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Laws Applicable to International Smart Contracts and Decentralized Autonomous Organizations (DAOs)

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Abstract

International contracts, legal persons and other external organizations raise choice-of-law problems. Should smart contracts and DAOs in general be considered International? Are the choice-of-law rules in force for State courts and for arbitral tribunals appropriate for the determination of the applicable laws? To provide replies to these questions the present essay starts by general introductions to smart contracts and DAOs and also outlines the Private International Law framework of these realities. Solutions for difficulties on the application of the choice-of-law rules in force and more flexible approaches to address them are proposed.

Keywords: *Smart contract, Decentralized autonomous organization, Law applicable to smart contracts, Laws applicable to decentralized autonomous organizations, Blockchain, Law applicable to blockchain*

1. Introduction

Smart contracts are one of the new realities of the internet world, with which many legal professionals, scholars and law students are not yet familiar. Therefore, in a study on determining the law applicable to international smart contracts, it is advisable to start with an introduction to these realities. It is not about examining their substantive regime or even identifying all of their regulatory problems, but only about making the object of my study intelligible and delimiting its scope.

There are multiple concepts of smart contract that have been adopted by authors and accepted in some States' legislations.

According to the most widespread concept, *the smart contract is a computer program that operates based on distributed ledger technology, namely the blockchain, and which allows the automatic performance of certain obligations when certain facts occur*[1].

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[1] *See* Cardozo Blockchain Project "Smart Contracts" & Legal Enforceability, 2018, 4-5, at https://cardozo.yu.edu/sites/default/files/2020-01/smart_contracts_report_2_0.pdf, 2; Pedro de MIGUEL ASENSIO – "Smart contracts", blockchain, derechos de autor y Derecho internacional privado", *Blog 19/6/2019*; Id. – *Conflict of Laws and the Internet*, Cheltenham (UK)

Distributed ledger technology consists of digital records that are shared simultaneously by a network of operators. 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 complies with the record[2].

In *blockchain networks*, anyone can create an "account", using a public address (public key) and a password (private key). To carry out a transaction, a network user searches for the public key of another user and introduces his private key. In this way the transaction is "authenticated", since it cannot be denied by the party that entered its private key[3]. The user's identity on certain platforms or types of transactions may not be known or may be difficult to know because users may use pseudonyms[4].

Understood in this sense, smart contracts can either be employed for the performance of the contract's obligations, or part of them, or for compensation in the event of a breach of contract or of other voluntary or involuntary obligations.

For example, the smart contract can be used to automatically compensate passengers for a canceled or delayed flight. The computer program can, in this case, be designed in such a way that, once the cancellation or delay is verified, the affected passengers are identified and the amount of compensation transferred to their bank accounts. This not only saves the resources needed to manage claims, but also facilitates obtaining compensation[5].

Smart contracts have been widely used for complex financial transactions, such as loans made by banking syndicates and derivatives, as well as for copyright license agreements. As we will see later, they also provide the basis for DAOs (*infra* IV).

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

When the smart contract is used as a contractual instrument, it presupposes that the parties reach an agreement on the contractual clauses raised by them[6]. This agreement can, in general terms, be formalized both in natural language and in machine language (also called a "hybrid agreement"), i.e., computer code, or in machine language only. On the other hand, the agreement may be concluded prior to the insertion of clauses in the distributed ledger platform (*off-chain smart contract*) or be concluded on the platform itself (*on-chain smart contract*)[7].

In other words, as a contractual instrument, the smart contract can be used to conclude a contract on a distributed ledger platform or as a measure of performance of a contract entered into in natural language, where the insertion of clauses in a distributed ledger platform already integrates the performance of the contract.

However, it is also possible that formalizing the contract in machine language constitutes a conventional form stipulated by the parties who are only bound after the insertion of the clauses in the distributed ledger platform (as provided in Art. 223 of the Portuguese Civil Code[8].

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and Northampton (MA, USA), 2020, nos. 6.63 et seq.; Luís de LIMA PINHEIRO – "Smart Contracts e Direito Aplicável", *in Discussões sobre Direito na Era Digital*, ed. by Anna Carolina Pinho, 503-527, Rio de Janeiro, 2021, 503; and ANA PERESTRELO DE OLIVEIRA – *Smart Contracts, Risco e Codificação da Desvinculação ou Modificação Negocial - Os Falsos Dilemas da Inter-relação Lei-código nos Contratos Empresariais*, Coimbra, 2023. 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.

2 *See* ISDA and Linklaters – "Whitepaper Smart Contracts and Distributed legal – A Legal perspective", 2017, 7, *at* 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.

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

4 LAW COMMISSION – *Advice to Government. Smart Legal Contracts*, 2021, nos. 3.19 et seq. 5 - See also Feliu REY – "Smart contract: conceito, ecossistema e principais questões de direito privado", *Redes - Revista Eletrônica Direito e Sociedade* 7/3 (2019) 96.

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

7 *See* Mateja DUROVIC e 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.

8 *See also* REY (fn. 5) 103-104.

A different problem is that of knowing whether an agreement formalized only in machine language meets the requirement of *legal form* prescribed by a given legal order.

In the case of a dispute, the parties will have to reach an amicable agreement, namely a settlement, or resort to a judicial or arbitration means of dispute resolution. In both cases, it may be necessary to reverse some of the effects of the smart contract, for example, through the restitution of automatically performed payments. This reversal can be effected through a new computer program (reverse transaction) and therefore automatically (*on-chain*), or through acts performed outside the distributed ledger platform and therefore not automatically (*off-chain*).

What distinguishes the contract based on a smart contract from a traditional contract is the fact that *the contract clauses, 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 the parties may not perform the contract, or suspend its performance, naturally subjecting themselves to the consequences of non-performance, 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[9].

The contract supported by a smart contract may or may not be a case of *electronic contracting*, i.e., in which declarations of will are transmitted through technological means. This will happen in the vast majority of cases.

The contract supported by a smart contract may or may not be associated with *automatic contracting*. In automatic contracting, the declaration is made through a machine, for example, a vending machine. In this case, according to the prevailing opinion, there is an offer to the public that the buyer accepts when activating the machine[10]. Automatic contracting may or may not be electronic. If it is, we may speak of *computer contracting*[11].

According to Portuguese and German laws, the electronic declaration is attributable to the person who programmed or had the computer programmed[12].

When concluding certain contracts supported by a smart contract, there is an offer of goods or services on a distributed ledger platform that allows the automatic performance of the contract with the acceptance of any person. According to the same laws, this offer should, in principle, be qualified as an offer to the public[13]. Acceptance is received by the offeror at the time it is entered into the distributed ledger platform[14]. It may also happen that both declarations are made using machines, namely computers, programmed for this purpose. Taking one more step, the computer can be programmed in such a way as to allow it to learn from the data given to it and to make decisions that result not only from the input introduced by the programmer, but also from this learning. These are, therefore, contracts concluded with the intervention of autonomous artificial intelligence systems in which the declarations of will are not precisely determined by the programmer.

The expression "smart contract" could suggest a relationship with *artificial intelligence*. However, this relationship is not necessary. In the case of a contract supported by a smart contract, what is automatic is the performance which also happens in certain cases of automatic contracting that cannot be considered smart contracts because the contractual clauses are not inserted into a distributed ledger platform[15]. Therefore, the term "smart contract" is misleading.

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[9] *See also* Cardozo Blockchain Project "Smart Contracts" & Legal Enforceability, 2018, at https://cardozo.yu.edu/sites/default/files/2020-01/smart_contracts_report_2_0.pdf,, 4-5.

[10] *See* José de OLIVEIRA ASCENSÃO – *Direito Civil. Teoria Geral*, vol. II – *Acções e Factos* Jurídicos, 2nd ed. Coimbra, 472-273; 2003; and António MENEZES CORDEIRO – *Tratado de Direito Civil*, vol. II – *Parte Geral/Negócio Jurídico*, Coimbra, 2021, 343-345 (with reference to the theory of automatic offer). See further Pedro PAIS DE VASCONCELOS – *Teoria Geral do Direito Civil*, 7th ed., Coimbra, 2012, 413-414.

[11] *Cf.* Jörg NEUNER – *Allgemeiner Teil des Bürgerlichen Rechts*, 12th ed., Munich, 2020, § 32 no. 38.

[12] *Cf.* MENEZES CORDEIRO (fn. 10) 347, and NEUNER (fn. 11) § 30 n.º 39.

[13] *Cf.* Tom BRAEGELMANN e Markus KAULARTZ – *Rechtshandbuch Smart Contracts*, 2019, Cap. VIII, no. 19. For a convergent view, regarding contracts concluded in digital platforms in general, PAULA COSTA E SILVA – A contratação automatizada, *in Direito da Sociedade da* Informação, IV, 289-305, Coimbra, 2003, 295 et seq. See Art. 32(1) of the DL no. 7/2004, of 7/1 (Electronic Commerce Law) on online offer of goods and services.

[14] *Cf.* BRAEGELMANN/KAULARTZ (fn. 13) no. 20.

[15] *See also* JOANA RIBEIRO DE FARIA – O regime jurídico da formação e do (in)cumprimento dos 'contratos inteligentes' (os smart contracts), *Revista de Direito Civil* 3/4 (2020) 723-764, 726, remarking that that this also occurs with devices for repossession of vehicles sold with retention of title used in the USA.

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

To obtain the information needed to perform 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 information to be extracted online (for example, meteorological information);
- Hardware oracles that allow objects to be tracked in the physical world (for example, the arrival of an aircraft); and
- 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, the mechanical assessment being entrusted to an expert[16].

In a broader sense, a smart contract can be understood as *the set formed by the contract and the computer program used in its performance*. It is in this sense that, in the next sections, I will refer to smart contracts.

It is also clear that, in this sense, the smart contract is not a contractual type, but a contract that uses a certain technology for performance and, eventually, conclusion. The characterization of the contractual type will fundamentally depend on the economic function and the content of the rights and obligations stipulated by the parties. This could be, for example, a sales contract, an insurance contract, a copyright license agreement or a financial derivative.

Regarding *DAOs* (*infra* IV-VI), I will again refer to smart contracts in the strict sense of computer programs, but I will argue that DAOs also have a contractual dimension and, therefore, these computer programs also support a contractual relationship. Nevertheless, the common purpose nature of this contract and its connection with an organization introduces specificities that are relevant for the determination of its governing law (*infra* VI).

The present essay deals only with international smart contracts and DAOs. I will start by pointing out the Private International Law framework of these contracts (II), then go on to determine the law applicable to these contracts when they are not covered by unified substantive law (III). I will then turn to DAOs, starting with an introduction (IV), followed by the outline of their Private International Law framework (V) and by the determination of the applicable laws (VI), and ending with some brief final remarks (VII). The Private International Law issues involved will be addressed under the *general choice-of-law rules of the European Union*, the *Transnational Arbitration Law*, and the *special Portuguese choice-of-law rules of arbitration*. However, I will also refer to the *special Spanish choice-of-law rules of arbitration* and to the *Brazilian general choice-of-law rules* and *special choice-of-law rules of arbitration*, as it seems to me that many of the problems identified in the Portuguese legal order, as well as the solutions proposed to address them, will also be of interest to the Spanish and Brazilian legal orders.

2. Smart Contracts and Private International Law

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 [17]. The relevance of storing records or the location of operators of the distributed ledger platform in different countries can, then, raise doubts. According to some authors, since the blockchain is essentially transnational, any relationship based upon the blockchain is transnational[18].

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[16] *See* REY (fn. 5) 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 and Ángel, Espiniella Menéndez, 683-708, Valencia, 2021, 686.

[17] *Cf.* Matthias AUDIT – Le droit international privé confronté à la blockchain, *R. crit.* (2020/4) 669- 694, 678, stresses the immateriality and the decentralization specific of the blockchain.

[18] *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. 17) 672.

However, only some 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[19].

I believe that the most relevant internationality criterion for smart contracts is a subjective criterion: 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 of the identity of parties, I believe that *the internationality of the smart contract can be presumed*. The same will be advocated regarding most DAOs (*infra* V).

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*.

With regard to the *competent jurisdiction*, it is necessary to verify whether or not there is a valid arbitration agreement. If so, the competent jurisdiction is a transnational arbitral tribunal. Otherwise, it is necessary to determine the internationally competent State jurisdiction or jurisdictions. The present essay will not deal with the resolution of this problem, but it cannot fail to consider the difference between the general choice-of-law system, applicable in the first place by the State courts, and the arbitration choice-of- law rules, which governs the determination of the applicable law to the merits by the transnational arbitration tribunals in the strict sense, or international commercial arbitration tribunals.

The present essay will also not deal with the problem of *recognition of foreign judgments and awards* rendered in relation to smart contracts.

The *need for legal regulation of smart contracts* seems evident today. Initially, some voices were heard expressing the view that the self-enforceability of smart contracts would dispense with legal regulation and the intervention of jurisdictional means of dispute resolution. However, it is clear that this is not the case. The law must regulate, namely, the formation of the smart contract, its validity pre-requisites and its interpretation and integration. Smart contracts may even give rise, with particular frequency, to certain disputes, such as those resulting from programming errors or the refund of payments in the event of revocation of contracts concluded by consumers[20]. The intervention of State courts or arbitration tribunals will be necessary, as already noted, when disputes arising from smart contracts are not resolved amicably.

This does not mean, however, that legal regulation cannot, to some extent, be provided by autonomous sources, such as customs or rules created by autonomous entities that administer distributed ledger platforms. This autonomous regulation could play an important role, especially in relations between enterprises[21].

When the smart contract is international, it cannot be assumed that it is subject to the substantive law of the forum. It is necessary to *determine the applicable law*. The determination of the law applicable to smart contracts does not only operate through the general choice-of-law system and the transnational arbitration choice-of-law rules. Certain smart contracts may fall within the scope of application of unified substantive law, especially by international conventions that regulate certain types of contracts.

This is the case of the Vienna Convention on the International Sale of Goods, to which Portugal, Spain and Brazil are parties. It should be noted that, for the purposes of this Convention, the concept of goods includes software[22].

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[19] For a different view, BRAEGELMANN/ KAULARTZ (fn. 13) § 12 nos 5 and 13.

[20] *See* Olaf MEYER. Stopping the Unstoppable – Termination and Unwinding of Smart Contracts (2020), on ssrn.com, 6 et seqs., mentioning the possibility of programming the automatic restitution in case of revocation.

[21] *See* Luís de LIMA PINHEIRO – "Reflections on Internet Governance and Regulation with Special Consideration of the ICANN", *LSN Transnational Litigation/Arbitration, Private International Law, & Conflict of Laws eJournal*, 3(41), 08/17/2016, 6 et seq., and "Algumas reflexões sobre a governação e a regulação da internet", *CyberLaw by CIJIC* 3 (february 2017) 136-145, B.

[22] *Cf.* Peter SCHLECHTRIEM and Ingeborg SCHWENZER – *Commentary on the UN-Convention on the International Sale of Goods (CISG)*, 4th ed., Oxford, 2016, Art. 1, III.

In the European Union (hereinafter referred to as the EU), other instruments may also apply, such as Reg. (EC) No. 261/2004, of 2/11/2004, Establishing Common Rules on Compensation and Assistance to Passengers in the Event of Denied Boarding and of Cancellation or Long Delay of Flights, a situation in which, as noted (I), smart contracts can find a field of use. In the same space, there are instruments for harmonizing the laws of Member States that may be relevant to the discipline of smart contracts, as is the case of the Directive on Electronic Commerce, regarding smart contracts concluded over the internet[23], and the Directive on Abusive Clauses, in relation to contracts concluded with consumers[24].

From the point of view of the Portuguese legal system, there is still the possibility of applicability of the *regime of standard contractual clauses* to be considered[25]. This regime is applicable not only to contractual clauses characterized by generality and rigidity, but also to pre-drafted individual clauses that the addressee cannot influence. Once these pre-requisites are met, the regime covers clauses drawn up by third parties.

Therefore, the regime of standard contractual clauses may be applicable to clauses encoded in machine language on smart contract platforms that are rigid[26]. For this purpose, the contract needs to be governed by Portuguese law or, in consumer relations, it must present a close connection with Portuguese territory or with the territory of another EU Member State (Art. 23).

As for the inclusion of these clauses in individual contracts, this regime may also be relevant based on the addressee's habitual residence in Portugal, if it appears from the circumstances that it would not be reasonable to determine the effect of his or her conduct in accordance with the law applicable to the contract (Art. 10(2) of Reg. no. 593/2008 on the Law Applicable to Contractual Obligations, hereinafter Rome I Regulation).

On the other hand, even when the smart contract is not covered by an instrument of unification of substantive law, the determination of the applicable law is not limited to issues that generally fall under the scope of the law applicable to the contract, namely formation of consent, interpretation and integration, substantial validity and obligations resulting from the contract.

First of all, there are legal issues concerning the *relationship between the parties and the operators of the distributed ledger platform*, which I will not address here.

Other issues are subject to autonomous connections, i.e., they are not covered by the *lex contractus*. This is the case, in particular, of the capacity of the parties, the form of the contract and the protection of personal data. With regard to these issues, it is important to resort to other bilateral conflict rules (capacity, form) or to instruments that establish their spatial scope of application through unilateral conflict rules (General Data Protection Regulation, in the EU, General Law for Data Protection, in Brazil).

I will not be examining these autonomous connections, but I would like to call attention to the importance that choice-of-law rules on *formal validity* can assume for smart contracts. In the EU, the Rome I Regulation establishes, as a general rule, alternative connections aimed at favoring the formal validity of the contract (Art. 11(1) and (2)). However, regarding contracts with consumers covered by Art. 6 of the Regulation, it is provided the application of the law of the consumer's habitual residence (Art. 11(4)).

One issue that arises is whether a smart contract that is not based on a document written in natural language satisfies the requirement of written form prescribed by several regimes on contracts with consumers.

In the EU, *pre-contractual liability* arising out of dealings prior to the conclusion of a contract is the subject of another instrument: Regulation no. 864/2007 Regarding the Law Applicable to Non-Contractual Obligations (Art. 12). This is another issue that will not be addressed in this essay.

Finally, smart contracts may also raise questions of *proof*, namely admissibility as a mode of proof and probative force.

The admissibility of modes of proof is subject to the choice-of-law rule provided in Art. 18(2) of Rome I Regulation, according to which a "contract or an act intended to have legal effect may be proved by any mode of proof recognized by the law of the forum or by any of the laws referred to in Article 11 [formal validity] under

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[23] Transposed to the Portuguese legal order by DL no 7/2004, of 7/1.

[24] Those diretives have been ammended Dir. (EU) 2019/2161. See, in the Portuguese legal order, the standard clauses regime provided by DL no 446/85, of 25/10, ammended by DLs nos 220/95, of 31/8, 249/99, of 7/7, and 323/2001, of 17/12.

[25] See previous footnote.

[26] *Cf.* BRAEGELMANN/KAULARTZ (fn. 13) Cap. VIII n.º 21.

which that contract or act is formally valid, provided that such mode of proof can be administered by the forum".

The probative force remained outside the scope of this Regulation[27]; in the Portuguese legal order, this issue must be assessed according to Portuguese substantive law[28]. In both cases, is also relevant for smart contracts Regulation EU no. 910/2014 on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market (Arts. 25 et seq.).

3. Law Applicable to International Smart Contracts

3.1. Lex Cryptographia?

Regarding the law applicable to contracts in the context of blockchain networks , it has been argued that these networks 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*[29].

This is an obvious parallel to previous theses favorable to the *new lex mercatoria*, as an autonomous law of international business[30], 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 networks, namely transactions based upon some smart contracts, do not require a 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 the blockchain network;
- State control of blockchain networks 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 degree of State regulation required by business-to-business relationships and to business-to-consumer or non-professional investors relationships[31]. Other arguments, such as the limitation of the scope of these rules, would not prevent them from operating in coordination with the State rules that are applicable to issues outside their scope.

Although I believe that 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 networks, 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.

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.

3.2. General Choice-of-Law Rules

When talking about the law applicable to smart contracts, it is important to bear in mind the meaning of the relevant smart contract for this purpose. As I pointed out earlier (I), not all computer programs for the automatic performance of obligations are intended for the performance of contractual obligations or even of voluntary obligations. In determining the applicable law, the computer program should not be considered in isolation,

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[27] *Cf.* Mario GIULIANO and Paul LAGARDE – Rapport concernant la convention sur la loi applicable aux obligations contractuelles, *JOCE* C 282, 31/10, 1980, 37.

[28] *Cf.* Luís de LIMA PINHEIRO – *Direito Internacional Privado*, vol. II – *Direito de Conflitos/Parte Especial*, 4th ed., Coimbra, 2015, 32-33, with further references.

[29] *See* Franz MAYER – Recht und Cyberspace, *NJW* (1996) 1782-1791, 1790; KRAUS/OBRIST/HARI/GUILLAUME (fn. 18) 71 et seq.; Primavera DE FILIPPI and Aaron WRIGHT – *Blockchain and the Law: The Rule of Code*, Cambridge, Massachusets and London, 2018, 193 et seq.

[30] *See* Luís de LIMA PINHEIRO – *Direito Internacional Privado*, vol. I – *Introdução e Direito de Conflitos/Parte Geral*, 3rd ed., Lisboa, 2014, § 6, with further references.

[31] *See* namely AUDIT (fn. 17) 676-677; Jonas DRÖGEMÜLLER – *Blockchain-Netzwerke und Krypto- Token im Internationalen Privatrecht*, Baden-Baden, 2023, 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.

rather the overall relationship in which it operates. It is this relationship that is the object of characterization for the purposes of selecting the choice-of-law rule that designates the applicable law[32]. The present essay deals only with cases in which the relationship qualifies as *a contractual relationship* or, more complexly, *as a DAO* (*infra* V-VI).

The choice-of-law rules concerning obligational contracts were unified in the EU, first by the Rome Convention on the Law Governing Contractual Obligations and then by the Rome I Regulation.

Pursuant to Art. 12(1)(b) of the Rome I Regulation, the scope of the law applicable to the contract includes the performance of obligations arising therefrom and, therefore, the computer program used for its automatic performance is covered by the contractual statute[33].

The Rome I Regulation establishes a *general regime for determining the law applicable to the contract* and a *special regime for consumer contracts*, which aims to protect the consumer. Let us start with the general rule.

The freedom of choice of the law applicable to obligational contracts is today a principle of Private International Law common to the overwhelming majority of national systems[34]. In the Rome I Regulation, this principle is enshrined in no. 1 of Art. 3.

Art. 3 of the Rome I Regulation establishes no limits as to the State legal orders that can be designated. It is common ground that the chosen law does not need to have an objective connection with the contract and, according to widely held understanding, there are no other limits to the freedom to choose State or local law[35].

The rules on the formation of consent and the formal validity of the contract also apply to agreement on the applicable law (Arts. 10 and 11 *ex vi* Art. 3(5)). Thus, the formation of consent on the applicable law is governed, in principle, by the designated law. In the most common contracts for the provision of goods and services, it should be considered sufficient, under Portuguese law, that consent is expressed through an exchange of email messages or, as is more frequent, through a mouse click on a field or icon on an internet page that expresses acceptance of the general terms accessible via a hyperlink or in an a pop-up window and that can be saved on the hard drive of the adherent's computer or printed by him.

It is also necessary to take into account the relevance granted to the law of the habitual residence of the contracting party under the terms of Art. 10(2). If the agreement on the applicable law constitutes a *standard contractual clause*, its inclusion in the contract will be assessed, primarily by the chosen law; if the question is answered in the affirmative by the chosen law, the addressee may also invoke, based on Art. 10(2), the law of

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[32] *Cf.* MARTINY (fn. 6) 559-560. See also Anton ZIMMERMANN – Blockchain-Netzwerke und Internationales Privatrecht - oder: der Sitz dezentraler Rechtsverhältnisse, *IPRax* 38 (2018) 566-573, 568.

[33] *See also* ZIMMERMANN (fn. 32) 569.

[34] *Cf.* Ole LANDO – The Conflict of Laws of Contracts. General Principles, *RCADI* 189 (1984) 223- 447, 284; António FERRER CORREIA – "Algumas considerações acerca da Convenção de Roma de 19 de Junho de 1980 sobre a lei aplicável às obrigações contratuais", *RLJ* (1990) nos. 3787 to 3789, nos. 3787 to 3789; Frank VISCHER – "General Course on Private International Law", *RCADI* 232 (1992) 9- 256, 139, considers that the freedom to choose the applicable law can be considered as a general principle of law; but refers to François RIGAUX – "Les situations juridiques individuelles dans un système de relativité générale", *RCADI* 213 (1989) 7-407, 234, when this author points out that the problem is not so much the principle itself, as its scope and limits. Strictly speaking, there has been some resistance to this principle by Latin American States – see Diego FERNÁNDEZ ARROYO (ed.) – *Derecho Internacional Privado de los Estados del Mercosur*, Buenos Aires, 2003, 1015 et seq. According to the Preamble of the Resolution of the *Institut de Droit International* on the Autonomy of the Parties in International Contracts Between Private Persons or Entities, adopted in the session of Basel (1991), the "autonomy of the parties is one of the fundamental principles of private international law". It should be remarked that, in the Portuguese law, freedom of choice of the applicable law was already adopted, in 1888, by Art. 4(1) of the Commercial Code.

[35] With regard to the Rome Convention, it follows from GIULIANO/ LAGARDE (fn. 27) no. 4 of Art. 3, that the risk of evading mandatory provisions through *dépeçage* was considered in the preparatory work, the experts understanding that this risk would be neutralized by the provisions of Art. 7. This comment, made with regard to partial references, applies *a fortiori* to the (minor) risk of evasion by means of a global designation. LANDO (fn. 34) 292, further states that the possibility of including the "principle of *fraus legis*" was raised, and not implemented, by the experts, and infers from the commentary on Art. 16, in which it is emphasized that "public order does not intervene, abstractly and globally, against the law designated by the convention", the exclusion of the application of the public policy to cases of *fraus legis*. The Explanatory Memorandum of the Proposal for the Rome I Regulation seems to point in the same direction when it states that "fraud of the law" is covered by paragraphs 4 and 5 of Art. 3, which correspond in the Regulation to paragraphs 3 and 4 of Art. 3. See further references in LIMA PINHEIRO (n. 16) n. 658.

[36] *See* António FRADA DE SOUSA – *Conflito de Clausulados e Consenso nos Contratos Internacionais*, Porto, 1999, 245 et seq. Art. 5 of the above mentioned Resolution of the *Institut de Droit International* on the Autonomy of the Parties in International Contracts Between Private Persons or Entities, after admitting, in its no. 1, that the "applicable law may be designated by

his or her habitual residence to demonstrate that he or she has not agreed, if it appears from the circumstances that it would be unreasonable to determine the effects of his or her conduct according to the chosen law[36].

Under the provision of the 2nd part of paragraph 1 of Art. 3 of the Regulation, the consent of the parties to *the designation of the applicable law may be expressed expressly or tacitly*.

The choice of applicable law presupposes an agreement between the parties. A simple computer program for automatic performance of obligations does not allow this to occur. Therefore, the agreement has to be stipulated off-chain[37] or at least complemented by natural language comments[38]. Normally, it will constitute a clause of the contract that uses the program for its performance, concluded off-chain, but it could also be an autonomous agreement. Of course, this does not prevent the choice of applicable law from being made on an electronic platform, provided that this is compatible with the form required for the contract[39].

The choice of the law that is applicable to the smart contract is highly recommended, not only because of the difficulties that may arise in determining the applicable law in the absence of choice, which are discussed below, but also because smart contracts are only subject to specific regulation in a few national systems: it may be convenient to choose one of these systems, even if it has no objective connection with the contract.

The choice of the applicable law excludes, in principle, mandatory rules of the law of the forum or of third laws, but the applicability of certain mandatory rules is safeguarded by Art. 3(3) and (4) of the Rome I Regulation regarding contracts "located" in the same State or in several EU Member States, as well as by Art. 9, regarding the "overriding mandatory provisions" of the State of the forum and certain "overriding mandatory provisions" of the State of performance of the contract.

In the absence of a valid choice of applicable law, the Rome I Regulation establishes primary connections based on a specific criterion (Art. 4(1) and (2)) accompanied by the relevance of the general criterion of the closest connection within the framework of an escape clause (Art. 4(4)) or to establish a subsidiary connection (Art. 4(4)).

The primary connection is mainly based on the doctrine of characteristic performance: the contract is, in principle, governed by the law of the habitual residence of the debtor of the characteristic performance[40]. In contracts whose function is the exchange of a thing, the use of a thing or the provision of a service for a pecuniary amount, the characteristic performance consists of the delivery of the thing, the allowance of the use of the thing or the provision of the service.

However, the Rome I Regulation does not limit itself to adopting this doctrine to establish the primary connection. With regard to a certain number of contracts, the Regulation materializes this doctrine (sale, provision of services, franchising and distribution), which proves to be useful in cases where determination of

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general conditions of contract, to which the parties have agreed", add, in its no. 2, a substantive rule, according to which this "agreement must be expressed in writing, or in a way which conforms with practices established by the parties, or in accordance with trade custom known to them". This solution is inspired by case law of the TCE regarding the choice of court clause inserted in the standard contract form proposed by one of the parties – cf. Erik JAYME. – "L'autonomie de la volonté des parties dans les contrats internationaux entre personnes privées. Rapport définitif", *Ann. Inst. dr. int.* 64-I (1991) 62-76, 72 et seq.

See further, regarding the cases of battle of forms, Art. 6(1)(b) of the Hague Principles on Choice of Law in International Commercial Contracts (2015), and the critique of Ole LANDO. – "The Draft Hague Principles on the Choice of Law in International Contracts and Rome I", *in Mélanges Hans Van Loon*, 299-310, Cambridge, Antwerp and Portland, 2013, 307-309.

[37] For this view, see BRAEGELMANN/KAULARTZ (fn. 13) § 12 n.º 17.

[38] *See* LAW COMMISSION – *Advice to Government. Smart Legal Contracts*, 2021, nos. 7.71 et seq.

[39] See Luís de LIMA PINHEIRO - "Direito aplicável aos contratos celebrados através da internet", *ROA* 66 (2006) 131-190 (= *Direito da Sociedade da Informação*, vol. VII, 363-415, Coimbra, 2008, Spanish version in *Estudios de Deusto* 54/2 [2006] 151-198), I.A, and "Contratos celebrados através da internet – Tribunais internacionalmente competentes e Direito aplicável", *in Estudos em Homenagem a Agostinho Pereira de Miranda*, 219-245, Coimbra, 2019 (=*Revista de Direito Civil* 3 (2018) 743-770), II.A.

[40] See, with further development, EUGÉNIA GALVÃO TELES – A prestação característica: um novo conceito para determinar a lei subsidiariamente aplicável aos contratos internacionais. O artigo 4.º da Convenção de Roma sobre a Lei Aplicável às Obrigações Contratuais, *O Direito* 127 (1995) 71-183, 108 et seq., and "Determinação do Direito material aplicável aos contratos internacionais. A cláusula geral da conexão mais estreita", *in Estudos de Direito Comercial Internacional*, vol. I, ed, by Luís de Lima Pinheiro, 63-141, Coimbra, 2004, 85 et seqs.; and Luís de LIMA PINHEIRO – *Direito Comercial Internacional*, Almedina, Coimbra, 2005, 117 et seq.

the characteristic performance is controversial. This is the case with franchising and distribution contracts, which are subject to the law of the habitual residence of the franchisee and distributor (Art. 4.(1)e and (f)[41].

Contracts that do not appear in the typology contained in paragraph 1, or that are "mixed contracts", in the sense of being covered by more than one type, are governed by the law of the habitual residence of the debtor of the characteristic performance (Art. 4(2)[42].

Often, smart contracts do not correspond to one of the types referred to in Art. 4(1).

This is the case of contracts for the sale of cryptocurrency and auctions that are carried out through blockchain. It is also the case of contracts underlying DAOs (*infra* IV and VI).

Cryptocurrency sales contracts are not considered to be sales of goods. They are subject to the rule of art. 4/2[43].

In *auction sale contracts* carried out via blockchain, it is not usually possible to determine the location of the auction due to the decentralization of the blockchain. The situation may be different when the blockchain is centrally administered[44]. In this case, it is conceivable that the law of the habitual residence of the network administrator will apply. The term 'auction' should be understood, in line with Art. 2(b) of the Vienna Convention on the International Sale of Goods, as a public and publicly announced sale upon acceptance of the highest bid by the auctioneer. Article 4(1)(g) of the Regulation in Rome I only includes auctions organized by private parties[45]. In any case, it seems that many of the so-called auctions on the internet are not auctions in the legal sense because there is no formal acceptance of the highest bid, which therefore qualifies them as mere sales of goods, if they have as object things that may be considered goods[46]. If the bidders are consumers, the special regime for contracts with consumers, discussed below, is applicable[47].

According to Art. 4(3) of the Regulation, where "it is clear from all the circumstances of the case that the contract is manifestly more closely connected with a country other than that indicated in paragraphs 1 or 2, the law of that other country shall apply".

According to one opinion, this *escape clause* does not normally operate in relation to smart contracts, due to the fact that, through the blockchain network, they have a multiplicity of contacts with several States[48]. This opinion does not seem to me to be entirely correct, because similarly to what was noted with regard to the internationality of these contracts (II), I understand that the places where the records are stored or the location of the operators of the distributed ledger platform are not, in principle, relevant. The most relevant connecting factors for the materialization of the escape clause are the location of the parties, the place of off-chain performance, the language of the contract concluded in natural language, the reference of this contract to provisions of a given legal order or the use of terms and expressions characteristic of this legal order (which, however, do not allow a tacit designation to be inferred), and the functional link that the contract establishes with another contract governed by a certain law.

The subsidiary operation of the general criterion of the closest connection is, above all, conceivable with respect to those contracts in which it is not possible to individualize a characteristic performance (Art. 4(4)). This is what happens with the barter contract and with most contracts for a common purpose (for example, with most joint venture contracts)[49]. This also applies to contracts underlying DAOs which, as we will see, are

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41 The Explanatory Memorandum of the Commission's Proposal [6] states that these solutions "are based on the fact that Community law seeks to protect the franchisee and the distributor as the weaker parties". See, for critical view, SÍLVIA BORGES MORAIS – "Direito aplicável ao contrato internacional de franquia", *Themis* 11 (2011) 279-318, 306 et seqs.

42 Recital 19 states that "In the case of a contract consisting of a bundle of rights and obligations capable of being categorised as falling within more than one of the specified types of contract, the characteristic performance of the contract should be determined having regard to its centre of gravity". The meaning of this passage raises doubts. It seems that it has in mind the cases in which the debtor of the characteristic performance would be the party A, before one of the types involved, and the party B before another of the types involved.

43 *Cf.* MARTINY (fn. 6) 561 and ZIMMERMANN (fn. 32) 569.

44 For this view, BRAEGELMANN/KAULARTZ (fn. 13) § 12 no. 27; see, on the modalities of central administration of the blockchain network, ZIMMERMANN (fn. 32) 569.

45 *Cf.* MAGNUS/MANKOWSKI/MAGNUS - Rome I Regulation. Commentary, Cologne, 2017, Art. 4 no. 143.

46 *See* MAGNUS/MANKOWSKI/MAGNUS (fn. 45) Art. 4 no. 652.

47 For this view, but referring to all internet auctions, MAGNUS/MANKOWSKI/MAGNUS (fn. 45) Art. 4 no. 654.

48 For this view, BRAEGELMANN/KAULARTZ (fn. 13) § 12 n.º 26

49 See Luís de LIMA PINHEIRO - Contrato de Empreendimento Comum (Joint Venture) em Direito Internacional Privado, Almedina, Coimbra, 1998, 1215 et seq.

contracts for a common purpose (*infra* IV and VI). If contracts in which payment is made through cryptocurrency are characterized as barter contracts, they will be subject to this provision[50].

Naturally, determining the closest connection can be problematic in relation to certain international smart contracts, especially contracts concluded and performed on- chain between parties located in different countries.

Most of the rules contained in Art. 4 refer to *the law of the habitual residence of one of the parties*.

In international contracts, it is very common for one of the parties, or both, to enter into the contract in the exercise of a professional activity. This poses the question of the relevance of their establishment. It is also common for legal persons to intervene, who do not exactly have a residence, but a seat (registered or of administration) and, normally, an establishment (or a main establishment and one or more secondary establishments).

Art. 19 of the Rome I Regulation seeks to answer these questions by determining that:

- "The habitual residence of companies and other bodies, corporate or unincorporated, shall be the place of central administration" ((1) § 1);
- "The habitual residence of a natural person acting in the course of his business activity shall be his principal place of business" ((1) § 2).

Paragraph 2 adds that where "the contract is concluded in the course of the operations of a branch, agency or any other establishment, or if, under the contract, performance is the responsibility of such a branch, agency or establishment, the place where the branch, agency or any other establishment is located shall be treated as the place of habitual residence".

The place of habitual residence is also, in principle, relevant for contracts concluded through the internet. However, it should be added that the party who, in the preliminary dealings or in the contract, declares to have habitual residence or relevant establishment in a given country cannot later claim the falsehood or inaccuracy of this statement[51].

The Directive on Electronic Commerce provides that Member States must ensure that the supplier of goods, as well as the provider of online services, both indicate to the beneficiary the geographical address where he or she is established (Art. 5(1)(b)). In the Portuguese legal order, this provision was transposed to Art. 10(1)(b) of DL no.7/2004, of 7/1 (hereinafter referred to as the Electronic Commerce Law).

With regard to legal bodies, although Art. 19(1) refers to the place where the central administration of the provider is located, the location cognoscible by the beneficiary in contracts concluded through the internet is normally the place of establishment that is indicated by the provider. In the absence of a statement about the place of establishment, its location can be inferred from a geographical indication contained in the domain name. If this indication is also missing, and that location is not otherwise cognoscible with reasonable diligence by the beneficiary[52], resort shall be made to the subsidiary connection of Art. 4(4) (law of the country with which the contract has the closest connection).

With regard to natural persons acting in the exercise of a professional activity, if the place of establishment cannot be determined with reasonable diligence by the beneficiary, resort shall also be made to the subsidiary connection.

Thus, the subsidiary criterion of the closest connection must also operate when the habitual residence of the relevant party to establish the connection with the smart contract pursuant to Art. 4(1) and (2) is not cognoscible with reasonable diligence by the other party[53].

The *special regime for contracts with consumers* applies to international contracts concluded between a person who acts in the context of his or her commercial or professional activities and a consumer, i.e., a person who does not act in the exercise of a professional activity.

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[50] *Cf*. MARTINY (fn. 6) 561.

[51] See LIMA PINHEIRO (fn. 39 [2006]) 26 and 34; MAGNUS/MANKOWSKI/LIMA PINHEIRO (fn.45) Art. 19 nos. 14 and 43; and Javier CARRASCOSA GONZÁLEZ - La ley aplicable a los contratos internacionales - el reglamento Roma I, Madrid, 2009, 332.

[52] In case that the place of central administration or the place of the relevant secondary establishment is not known, the place of the registered office may be considered, if it is known by the beneficiary – see MAGNUS/MANKOWSKI/LIMA PINHEIRO (fn. 45) Art. 19 no. 43.

[53] *Cf.* MAGNUS/MANKOWSKI/LIMA PINHEIRO (fn. 45) Art. 19 no. 43; MARTINY (fn. 6) 558; BRAEGELMANN/ KAULARTZ (fn. 13) § 12 nos. 28 and 41. 54 - ECJ 28/7/2016 [ECLI:EU:C:2016:612].

Pursuant to Art. 6(1), this regime is applicable when there is a connection between the activity of the professional and the country of habitual residence of the consumer. The professional must:

- Pursue his commercial or professional activities in the country where the consumer has his habitual residence, or
- By any means, direct such activities to that country or to several countries including that country, and the contract must fall within the scope of such activities.

Let us see what the *special regime for determining the law applicable to contracts with consumers* consists of.

Art. 6(2) of the Regulation establishes a limit to the principle of freedom of choice of the law applicable to the contract. Indeed, this provision determines that the choice by the parties of the applicable law cannot have the consequence of depriving the consumer of the protection afforded to him or her by mandatory provisions of the law of the country in which he or she is habitually resident.

In the absence of choice by the parties of the applicable law, At. 6(1) of the Regulation provides a deviation from the connection established by Art. 4. Art. 4 often leads to the application of the law of the country in which the provider of goods or services is established. By virtue of Art. 6(1), the contract with a consumer will be governed by the law of the country in which the consumer has his or her habitual residence.

In the case *Verein für Konsumenteninformation I* (2016)[54], the Court of Justice of the European Union understood that, under the Directive on Unfair Terms (Dir. 93/13/EEC), a standard contractual clause stipulating that the contract concluded with a consumer is governed by the law of the Member State in which that professional is seated is abusive insofar as it misleads that consumer, giving him or her the impression that only the law of that Member State is applicable to the contract, without informing him or her that he or she also benefits from the protection provided by the mandatory provisions of the Law that would be applicable in the absence of this clause[55].

It follows, from this judgment, that choice-of-law clauses are subject to the general control of the rules transposing the Directive on Unfair Terms, within the scope of application of this Directive (consumer contracts).

According to Art. 12(2) of the Rome I Regulation, the law of the country where the obligation is performed must be taken into account as to the manner of performance and the steps to be taken in the event of defective performance. By the term 'manner of performance' it is understood the measures that, according to the contract or the *lex contractus*, are necessary for the its performance and do not concern the content of the obligation[56]. This rule does not mean that the modes of performance are entirely subject to the law of the place of performance. One should apply the *lex contractus*, but take into account the law of the place of performance[57]. In the case of the performance of an on- chain smart contract, the manner of performance is governed exclusively by the *lex contractus*. Art. 12(2) may already have a useful meaning for a smart contract involving off-chain performance.

Although a smart contract can, in certain cases, be seen as a performance measure prescribed by an underlying contract, it should not be considered a manner of performance for the purposes of Art. 12(2) of the Rome I Regulation, because what is at stake are external performance procedures that are mandatorily conformed by the law of the place of performance, to which digital processes are unrelated.

The foregoing examination demonstrates, in my view, that the general choice-of-law rules in force in the Portuguese legal order regarding obligational contracts are, to a certain extent, appropriate to determine the law applicable to smart contracts. The place of conclusion of the contract and the place of its performance are not primarily relevant and, therefore, there is no reason to distinguish contracts concluded and/or performed on- chain from those concluded and/or performed off-chain in terms of determining the applicable law[58].

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[54] ECJ 28/7/2016 [ECLI:EU:C:2016:612].

[55] What is for the national court to determine in the light of all the relevant circumstances (para. 71).

[56] *Cf.* REITHMANN/MARTINY/MARTINY – Internationales Vertragsrecht. Das internationale Privatrecht der Schuldverträge, 9th ed., Cologne, 2022, n.º 3.219; Staudinger/MAGNUS – Internationales Vertragsrecht. Neubarbeitung 2011, Berlim, 2011, Art. 12 no. 81; and MAGNUS/MANKOWSKI/FERRARI (fn. 42) Art. 12 no. 38.

[57] Cp., regarding this issue, REITHMANN/MARTINY/MARTINY (fn. 56) n.º 3.221; Saudinger/MAGNUS (fn. 56) Art. 12 no. 93; and MAGNUS/MANKOWSKI/FERRARI (fn. 45) Art. 12 no. 41

[58] For the same view, BRAEGELMANN/KAULARTZ (fn. 13) § 12 no. 41 and fn. 144.

I have already alluded to the problem raised by cases, frequent in contracts through the Internet, in which the habitual residence of one of the parties is not known with reasonable diligence by the other party. Recourse to the subsidiary connection may not be possible in borderline cases, in which no links relevant to the determination of the closest connection are determinable. In an even more extreme hypothesis, the identity of one of the parties may not be known with reasonable diligence by the other party, with consequences for access to jurisdictional protection. This can occur in cases of pseudonymity of blockchain accounts.

In cases where it is not possible to materialize the connecting factor of the primary connection or the subsidiary connection, it has been held that one has to resort to the *application of the substantive law of the forum* (Arts. 23(2) and, by analogy, 348(3) of the Portuguese Civil Code). A more flexible approach in determining the applicable law, such as that provided by the Transnational Arbitration Law (*infra* C), would allow for a more satisfactory solution, at least in these cases. I will return later to this issue (C).

Regarding *Brazilian law*, Art. 9 of the Law of Introduction to the Norms of Brazilian Law (hereinafter referred to as LINDB), determines that in order to characterize and govern the obligations, the law of the country in which they are constituted will apply. The obligation resulting from the contract is deemed to have been constituted in the place where the offeror resides (§ 2). The law does not expressly allow the choice of applicable law by the parties and its admissibility divides the doctrine[59]. Case law is also not entirely conclusive on this point. However, there is a decision by the Superior Court of Justice in 2016 that does allow this choice, although only in *obita*, i.e., on considerations that do not form part of the reasons for the judgment[60].

With regard to *contracts with consumers*, the courts tend to favor the Brazilian Consumer Protection Code over the foreign governing law[61].

It was proposed that Art. 9 of LINDB be amended in order to allow freedom of choice of the applicable law and to establish a special regime for contracts with consumers[62].

Meanwhile, the Mercosur Agreement on the Law Applicable in Matters of International Consumer Contracts (2017) was adopted. Pursuant to its main rule (Art. 4 – contracts concluded by the consumer in the Contracting state of his or her domicile), there is freedom of choice, but the choice only prevails if the chosen law is more favorable to the consumer than the law of his domicile. Additionally, the choice is limited to the law of the consumer's domicile, the law of the place of conclusion or performance or the law of the provider's seat. If a valid choice is lacking, the law of the Contracting State where the consumer has his or her domicile is applicable.

Therefore, the direction in which Brazilian law is evolving points to a convergence with Portuguese law and the abovementioned considerations on the choice of law applicable to smart contracts and on the problems in determining the habitual residence of one of the parties may be of interest under present and future Brazilian law[63].

3.3. Arbitration Choice-of-Law Rules

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[64].

With regard to smart contracts, there is also the possibility of using arbitration as an oracle (*supra* I) which, in the face of controversies arising from relevant facts, allows for the suspension of its automatic performance

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[59] *See* Jacob DOLINGER - Direito Internacional Privado. Parte Geral, 11st ed., Rio de Janeiro, 2014, 350; NADIA DE ARAUJO - Direito Internacional Privado. Teoria e Prática Brasileira, 8th ed., São Paulo, 2019, 372 et seq.; MARISTELA BASSO - Curso de Direito Internacional Privado, 6th ed., São Paulo, 2020, 366 et seq.;ande Valerio de Oliveira MAZZUOLI - Curso de Direito Internacional Privado, 5th ed., Rio de Janeiro, 2019, 143 et seq. and 421 et seq.

[60] REsp. 1.280.218/MG, 12/8/2016, https://stj.jusbrasil.com.br/jurisprudencia/373068518/recurso- especial-resp-1280218-mg-2011-0169279-7/inteiro-teor-373068520.

[61] *See* NADIA DE ARAUJO (fn.59) 378.

[62] *See* NADIA DE ARAUJO (fn. 59) 379 et seq., MARISTELA BASSO (fn. 56) 376.

[63] See, on the difficulties that may arise in determining the offeror's residence, from the perspective of Brazilian Private International Law, Marco FERNANDES GARCIA – "O local de celebração dos smart contracts em blockchain – notas de Direito Internacional Privado", *in Direito Internacional Privado – negócios e novas tecnologias*, ed. by Gustavo Campos Monaco, Solano de Camargo e Amanda Smith Martins, São Paulo, 2021, no. 4.

[64] Regarding these advantages, see Luís de LIMA PINHEIRO – *Arbitragem Transnacional. A Determinação do Estatuto da Arbitragem*, Lisboa, 2005, Introdução I.

and the introduction of modifications to the performance program[65]. For example, the program can be formulated in such a way that, in case of notification of a dispute, performance is suspended until there is a decision by the arbitrator. The decision can trigger a restart of the previously programmed performance or be converted into a modification of the automatic performance program.

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 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[66]. 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[67]. 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 the solutions of the Transnational Arbitration Law and then assess to what extent its application is limited by State guidelines.

Solutions provided by the Transnational Arbitration Law result mainly from the practice of arbitral tribunals, which 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, the *principle of freedom of choice* is understood, within the framework of this Transnational Law, as allowing the parties to refer to State law, to Public International Law, to *lex mercatoria*, to rule models such as the UNIDROIT Principles of International Commercial Contracts, to "general principles" or to *ex aequo et bono* considerations[68]. In the practice of arbitral tribunals, the use of non-State decision criteria is relatively frequent.

The choice of the rules of law applicable to the merits of the case is particularly important with respect to smart contracts, first of all, for the same reasons that were mentioned in relation to general choice-of-law rules (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 some rules that develop within the platforms on which they are concluded and/or performed.

The legal nature of the rules that develop within blockchain networks depend on their object and sources. Code provisions can be formulated by the person or entity administrating the blockchain infrastructure, and

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[65] *See* Samuel BOURQUE e Sara Fung LING TSUI – A Lawyer´s Introduction to Smart Contracts, *in Scientia Nobilitat. Reviewed Legal Studies*, 4-23, 2014, 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.

[66] *See* LIMA PINHEIRO (fn. 64) 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., Milan, 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.

[67] This conception, that I already advocated in *Contrato de Empreendimento Comum (Joint Venture) em Direito Internacional Privado* (fn. 49) 630 et seq.., was adopted by the Supremo Tribunal de Justiça in its ruling of 11/10/2005, proc. 05A2507 [*in www.dgsi.pt*]. See also HELENA BRITO (fn. 66) 43-44.

[68] *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), Zurich, 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, Amesterdão *et al.*, 1992, 290; Ursula STEIN –Lex Mercatoria. Realität und Theorie, Francoforte-sobre-o-Meno, 1995, 138; Yves DERAINS – "Transnational Law in

which does not represent its users, who only adhere to these provisions. They can then be considered standard contractual clauses. These rules can also be formed based on the collective autonomy or on the trade practices of users, and are not limited to contractual provisions stipulated between the platforms' administrators and their users. It is in this second case that a conflictual reference 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.

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 UNCITRAL Model Law on International Commercial Arbitration, Art. 52(1) of the Portuguese Voluntary Arbitration Law (hereinafter LAV) and Art. 34(2) § 1 of the Spanish Law on Arbitration. 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).

In the omission of the parties, 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 *criterion of the rules of law most appropriate for the dispute*.

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 legal order, with the LAV of 1986, which ordered the application of the most appropriate law to the dispute (Art. 33(2))[69].

The idea of appropriation allows for a balancing of interests and consideration of the specific content of the legal issues to be resolved[70]. In determining the applicable law, the arbitrators must take into account the links that the disputed relationship establishes with the different countries, although they can also consider the content of the respective laws[71].

Assessment of the content of the laws in question should not be based on the subjective preference of the arbitrators. The idea of appropriation 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[72], 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 guidelines for determining the applicable law issued by States that have particularly significant links with arbitration or where the awarding may foreseeably have to be enforced.

Portuguese and Spanish law have a special regime for determining the applicable law in international arbitration (Art. 52 LAV and Art. 34(2) of the Spanish Arbitration Law).

Under Portuguese law, international arbitration is understood to be that which, taking place in Portuguese territory (Art. 61 LAV), "puts international business interests at stake" (art. 49 LAV).

ICC Arbitration", in The Practice of Transnational Law, ed. by Klaus Peter Berger, 43-51, The Hague, London and Boston, 2001, 41; and Nigel BLACKABY e Constantine PARTASIDES

– Redfern and Hunter on International Arbitration, 7.ª ed., Oxford and New York, 2023, n.ºs 3.124 et seq. See also Preamble of the UNIDROI Principles on International Commercial Contracts and respective comment no. 4a. My opinion, already advocated in Contrato de Empreendimento Comum (Joint Venture) em Direito Internacional Privado (fn. 49) 1020 et seq., was adopted by the Supremo Tribunal de Justiça in its ruling of 11/10/2005, proc. 05A2507 [in www.dgsi.pt].

[69] *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.

[70] *See* ISABEL DE MAGALHÃES COLLAÇO – L'arbitrage international dans la récente portugaise sur l'arbitrage volontaire", in Droit interna-tional et droit communautaire. Actes du colloque. Paris 5 et 6 avril 1990 (Fundação Calouste Gulben-kian, Centro Cul-tural Português), 55-66, Paris, 1991, 64.

[71] *See* BATIFFOL (fn. 69), GAILLARD (fn. 69) no. 133, and Philippe FOUCHARD, Emmanuel GAILLARD and Berthold GOLDMAN – *Traité de l'arbitrage commercial international*, Paris, 1996, 889-890.

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

Under Spanish law, arbitration will be international not only when the dispute affects the interests of international business, but also when the parties are domiciled in different States at the time of conclusion of the arbitration agreement and when the place of arbitration, the place of performance of a substantial part of the obligations of the disputed relationship or the place with which it has a closer relationship is located outside the State where the parties have their domiciles (Art. 3(1) of the Spanish Arbitration Law). Art. 52(1) LAV allows parties to choose, without any restriction, the "rules of law" to be applied by the arbitrators. The replacement of "law", which appeared in the 1986 LAV, by "rules of law", aligns Portuguese law with UNCITRAL 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[73]. This expressly adopts the solution that I defended before the LAV of 1986[74].

Spanish Arbitration Law also allows parties to choose, without any restriction, the "legal norms" applicable to the merits of the case (Art. 34(2) § 1). The Preamble of the 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, law clarifies that this formula must be understood in the sense that the choice is not limited to a certain State order, and may also have as its object common rules of international trade (no. VII). At least some authors point to the same interpretation that I defended regarding Portuguese law[75].

Art. 52(2) of the 2011 LAV, however, came to provide 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 UNCITRAL Model Law, but represents a step backwards in relation to the provisions of the 1986 LAV, which followed the trend in which Transnational Arbitration Law was evolving, and 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 state laws in question[76].

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, the 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.

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

If we accept that, in the case of *impossibility of determination of the closest connection*, there is a *gap* in both general choice-of-law rules and arbitration choice-of- law rules, the gap should be filled according to the methodology adopted by the law and 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 of impossibility of determining 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 problem of impossibility of materialization

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[73] 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. 66) 44; Dário MOURA VICENTE – "A determinação do Direito aplicável ao mérito da causa na arbitragem internacional à luz , 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 no. 4; and Mário ESTEVES DE OLIVEIRA (ed.) – *Lei da Abitragem Voluntária Comentada*, Coimbra, 2014, Art. 52 no. 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.

[74] *Cf.* LIMA PINHEIRO (fn. 49) § 19 D and (fn. 64) § 25.

[75] *See* Alfonso-Luis CALVO CARAVACA and Javier CARRASCOSA GONZÁLEZ (eds.) 0 –*Tratado de Derecho Internacional Privado*, Valência, 2020, XX no. 313.

[76] For the same view, HELENA BRITO (fn. 66) 46, MOURA VICENTE (fn. 73) 47, and ESTEVES DE OLIVEIRA (ed.) (fn. 73) Art. 52 nos. 6-7. For a different view, MENEZES CORDEIRO (fn. 73) Art. 52 no. 115.

of the connecting factor from the point of view of choice-of-law justice. The general choice-of-law principles provide a solution for 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 to the idea of connecting justice and, more widely, to all conflictual 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[77]. 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 its omission, 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. Portuguese and Spanish law, like German and French law[78], expressly establish the autonomous relevance of usages in "international commercial arbitration" (Art. 52(3) LAV 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.

The general choice-of-law rules, examined above (B), are applicable to arbitrations that, having legally relevant contacts with more than one State, are not "international" in the sense of Art. 49 LAV, i.e., do not put international trade interests at stake[79]. 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 Portuguese 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.

To conclude, let us briefly examine *Brazilian Arbitration Law*. Art. 2. This law provides that the parties may freely choose the rules of law that will be applied in the arbitration process, provided there is no violation of good customs and public policy (§ 1), and clarifies that the parties may agree that the arbitration be carried out based on the general principles of law, on usages and customs and on international business rules (§ 2).

It therefore seems that Brazilian law does not limit the scope that the principle of freedom of choice has according to Transnational Arbitration Law[80].

The silence of the Law regarding the law applicable to the merits of the case in the omission of the parties can certainly be understood in different ways, but I believe that an understanding that conforms to the best trends of Transnational Arbitration Law should be favored.

4. Introduction to DAOs

According to one of the first *definitions of a DAO*, "[it]is a particular kind of decentralized organization that is neither run nor controlled by any person, but entirely by code". It can be based on one or more interacting smart contracts, but generally is based on a set of interacting smart contracts[81]. This definition is not completely accurate, as we will see, but 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*, either internal or external[82].

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[77] *See* Luís de LIMA PINHEIRO – "Choice-of-Law Justice", *LSN Transnational Litigation/Arbitration, Private International Law, & Conflict of Laws eJournal*, Vol. 7 No. 45, 10/27/2020 (=*LSN Comparative Law eJournal*, Vol. 20 No. 75, 11/03/2020); Portuguese version *in Direito Internacional e Comparado: Trajetória e Perspectivas. Homenagem aos 70 anos do Professor Catedrático Rui Manuel Moura Ramos*, ed. by Gustavo de Campos Monaco and Maria Rosa Loula, vol. I, 411-434, São Paulo, 2021, III.C.

[78] *Cf.* Art. 1051.º/4 ZPO and Art. 1511(2) French CPC.

[79] *Cf.* ISABEL DE MAGALHÃES COLLAÇO (n. 70) 60 *in fine*-61. See further MENEZES CORDEIRO (fn. 73) Art. 52 no. 111.

[80] See also Frederico STRAUBE, Marcelo DE SOUZA e Rafael GAGLIARDI – Leis aplicáveis à arbitragem, *in Arbitragem Comercial. Princípios, Instituições e Procedimentos*, org. por Maristela Basso e Fabrício Pasquot Polido, São Paulo, 2013, 156; MARISTELA BASSO (n. 43) 372 and 379; and Rui PEREIRA DIAS – "Direito aplicável à convenção de arbitragem e ao mérito", *in Manual de Arbitragem Internacional Lusófona*, ed. by CATARINA MONTEIRO PIRES and Rui PEREIRA DIAS, vol. I., Coimbra, 2020, 186-187.

[81] *Cf.* DE FILIPPI/WRIGHT (fn. 29) 148.

[82] *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.

When the DAO operates on blockchain, it is also based upon a *decentralized software program* that runs in the blockchain, and that allows the programming of the smart contracts on which the DAO is based[83].

It is often assumed that a DAO is not managed by a person or a limited group of persons in view of the fact that all decisions are taken by its members through a code protocol. As a matter of fact, *the management of most DAOs is decentralized*. However, this does not happen, or does not happen entirely, in the case of all DAOs.

It was recently stated that certain decisions on DAO management can be taken by autonomous systems based upon artificial intelligence[84]. The present essay will not be dealing with the specific issues that can arise when decentralized organizations and artificial intelligence are combined.

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

First of all, they can have completely *different purposes*. Normally they pursue an economic purpose, but they can also pursue a non-economic purpose. The economic purpose can be a shareable profit resulting from a common activity, in a strict sense, or, more widely, 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 charity action[85].

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

Furthermore, a DAO can be based upon a *public or a private blockchain* and upon a *permissioned or a permissionless* blockchain.

From a legal point of view, DAOs can be *incorporated* with the intervention of public bodies belonging to one State, and then registered, or *unincorporated*, as is mostly the case. Since the purposes and activities of DAOs can be different, the corporate form and the way they operate can also differ quite significantly and can correspond to human- run version of organizations that have the same type of purpose and carry out the same type of activity[86].

DAOs can have a *legal personality* that is independent from the personality of their members, or, as often happens with unincorporated DAOs, they can be deprived of legal personality.

Although their *management* is often decentralized, DAOs can also by managed by members' representatives or by an external entity. In certain cases, these representatives or this external entity can hold only part of the powers that are normally held by the management of a company or other external organization, making it difficult to draw a line between central management and decentralized governance.

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

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

Interested parties become *members* of the DAO by acquiring a digital representation of their membership, a certain type of token. These tokens can be of different types and confer different powers.

Thirdly, we have the *validators*, who operate validating nodes and maintain the network by creating new blocks to be added to the chain[87].

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

[84] *See* MIENERT (fn. 83) 2022, 53.

[85] *See* DE FILIPPI/WRIGHT (fn. 29) 148; Alex ANDERSON – *DAO - Decentralized Autonomous Organizations for Beginners: The Ultimate Beginner's Guide*, 2021, 20-21; MIENERT (fn. 82) 56 et seq., referring several DAOs examples and modalities.

[86] *See* AUDIT (fn. 17) 69, points out that it also does not require employees; ANDERSON (fn. 83); MADALENA PRERESTRELO DE OLIVEIRA, António GARCIA ROLO, João VIEIRA SANTOS eANA NUNES TEIXEIRA – Decentralised Autonomous Organisations (DAO): conceito, enquadramento legal e desafios, *Boletim da Ordem dos Advogados 35 (2022)* 66-69, 66.

[87] Through either proof-of-work or, increasingly, proof-of-stake consensus mechanisms – 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 validating nodes are, therefore, mining nodes in the sense referred by Matthias ARTZT e 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.

Finally, we can still have a person or entity who is entrusted with the *management of the blockchain infrastructure* and who administrates the respective protocol.

The ideal DAO operates only within a blockchain network, even when its activity includes the provision of goods and services to third parties. However, if the smart contracts on which the DAO is based include off-chain performance, there is a need for human intervention[88]. Additionally, other circumstances can occur that require human intervention besides the taking of decisions by the members according to the code protocol, such as changes of the code to correct programming errors or preventing or reverting illegal exploitations of code vulnerabilities.

Although DAOs are projected to operate, as far as possible, according to the provisions that are codified in smart contracts, as I pointed out above (I), the law has to govern the formation of the contract and its requisites of validity, as well as its interpretation and gap filling.

In the case of DAOs, vulnerabilities caused by programming errors can lead to misappropriation of assets as happened in the famous hacking case of "The DAO" and the corresponding issue of the right to fork, i.e., the right to change the code.

Normally, DAOs have both *a contractual and an organizational dimension*.

Setting aside the possibility of relationships in which there is no intention of legal binding and where there is no external organization with legal relevance, DAOs can be prone to internal conflicts (between a DAO and its members or among its members concerning the DAO's operation) as well as external conflicts (between a DAO or its members and third parties) that must be governed by legal rules.

The *pseudonymity of a DAO's members* and the decentralization and immateriality of the blockchain can set limits for the application of law and for resorting to State courts. However, as far as possible, these disputes shall be settled according to rules of law and enforced by dispute resolution mechanisms that apply these rules in order to avoid situations of denial of justice[89].

The contract between DAO members can be considered, from a legal science viewpoint, as a *contract for a common purpose*[90]. Depending on the circumstances of the case and of the applicable law, it can be substantively characterized in different ways, namely as a "society" (for example, a civil society in Portuguese law, a partnership or a memorandum of association of a company in a Common Law system or a *BGB Gesellschaft* in German law), a joint venture or a consortium.

Another problem is the nature and characterization of the relationship with the developers who did not become members, as well as with the validators and with the administrator of the blockchain infrastructure. I cannot enter into an examination of these relationships[91].

We have reached, therefore, the point where applicable rules should be determined. This determination requires not only the characterization of relationships with regard to a given legal order and the interpretation and application of its substantive provisions, but also, often, the solution of *choice-of-law problems* to be provided by Private International Law.

5. DAOs and Private International Law

As stressed above (II), a choice-of-law problem in the sense of Private International Law results from relevant contacts of the relationship with two or more sovereign States. If there are no relevant contacts with more than one State, the law of this State is directly applicable.

However, 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.

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88 *See also* Anderson (fn. 84) 34-35.

89 *See* GUILLAUME/RIVA 2022 (fn 82) 16.

90 For the view that the contract can be considered as a cooperation contract, also DRÖGEMÜLLER (fn. 31) 114-115.

91 *See* MIENERT (fn. 83) 106 et seq.

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[92].

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[93].

I have already stated (*supra* III), that the legal nature of the provisions codified in blockchain networks depend on their object and sources. I would like to add that 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 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, and 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 refer to what was previously exposed regarding the relevance of the *lex cryptographia* for the regulation of international DAOs (*supra* III.A). Since DAOs have both a contractual and an organizational dimension, *the choice- of-law rules for contracts and for legal persons come into play*.

If *the DAO is incorporated as a legal person*, the choice-of-law rules on legal persons apply. These choice-of-law rules 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 legal commerce 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) Commercial Companies Code), as also it is 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[94]. Furthermore, incorporation theory applies to foundations (Arts. 2(1) and 5 of Foundations Law[95]).

Spanish law is more differentiated. In principle, it refers to the law of the nationality of the legal person (Art. 9.11 of the Spanish Civil Code). Some authors and recent case law point towards the incorporation theory regarding companies [96]. The law of domicile applies, in principle, to associations, although associations with foreign domicile that carry out their main activities in Spain are also subject to Spanish law[97]. Spanish law applies to foundations that carry out their main activity in Spain and the law of domicile to other foundations[98].

Brazilian law adopts incorporation theory (Art. 11 of the Law of Introduction to the Rules of Brazilian Law).

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[92] *See* DRÖGEMÜLLER (fn 31) 36.

[93] See DRÖGEMÜLLER (fn 31) and 114-115 regarding blockchain networks in general.

[94] *See* Luís de LIMA PINHEIRO – Direito Internacional Privado, vol. II – Direito de Conflitos/Parte Especial, t. I – Introdução, Pessoas Singulares e Coletivas e Princípios Gerais de Direito dos Estrangeiros, 5th ed., Lisbon, § 59 B and D, with further references.

[95] Adopted by L no. 24/2012, of 9/9.

[96] See CALVO CARAVACA(CARRASCOSA GONZÁLEZ (fn. 75) no. 44.

[97] *Op. cit.*, no. 121.

[98] *Op. cit.*, no. 122.

In romangermanic family systems, the assumption 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[99].

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. Regarding special connections relevant for partial issues and pre-contractual liability, I refer to my previous remarks (*supra* II). The considerations that follow concern only the determination of the *lex contractus*.

Choice-of-law rules on contracts that are more relevant for DAOs fundamentally pursue the interests of the parties involved and are, therefore, based upon *freedom of choice of the applicable law* (Art. 3 of Rome I Regulation, Art. 41 of the Portuguese Civil Code) and Art. 52(1) LAV). In the absence of a valid choice of law by the parties, these rules 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) LAV).

In my opinion, *choice-of-law rules on contracts are applicable to the contract of common purpose underlying the DAO*[100]. However, two points should be made. Firstly, this is without prejudice to mandatory rules concerning the contract provided by the law applicable to the DAO's organization. Secondly, as the Rome I Regulation seems to exclude from its scope of application contracts that directly institute entities with external organization subject to an institutional regime (Art. 1(2)(f)), the choice-of-law rules relevant in this case are those provided in Arts. 41 and 42 of the Portuguese Civil Code. In the case of a valid arbitration agreement, the choice-of-law rule is provided by Art. 52 LAV.

These choice-of-law rules are, in principle, applicable to the formation, validity, interpretation and gap filling obligations created by the contract and consequences of non- performance.

Regarding the *right to fork*, it seems that the law governing the contract should be applied as long as the law governing the external organization does not claim applicability. If there is a person or entity who is entrusted with the administration of the blockchain infrastructure, it seems that the law applicable to the relationship between the DAO, or its members, with this person or entity should also be taken into account, but I believe that the stance of the laws previously mentioned cannot be ignored.

In any case, three observations should be made in this regard.

First of all, the principles and values underlying choice-of-law rules on contracts and choice-of-law rules on legal persons are, to a certain extent, different and, therefore, contrarily to some proposals, determination of the law applicable to DAOs with external organization should not be based exclusively on one of them.

Notwithstanding, the coincidence of the law applicable to the DAO contract with the law applicable to the DAO organization is desirable, since it promotes substantive harmony and avoids many problems of delimitation among issues governed by each of the laws and of coordination of these laws.

Furthermore, *proprietary issues of DAO tokens*, namely those that can be characterized as securities, also raise a choice-of-law problem. These issues include, for example, the determination of the effects of the tokenholder's right with regard to third parties, with the exclusion of those effects that are subject to the external organization's governing law[101]. I will not be dealing with these issues in the present essay.

6. Laws Applicable to Interantional DAOs

As previously mentioned (V), choice-of-law rules on contracts have a role to play in the determination of the law applicable to DAOs, as well as choice-of-law rules on legal persons regarding DAOs with an external organization.

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[99] *See* LIMA PINHEIRO (fn. 94) § 58 B.

[100] *Cp.* MIENERT (fn. 83) 82-85, understanding that in most cases DAOs are external organizations; and in general, regarding the relationship between the participants in a blockchain network, DRÖGEMÜLLER (fn. 31) 113 e et seq.

[101] *See* Thomas JOHN – "Technologie, gesellschaftlicher Wandel und internationale Privatrechtsanknüpfung im Bereich Fin Tech", *in Fest. 40 Jahre IPRG*, ed. by Florian Heindler, 405-423, 2020, 413 et seq.; Markus AIGNER – "Das internationale Privatrecht und die Blockchain – ein unlösbarer gordischer Knoten?", *ZfRV* (2020) 211-223, 218-220; Christiane WENDERHORST- "EGBGB Art. 43", *in Münchener Kommentar zum BGB*, 8th ed., Muncih, 2021, nos. 306 et seqs.; Yueh-Ping YANG – "When Jurisdiction Rules Meet Blockchain: Can the Old Bottle Contain the New Wine?", *LSN Transnational Litigation/Arbitration, Private International Law, & Conflict of Laws eJournal*, Vol. 9 No. 8, 02/21/2022, 49 et seq.

Regarding *choice-of-law rules on contracts*, choice of law by the parties involved should be 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[102] or, at least, a complement by commentaries in natural language (see *supra* III.B)[103].

As previously stated, in the absence of a valid choice of law by the parties, these choice-of-law rules 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) CC and Art. 52(2) LAV). Determining the closest connection with the contract is highly problematic in most DAOs in which the members are located in multiple States or in situations 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;
- The habitual residence or seat of the developers;
- The seat of the entity that administrates the blockchain infrastructure;
- The language of the underlying contract concluded in 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)[104]. The same position is held in the context of Spanish Private International Law[105].

In contrast, the *Transnational Arbitration Law* (above III.C), allows for the application of the rules most appropriate to the dispute. This flexible approach would seem more satisfactory than resorting to the *lex fori*, also given the fact that Portuguese substantive law does not contain specific provisions on DAOs.

As previously stated (*supra* III.C), if we accept that, in the case of *impossibility of determination of the closest connection*, there is a *gap* in both general choice-of-law rules and arbitration choice-of-law rules, it is arguable that the application of the rules most appropriate to the issue is sound also from a *de iure condito* point of view.

Regarding *choice-of-law rules on legal persons*, the first assertion is that corporate DAOs should be governed by the law of the State of incorporation, understood in the previously mentioned terms (V). This is even true, in principle, regarding a system based upon the seat theory, such as the Portuguese, for many reasons among which I will mention the following:

- Incorporation with the intervention of public bodies is always governed by the law of place of incorporation[106];
- It should be presumed that the seat of administration is located in the same place as the registered seat, which is normally in the State of incorporation, namely to protect the trust of third parties[107];
- Portuguese law gives relevance to the place of the registered seat towards third parties regarding commercial companies and to the incorporation theory regarding foundations (*supra* V)[108];

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[102] For this view, BRAEGELMANN/KAULARTZ (fn. 13) § 12 n.º 17.

[103] *See* LAW COMMISSION – *Advice to Government. Smart Legal Contracts*, 2021, nos. 7.71 et seq.

[104] *See* António MARQUES DOS SANTOS – "A aplicação do Direito Estrangeiro", *ROA* 60 (2000) 647-668, 667; and LIMA PINHEIRO (fn. 30) § 29 B. In result, also João BAPTISTA MACHADO – *Lições de Direito Internacional Privado*, 2nd ed., Coimbra, 1982, 251.

[105] *See* José FERNÁNDEZ ROZAS and Sixto SÁNCHEZ LORENZO – *Derecho Internacional Privado*, 12nd ed., Cizur Menor (Navarra) 2022, no. 130.

[106] *See* LIMA PINHEIRO (fn. 94) § 59 C.

[107] *Op. cit.*, § 59 B and D.

[108] *Op. cit.* § 59 D.

- The great majority of DAOs are not centrally managed, and therefore, there is gap that should be filled according to the principle of freedom of choice and the values of legal certainty and foreseeability[109]. This points to incorporation theory.

In most cases, DAOs are unincorporated and, therefore, the law applicable to external organization should be determined, in my opinion, 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 Swiss Private International Law Act).

A choice of law in an off-chain agreement or a reference to the applicable law on the developers' website could be relevant in this regard. Taking a step further, a choice of the law applicable to the DAO's organization should be allowed, as far as cognoscible with reasonable diligence by third parties[110].

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

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[111].

In exceptional cases, in which participation in the DAO is limited to persons located in one State, and admitting that despite this a choice-of-law problem arises, the seat of administration 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[112].

As a last resort, if there is no point of reference for third parties, 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 with a third party[113].

The *flexible approach of the rules most appropriate to the dispute* that is allowed by Transnational Arbitration Law could again constitute a better solution for these *hard cases*.

7. Conclusion

International smart contracts and DAOs are *new dimensions of the challenge that the Internet has posed to Private International Law*, due to the weakening of the spatial ties of the relationships that are established within it. It is now not just a matter of contracts that are concluded through the internet, but also contracts that tend to be performed on chain in distributed ledger platforms with multi-located operators and organizations that tend to be managed and operate in these platforms.

In principle, it is possible to respond to this challenge with *choice-of-law techniques*, but, in *hard cases, more flexible standards for the determination of the applicable law*, such as those that are practiced in transnational arbitration, prove to be more appropriate to the specificity of these relationships rather than the traditional solutions adopted by general choice-of-law rules (i.e., choice of law rules applied by State courts).

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[109] *See* LIMA PINHEIRO (fn. 77) III.C.

[110] *See also* MIENERT (fn. 83) 86-87, less clearly regarding cognoscibility by third parties.

[111] For the same view, ZIMMERMANN (fn. 32) 568; AUDIT (fn 17) 693; GUILLAUME/RIVA (fn. 82) 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 OLIVEIRA/ROLO/SANTOS/TEIXEIRA (fn. 85) 69, but this solution does not assure the required point of reference to third parties.

[112] *See also* the remarks of MIENERT (fn. 83) 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.

[113] For this view, in any case of impossibility of materialization of the traditional connecting factors, see ZIMMERMMANN (fn. 32) 570 et seqs.

In extreme cases, such as the identity of one of the parties not being known with reasonable diligence by the other party, it is not only Private International Law that does not provide an answer to the legal regulation of the smart contract or of the DAO, it is the legal protection itself that comes into crisis[114].

The analysis I have carried out certainly does not provide an answer to all issues regarding the determination of the laws applicable to smart contracts and DAOs, even if limited to the *lex contractus* and the law governing external organizations. My goal was merely to make *a first approach to these issues*, more concerned with identifying the problems and suggesting possible solutions rather than offering definitive conclusions.

[114] *See also* AUDIT (fn. 17) 689.

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