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## **ARBITRATION IN SMART CONTRACTS DISPUTES – A LOOK INTO THE FUTURE**

*The paper explores the growing integration of blockchain technology in the legal field, specifically focusing on the emergence of smart contracts with their automated execution of contractual obligations. Technology experts believe that the use of smart contracts contributes to the eradication of disputes. However, the author challenges this claim while analyzing the disputes that may arise in this area, including classic contract law disputes and new issues specific to smart contracts. The paper focuses on whether arbitration is the optimal forum for resolving these disputes. The relationship between traditional and blockchain arbitration is explored, examining disputes that would be resolved using established methods and those suitable for the newly created mechanism. The interests of traditional arbitration do not coincide with those of blockchain arbitration. Both should cooperate and take advantage of each other. The author asserts that the flexibility and adaptability of arbitration will be its dominant advantage in addressing these disputes.*

**Key words:** *Smart contracts. – Blockchain technology. – International arbitration. – Blockchain arbitration. – Alternative dispute resolution.*

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## 1. INTRODUCTION

For most lawyers, even globally, the subject matter of this paper pertains to the realm of science fiction. Encoded, self-executing contracts, often praised as “smart”, which lead to disputes capable of being resolved privately rather than relying on national courts, appear far-fetched. Nevertheless, the current reality not only challenges but also contradicts such skepticism.

The reality that this is not a 22<sup>nd</sup> century topic is apparent from the fact that smart contracts are already revolutionizing business in various sectors of the economy. Forecasts indicate that specific industries will undergo substantial transformation due to the ongoing implementation of smart contracts, which is evident in certain segments that are already experiencing these changes.<sup>1</sup> These contracts are based on the so-called blockchain technology, i.e., distributed ledger technology, which is considered to be one of the greatest discoveries after the Internet (Werbach 2018, 489) and will change the business world in the coming decades (Tapscott, Tapscott 2016). Blockchain technology became relevant as a result of the shaken trust in classical financial institutions after the financial crisis of 2008 and the desire to move from centralized institutions to a decentralized cryptocurrency market. However, this technology<sup>2</sup> has far broader applications than solely cryptocurrencies<sup>3</sup>, with one notable use being the basis for smart contracts. According to some authors (Lefèvre, Delwaide 2019, 226), its true potential does not primarily lie within cryptocurrencies, the more prominent aspect, but rather in the domain of smart contracts.

One of the primary touted advantages of smart contracts is their ability to eliminate reasons for disputes by ensuring certainty in contract execution, with claims that they may render dispute resolution mechanisms unnecessary. In our paper, we aim to demonstrate that such assertions do not align with reality. We plan to achieve this by first providing a brief introduction of smart contracts<sup>4</sup> and subsequently analyzing both the

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1 One of the best examples of an industry that will be significantly changed by the development of smart contracts is the insurance industry, where new products and services are introduced, but where smart contracts can also serve to facilitate the detection of fraud, as well as to reduce costs for existing services of insurance companies. See Đurović 2020, 312.

2 On the legal framework of blockchain and DLT technology, see Cvetković 2020, 134–137.

3 Cryptocurrencies are just a segment of digital assets.

4 Especially considering that it is a new institute in domestic and foreign theory and practice.

traditional contractual disputes likely to persist in the future and the novel disputes unique to smart contracts. Considering the distinctive features of smart contracts and the disputes they may generate in the future, we intend to examine whether arbitration, known for its private dispute resolution features, serves as the optimal forum for their resolution. This examination will involve evaluating the relationship between traditional (classical) and blockchain arbitration, and determining the types of disputes suitable for previously known dispute resolution mechanisms and those better resolved through the newly developed ones. The conclusions are that today blockchain arbitration is suitable only for low-value and low-complexity disputes, due to the different presented factors. Accordingly, traditional arbitration is here to stay. Nevertheless, there is a need for arbitration to show one of its greatest advantages – flexibility, in order to be(come) the primary forum for resolving this category of disputes.

## **2. SMART CONTRACTS – OPENING NEW HORIZONS**

When presenting the institute of smart contracts, it is necessary to understand the technology on which they rest, the basis of their functioning. Distributed ledger technology is a digital record of transactions that is replicated, validated, and updated simultaneously across a network of participants, whether they are known, pseudonymous, or completely anonymous (Athanassiou 2018, 105). Distributed ledgers store information related to the exchange of various values, including but not limited to cryptocurrencies, tangible assets, and intellectual property. All of this operates without the necessity for a central authority as the accuracy of information is ensured by multiple copies of the distributed ledger held by all participants (Lefèvre, Delwaide 2019, 255), creating an immutable record. Distributed ledgers are often based on blockchain technology, so the two terms are regularly used interchangeably. Data is organized into blocks and stored on these chains, which, once verified through network consensus, are permanently appended to the chain and interlinked with previous blocks (Lefèvre, Delwaide 2019, 226). The principal strengths of blockchain technology lie in its decentralization and immutability – nothing relies on a singular authority, and there is minimal risk of alterations or manipulations within the chain.

Smart contracts, initially introduced by computer scientist Nick Szabo at the close of the last century, were defined as “a computerized transaction protocol that executes the terms of the contract.” Szabo illustrated their essence by comparing them to a vending machine for snacks and drinks

(Szabo 2018). When a customer chooses a product and inserts the required payment into the machine, it initiates the fulfillment of the request by dispensing the desired item. A contract is concluded between the buyer and the “machine” by selecting the product and entering the requested amount (the price is known in advance, and the product becomes known by selecting the buyer, which fulfills the elements of the sales contract).<sup>5</sup> The buyer, by taking these actions, effectively accepts the offer and fulfills their part of the contractual obligation. Subsequently, the machine is tasked with executing its part of the contract, namely, dispensing the requested item. Once the money is inserted, no further human intervention is necessary for the contract’s execution. The machine, hence, *independently* and *automatically* executes the contractual obligation, demonstrating precisely the core concept of smart contracts. In this light, Szabo refers to these machines as “the primitive ancestors of smart contracts”.

A smart contract can be defined as a computer code<sup>6</sup> that was created to automatically perform contractual obligations after the occurrence of a certain event or as an agreement between the parties whose execution is automated through a computer program.<sup>7</sup> Recently, Serbia has joined in the circle of countries that have legally regulated the legal aspects of digital assets.<sup>8</sup> The importance of the Law on Digital Assets<sup>9</sup> is also reflected in the fact that Serbian law gained a pioneering definition of a smart contract. Smart contract is defined as a computer program or a computerized protocol based on the distributed ledger technology (DLT) or similar technologies, which is partly or wholly performed by software and which automatically executes, controls or documents legally relevant events and actions according to the terms of a contract already concluded, whereby the contract may be

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5 See Serbian Law on Obligations, [Zakon o obligacionim odnosima], *Official Gazette of the SFRY*, Nos. 29/78, 39/85, 45/89 – Decision of the Constitutional Court and 57/89, *Official Gazette of the FRY*, No. 31/93, *Official Gazette of SCG*, No. 1/2003 – Constitutional Chart and *Official Gazette of the RS*, No. 18/2020, Arts. 458–466.

6 This is about turning contractual provisions into code, as one aspect of law algorithmization. For more about this phenomenon, as well as about the so-called *LegalTech*, see Cvetković 2023, 316–326.

7 Definitions derived from Durovic, Janssen 2019, 4.

8 At the time of enacting the Law on Digital Assets, Serbia was among the few countries to do so. Not long ago, countries often referred to as offshore jurisdictions, such as the British Virgin Islands, also enacted regulations on the digital assets market. This led some crypto companies to move to other jurisdictions without regulation.

9 Law on Digital Assets, [Zakon o digitalnoj imovini], *Official Gazette of the RS*, No 153/2020.

concluded electronically by such program or protocol.<sup>10</sup> However, different types of these more or less “smart” contracts have been developed: i) a traditional (paper) contract with automatic execution through computer code, ii) a hybrid contract,<sup>11</sup> and iii) a contract drawn up exclusively in computer code.<sup>12</sup>

The first two types necessitate the formation of a conventional (paper) contract, prompting some authors to label them as smart *legal* contracts.<sup>13</sup> In contrast, the third type embodies the true essence of a smart contract, existing entirely in code, without a separate written document. Smart contracts function based on the if-then principle, operating in binary logic. The latter type is currently limited to simpler transactions with automatic payment capabilities. These transactions encompass straightforward consumer interactions (such as payment to the seller upon receipt of package), compensation for insured passengers for flight delays or cancellations, cryptocurrency or digital token transactions (where the entire transaction takes place in the digital world). In these specific domains, smart contracts significantly enhance efficiency by reducing administrative costs, eliminating the necessity for physical documentation, and bypassing external verification and intermediaries (Wiegandt 2022, 679). It is acknowledged that, presently, smart contracts might not be the optimal solution for very complex commercial transactions wherein contractual rights and obligations rely on abstract concepts such good faith, reasonable efforts, or due care in long-term business commitments (Wiegandt 2022, 679). However, the author suggests that this limitation primarily concerns the third type of smart contracts, which are entirely expressed through computer code. In contrast, hybrid contracts possess the capability to incorporate binary rights and obligations via code, while also accommodating abstract concepts and contractual provisions such as governing law and dispute resolution clauses in a traditional contract.

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10 Law on Digital Assets, Art. 2, para. 1, it. 39.

11 Law Commission (2021, 6) defines a hybrid smart legal contract as a contractual agreement where certain obligations are articulated in natural language, while others are encoded within a computer program. The execution of some or all contractual obligations is automated through the underlying code. There is also a possibility that the terms of a hybrid contract are primarily written in code with a few natural language terms.

12 For more details on the forms of smart contracts, see *Ibid.*

13 The English term *Ricardian contract* is also often used.

Regarding all the questions arising from smart contracts solely expressed in code – such as jurisdiction, applicable law, interpretation and liability, the primary issue is whether parties can autonomously express their intentions to create a legally binding contract solely through code. We accept the opinion that one of the fundamental principles under most contract laws is the freedom of choice,<sup>14</sup> which allows parties to select any form for their contractual relationship. This principle contributes to making smart contracts legally enforceable.<sup>15</sup> Moreover, it is stated that there is no need to change existing contract law to tailor it to smart contracts.<sup>16</sup> Existing principles and doctrines are sufficiently flexible to also be applied to smart contracts.

### 3. FUTURE DISPUTES RELATING TO SMART CONTRACTS

It is frequently suggested that the primary advantage of smart contracts lies in their ability to eliminate reasons for disputes by ensuring the certain execution of contractual obligations. The premise is that if execution is independent of human factors, the need for litigation diminishes. However, the question arises: is this actually the case?

Smart contracts not only introduce new legal issues but also fail to eliminate traditional disputes inherent in contract law. Similar to other forms of contracts, parties may seek a nullity of a smart contract due to lack of consent or duress, or if the contract execution violates public policy (Lefèvre, Delwaide 2019, 232). The Serbian Law on Obligations allows parties the freedom to arrange their contractual relations as they please, within the confines of compulsory legislation, public policy and good faith,<sup>17</sup> similarly applicable when expressing agreements through a smart contract.

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14 For Serbian law see Law on Obligations, Art. 10 and Art 67, para. 1. For English law see Durovic, Lech 2019, 76.

15 Durovic and Lech (2019, 92–93) state that under current English law, commercial transactions conducted through smart contracts should be enforceable by the courts if they meet the existing criteria for contract enforcement. It appears that no alterations to English law are necessary to ensure the enforceability of smart contracts. Smart contracts should be seen as an extension of the freedom to contract, where they serve as a tool for fulfilling promises made under a contract. For types of contracts that necessitate a written form for enforceability, smart contracts entirely based on computer code can meet the statutory “in writing” requirement.

16 For considerations under US law, see Raskin 2017, 306, 321–329.

17 Serbian Law on Obligations, Art. 10.

Additionally, parties can invoke traditional contract law principles, such as the impossibility of performance, for instance, when trade is prohibited due to imposed sanctions on an enemy country.

Classical issues in contract law, such as contract modification or termination, take on new dimensions when viewed within the realm of smart contracts. These “new problems” are akin to those encountered in the operation of vending machines for food and beverages. Similar to a customer changing its mind after inserting money or the machine failing to dispense a product, smart contracts, despite their automation, can encounter analogous issues during automatic execution (Sherata 2018, 6). They too can end up being void after execution, necessitating dispute resolution for refunds. More frequent disputes may focus on unjust enrichment<sup>18</sup> rather than the non-performance of a contractual obligation.

By their nature, smart contracts are inflexible<sup>19</sup> and immutable, and no one can stop the execution of the contract when the software recognizes that an event has occurred that activates the execution of the obligation. This is both an advantage and a disadvantage of a smart contract. The performance of the obligation does not depend on the will of the contracting party. Thus, if one person would like to buy a car from another person through a smart contract, the smart contract will automatically transfer money from the buyer’s account to the seller’s account (at a moment that is considered relevant for the fulfillment of the seller’s obligation, for example when the car crosses the border of the buyer’s country),<sup>20</sup> while it will automatically change the owner of the property right. Even with automatic execution, the possibility of a car having substantive defects remains, leading the buyer to question the seller’s fulfillment of their obligation. Smart contracts are likely to decrease disputes related to non-payment of the contract price, but

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18 For more on unjust enrichment in relation to the contract, see Lutman 2020, 111-113.

19 This inflexibility actually rises a plethora of new and additional costs during the negotiations, drafting and enforcement of a smart contract. Accordingly, it is up to parties to decide whether it is convenient to them to conclude a smart contract or a paper contract. For one of the examples where smart contracts increases the costs see in Sklaroff 2017, 292-293.

20 The smart contract notifies an oracle, an external data source that sends information to a computer program, about external events. For example, if flight delay or cancellation insurance is in the form of a smart contract, oracle transmits the information about delay or cancellation to the smart contract. See Law Commission 2021, 21.

conversely, they may notably increase disputes<sup>21</sup> concerning buyer rights and seller responsibilities due to the delivery of goods with substantive defects.<sup>22</sup>

The language used in contracts can sometimes be problematic, failing to clearly express the true intent of the contracting parties at the time of conclusion. Such issues can become more pronounced with smart contracts, as translating the will of the parties into code can lead to discrepancies between the actual intent and the developer's understanding or coding capabilities. Consequently, disputes regarding the genuine intent of the parties may become more frequent. Interpreting contracts written in part or entirely in code presents a new dimension that must be adapted to the reality of the digital world. Modes of interpretation traditionally developed for plain language provisions now face the challenge of interpreting codified provisions. Hence, various proposed solutions seek to adapt existing principles to these new challenges.<sup>23</sup>

Proving the existence, form, and content of a smart contract can be the subject of dispute, particularly when the contract is solely in the form of code, lacking a paper contract (Lefèvre, Delwaide 2019, 232). In addition, in most jurisdictions a contract is valid if entered into by parties with adequate legal capacity. Frequent pseudonymity or anonymity of parties in smart contracts makes it difficult to assess the fulfillment of this condition (Sherata 2018, 11).

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21 The considered problem can be mitigated, for example, by providing the option for the party that is dissatisfied with the performance of the contract by the other party to order the automatic return of funds, and to activate the dispute resolution clause.

22 About the buyer's rights when it receives goods with substantive defects, see Art. 488 of the Serbian Law on Obligations. Under Art. 35 of the United Nations Convention on Contracts for the International Sale of Goods (CISG), the seller must deliver goods that are of the quantity, quality and description required by the contract and that are contained or packaged in the manner required by the contract. For an analysis of whether the CISG can be applied to smart contracts, see Janssen 2022, 9–17. If the affirmative answer is accepted, on other questions concerning CISG and smart contracts, see Duke 2019.

23 Thus, the question of how a reasonable person would understand the terms of the contract is replaced by the question of how a functioning computer would understand them. There is also a proposal with even more supporters – the application of the standard of a reasonable programmer (coder). In that case, the programmer would have the role of an expert who would “translate” the code to the forum with the main task of providing an expert opinion on what instructions the code is giving the computer. See Law Commission 2021, 16.

The issue of arbitration jurisdiction arises when the arbitration agreement is exclusively expressed in code,<sup>24</sup> without a traditional written contract. Within legal literature, extensive consideration is given to whether such a scenario fulfills the criterion stipulated in the New York Convention on the Recognition and Enforcement of Foreign Arbitral Awards (New York Convention),<sup>25</sup> which requires the arbitration agreement to be in writing<sup>26</sup>. Additionally, this raises questions concerning compliance with more permissive national arbitration laws.<sup>27</sup>

Beyond traditional disputes, the unique features of smart contracts give rise to new issues. Inevitable “holes” or bugs in the code<sup>28</sup> significantly affect execution. The famous DAO incident serves as a stark example, illustrating how a single code vulnerability allowed hackers to withdraw \$40 million (Shehata 2018, 6). Studies indicate that Ethereum-based smart contracts have an average of at least one hundred errors per thousand lines of code (Zaslowsky 2018, 360). This brings forth the crucial question of liability, particularly regarding the third party responsible for creating the smart contract.<sup>29</sup>

Completely new questions will arise regarding disputes from smart contracts with the currently most common subject matter – digital assets. These disputes will share many similarities with other commercial disputes with issues of contract enforcement, property rights, intellectual property rights, and vitiating factors. Nevertheless, the immaterial (intangible) nature of digital assets, the potential anonymity (or pseudonymity) of parties and the immutability of the distributed network, open completely new horizons of substantive law (Scott *et al.* 2022, 2).

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24 If arbitration agreements in the form of code become widespread, this may prompt arbitral institutions to create a model clause in that form.

25 The New York Arbitration Convention on the Recognition and Enforcement of Foreign Arbitral Awards, New York, 10 June 1958. According to the UNCITRAL, it is a convention that has been ratified by 172 countries to date. It entered into force in Serbia in 1992.

26 New York Convention, Art. 2, paras. 1 and 2. For affirmative answer see Sharma 2022, 80, for the negative see Michaelson, Jeskie 2019, 130.

27 Serbian Arbitration Act, [Zakon o arbitraži], *Official Gazzete RS*, No. 46/200 was modeled after the UNCITRAL Model Law on International Commercial Arbitration (UNCITRAL Model Law) and provides for a more liberal regime regarding the form of the arbitration agreement than the New York Convention. See Pavić 2010, 12.

28 Bill Gates said that software is a great combination of art and engineering. However, given that art, engineering and software are products of humankind, perfectionism is a utopia. See Michaelson, Jeskie 2019, 114.

29 In the future, it should be defined whether this is contractual or non-contractual liability. See Lefèvre, Delwaide 2019, 233.

Often the parties to the contract will not be from the same country, therefore, the answers to all these questions will depend on the applicable law. However, given the absence of smart contract regulation in many countries, the development of judicial and arbitration case law becomes pivotal. Resolving these unaddressed issues and legal gaps will largely depend on the willingness and intellectual capacity of decision-makers to navigate these novel aspects within the relevant legal frameworks. Taking into account that the parties will most often be located in different jurisdictions and unknown to each other (due to anonymity or pseudonymity), and that the distributed network is not present only in one country, there will be many pressing issues of private international law, which will concern above all, the jurisdiction of the courts or arbitration and applicable law (Scott *et al.* 2022, 2).

#### **4. ARBITRATION AS A FORUM FOR RESOLVING DISPUTES OUT OF SMART CONTRACTS**

Arbitration is a private way of resolving disputes that rests and largely depends on party autonomy. Not only is it up to the parties whether they will resolve the dispute in arbitration, but they have the opportunity to choose the seat of arbitration, the arbitrators, shape the procedure and otherwise use their party autonomy within the limits of the mandatory norms of the arbitration laws of the seat.<sup>30</sup> This adaptability to the needs and preferences of its users is one of arbitration's foremost advantages over court proceedings. In addition to commercial transactions, this way of resolving disputes has been adapted to the specific requirements of various other areas, giving birth to sports arbitration, commodity arbitration,<sup>31</sup> investment arbitration,<sup>32</sup> arbitration concerning intellectual property,

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30 For a detailed analysis of the limitations of party autonomy in international arbitration, see Ferrari, Rosenfeld 2023, 49–80.

31 Within the Belgrade Arbitration Center, there are special rules on settlement of commodity disputes, which establish a faster procedure for settlement of this category of disputes. For more about this see Pavić 2021, 371–375.

32 On the differences between investment and commercial arbitration, see Paunović 2018, 173–189; Jovanović 2018, 345–364.

inter-state arbitration, etc. In recent times, the domain of arbitration has expanded to include all arbitrable disputes,<sup>33</sup> and we are witnessing the birth of special arbitration rules even regarding inheritance disputes.<sup>34</sup>

The attractiveness of arbitration<sup>35</sup> has already been recognized by companies dealing with cryptocurrencies, which most often include arbitration clauses in their contracts.<sup>36</sup> The decentralized nature of cryptocurrencies aligns well with party autonomy and the (relative) freedom of arbitration from interference by national courts (Taylor, Wu, Li 2022). Most of its characteristics, which are also differences in comparison to state courts, correspond to the business world in general. In other words, arbitration is suitable for adaptation to the requirements of any type of dispute that can be resolved privately.

#### **4.1. Features of Arbitration in Relation to the Parties' Demands in Smart Contracts**

Serbia has traditionally struggled with poor contract execution speed, which is a critical concern for users of smart contracts. Efforts have long been ongoing in Serbia and worldwide to promote alternative dispute resolution, particularly arbitration and mediation, aiming to enhance the

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33 Different countries define the arbitrability of the subject matter of the dispute in different ways, and the question of the governing law for objective arbitrability also arises. See Jovanović 2021, 416–418.

34 Thus, the 2021 Vienna Arbitration and Mediation Rules contain supplementary rules for disputes related to inheritance, which apply, for example, when the testator provides so for the disposition of the property after death. See VIAC Arbitration and Mediation Rules 2021, Annex 6.

35 Due to Queen Mary University of London, White & Case (2021, 5), international arbitration is the preferred method of resolving cross-border disputes for 90% of respondents, either on a standalone basis (31%) or in conjunction with alternative dispute resolution (59%).

36 When concluding an arbitration agreement, the parties must consider the seat of arbitration that is friendly to digital assets, as well as conduct extensive analysis of the position of the courts of the countries in which the arbitral award will potentially be enforced. Every suspicion is justified. Thus, the Chinese court annulled the arbitral award made in China where the respondent was required to pay damages in Chinese yuan because he did not transfer the Bitcoins to the claimant. The court cited that the decision is contrary to public policy because it facilitates the circulation of cryptocurrencies and their exchange for money, contrary to Chinese law. See Scott *et al.* 2022, 4. Also, a Greek appellate court refused to enforce an arbitration award set out in Bitcoin citing public policy. See Taylor, Wu, Li (2022).

efficiency of the dispute resolution system (Pavić, Đorđević 2014, 244–245). Users of smart contracts have specific and apparent requirements. Their pursuit of automated contract execution and exclusion of intermediaries highlights their prioritization of speed, efficiency, confidentiality, expertise, and cost-effectiveness. Thus, for arbitration to become the preferred forum for resolving these disputes, it must effectively cater to these needs.

In this sense, arbitration holds an initial advantage over state courts. The length of the proceedings is a serious issue, especially in cases of disputes involving new technologies that might become obsolete before the court proceedings are concluded (Benton 2017). While court proceedings notably are prolonged and sluggish, arbitrations typically involve a more flexible, single-stage process, often governed by simplified delivery procedures and institutional rules that frequently impose deadlines for rendering a final award (Knežević, Pavić 2013, 21). For instance, in line with the expedited procedure<sup>37</sup> or even the “regular” rules of some arbitral institutions,<sup>38</sup> the deadline for reaching a decision is often set at six months from the case management conference or the constitution of the arbitral tribunal. Moreover, arbitration can be conducted through the electronic exchange of submissions, making it entirely paperless. Even if an oral hearing requiring evidence presentation is necessary, virtual (online) arbitrations have become a common practice.<sup>39</sup> Yet, for parties engaging in smart contracts, who prioritize efficiency, waiting for half a year for an award, along with at least a month for the procedural phase before the arbitrator appointment, might seem too lengthy to cease a business relationship and withhold disputed funds. At first glance, this may appear as a drawback of traditional arbitration, however, it is important not to overlook that parties, within their arbitration clause, can stipulate a shorter deadline for rendering an award. Nonetheless, it remains at the discretion of the permanent arbitral

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37 See, for example, Rules of Arbitration of the International Chamber of Commerce (ICC), Appendix VI Expedited Procedure Rules, Art. 4, para. 1.

38 Rules of the Belgrade Arbitration Center (Belgrade Rules) – BAC Rules, Art. 32, para. 1.

39 Serbian law contains no obstacles to the arbitration being completely virtual. Both in Serbia and globally, it is expected that the option of virtual arbitrations will become a regular feature. Pavić, Đorđević 2021, 536. Additionally, the Queen Mary University of London, White & Case (2021, 27) survey shows that there appears to be a growing expectation that virtual hearings will become the default option for procedural hearings.

institution to assess the compliance of such provisions with its rules.<sup>40</sup> This assessment will shed light on the flexibility and adaptability of different arbitration institutions.

Arbitration significantly favors efficiency.<sup>41</sup> Once an arbitral award is rendered, the parties engaged in arbitration can benefit from the facilitated recognition and enforcement of the award across any member state of the New York Convention. Given that parties involved in smart contracts often come from different countries, this advantage elevates the attractiveness of arbitration, especially when considering the prevailing difficulty in international recognition of court decisions.<sup>42</sup> Moreover, arbitrations commonly operate as a single-stage process, usually without the option for an appeal. Dissatisfied parties have recourse against an arbitral award through the far narrower grounds for annulment, a remedy distinct from an appeal against a court decision, which has significantly broader grounds.<sup>43</sup>

Parties engaging in smart contracts often prioritize confidentiality, frequently operating under the principles of anonymity or pseudonymity to safeguard their identity and prevent alarming current or potential business partners or investors about any disputes. Arbitration distinctly upholds confidentiality; the identities of disputing parties remain undisclosed other than to the involved parties, the arbitrator, and the institution's secretariat. In the event of a dispute, parties would be obligated to disclose their identities. However, they can be assured that only a limited circle of individuals will be privy to this information and are required to maintain confidentiality.

In arbitration proceedings, unlike court proceedings, parties hold the autonomy to select the arbitrators who will adjudicate their dispute. Opting for an expert well-versed in the field pertinent to their dispute, comprehending the mechanisms of smart contracts, ensures a legally and

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40 For example, BAC Rules in Art. 3, para. 1 stipulates that the procedure is governed by these Rules, as well as by the rules agreed upon by the parties, except for the rules whose application would be irreconcilable with the provisions of these Rules and the principles of arbitration.

41 For its users, the most valuable feature of international arbitration is the enforceability of awards, followed by avoiding specific legal systems/national courts, flexibility and ability of parties to select arbitrators. See the Queen Mary University of London, White & Case (2018, 7).

42 On the exequatur procedure and certain difficulties in Serbia, see Jovanović, Vučinić 2022, 535-552.

43 Perhaps the most significant difference is that, during setting-aside proceedings, the court does not review a wrongly established factual situation or a wrong application of substantive law, unless the mistakes are so significant that they also constitute a violation of public policy. See Stanivuković 2013, 30.

professionally sound final decision. The opportunity for parties to choose arbitrators based on their reputation serves as a powerful incentive for arbitrators to enhance their expertise in the relevant subject area and stay updated on the constantly evolving trends. This becomes especially significant in fields experiencing continuous and rapid development, pushing boundaries to extents that are currently beyond imagination.

Individuals engaging in contracts with automatic execution of obligations typically aim to eliminate additional intermediary costs. Similarly, in case of a dispute, they prefer a less costly resolution. Despite arbitration having predictable and predefined expenses, its costs cannot be currently deemed an advantage. In fact, it often proves more expensive than going to court, especially when abiding by the rules of the world's most prestigious arbitration institutions. Opting for an institution in Serbia might entail lower costs compared to the rules of renowned institutions in, for example, Paris or Singapore. Although this does not make arbitration notably inexpensive, "you can't have your cake and eat it too," so given its other advantages<sup>44</sup>, participants in international commerce continue to regard it as their primary choice for dispute resolution.

As certain authors recognize (Landbrecht, Wehowsky 2022, 315), studying the past is essential to predicting the future. Classical arbitration has evolved various subtypes and adapted significantly in specific areas, such as commodity disputes<sup>45</sup> (focusing on speed, short deadlines, and reduced costs), aligning well with the process of resolving disputes from smart contracts. Therefore, as a further step toward the integration of arbitration in smart contract disputes, permanent arbitration institutions can create special rules. One notable example is the American Judicial Arbitration and Mediation Services (JAMS), which has introduced the JAMS Smart Contract Clause and Rules.<sup>46</sup> With just 18 articles, these rules establish a swift procedure with short deadlines, catering to the demands of simple, almost binary disputes, seeking quick, cost-effective solutions. This procedure is

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44 For other advantages, see Knežević, Pavić 2013, 18–22.

45 The Belgrade Arbitration Center has special rules for commodity disputes. The Rules of the Belgrade Arbitration Center on Commodity Arbitration (the Belgrade Rules on Commodity Arbitration) were adopted on 26 March 2018, and came into effect on 21 June 2021.

46 JAMS Smart Contract Clause and Rules (DRAFT) – JAMS, <https://www.jamsadr.com/rules-smart-contracts> (last visited 14 November 2023).

conducted electronically, with some deadlines measured in hours<sup>47</sup> and the arbitration award typically rendered within 30 days of appointment.<sup>48</sup> In the case of an objection to the arbitrator's jurisdiction, a decision is made within 72 hours of the objection.<sup>49</sup> According to these rules, proceedings will conclude within a maximum of 45 days<sup>50</sup>, significantly shorter than existing expedited procedure rules.<sup>51</sup>

The emergence of arbitration institutions exclusively dedicated to blockchain and new technologies disputes is a global occurrence. The first institution was established in Japan, followed by another in Poland, marking the first appearance on the European continent (Kasatkina 2022, 147). In addition to the traditional arbitration options, there are also specialized platforms specifically tailored to meet the requirements of these distinct groups of users.

#### **4.2. Traditional Arbitration and Blockchain Arbitration: Alternative or Cooperation?**

A spectrum of online dispute resolution platforms has emerged beyond the traditional arbitration as we know it today. Within the realm of resolving disputes from smart contracts, a key differentiation exists between off-chain solutions (external to the blockchain platform), employing classical arbitration, and on-chain resolution (within the blockchain itself), directly

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47 For example, within 72 hours of the arbitration statement being filed and served, the parties shall appoint an arbitrator, who shall be a JAMS panelist. See JAMS, Art. 4, para. 1, it. 2. Any party may request clarification of the decision within 120 hours of issuance. See JAMS, Art. 13, para. 2.

48 JAMS, Art. 13, para. 1.

49 JAMS, Art. 7, para. 2.

50 The short deadlines are not a significant concern in low-value and low-complexity disputes, as detailed in the later part of the paper. Furthermore, the appointed arbitrators might not be senior professionals. Considering the rapid resolution expectations under these rules, arbitrators will largely handle cases with extremely tight deadlines, giving young arbitrators an opportunity to gain experience in these simpler cases.

51 The Permanent Arbitration (PA) at the Chamber of Commerce and Industry of Serbia prescribes in its Rules a 6-month deadline for reaching an award. Nevertheless, Art. 61, para. 1 of the Rules of PA, on the other hand, provides that the sole arbitrator will make the arbitral award within 15 days of the day when the hearing was held or within 15 days of the day when the conditions for making the award without holding a hearing were fulfilled. Provisions on the extension of the deadline are not provided. See critics in Đorđević 2021, 482–483.

addressing disputes within the blockchain network. Perhaps the most successful example of the latter<sup>52</sup> is Kleros<sup>53</sup>, an online platform based on the Ethereum blockchain, which uses cryptocurrencies and game theory to resolve disputes. Parties submit their case and evidence to the platform. The dispute is decided by the so-called jurors who play the role of arbitrators, while the final decision is taken by the majority of votes. Jurors invest their cryptocurrencies in order to participate in the decision making, and further developments depend on whether they voted in accordance with the majority. If they did not – they lose part of the invested funds, if they did – they earn part of the funds of those who lost, with additional compensation paid by the parties.

Given that jurors cannot communicate with each other, they must make a decision based on what they think other conscientious and well-informed jurors will decide. In game theory,<sup>54</sup> this approach is known as a “focal point” or “Schelling point”, which represents the result that well-informed decision makers are most likely to reach as a consensus without mutual communication.

The functioning of Kleros as a blockchain arbitration is interesting, however, it raises the question of whether the decision made in that procedure can be enforced under the rules of the New York Convention. The main concern is whether procedural due process has been respected, which is a condition for the recognition of an arbitral award under the Convention. The selection of arbitrators, conduct of the proceedings, engagement in the dispute, and decision-making should align with the parties’ right to equal treatment and fairness. This includes the opportunity for both parties to present their perspectives, evidence, and responses to the actions and

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52 In this paper, we will pay attention to this platform because, as stated, Kleros is currently the most advanced project (Sharma 2022, 100), and furthermore, within this platform, the first ever arbitral award decision was made that was indirectly enforced by a Mexican court (more about that below).

53 In Kleros White Paper is stated: “Existing dispute resolution technologies are too slow, too expensive and too unreliable for a decentralized global economy operating in real time. A fast, inexpensive, transparent, reliable and decentralized dispute resolution mechanism that renders ultimate judgments about the enforceability of smart contracts is a key institution for the blockchain era.” See Lesaege, Ast, George 2019, 1.

54 Legal scholars have already explored game theory, e.g., in the context of international law and the World Trade Organization. See Cvetković 2018, 90–94.

propositions of the opposing party.<sup>55</sup> Moreover, the award must be made by arbitrators who are impartial and independent,<sup>56</sup> otherwise the parties have the right to challenge them during proceedings.<sup>57</sup>

Considering that the parties involved in proceedings before Kleros are unaware of the jurors' identities, they do not have the opportunity to fully respond to the evidence of the other party and the jurors in the proceedings potentially have a financial bias (with their compensation or loss of invested funds dependent on their alignment with the winning or losing party), a question arises whether the Kleros award can be recognized and enforced under the New York Convention due to the application of Art. 5 para. 1, its b) and d), and Art. 5 para. 2 it. b) (public policy). Furthermore, in order for a decision to be considered an arbitral award, it is important that a fair and impartial procedure is ensured during the proceedings and that the decision is based on law or principles of equity.<sup>58</sup>

We believe that the concerns raised in the literature and in practice are exaggerated. The New York Convention outlines various obstacles to recognizing a foreign arbitral award, categorizing them into groups that a court reviews only upon a party's objection and those it monitors *ex officio*. In the Kleros process, if Art. 5, para. 1, it. b) and d) are violated, we regard that the court may not refuse recognition of such an award. This is because these conditions are considered only upon a party's objection, and the party accepted this dispute resolution method by submitting it to Kleros, thereby

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55 Serbian Arbitration Act, Art. 33, paras. 1 and 2, UNCITRAL Model Law, Art. 18. The party must have the right to be heard and to present its evidence at the oral hearing. The growth of opportunities for virtual arbitrations allows the oral hearing to be held without tremendous costs and time, and to be fully in line with the requirements of expedited procedure. See Uff 2021.

56 Serbian Arbitration Act, Art. 19, para. 3.

57 UNCITRAL Model Law, Art. 12, Serbian Arbitration Act, Art. 23.

58 In 2004, the German Supreme Court made a decision exemplifying this point. The case involved a member of a dog breeders association who initiated proceedings before an "arbitral tribunal", established based on the association's bylaws. Upon losing the case, the applicant challenged the "arbitral award" through set-aside proceedings. The Supreme Court concluded that the dispute resolution body did not meet the criteria of a genuine arbitral tribunal. The court reasoned that the tribunal was designed to resolve internal administrative disputes among members of the association's bodies. The association's bylaws lacked provisions for ensuring a fair and impartial procedure, and did not mandate decisions based on law or equitable principles. Furthermore, the parties did not have an equal opportunity to participate in forming the arbitral tribunal. Due to these reasons, the court determined that the decision could not be considered an arbitral award. See Ferrari, Rosenfeld 2023, 61.

precluding procedural challenges to the award. However, if the deficiency infringes upon the public policy of the state of recognition, the award's recognition must be refused.<sup>59</sup>

It is important to recognize that blockchain arbitration, at present, is suited for low-value and relatively straightforward disputes. Consider an example where a Serbian entrepreneur hires a freelancer from Argentina to build a website for a small business at a cost of 3,000 euros. If the entrepreneur is dissatisfied and seeks redress, turning to traditional legal proceedings presents challenges. The process begins with proceedings before Kleros, during which the jurors will have three choices: to issue a refund of 3,000 euros, to allow freelancer to retain 3,000 euros, or to provide an extended deadline for completing the website.<sup>60</sup> Engaging in court proceeding in Argentina for a dispute of such small value would be impractical and costly. Even opting for arbitration in Serbia would likely incur expenses close to the value of the dispute.<sup>61</sup> Consequently, the entrepreneur might opt for a more informal process, such as blockchain arbitration through Kleros, in order to seek “rough” justice without the procedural assurances guaranteed in court proceedings or traditional arbitration. This shift reflects the choice of efficiency over the intricacies of procedural fairness and equal treatment, often valued in traditional legal frameworks. The question arises regarding the extent to which parties can waive fundamental procedural guarantees and which ones they can or cannot forego. The concept of public policy, as the baseline checked *ex officio* by the court, will likely set the minimum threshold. However, as the values and complexities of these disputes grow, participants may become less inclined to rely solely on methods that do not ensure the comprehensive safeguards of due process, which have established through the centuries, ensuring fundamental principles of equitable treatment, a fair

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59 It is worth mentioning, however, that in arbitration laws, such as the Serbian one, provisions concerning the equality of the parties in the proceedings and the right to respond to the allegations and evidence of the opposing party, as well as the rule on an odd number of arbitrators and their independence and impartiality, can be considered imperative. Hence, any gross violation of these provisions in the Kleros procedure could be deemed a violation of Serbian public policy.

60 A similar example is used in the Kleros White Paper. See Lesaege, Ast, George 2019, 2–3.

61 Thus, the registration fee, administrative costs and fee of the sole arbitrator before the Belgrade Arbitration Center would amount to a total of 2,700 euros in this case. See Belgrade Rules, Annexes 1, Arts. 2–4.

hearing,<sup>62</sup> and independent and impartial decision-makers. This will lead to the (re)emergence of traditional arbitration as a preferred forum for such disputes.

However, the legal challenges of blockchain arbitrations do not stop there. In addition to the abovementioned, many more questions are raised. Can an on-chain award even be considered an arbitral award within the meaning of the New York Convention and national arbitration laws?<sup>63</sup> Relatedly, does it have a *res judicata* effect preventing the initiation of off-chain arbitration or court proceedings? Does the arbitrator have to give the reasons for the decision? Is the arbitrator obliged to comply with the arbitration laws and if so, which ones?<sup>64</sup> Can national courts enforce an on-chain award based on the New York Convention? Can the award be set aside under national arbitration laws? There are many more questions, and for now very few definitive answers, with a fertile ground for legal science and practice to reach them.<sup>65</sup>

Beyond the essential considerations of due process, an additional issue surfaces in blockchain arbitration – including within the Kleros framework. The lack of reasoned decisions poses a significant challenge since parties have no guidance when formulating their arguments. This absence leads to an increase in resource demand in decentralized adjudication over time. The absence of previous case law, provided by traditional courts and tribunals for traditional contracts, means that each dispute must be argued from scratch, with no predictions of how these disputes will be assessed by decision-makers. Regrettably, this leads to increased business costs, contrary to the intended cost reduction through digitalization (Sklaroff 2017, 301–302).

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62 The principle of equal treatment of parties has a rich history and is associated with the right to a fair trial. The principle has its roots in the *Magna Carta Libertatum* from 1215. Today, Art. 18 of the UNCITRAL Model Law is considered as the Magna Carta of arbitral procedure. See Scherer, Prasad, Prokic 2023, 1128–1130.

63 On the conditions in Serbian law, see Stanivuković 2022, 43–44.

64 These two questions are also raised in Scott *et al.* 2022, 9.

65 Moreover, it is questionable whether the prevailing party, having already benefited financially from the arbitration award, would willingly return the gains if the court subsequently annulled the award. If the party resists, a new dispute might have to be initiated, likely in court, undermining the speed and efficiency of dispute resolution. This is a critical question, since arbitrators could potentially place their award on the blockchain, enabling automatic execution of the award through a smart contract mechanism as soon as it is posted and verified on the chain, provided the parties agreed to such terms in their smart contract and deposited the funds or voluntarily provided a cryptographic key.

It remains to be determined whether classical and blockchain arbitration act as alternatives in competition or as cooperative mechanisms. It has been recognized that they serve distinct purposes and address different kinds of disputes, which suggests that they are not in competition. Furthermore, they have the potential to complement each other and enhance the dispute resolution landscape through collaboration. Within this collaborative mood, we see two possibilities for interaction. The first possibility is for on-chain arbitration to function as a preliminary dispute resolution mechanism before engaging in “real” arbitration proceedings. This concept is reminiscent of the recognized multi-tier arbitration clauses. For example, in construction contracts using FIDIC conditions, the process involving the Dispute Avoidance/Adjudication Board (DAAB) acts as an initial phase before progressing to final arbitration; traditional arbitration then provides the conclusive determination of rights and obligations, which can be enforced through state intervention.

Another solution could be the one that has already appeared in practice and was decided by the Mexican court (albeit in the context of domestic arbitration). The claimant initiated proceedings before an arbitrator in classical arbitration, while the arbitration clause stipulated that the arbitrator would refer the parties to settlement before Kleros, through a procedural order. Three jurors were appointed in the manner previously described and rendered a decision in favor of the claimant. Subsequently, the arbitrator incorporated the Kleros decision into the arbitral award and it was enforced before the national court as a domestic arbitral award.<sup>66</sup> Party autonomy is the primary postulate in arbitration and implies that the parties can create the procedure and the way of decision-making up to the limits of the imperative norms of the seat of arbitration. Unquestionably, arbitrators must be careful about the eligibility of the decision to be recognized in the country where the decision is going to be executed, and it remains to be seen how national courts will accept the incorporation of blockchain arbitral awards into the classic arbitral awards in the recognition process. At first glance and with a high level of abstraction, we see no reason why such awards would not have a bright international future.

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<sup>66</sup> For additional details about the case, see Carrera 2022, 16–18.

### 4.3. The Most Suitable Type of Arbitration in Relation to the Value and Complexity of Smart Contract Disputes

As observed so far, blockchain arbitration is not an alternative to traditional arbitration. Both mechanisms should mutually support their legitimacy: the former to address low-value and low-complexity disputes, and the latter to ensure the certain enforcement of the former through its established mechanisms. Smart contract disputes vary in value and complexity. Also, they stem from either hybrid or fully coded smart contracts. Presently, not all types of arbitration are universally appropriate for these disputes. Hence, in the context of this study, we offer a tabular presentation categorizing different dispute groups according to their value and complexity, delineating the most suitable methods for their resolution through arbitration, as a more appropriate means of dispute resolution in comparison to the court system.

<b>Dispute Group No.</b>	<b>Type of the dispute in relation of value and complexity</b>	<b>The most suitable type of arbitration for smart contract disputes</b>
<b>1</b>	High value and high complexity	Classic arbitration without a stipulated deadline for making an award; classic arbitration with a deadline for making an award of at least 6 months
<b>2</b>	High value and low complexity	Classic arbitration with a deadline for making an award of up to 6 months; special rules of arbitral institutions for resolving smart contract disputes
	Low value and high complexity	
<b>3</b>	Low value and low complexity	Special rules of arbitral institutions for resolving smart contract disputes; blockchain arbitration (on-chain)

Table 1.  
The most suitable types of arbitration in relation to the value and complexity of smart contract disputes

The determination of whether a dispute is of high or low value is indeed subjective and may vary significantly based on the perspective of the involved parties. Acknowledging this subjectivity, we omitted the classification of disputes of medium value in the initial grouping, although they could certainly fall within the second category.

In cases where disputes hold substantial value – potentially impacting the businesses of the involved parties – it is unlikely that they would forgo the procedural safeguards developed over centuries, the expertise of arbitrators, and the need for meticulous resolution of the disputes. The maximum that the parties might agree to is setting deadlines for rendering an award, but without excessively speeding up the decision-making process.

In the context of disputes that fall within the second group, parties are unlikely to turn to blockchain arbitration. This reluctance may stem from the substantial value involved, where they seek equivalent procedural assurances and expertise, as is the case with disputes in the first group. Alternatively, the complexity of these disputes might require professional arbitrators instead of unknown decision-makers relying on game theory or similar methodologies. However, when dealing with disputes of either low complexity or value, the speed of resolution becomes crucial.

Finally, disputes from the third group are absolutely suitable to be resolved quickly at low cost, with short deadlines, in order to resolve the unwanted misunderstanding as soon as possible. It is worth noting that the suitability of fully coded smart contracts for complex disputes is also a subject of consideration. As mentioned previously, for contracts demanding flexibility and containing vague provisions, such as good faith, the recommended choice should be the hybrid contract. Fully coded contracts, referred to as smart contracts in the true sense, find optimal use in situations with minimal uncertainty or where monitoring performance would otherwise be excessively expensive, particularly in routine transactions.<sup>67</sup> As a significant portion of these transactions involves low-value transactions, the role of the third category of disputes holds immense significance within this domain.

## 5. CONCLUSIONS

New technologies are reshaping the landscape of business contracting and dispute resolution, potentially revolutionizing these spheres. Among the dispute resolution methods, arbitration stands out as having the highest potential to evolve and meet the demands of users engaging with smart contracts and blockchain technology, serving as an alternative to traditional court proceedings. Despite its numerous advantages, arbitration must

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<sup>67</sup> Sklaroff 2017, 302.

continually adjust and cater to the ever-evolving needs of its users in order to prevent users from seeking an alternative to the already established alternative.

The adaptability of arbitration has already given rise to special institutions or institutional rules for the resolution of disputes arising from smart contracts. There are also special types – blockchain arbitrations, whose enforceability according to the New York Convention is questionable, the issue being whether these platforms can be used under the notion of “arbitration”. Either way, they can be a significant factor in resolving disputes that have so far been off the radar of arbitration and courts. In addition, traditional and blockchain arbitration should cooperate and take advantage of each other. On this occasion, we analyzed which type of arbitration is the most adequate for dispute resolution, according to their value and complexity. This shows that the interests of all the variations of traditional arbitration do not coincide with blockchain arbitration in any segment.

It has been proven that smart contracts and blockchain technology will not prevent disputes – in fact we are not even certain that they will reduce them. Issues that will continue to arise are related to classical contract law, only in a new guise, as well as some new ones. However, this will lead to the need for adjustments to arbitration as we know it today. Apart from speed, efficiency, lower costs and arbitrator specialization, this will increase the need for experts who are well versed in programming, but will not cause arbitrators to stop being lawyers.

Beyond the realm of arbitration, it is up to the entire legal system to work on accepting the new institute with great potential. It is desirable for Serbia to establish itself as a jurisdiction that is supportive and accommodating of smart contracts, in order to be competitive in the digital age. When entering into arbitration agreements, parties should be diligent in selecting a smart contract-friendly jurisdiction as the seat of the arbitration. This becomes even more critical when the contract concerns cryptocurrencies, necessitating a jurisdiction that is favorable for this domain. The careful selection of the arbitration seat and the applicable law in such cases becomes essential to ensure the maximum certainty that the arbitration award can be enforced.

The title of this paper may suggest that the subject is futuristic, however, the “future” it denotes is already upon us. Adjustments to new business practices, contract conclusions, dispute resolutions, and the specialization of arbitrators in these evolving disputes cannot happen soon enough. Gašo Knežević (2006, 123) likened the law to Sleeping Beauty, expressing the view that due to its conservative nature, it tends to lag chronically behind societal changes. Presently, there is an opportunity to look ahead. This forward-

looking perspective will distinguish market participants who leverage the transformations brought by new technologies to their advantage, over those who might miss the opportunities or fail to adapt. This inevitable division arises because not all jurisdictions remain dormant. Lawyers from some countries are actively working to position their jurisdictions as favorable for smart contracts, addressing both the procedural and substantive aspects. Serbia's forthcoming activities in this technological revolution remain uncertain. Will it settle for the major players' table scraps, or will it take advantage of the momentum to claim a seat at that table? Given Serbia's thriving IT climate made by numerous companies, including those dealing with smart contracts, the author remains hopeful that Serbia's future will shine brightly in the midst of the clash between dormant law and tireless technology.

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