguese Civil Code) ([156]).

In contrast, *Transnational Arbitration Law* allows for the application of the rules most appropriate to the dispute. This flexible approach would seem more satisfactory than only taking into account the links between the dispute and the States involved and applying only State law. As previously mentioned, this approach allows the assessment not only of spatial links with the States involved, but also of other circumstances of the particular case, including the content of the rules at stake (*supra* C).

The most appropriate rules to the dispute approach can also provide a better solution for hard cases than resorting to the *lex fori*, also given the fact that a significant connection between the disputed relationship and the Portuguese State may be absent and that its substantive law does not contain specific provisions on DAOs. If we accept that, in the cases where it is *impossible to determine the closest connection*, there is a *gap* in Art. 52(2) of the Portuguese Arbitration Act, it is arguable that the application of the rules most appropriate to the issue is also sound from the point view of this provision.

Regarding *the law applicable to corporate or other organizational disputes*, first resort should be to the rules of law chosen by the parties, as previously mentioned. For instance, this can result explicitly from a choice of law contained in an off-chain agreement or implicitly from a reference to the applicable law made on the developers' website.

In the absence of a parties' choice, the law of the State of incorporation, understood in the previously mentioned terms, should, in principle, be applied.

However, in most cases, DAOs are unincorporated and, therefore, the law applicable to external organization should be determined, in principle, by a subsidiary connecting factor that is as close as possible to incorporation theory: *the law according to which, in an externally visible manner, its constitution was guided* (see also Art. 154 (1) *in fine* of the Swiss Private International Law Act).

If unequivocal determination of this law is impossible, the subsidiary solution would be the application of the law of the administration seat.

However, these solutions are often unavailable. On one hand, because the constitution of an unincorporated DAO is often not guided by any law, or this guidance is not externally visible. On the other hand, because the great majority of DAOs do not have a central administration in the sense required by seat theory ([157]).

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[156] - See António MARQUES DOS SANTOS – "A aplicação do Direito Estrangeiro", *ROA* 60 (2000) 647-668, 667; and LIMA PINHEIRO (fn. 117) § 29 B. In result, also João BATISTA MACHADO – *Lições de Direito Internacional Privado*, 2nd ed., Coimbra, 1982, 251.

[157] - For the same view, Anton ZIMMERMANN – "Blockchain-Netzwerke und Internationales Privatrecht - oder: der Sitz dezentraler Rechtsverhältnisse", *IPRax* 38 (2018) 566-573, 568; AUDIT (fn

In exceptional cases, in which participation in the DAO is limited to persons located in one State, and admitting that a choice-of-law problem nevertheless arises, the administration seat may be deemed to be situated in this State.

In normal cases, *we have to resort to other connecting factors to fill the gap*.

If there is a person or entity with some powers to administer the DAO, or, if not, a registered representative of the DAO, or, if this is not the case, a person or entity entrusted with the administration of the Blockchain infrastructure, his or her registered address or its registered seat can provide the necessary point of reference for third parties and consequently operate as the relevant connecting factor ([158]).

As a last resort, if there is no point of reference for third parties, I have advocated, for the cases in which there is no arbitration agreement, that instead of applying the *lex fori*, it seems preferable, with regard to the internal affairs of the external organization, to apply the law governing the DAO contract, and with regard to liability involving third parties, the law governing each contractual or non-contractual relationship established with a third party ([159]).

In the presence of an arbitration agreement, there is greater flexibility that, as above mentioned, stems from the contractual basis of the arbitration and from the circumstance that, in principle, the award only binds the parties that entered into or adhered to the arbitration agreement.

Thus, in particular, it cannot be ruled out that a balancing of the interests of the parties in the particular case, as well of other aims pursued by individual rules, taking into account the spatial links of the disputed relationship with the States involved and the content of their laws, may lead to the application of other rules of law as the rules most appropriate to the dispute. Furthermore, in any case, respect for fundamental rules and principles may be required by the transnational public policy of arbitration (*supra* C).

On the other hand, in hard cases where such general criteria do not allow the determination of the applicable law, *the most appropriate rules to the dispute approach may lead to more adequate solutions than merely resorting to the substantive law of the forum State*, which may not have a significant connection with the disputed relationship nor a regime appropriate to the decision of the case.

As previously remarked, in any case, *the arbitral tribunal must take into account the applicable contractual provisions and the usages of trade* (*supra* C).

IV. FUTURE PERSPECTIVES

It follows from the above that *the establishment of Blockchain-based dispute resolution methods (BDRs) is justified by the specific nature of the relationships that are*

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19) 693; GUILLAUME/RIVA (fn. 22) 9. The nationality or residence of the group of tokenholders with sufficient voting rights to determine the activity of the DAO has been suggested as a relevant connecting factor – see MADALENA PRERESTRELO DE OLIVEIRA/GARCIA ROLO/ VIEIRA SANTOS/ANA NUNES TEIXEIRA (fn. 19) 69, but this solution does not assure the required point of reference to third parties.

[158] - See also the remarks of MIENERT (fn. 17) 95 et seq. For this purpose, it is also conceivable that the habitual residence of a person may operate as the relevant connecting factor in lack of a registered address, but the issue raises doubts.

[159] - For this view, in any case of impossibility of materialization of the traditional connecting factors, see ZIMMERMANN (fn. 155) 570 et seq.

established within it and responds to real needs for legal protection that may not otherwise be adequately ensured ([160]).

As prospects for evolution ([161]), one might first think of *adapting BDRs to the main national arbitration laws*. An evolution of BDRs in this direction is certainly possible, but it seems difficult to adapt them to the arbitration model defined by these laws.

On the other hand, *a specific Blockchain-based arbitration regime could be conceived* which, while not allowing arbitral characterization of BDRs as they are currently designed, would overcome some of the practical difficulties of true *Blockchain-based* arbitration.

The regulation of BDRs, which currently leads to a decision with mere contractual effect, could be carried out in two directions. Firstly, by clarifying the applicable regime, and secondly, by reinforcing its procedural guarantees and its legal effects in terms that could lead to a new legal category of dispute resolution situated between arbitration and the contractual role of a third party.

The articulation of Blockchain arbitration and BDRs with the use of AI should also be clarified.

When drafting these legal regimes, all the values and interests at stake must be weighed up, namely the interests of *Blockchain* platform users, DAO developers, dispute resolution platform providers and arbitrators, as well as those of the legal transactions in general. *The applicable regimes must also be suited to the decentralized "culture" of Blockchain communities and their technological specificities* ([162]).

Given the transnational nature of a large part of the relationships in question and the general presumption of transnationality of DAOs *(see* III.A *above*), *it is strongly recommended that internationally unified regimes be established* to ensure coordination of the powers of intervention of national bodies and international cooperation, particularly in cases where recognition and *off-chain* enforcement of the decision is necessary ([163]).

With regard to determining the law applicable to the merits of the case, the flexibility of the most appropriate rules to the dispute approach, admitted by *the Transnational Arbitration Law and by some national arbitration laws, for cases in which the parties have not chosen these rules, is particularly suitable for the relationships established on the Blockchain,* so its admissibility would also be appropriate under other national regimes.

Above all, it is conceivable that these regulating tasks will be carried out through international conventions drawn up under the aegis of the *Hague Conference of Private International Law* and/or of the *United Nations Commission on International Trade Law*.

And with this, I end the present study, which is more intended to identify and suggest provisional answers to the main issues raised by the topic than to provide definitive conclusions.

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[160] - See ANA PERESTRELO DE OLIVEIRA (fn. 7) 47 e segs.; BAHADORI (fn. 29) 190-191 and TAN (fn. 26) 151 et seq. See also Council Conclusions "Access to Justice – Seizing the Opportunities of Digitalisation", at https://data.consilium.europa.eu/doc/document/ST-11599-2020-INIT/en/pdf.

[161] - See YANG (fn. 34)].

[162] - See SCHMITZ (fn. 83 [2024]) 9-11.

[163] - See ORTOLANI (fn. 23) 666 et seq.