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INTELLIGENT CONTRACTS – A NEW GENERATION OF CONTRACTUAL AGREEMENTS?

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1. Introductory thoughts

The fourth industrial revolution that we are witnessing, fundamentally changes the world and almost all areas of our life. The process called digital transformation impacts our work activity and our private life also does not remain intact. In parallel with the 'smarten-up' process, almost all profession undergoes changes to some extent, thereby artificial intelligence (hereinafter referred as to AI) appears and is integrated into the work of lawyers.

The appearance and the impacts of the AI and the digitalisation in the different types of legal work and in the different legal areas and in relation to certain legal institutions, are nowadays examined and analysed by many researches in many ways. The scope of the problems posed and the questions to be answered is extremely colourful and virtually infinite.

Smart contract constitutes the core element of this study. In the first part of the work, we attempt to designate the conceptual framework of smart contract and to collect the main characteristics of this new legal phenomenon. After reviewing the definition problems, we try to find the right place of intelligent contract within the system of the traditional contract law. In the course of this, we outline the different scientific approaches of smart contract. At the same time, we intend to draft all those questions relating to the smart contracts, which shall be answered over time by the legislation and by the contract law regulation.

2. Conceptual framework. Main characteristics and definition problems

During the examination of the different digital technologies' impact on the law of obligations, the appearance and interpretation of the so-called 'intelligent contract' or 'smart contract' and its incorporation into the framework of the classical contract law is one of the most frequently examined areas.

A couple of years ago, the appearance of the conclusion of contract by electronic means brought radical changes in the method of the formation of contract. However, these changes were merely technical, although they raised regulatory questions at the same time. Conversely, *the appearance of smart contracts means not only a new kind of contract conclusion, but a whole new phenomenon in the world*

of contract law, since the application of these contracts based mostly, but not exclusively, on blockchain technology.[1] This latter feature is very important, since it impacts the performance of the contract as well. Indeed, in case of application of this new technology, *the fulfilment of conditions and terms determined in the contract leads automatically to the performance of the contract*. This characteristic of smart contract called *'self-enforcement'* is derived from the technical term *'self-execution'* and the two expressions are used often, and improperly, interchangeably in the literature.[2]

In relation to smart contract, there are basic expressions which shall be explained. First of all, the term 'blockchain' deserves clarification. *Blockchain* is a kind of 'distributed ledger technology' (DLT), which, in order to distribute values and information, allows to establish a peer-to-peer (P2P) relationship between parties who are geographically absent or who less trust each other. Despite the fact that blockchain is typically public, it is able to proof satisfactory transactions, without the need for involving of an intermediary due to the different cryptographic processes.[3]

By the application of blockchain technology, not only different asset movements, but the conclusion and fulfilment of contract, as well as the tracking of its phases and the processing of different data takes place entirely by computer encryption.[4]

Determining the *conceptual framework of smart contract* is not an easy task, since *it does not have a generally accepted, universal definition*.[5, 6] At first sight, it

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1 The operation of smart contracts mostly, but not always, based on the blockchain technology. However, there are other platforms, e.g. the Hungarian developed TrustChain, which ensures the online conclusion of contract, but it is not based on blockchain technology. About the TrustChain see: www.trustchain.com

2 About this problematic see MIK, Eliza: Smart Contracts: A Requiem. *Journal of Contract Law*, Vol. 36, 2019, Part 1 (hereinafter referred as MIK [2019]), p. 70.

3 DE FILIPPI, Primavera – WRIGHT, Aaron: *Blockchain and the Law: The Rule of Code*. Harvard University Press, 2019, pp. 13–14.

4 The functioning of blockchain technology is not reviewed in detail within this study. About the detailed elaboration of the topic see GLAVANITS, Judit – KIRÁLY, Péter Bálint: A blockchain-technológia alkalmazásának jogi előkérdései: a fogalmi keretek pontosításának szükségessége. *Jog – Állam – Politika*, 2018/3, pp. 173–183; SZUCHY, Róbert: A blockchain technológia alkalmazása a kötelmi jogban. In: CERTICKY, Mário (ed.): *Innovatív magánjogi megoldások a társadalmi-gazdasági haladás szolgálatában*. Miskolc, 2020, pp. 75–83; CSITEI, Béla: *Okos szerződések*. Opuscula Civilia, 2019, https://antk.uni-nke.hu/document/akk-copy-uni-nke-hu/Opuscu la_Civilia_2019_Csitei_Bela.pdf (Date of download: 18 March 2020).

5 Cf.: DE CARIA, Riccardo: The Legal Meaning of Smart Contracts. *European Review of Private Law*, 2019/6, pp. 731–752, p. 735.

6 Although the fact that smart contract does not have a general, worldwide accepted definition, there are countries, where a regulation was adopted which recognise the application of blockchain technology and smart contract, and, at the same time, to a certain extent, it designates the conceptual framework of these contracts. For instance, several

can be surprising, since the topic of smart contract is one of the most frequented and most researched area within the researches in the borderlines of computer science, digitalisation trends, AI and jurisprudence. Nevertheless, the lack of definition can be traced back to various causes.

a) Although the expression 'smart contract' has already been present for more than two decades in the public consciousness[7], it appears as a relatively new phenomenon in the present contractual practice, inasmuch as it came to the forefront of the attention of legal professionals interested in computer science and programming, only in the last few years, due to the spread of bitcoin and blockchain technology. Additionally, it should be mentioned that the original meaning of the expression at the time of its first use by *Nick Szabó*, is not identifiable with all those elements, which the not strictly limited concept of smart contract covers.
b) When defining the notion of intelligent contract, the complexity of the technology upon which the functioning of this contract is based also causes difficulties, since *the proper conceptual delineation of smart contract is not possible without the thorough knowledge of blockchain technology*. Creating the concept of intelligent contract requires at least a minimum knowledge and understanding of the information technology operating behind the contract. However, such a knowledge and perception means a major challenge for average legal professionals having only user-level computer skills. It is an additional difficulty that the denomination 'smart contract' is basically created and used by IT specialists. According to their conception, smart contract is merely a computer protocol, which has no real legal relevance. This is the reason, why the expression 'smart contract' appears in clarified form in the foreign-, mostly English-language literature. *'Smart contract code'* means the contract in the IT sense mentioned above, while the expression *'smart legal contract'* is used for analysing the topic from a legal perspective.[8] Nevertheless, the term 'smart legal contract' also can be used in two ways: it can be interpreted as contract or as a

states of the USA, e.g. Arizona, Deleware, Nevada, Ohio, Tennessee, Wyoming have rules on smart contract. Cf. CATCHLOVE, Paul: *Smart Contracts: A New Era of Contracts Use*, https://papers.ssrn.com/sol3/papers.cfm?abstract _id=3090226 (Date of download: 17 March 2020).

7 The expression was used at first by Nick Szabó. He defined smart contract as *'[a] set of promises, including protocols within which the parties perform on the other promises. The protocols are usually implemented with programs on a computer network, or in other forms of digital electronics, thus these contracts are "smarter" than their paper-based ancestors. No use of artificial intelligence is implied.'* L. SZABO, Nick: *Smart Contracts: Building Blocks for Digital Markets*, http://www.fon.hum.uva.nl/rob/ Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart_contracts_2.html (Date of download: 6 January 2020).

8 Cf. STARK, Josh: *Making Sense of Blockchain Smart Contracts*, https://www.coindesk.com/mak ing-sense-smart-contracts (Date of download: 2 March 2020).

method to perform an already existing contract.[9] In this latter sense, smart contract is not a contract, but a tool, through which a contract is performed. An alternative view is that 'smart legal contract' is a combination of the 'smart contract code' and traditional legal language.[10] According to smart legal contract *Durovic* and *Janssen* apply a further typing regarding the fact, if the given contract is concluded *off-chain* or *on-chain.*[11] In the former case, data are stored in the chain in itself. In case of off-chain smart contracts, information is stored in various forms off the blockchain.[12]

Briefly, due to all factors mentioned above, it is not possible to speak about a general and universal concept of smart contract. Nevertheless, several *definition attempts* appear in the quite rich and expanding literature relating to the topic. A typical feature of these definitions that, instead of the conceptual delimitation of smart contract, *they identify and highlight the main characteristics* of the construction, seeking to draw the borders of this construction, while designating the conceptual framework of intelligent contract is not an aim in itself. This kind of work is absolutely necessary to make remarks and to draw conclusions regarding the relationship existing between smart contracts and traditional contract law. Moreover, based on all these, it becomes possible to make recommendations and, in a given case, to designate the directions of the transformation of contract law, triggered by technological development. However, beyond the relative precise designation of conceptual framework and the creation of the logical closure, *the definition method shall* also *be flexible*. It means that *the scope of the concept shall be 'moveable' in order to be able to adapt itself later to the relatively fast-changing technological environment*, upon which the operation of intelligent contracts is based.

Thanks to the particularly high level of attention for the different issues of intelligent contracts and to the quantity of studies published recently, the number of definition attempts is practically endless. Therefore, giving a complete picture of these various, sometimes more, sometimes less complex definitions seems hardly

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9 FINOCCHARIO, Giusella – BOMPREZZI, Chantal: A legal analysis of the use of blockchain technology for formation of smart legal contract. *Rivista di diritto dei media*, 2020/2, pp. 111–135, p. 116

10 Cf. DJAZAYERI, Alexander: Rechtliche Herausforderungen durch Smart Contracts. *jurisPR-BKR*, 2016/12; KAULARTZ, Marcus: Herausforderungen bei der Gestaltung von Smart Contracts. *Zeitschrift für Innovations- und Technikrechts*, 2016/1, pp. 201–206, p. 205; DUROVIC, Mateja – JANSSEN, André: The Formation of Blockchain-based Smart Contracts in the Light of Contract Law. *European Review of Private Law*, 2019/6, pp. 753–772, p. 756.

11 DUROVIC – JANSSEN: op. cit. p. 760.

12 About the technological background, advantages and disadvantages of on-chain and off-chain data storage see HEPP, Thomas –SHARINGHOUSEN, Matthew – EHLET, Philip – SCHOENHALS, Alexander – GIPP, Bela: On-chain vs. off-chain storage for supply- and blockchain integration. *Information Technology*, 2018/5–6, pp. 283–291, p. 284.

possible. Regarding this, some potential definition of smart contract will be presented, without being exhaustive.[13]

If we designate the conceptual borders of the intelligent contract, we are given more options. *From the technical point of view, intelligent contract is a kind of computer protocol*, which, by the application of blockchain technology, executes itself automatically, without the contribution of any other actor or intermediary. [14] In addition, the transaction is automatically registered in a distributed database. With regard to this latter feature, these blockchain-based contracts are often called in the practice *'decentralised intelligent contract'*.[15] According to another approach, *smart contract is an agreement incorporated into digital form, which executes and enforces itself*[16]; it is an objective and infallible computer program, which establishes, performs and enforces the agreements.[17]

A further definition considers that *smart contract are computer programs* of a new type, which are independent from a central operator and which are able to make the contract, in whole or in part, self-executing by transforming the contract terms to computer code.[18]

According to the simplest and briefest phrasing, *smart contract is a self-executing agreement*.[19]

After reviewing the sometimes simpler, sometimes complicated wordings of intelligent contract, it is clear that there is a common characteristic which is included in every definition: all of them contain the *self-executing nature of the contract* which can be deem as the *key feature of smart contract*. *Self-enforceability* and *tamper-proof nature* can be identified as *further essential features* of the intelligent contract. Tamper-proof enforcement means that smart contract cannot be stopped or modified, which raises several problems opening numerous further examination directives and possibilities which are not to be discussed within the framework of this study. [20]

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[13] In his previously referred work *De Caria* collects several definition attempts of smart contract. See DE CARIA: op. cit. p. 735.

[14] DE FILIPPI – WRIGHT: op. cit. p. 33; WOEBBEKING, Maren K.: The Impact of Smart Contracts on Traditional Concepts of Contracts Law. *Journal of Intellectual Property, Information Technology and E-Commerce Law*, 2019/1, pp. 106–113, p. 107.

[15] DE CARIA: op. cit. p. 733.

[16] WERBACH, Kevin – CORNELL, Nicolas: Contracts Ex Machina. *Duke Law Journal*, 2017/2, pp. 313–382, p. 320.

[17] MIK, Eliza: Smart contracts: terminology, technical limitations and real world complexity. *Law, Innovation and Technology*, 2017/2, pp. 269–300 (hereinafter referred as MIK [2017]) p. 270.

[18] ROHR, Jonathan – WRIGHT, Aaron: Blockchain-Based Token Sales, Initial Coin Offerings, and the Democratization of Public Capital Market. *Hastings Law Journal*, 2019/2, pp. 463–524, p. 473. Cited by GLAVANITS – KIRÁLY: op. cit. p. 180.

[19] RASKIN, Max: The Law and Legality of Smart Contracts. *Georgetown Law Technology Review*, 2017/2, pp. 306–341, p. 306.

[20] About the elaboration of this topic see MIK [2017] pp. 283–284 and CLACK, Christopher – BAKSHI, Vikram A. – BRAINE, Lee: *Smart Contract Templates: foundations, design*

If smart contract is approached from the point of view of the traditional contract law, it shall be noted that *it cannot be deemed as a specific type of contract*, just like the different groups and contract types existing and regulated by national laws. Instead, *smart contract* can be perceived as *an improved, 'upgraded', AI-supported version of the formation of contract by electronic means.* Smart contract is *independent from the type of contract*, therefore it ensures for contracting parties to conclude and perform their contract online, fully virtually, without personal meeting, using the guarantees ensured by the blockchain technology.

Smart contract is practically 'type-independent', as it, in theory, can appear in any form of contract types. Nevertheless, it should be added that there are and always be contracts, which would not be or less appropriate or which do not arise the demand for smart contracting.

Regarding the appearance, *smart contract always shows the contract terms in translated form, i.e. as a computer code*. In some cases, smart contract appears exclusively in encoded and encrypted form. In other cases, smart contract is the encoded version of a traditional contractual document. However, there are other cases, where intelligent contract combines the two form and appears as a hybrid which contains together the elements of the traditional contract and the computer code.[21] Regardless the form of smart contracts, the most important characteristic are their irrevocability (finality) and automation.[22]

In the case, if contractual partners conclude an intelligent contract, both *the performance and the enforcement of the contract is ensured by an unchangeable computer code by using blockchain technology*.[23] Such a contractual construction allows contractual parties to rely exclusively on the blockchain technology, instead of establishing and strengthening the mutual trust. In such a case, parties let the performance of contractual obligations fulfil via blockchain technology, irrespective of whether changes occurred after the conclusion of the contract either in the external circumstances or in the parties' attitude to the contract or each other, their intention, motivation or goals to be reached by the conclusion of the contract.

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landscape and research directions. http://www.resnovae.org.uk/fccsuclacuk/images/article/sct2016.pdf, (Date of download: 19 March 2020), p. 4.

21 CIEPLAK, Jenny – LEEFATT, Simon: Smart Contracts: A Smart Way to Automate Performance. *Georgetown Law Technology Review*, 2017/2, pp. 417–427, p. 418.

22 SZCZERBOWSKI, Jakub J.: Place of smart contracts in civil law. A few comments on form and interpretation. *Proceedings of the 12th Annual International Scientific Conference: New Trends 2017 – New Trends in Economics*, Management, Marketing and Public Administration, Znojmo, pp. 333–338, p. 333; RASKIN: op. cit. p. 306.

23 SAVELYEV, Alexander: *Contract law 2.0:* 'Smart' contracts as the beginning of the end of classic contract law. *Information & Communications Technology Law*, 2017/2, pp. 116–134.

3. The place of intelligent contracts in traditional contract law

Before finding the right place of intelligent contract within the system of the traditional contract law, two basic question shall be answered. First, it shall be discussed, if these contracts are really intelligent, really smart. It is evident that these attributes are not to be taken literally.[24, 25] Moreover, it is also important to see that a smart contract goes much further than a kind of digitalized contract conclusion. The denomination of the legal institution is also misleading: it suggests that the use of artificial intelligence is essential in the operation of the contract, while it is not true.[26] In general, a given contract shall be deemed as intelligent, if it is able to communicate with another computer protocol.[27] Smart contracts based on blockchain technology fulfil this criterion.

Secondly, it is also a question, if clauses existing in encoded form as computer protocols can be deemed in classical contract law approach as a contract which includes the consent of the contracting parties or not.
The answers to questions asked above are quite diverse. There is a sense, for instance, in which the expression 'intelligent contract' is a mere habit, since these constructions are neither smart, nor contract.[28]

In their co-written study, *Werbach* and *Cornell* do not dispute that intelligent contract can be deemed as contract[29], but, at the same time, they draw attention to the fact that the legal enforceability of the agreement is an important question which must be examined in order to assess the legal nature of smart contract. According to Werbach and Cornell, with the application of smart contracts, contracting partners probably intend to avoid the legal enforcement of the contract, since the automation of performance precludes or, at least, minimises the possibility of breach of contract by either of the parties.[30] For this reason, they conclude that

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[24] MÜLLER, Lukas – SEILER, Reto: Smart Contracts aus Sicht des Vertragsrechts. Funktionsweise, Anwendungsfälle und Leistungsstörungen. *Aktuelle Juristische Praxis*, 2019/3, pp. 317–328, p. 318.

[25] DE CARIA: op. cit. p. 736.

[26] Cf. DE CARIA: op. cit. p. 737. It is important to note that opposing views also exist in the relating legal literature. Most them emphasise that the use of AI is one of the essential elements of the concept of intelligent contract. See O'SHIELDS, Reggie: Smart Contracts: Legal Agreements for the Blockchain. *North Carolina Banking Institute*, 2017/3, pp. 177–194; SCHOLZ, Lauren Henry: Algorithmic Contracts. *Stanford Technology Law Review*, 2017/2, pp. 128–169.

[27] CARRON, Blaise – BOTTERON, Valentin: How smart can a contract be? In: KRAUS, Daniel – OBRIST, Thierry – HARIP, Olivier (eds.): *Blockchains, Smart Contracts, Decentralised Autonomous Organisations and the Law*. Edward Elgar Publishing, Cheltenham – Northampton, 2019, pp. 101–143, p. 109.

[28] Cf. GRIMMELMANN, James: All Smart Contracts are Ambiguous. *Journal of Law & Innovation*, 2019/1, pp. 1–22.

[29] WERBACH – CORNELL: op. cit. p. 339.

[30] WERBACH – CORNELL: op. cit. p. 339.

intelligent contracts still not can be deemed as contract in the traditional sense, but they are more like a 'gentlemen's agreement', which is informal and typically has no legal binding force, therefore it cannot be enforced in a judicial proceeding.[31]

The arguments put forward by Werbach and Cornell, definitely reflects the approach of the Anglo-Saxon contract law. Nevertheless, we presumably come to a different conclusion, if we intend to examine the legal nature of smart contract on the basis of continental contract law. In this approach, legal enforcement is an essential element of contract[32]; in the lack of enforceability, the given legal relationship is 'natural obligation' which the debtor may perform, but the performance of which cannot be required by the creditor. If smart contract is considered as contract in legal sense, it shall also be assumed that legal enforceability relates to it. However, it is important to note that in case of smart contract, the non-applicability of a judicial proceeding, i.e. the lack of legal enforceability, is due to the fact that the automated performance of contract theoretically does not arise any problem or does not raise a dispute.

At present, the question of legal enforceability of smart contract remains unanswered yet, since it needs for further discussion. Nonetheless, in the course of answering, it will be crucial, how the smart contract appears, is there a traditional contract prior to it or the contractual parties' intention is recorded only in encoded form.

4. In case of comparing smart contract with traditional contract, the difference between the two legal institutions is apparent.[33] From legal viewpoint, the appearance of the contract is an existing, but less relevant difference. Thus, in case of a smart contract contractual terms do not appear in tangible form, e.g. as a written document, but in computer code. According to contract law, contractual parties are free to choose the manner of expressing their contractual intention; they can choose written or oral form or they can express their intention by conduct which can be regarded as the equivalent of a statement. Though smart contracts are, by definition, written in code, it is a question, if this way of expressing the contractual intention can be deemed as written form. As *Eliza Mik* noticed, the source of the parties' rights and duties is the agreement itself, not words or documents.[34] *Finocchario* and *Bomprezzi* emphasize that regarding the national civil laws and the European and international model rules, in the silence of law, parties are free to choose any form to conclude their contract. According to this, they can conclude their contract by electronic means which covers the expression of intention in the form of a computer code as well.[35]

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[31] About the question of enforceability see DUROVIC, Mateja – LECH, Franciszek: The Enforceability of Smart Contracts. *The Italian Law Journal*, 2019/2, pp. 493–511.

[32] VÉKÁS, Lajos: *Szerződési jog. Általános rész.* ELTE Eötvös Kiadó, Budapest, 2016, p. 21.

[33] In their co-written work, *Stefan Grundmann* and *Philipp Hacker* review and analyse the differences between smart contracts and traditional contracts. See GRUNDMANN, Stefan – HACKER, Philipp: Digital Technology as a Challenge to European Contract Law – From the Existing to the Future Architecture. *European Review of Contract Law*, 2017/3, pp. 255–297.

[34] MIK [2019] p. 70.

[35] FINOCCHARIO – BOMPREZZI: op. cit. p. 117.

Agreeing with the assessment of Mik, Finocchario and Bomprezzi, it also should be emphasized that it is a further question, how smart contracts meet other formal requirements (e.g. notarisation of the agreement) provided by national laws for a legally binding agreement.

Actually, the seemingly almost irrelevant feature of contract, i.e. its real appearance, is of paramount importance, since this element ensures the self-executive, automatic performance of the contract. Regarding the performance of the contract, this characteristic is relevant from a legal point of view, which reflects a completely different approach compared to the logic of traditional contract law. Classical contract law mainly aims at treating the losses and injuries suffered by the contractual parties in relation to their contracts. Conversely, in case of application of smart contract, contractual parties, by the automation of performance, preclude the possibility of the breach of contract by either of them, overshadowing the above mention function of traditional contract law.[36]

According to this characteristic of smart contracts, *Raskin* brings an illustrative example in his relating work, when he compares the contractual parties to Ulysses who had himself tied to the mast of the ship to be able to resist the deadly seduction of Sirens.[37, 38] Although the different factors impacting the existence and performance of contract do not mean mortal danger neither the contractual parties, nor the contract, the parallelism drawn by Raskin can be right. Contractual parties, indeed, commit themselves *ex ante* to comply with the terms stipulated in their contract and, at the same time, avoiding the occurrence and the legal consequences of the breach of contract by either of them. Considering the aspect of contractual law, the course of contractual phases[39] is incomplete in case of intelligent contract, since the phase of breach of contract lefts out due to the exclusion of future occurrence of both parties' breach of contract. In other words, the 'life cycle' of a smart contract is shorter, since it comes to an end by the performance of the contract, which is automatic due to the computer encoding.[40]

5. Relating to the application of smart contracts, fully automation means the main problem. Nevertheless, the amendment of contract is no less problematic, since it is, in theory, also precluded.[41] Smart contracts are less flexible than agreements fixed on paper. After the conclusion and the encoding of the contract, parties have no opportunity to make any amendment in their contract. The contract runs to completion, to the programmed 'expiration date' without external intervention and regardless any external circumstance, and, without reacting to any of them.[42]

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36 WERBACH – CORNELL: op. cit. p. 318.

37 HOMER: *Odyssei*, Book XII, 39–52.

38 RASKIN: op. cit. p. 309.

39 VÉKÁS, Lajos: op. cit. p. 77–79.

40 About this topic see SILLABER, Christian – WALTL, Bernhard: Life Cycle of Smart Contracts in Blockchain Ecosystems. *Datenschutz und Datensicherheit*, 2017/41, pp. 497–500.

41 CLACK – BAKSHI – BRAINE: op. cit. p. 4.

42 MIK [2017] p. 281.

The amendment of contract is only possible, if parties, at the time of the conclusion of the contract, include the potential future amendments (e.g. indexation clause, payment deferment, moratorium, etc.) into their agreement. Therefore, these clauses are to be also encoded and automatically executed if the prescribed conditions fulfilled. Nevertheless, since parties are not able to anticipate and cover every situation, there will always be such external circumstances arising after the conclusion of the contract, which would impact the existing contract, but cannot be treated at all because of the intelligent nature of the contract.

From programming aspect, it is practically impossible to insert into the contract such a 'sensitive' command, which is able to handle unforeseeable changes in circumstances occurring after the conclusion of the contract, since the potential consequences of these changes are very diverse and therefore these potential outputs cannot be fully programmed.[43]

6. As it was mentioned before, there are also cases, where smart contract is linked to the contract in the traditional sense. Broadly speaking, two different methods are imaginable. In the first case, contract is concluded in traditional way, but this legally binding agreement will be later transformed into computer codes by the use of the technology built-in the smart contract. This action allows the application of blockchain technology and the performance of the contract will be automatized. In this case, the smart contract can appear in two roles. It is possible that it only provides support for the performance of the contract by the blockchain technology, i.e. it makes the payment transparent and safer. However, it is also possible that the contract transformed to computer code is wholly performed by the intelligent contract.[44]

In the above mentioned cases, the existence and operation of a smart contract is necessarily preceded by the conclusion of a traditional contract. Therefore, in these cases, *smart contract is nothing but the dematerialisation of the latter*. Nevertheless, there are cases, where smart contract does not appear as the computerised manifestation of the traditional contract, but the contractual parties conclude their contract from the beginning in coded form, without defining their contractual intention, rights and duties in understandable terms, in legal language. In these cases, the relationship between the contractual parties is exclusively regulated by the smart contract, i.e. both offer and its corresponding acceptance are made in encoded form by the blockchain, which records and stores the agreement of the parties.[45] From that moment, smart contract is not a mere computer code, but a real and binding contract ('smart legal contract'), which establishes rights and duties for the contracting parties. In this regard, intelligent contract is the platform facilitating the conclusion of the contract. However, the mere fact that the contract is concluded

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[43] The in-depth elaboration of the question see CARRON – BOTTERON: op. cit. p. 120–121.

[44] CARRON – BOTTERON: op. cit. pp. 111–112.

[45] CARRON – BOTTERON: op. cit. p. 113.; JACCARD, Gabriel: *Smart Contracts and the Role of Law*, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3099885 (Date of download: 3 February 2020) p. 22.

exclusively in this form, via internet, arises the appropriate protection of the offeree who typically does not have IT expertise, but user-level computer skills.

7. Closely linked to this latter topic, it also shall be examined, how a 'non-expert', i.e. a person having only average computer knowledge can participate in the negotiations prior to the conclusion of the contract and in the preparation of the draft agreement and its assessment. Actually, in the lack of technological knowledge, contractual parties have to rely on a third party, a computer specialist, a programmer who transforms the traditional contract into an intelligent contract. This moment requires for a special confidence from the parties. This case is similar to the situation, where, because of the use of legal terms, a client has problems with the understanding of the language of the contract and therefore he needs for the explanation of these terms by a lawyer. As it was said, the situation is similar but not the same as in case of a smart contract, where the client having no programming knowledge practically is in complete darkness concerning the content of the contract, even if the given smart contract was made in the simplest programming language. Precisely for this reason, it is common in the practice that contractual parties ask the programmer to declare that the smart contract appearing in encoded form and made by him complies with the expressed intention of the contracting parties, and, it contains the terms and conditions envisaged by them.

The involvement of the third person, the IT expert, into the process of contract conclusion, which is needed because of the technological incompetence of the parties, is not only a question of confidence, but arises further questions relating to liability. There may be situations in which the non-performance of the contract is dues to programming error. A situation can also arise, where the intelligent contract does not fully cover, does not express faithfully the parties' intention, because the contractual parties did not tell it with sufficient precision to the IT expert preparing the smart contract.[46] It is also problematic, how a situation should be assessed, where a smart contract made by a programmer is to be used by the parties for unlawful purpose.[47] All three situations arise liability questions which cannot be answered yet, since the regulation of smart contract is controversial and it generates quite a lot of problems at this time.

8. Closing remarks

According to the American futurist, Martin Ford, we are not at the beginning of the development of information technology, but, in a short time, we get to the steep section of the exponential curve. The events accelerate and the future can arrive long before we could prepare for it. Digitalisation and the fourth industrial revolu-

[46] The explanation of this topic see HOFFMANN, Thomas: Smart Contracts and Void Declarations of Intent. In: PROPER, Henderik A. – STIRNA, Janis. (eds.): *Advanced Information Systems Engineering Workshops. CAiSE 2019. Lecture Notes in Business Information Processing*, Springer, Cham, pp. 168–175.

[47] SAVELYEV: op. cit. p. 20–21.

tion open new perspectives which we could not imagine before. New constructions appear, which make us uncertain and arise a number of questions.

Ford's thought above can be especially true, if we compare the particularly rapid tempo of the technological development to the circumstantial and quite slow process of the legislation which would react to the technological development and which would designate the regulatory framework. However, legal regulation does not exist in itself, but always has its own purpose. Therefore, legislators are under the duty to react to the regulation demands arisen due to the technological development, and, to modernise the existing legal regulation to the extent necessary.

The achievements of the modern age affect all areas of the law. Due to the spreading of the Internet, almost all segments of life changed. These changed situations requires for the amendment of the existing rules, or for the adoption of new provisions if a relating regulation did not exist before.

At the beginning of the 2000s, a process started in the field of private law, particularly in contract law, which resulted in the gradually development of rules on the electronic commerce. Accordingly, provisions on contracts concluded by electronic means also appeared including special consumer protection rules. Nevertheless, the development process did not stop at this point. The spreading of digital tools forced the legislators to face up with new challenges. It soon became clear that contracts on these tools need more detailed rules. In 2019, two directives were adopted under the auspices of the European Union[48], which can be understood as an answer to the above mentioned regulatory demands, since these legal acts contain express rules on the digital content and digital services and the supply of digital services.

The expanding of contracts for the supply of digital content or digital service is a major challenge for national legislators, particularly in case of cross-border online contracts. Similarly, it is also a difficult situation for legislators, when the demand for amending an already existing regulation or for creating new rules are not arisen by the specific subject-matter of contract, but the new method of contract conclusion.

Concluding a contract by electronic mean is an ordinary phenomenon today. Nevertheless, the conclusion of contract via Internet enters another dimension when electronic mean joins to cryptography, another achievement of technological development. In these cases, it is possible that a given contract exists only in the form of computer code. In some way, intelligent contracts mark a new phase, practically the end of the development of contract conclusion by electronic means. Nonetheless, due to the involvement of a new element, i.e. cryptography, these

[48] Directive (EU) 2019/770 of the European Parliament and of the Council of 20 May 2019 on certain aspects concerning contracts for the supply of digital content and digital services, OJ L 136, 22. 5. 2019, pp. 1–27.; Directive (EU) 2019/771 of the European Parliament and of the Council of 20 May 2019 on certain aspects concerning contracts for the sale of goods, amending Regulation (EU) 2017/2394 and Directive 2009/22/EC, and repealing Directive 1999/44/EC, OJ L 136, 22. 5. 2019, pp. 28–50.

contracts are completely different from any other previously known and used solutions of contract conclusion.

The use of intelligent contracts starts from the idea that the transformation of traditional agreements to computer codes and their storing in blockchain make the contracts tamper-proof, self-executive and self-enforcing. Application of smart contracts bring numerous benefits. By the exclusion of human routine tasks and intermediaries, process of contract conclusion becomes less risky and more cost-effective at the same time. On the other hand, due to the use of artificial language, these contracts are always univocal, while traditional contracts carrying several uncertainties because of the use of human language.[49] Though the widespread use of intelligent contracts offers several opportunities, their real application, due to its nature, is limited in several ways. Moreover, the application of this contracting method is also restricted by the regulatory environment in force.[50]

There can be no question that the appearance of blockchain technology and intelligent contract based on this technology revolutionize the contractual practice. Nevertheless, the expansion of their application requires for the soon revision of the existing regulatory framework and the contract law rules. In some countries, for instance in certain states of the USA, the elaboration of a legal regulation on intelligent contracts has already started or the relating provisions have already been adopted. On the contrary, the legal status of smart contracts is still uncertain in the jurisprudence, which makes more difficult for the national legislators to create their own rules on smart contracts. Though the appropriate application of the legal provisions in force can be a solution, it is unsatisfactory, since smart contracts arise constantly new questions in the practice.

During the examination of intelligent contracts, often raises the question whether the law, particularly contract law, shall react to such a construction, which is so far from the thinking of lawyers and other professionals having legal knowledge.

There is no doubt that law shall reckon with the massive expansion of intelligent contracts and, shall answer in the future to the difficult questions raised by them. One of these questions, if smart contracts can replace traditional contracts, i.e. can smart contract appear as a real alternative of traditional contract over time. Answering these questions may be too soon, even if we know that the future is happening now. However, one thing is certain: the appearance of intelligent contracts and their online conclusion in encoded form opens a new era of contract law, where all of us have to learn how to manage our life.

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[49] That conclusion is contradicted by *James Grimmelmann*. See GRIMMELMANN: op. cit. pp. 20–21.

[50] SZUCHY: op cit. 82.