

## The Formation of Blockchain-based Smart Contracts in the Light of Contract Law

Mateja DUROVIC\* & André JANSSEN\*\*

**Abstract:** This contribution examines the formation of (blockchain-based) smart contracts. The term smart contract is used to refer to software programmes which are often, but not necessarily, built on blockchain technology as a set of promises, specified in digital form, including protocols within which the parties perform on these promises. It is regularly said that smart contracts are neither legal contracts in the traditional sense nor they are smart and that the term is therefore a misnomer. The crucial question this article is trying to answer is whether the traditional common law concept of contract formation is seriously challenged by the rise of smart contracts. As such, are smart contracts marking the end of contract formation as we know it or is it just much ado about nothing?

**Résumé:** Cette contribution examine la formation de contrats intelligents (basés sur la blockchain). Le terme de contrat intelligent est utilisé pour faire référence aux programmes de software qui sont souvent, mais pas nécessairement, conçus sur la technologie de la blockchain comme un ensemble de promesses, spécifiées sous forme digitale, comprenant des protocoles au sein desquels les parties accomplissent ces promesses. On a souvent dit que les contrats intelligents ne sont ni des contrats juridiques au sens traditionnel ni intelligents et que le terme est donc inapproprié. La question cruciale à laquelle le présent article tente de répondre est de savoir si le concept traditionnel dans la common law de la formation du contrat est sérieusement mis au défi par l'arrivée des contrats intelligents. Comme tels, les contrats intelligents marquent-ils la fin de la formation des contrats telle que nous la connaissons ou ne s'agit-il finalement que de 'beaucoup de bruit pour rien'?

**Zusammenfassung:** Dieser Beitrag untersucht den Abschluss von (Blockchain-basierenden) Smart Contracts. Der Begriff Smart Contract wird verwendet, um Software-Programme zu bezeichnen, die oft, aber nicht notwendigerweise, auf Blockchain-Technologie als eine Reihung von vertraglichen Verpflichtungen basieren, die in digitaler Form spezifiziert werden, einschließlich Protokollen, innerhalb derer die Parteien diese Verpflichtungen erfüllen. Es wird regelmäßig statuiert, dass Smart Contracts weder rechtliche Verträge im herkömmlichen Sinne, noch 'smart' sind und dass der Begriff daher eine Fehlbezeichnung sei. Die entscheidende Frage, die dieser Beitrag zu beantworten versucht, ist, ob das traditionelle Konzept des Vertragsschlusses im Common Law durch die Einführung von Smart Contracts ernsthaft bedroht wird. Sind Smart Contracts also das Ende des Vertragsschlusses, wie wir sie kennen, oder ist es am Ende nur viel Lärm um nichts?

---

\* Lecturer in Contract and Commercial Law, Dickson Poon School of Law, King's College London.

\*\* Chair Professor of Civil Law and European Private Law at the Radboud University Nijmegen. We would like to thank JASON BOND LO for the revision of the final draft of this contribution. The final version of this contribution was submitted on 30 September 2018.

## 1. Introduction

1. This contribution concentrates on the formation of (blockchain-based) smart contracts. The crucial question to be answered here is whether the traditional common law concept of contract formation is seriously challenged by the rise of smart contracts. Therefore, are smart contracts marking the end of contract formation as we know it or is it just much ado about nothing? This is the question this contribution is trying to answer.

This article would firstly explain briefly what are smart contracts. Secondly, it would move to the relationship between the evolution of the blockchain technology and the rise of smart contracts. Next, the blockchain-based smart contracts and the process of contract formation are discussed and exemplified. Then the article would evaluate the compatibility of smart contracts with the existing law of contract formation. It ends with a short conclusion.

## 2. What Are Smart Contracts?

2. The main threads of argument regarding smart contracts in the legal scholarship seem to be whether or not they are contracts in the legal sense, whether they are a disruptive innovation in the legal system, their benefits and potential threats. That being said, the *legal* scholarships on aforementioned remain scarce compared to the impact of smart contracts might have in the future even though the legal literatures on aforementioned are growing quickly recently.<sup>1</sup> There is a multitude of

---

1 The following contributions are dealing exclusively or at least partly with the legal aspects of smart contracts: A. BÖRDING, T. JÜLICHER, C. RÖTTGEN & M. VON SCHÖNFELD, 'Neue Herausforderungen der Digitalisierung für das deutsche Zivilrecht: Praxis und Rechtsdogmatik', *Computer und Recht (CR)* 2017, pp 134-140; S. BOURQUE & S. FUNG LING TSUI, *A Lawyer's Introduction to Smart Contracts* (Lask: Scientia Nobilitat, 2014), p 4-23; C. BUCHLEITNER & T. RABL, 'Blockchain und Smart Contracts', *ecolex* 2017, p 4-14; A.J. CASEY & A. NIBLETT, 'Self-Driving Contracts', 43. *Journal of Corporation Law* 2017, pp 1-33; P. CATCHLOVE, *Smart Contracts: A New Era of Contract Use*, SSRN.com/abstract=3090226; A. DJAZAYERI, 'Rechtliche Herausforderungen durch Smart Contracts', *jurisPR-BKR* 12/2016, no. 1; M. FINCK, 'Blockchains: Regulating the Unknown', 19. *German Law Journal* 2018, pp 665-691; N. GUGGENHEIM, 'The Potential of Blockchain for the Conclusion of Contracts', in R. Schulze, D. Staudenmeyer and S. Lohse (eds), *Contracts for the Supply of Digital Content: Regulatory Challenges and Gaps* (Baden-Baden: Nomos, 2017), pp 83-97; J. I-H HSIAO, 'Smart Contract on the Blockchain-Paradigm Shift for Contract Law', 14. *US-China Law Review* 2017, pp 685-694; C. JACOBS & C. LANGE-HAUSSTEIN, 'Blockchain und Smart Contracts: zivil- und aufsichtsrechtliche Bedingungen', *IT-Rechts-Berater (ITBR)* 2017, pp 10-15; M. JÜNEMANN & A. KAST, 'Rechtsfragen beim Einsatz der Blockchain', *Kreditwesen* 2017, pp 531-536; M. KAULARTZ & J. HECKMANN, 'Smart Contracts - Anwendung der Blockchain-Technologie', *Computer und Recht (CR)* 2016, pp 618-624; M. KAULARTZ, 'Herausforderungen bei der Gestaltung von Smart Contracts', *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, p 201-206 (in the following cited as M. KAULARTZ (I)); M. KAULARTZ, 'Die Blockchain-Technologie: Hintergründe zur Distributed Ledger Technology und zu Blockchain', *Computer und Recht (CR)* 2016, p 474-480 (in the following cited as M. KAULARTZ (II)); E. MIK, 'Smart Contracts: Terminology, Technical Limitations and Real

documents on how smart contracts work or what they are, especially on blockchain or bitcoin-devoted forums. However, they normally do not offer an in-depth analysis of the legal issues. Smart contracts definitely raise interesting questions about their legal nature. It is often only said that the existing smart contracts are neither particularly smart nor they are even strictly speaking legally binding contracts at all.<sup>2</sup> Any discussion about smart contracts and their impact on today's contract law must begin with identifying the definition of the concept to avoid it being purely a buzzword. Therefore, what is a smart contract? The question, rather ironically considering all of the proponents' of blockchain technologies' praises of the end in ambiguity and confusions caused by natural language, is more contentious than one could expect.

3. There are numerous definitions of what a smart contract is which cannot all be presented here. However, they are often defined as a special protocol intended to contribute, verify or implement the negotiation or performance of the contract without the interference of third parties in a trackable and irreversible manner.<sup>3</sup> One could perhaps go back to *Szabo* (the creator of the concept of smart contracts from the 1990s), who defined a smart contract as a 'computerized transaction protocol that executes the terms of a contract. The general objectives of smart

---

World Complexity', *Journal of Law, Innovation and Technology (JLIT)* 2017, pp 269-300; R.O'SHIELDS, 'Smart Contracts: Legal Agreements for the Blockchain', 21. *North Carolina Banking Institute* 2017, pp 177-194; P. PAECH, 'The Governance of Blockchain Financial Networks', 80. *Modern Law Review* 2017, pp 1072-1100; M.L. PERUGINI & P. DAL CHECCO, *Smart Contracts: A Preliminary Evaluation*, [ssrn.com/abstract=2729548](https://ssrn.com/abstract=2729548); M. RASKIN, 'The Law and Legality of Smart Contracts', 1. *Georgetown Technology Review* 2017, pp 305-341; C.L. REYES, 'Conceptualizing Cryptolaw', 96. *Nebraska L. Rev.* 2017, pp 384-445; P. RYAN, 'Smart Contract Relations in e-Commerce: Legal Implications of Exchanges Conducted on the Blockchain', 7. *Technology Innovation Management Review* 2017, pp 10-17; A. SAVELYEV, *Contract Law 2.0: «Smart» Contracts As the Beginning of the End of Classic Contract Law*, [ssrn.com/abstract=2885241](https://ssrn.com/abstract=2885241); J. SCHREY & T. THALHOFER, 'Rechtliche Aspekte der Blockchain', *Neue Juristische Wochenschrift (NJW)* 2017, pp 1431-1436; L.H. SCHOLZ, 'Algorithmic Contracts', 20. *Stanford Technology Law Review* 2017, pp 101-147; J.M. SKLAROFF, 'Smart Contracts and the Cost of Inflexibility', 166. *University Pennsylvania Law Review* 2017, pp 263-303; T. SÖBBING, 'Smart Contracts und Blockchain: Definitionen, Arbeitsweise, Rechtsfragen', *IT-Rechts-Berater (ITBR)* 2018, pp 43-46; T.F.E. Tjong Tjin Tai, 'Juridische aspecten van blockchain en smart contracts', 54. *Tijdschrift voor Privaatrecht* 2017, pp 563-608 (in the following cited as T.F.E. Tjong Tjin Tai (I)), T.F.E. Tjong Tjin Tai, 'Smart contracts en het recht', 93. *Nederlands Juristenblad* 2017, pp 176-182 (in the following cited as T.F.E. Tjong Tjin Tai (II)); K. WERBACH & N. CORNELL, 'Contracts Ex Machina', 67. *Duke Law Journal* 2017, pp 313-382; K. WERBACH, 'Trust, But Verify: Why the Blockchain Needs the Law', *Berkley Technological Law Journal* (forthcoming) 2018, [ssrn.com/sol3/papers.cfm?abstract\\_id=2844409](https://ssrn.com/sol3/papers.cfm?abstract_id=2844409).

2 S. BOURQUE & S. FUNG LING TSUI, *A Lawyer's Introduction*, p 4; R. O'SHIELDS, 21. *North Carolina Banking Institute* 2017, pp 177-178.

3 See e.g. S. BOURQUE & S. FUNG LING TSUI, *A Lawyer's Introduction*, p 4; T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, p 43.

contract design are to satisfy common contractual conditions (such as: payment terms, liens, confidentiality, and enforcement etc.), minimize exceptions both malicious and accidental, and minimize the need for trusted intermediaries like banks or other kind of agents.<sup>4</sup> Related economic goals of smart contracts include reducing loss resulted by fraud, enforcement costs, other transaction costs etc. They are presumed to be able to provide full transparency of the transaction and to grant a high degree of privacy contemporaneously.<sup>5</sup> Szabo's definition can be simplified to a computer code that is created to automatically execute contractual duties upon the occurrence of a trigger event,<sup>6</sup> or agreements wherein execution is automated, usually by a computer programme.<sup>7</sup> A consensus definition can be distilled: a smart contract is a sort of computer code which is operated by a computer and is self-executing and self-enforcing.<sup>8</sup> The existence of some kind of artificial intelligence is not necessary.<sup>9</sup>

4. It has become apparent that there are many debates and confusions on the concept of smart contracts. For blockchain-based smart contracts, a useful dichotomy can be drawn between the 'smart contract code', which is the computer code stored, verified and executed in a blockchain, and the 'smart legal contract', which is a complement (or maybe even a substitute) for a legal contract to apply such technology.<sup>10</sup> In essence, a 'smart legal contract' is a combination of the 'smart contract code' and traditional legal language.<sup>11</sup> A smart contract is a computer code that specifies in 'if this happens that shall happen' language, in a way understandable to a computer, on a blockchain platform. Once verified, it will self-execute and self-enforce by recognizing an occurred triggering event and dispensing the assets accordingly.<sup>12</sup>

- 
- 4 N. SZABO, *Smart Contracts*, <http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html>
- 5 C. BUCHLEITNER & T. RABL, *Ecolex* 2017, pp 4, 5; N. GUGGENHEIM, in *Contracts for the Supply of Digital Content*, pp 83, 94; M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, pp 201, 202; N. SZABO, *Smart Contracts*.
- 6 P. PAECH, 80. *Modern Law Review* 2017, pp 1072, 1082.
- 7 M. RASKIN, 1. *Georgetown Technology Review* 2017, pp 305, 306; T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, pp 43, 44.
- 8 A. BÖRDING, T. JÜLICHER, C. RÖTTGEN & M. VON SCHÖNFELD, *Computer und Recht (CR)* 2017, pp 134, 138; E. MIK, *Journal of Law, Innovation and Technology (JLIT)* 2017, pp 269, 269; R. O'SHIELDS, 21. *North Carolina Banking Institute* 2017, pp 177, 179. A slightly different definition offers M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, pp 201, 203.
- 9 C. JACOBS & C. LANGE-HAUSSTEIN, *IT-Rechts-Berater (ITBR)* 2017, pp 10, 13; M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 618; T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, pp 43, 44.
- 10 J. STARK, 'Making Sense of Blockchain Smart Contracts', *Coindesk* June 4 2016, [www.coindesk.com/making-sense-smart-contracts/](http://www.coindesk.com/making-sense-smart-contracts/).
- 11 A. DJAZAYERI, *jurisPR-BKR* 12/2016, no. 1; M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, p 205.
- 12 T.F.E. TJONG TJIN TAI (II), 93. *Nederlands Juristenblad* 2017, pp 176, 177.

5. What became evident is that the term smart contract is a misnomer.<sup>13</sup> A smart contract as we know it right now is independent from the applicable law in which it is not a contract in the legal meaning. The choice of such name for the concept of a self-executing and computer-coded agreement is unfortunate as it creates confusion. Some theoretical similarities, however, exist between smart contracts and legal contracts insofar as both ‘are frameworks for regulating the interaction between different entities.’<sup>14</sup>

6. As for the question regarding how a smart contract works in practice and how it is concluded, Szabo (and other legal writers also follow his example) use the famous simple vending machine analogy.<sup>15</sup> A vending machine takes coins and dispenses change and product according to the displayed price. Once the coins are inserted, there is no further human intervention required to conclude and later execute the contract. Similar to a smart contract, a contract concluded through a vending machine is also in principle immutable and self-enforcing. Even if a person was forced to buy something from the vending machine, the machine would still give the product the person, even if the court later sets aside the transaction due to duress. Furthermore, in theory, anybody with coins can participate in an exchange with the vendor regardless the legal capacity of the contracting parties. What smart contracts go further is ‘in proposing to embed contracts in all sorts of property that is valuable and controlled by digital means’.<sup>16</sup> Essentially, once both parties agree on a smart contract, its execution is taken from their control. Human discretion in performance and enforcement are deemed to be excised.<sup>17</sup>

### 3. The Evolution of the Blockchain Technology and the Rise of Smart Contracts

7. There are smart contracts which function without blockchain technology.<sup>18</sup> However, there is little doubt that the main reason for the actual rise of smart contracts is the recent rise of the blockchain technology. This technology allows

---

13 C. BUCHLEITNER & T. RABL, *Ecolex* 2017, pp 4, 6; A. DJAZAYERI, *jurisPR-BKR* 12/2016, no. 1; T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, pp 43, 46.

14 C. LIM, T.J. SAW, & C. SARGEANT, ‘Smart Contracts: Bridging the Gap Between Expectation and Reality’, *Oxford Business Law Blog* (11 July 2016) [www.law.ox.ac.uk/business-law-blog/blog/2016/07/smart-contracts-bridging-gap-between-expectation-and-reality](http://www.law.ox.ac.uk/business-law-blog/blog/2016/07/smart-contracts-bridging-gap-between-expectation-and-reality).

15 N. SZABO, ‘Formalizing and Securing Relationships on Public Networks’, 2. *First Monday* 1997(9), <http://firstmonday.org/ojs/index.php/fm/article/view/548/469-publisher=First>.

16 *Ibid.*

17 P. PAECH, 80. *Modern Law Review* 2017, pp 1072, 1077.

18 *Blockchain (technology)* is sometimes also referred to as *distributed ledger (technology)* or *shared ledger (technology)*. While these three notions still remain in flux (and some authors consider them to designate different forms of technology), we will refer to them interchangeably for the sake of simplicity. However, mainly the term blockchain (technology) will be used in this contribution.

smart contracts to use their full potential for automation and this is the type of smart contracts this article is going to focus on. Bitcoin, which proliferated this technology, led to the establishment of *Ethereum*, which is a more sophisticated blockchain platform allowing more complicated transactions beyond just transfers of currency, or bitcoins.<sup>19</sup> Ethereum even developed its own coding language called *Solidity*.<sup>20</sup> The blockchain technology demonstrates how a network could be set up so that once a transaction is set in motion, the network can produce outputs autonomously without the direct intervention of any party or any intermediaries.<sup>21</sup> Because of this feature, it is said that the participants do not need to trust each other, they can rely on the system as a whole to carry out transactions knowing that the parties cannot frustrate the intended outcome.<sup>22</sup> Blockchain not only allows verification of each transaction through the nodes (the computers in the chain), but it also, by storing the contract in a 'block' and sending it to each node, makes the execution automatic and, in principle, *immutable*. Thus it is argued that it allows the 'digitization of trust through certainty of execution' and the 'creation of efficiency through removal of intermediaries and the costs they bring to the transactions'.<sup>23</sup> These characteristics are perhaps the greatest appeal of smart contracts making use of blockchain technology.

8. Currently, there are various ideas on how to make use of blockchain-based smart contract in today's practise and in the future. One frequently mentioned example is the distribution of compensation for suffered damages resulting from the exercise of flight passenger rights<sup>24</sup> under the Flight Compensation Regulation 261/2004.<sup>25</sup> These cases normally take place in a business to consumer relationship. It includes a large number of potential claimants for relatively small compensation sums. The criteria for the validity of the consumers' claims (delay or cancellation) are in principle purely objective and the conditions which trigger the compensation can be verified reliably by oracles, which

---

19 See more detailed L.H. SCHOLZ, 20. *Stanford Technology Law Review* 2017, pp 101, 120; T.F.E. TJONG TJIN TAI (II), 93. *Nederlands Juristenblad* 2017, p 177.

20 See <https://solidity.readthedocs.io/en/develop/>.

21 CLIFFORD CHANCE, *Smart Contracts. Legal Agreements For the Digital Age* (November 2017), p 2, [www.cliffordchance.com/briefings/2017/06/smart\\_contracts\\_legalagreementsforth.html](http://www.cliffordchance.com/briefings/2017/06/smart_contracts_legalagreementsforth.html).

22 This has led some authors to the conviction that only 'the code is the law' and that law is obsolete for smart contracts (see L. LESSIG, *Codes and Other Laws of Cyberspace* (New York: Basic Books 1999), 24). However, this opinion did not gain sufficient support as it is obvious that (contract) law remains to play an important role for smart contracts. See more detailed for this aspect M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, pp 618-623; T.F.E. TJONG TJIN TAI (II), 93. *Nederlands Juristenblad* 2017, p 179.

23 J. I-H HSIAO, *US-China Law Review* 2017, pp 685, 687.

24 See e.g. C. BUCHLEITNER & T. RABL, *Ecolex* 2017, p 7.

25 Regulation (EC) No 261/2004 of the European Parliament and of the Council of 11 February 2004 establishing common rules on compensation and assistance to passengers in the event of denied boarding and of cancellation or long delay of flights, and repealing Regulation (EEC) No 295/91.

means by external sources. However, as mentioned correctly by *Guggenheim*, this example also shows that there is no claim simple enough to be determined only by simple objective criteria since in specific circumstances, an airline does not need to pay a compensation in case of force majeure (see Art. 5(3) of the Flight Compensation Regulation 261/2004). This essentially challenges the automation of contracts.<sup>26</sup> Besides the well-known smart refrigerator example (the refrigerator orders the food automatically),<sup>27</sup> ‘the pay as you drive-principle’, which is discussed in the insurance industry, is another potential sphere of applicability of blockchain-based smart contracts.<sup>28</sup> Here the policyholder concludes a car insurance contract with the insurance company. The contract contains a ‘pay as you drive-provision’, which means the riskier you drive, the higher the premium of the policyholder. For data collection, the policyholder’s car has a blockchain interface and the blockchain-based smart (insurance) contract, which adjusts the amount of the payable premium automatically according to the way the insured car is driven.<sup>29</sup>

#### 4. Blockchain-based Smart Contracts and the Process of Contract Formation

9. The way and method smart contracts are, and will be created in the future, can differ significantly. This depends on three different aspects:

- the level of automation of the execution of the smart contract;
- the extent of separation between the actual agreed terms and the executed code; and
- the custodial rights and/or discretion of the smart contract and its execution from the parties.<sup>30</sup>

10. Considering the three mentioned aspects, one can distinguish roughly between two kinds of smart contract.<sup>31</sup> The first category of smart contract is

---

26 N. GUGGENHEIM, in *Contracts for the Supply of Digital Content*, pp 83, 95.

27 A. DJAZAYERI, *jurisPR-BKR* 12/2016, no. 1.

28 C. BUCHLEITNER & T. RABL, *Ecolex* 2017, pp 4, 7; A. DJAZAYERI, *jurisPR-BKR* 12/2016, no. 1; C. JACOBS & C. LANGE-HAUSTEIN, *IT-Rechts-Berater (ITBR)* 2017, pp 10, 12; M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 618.

29 For further examples see A. BÖRDING, T. JÜLICHER, C. RÖTTGEN & M. VON SCHÖNFELD, *Computer und Recht (CR)* 2017, pp 134, 137; C. BUCHLEITNER & T. RABL, *Ecolex* 2017, pp 4, 6; M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 619; M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, pp 201, 203; R. O’SHEILDS, 21. *North Carolina Banking Institute* 2017, pp 177, 181; M. RASKIN, 1. *Georgetown Technology Review* 2017, pp 305, 330; T.F.E. T’JONG T’JIN TAI (II), 93. *Nederlands Juristenblad* 2017, p 182.

30 See S. BOURQUE & S. FUNG LING TSUI, *A Lawyer’s Introduction*, p 4 ff.

31 For the following differentiation see C. BUCHLEITNER & T. RABL, *Ecolex* 2017, p 7; L.H. SCHOLZ, 20. *Stanford Technology Law Review* 2017, pp 101, 108.

concluded ‘unsmart’ and only executed ‘smart’. In other words, they are ‘purely’ self-enforcing smart contracts. They can be concluded either off-chain or on-chain. However, even in the latter case, the algorithms are exclusively employed as mere tool in contract formation.<sup>32</sup> When describing the actual process of formation of *on-chain* smart contracts, the concept can be well explained through the Ethereum’s process.<sup>33</sup> This process is as follows: The user first types out the contract in coding language, after he has downloaded the Ethereum software and became part of its network. Then he will ‘propose’ a specific contract by making it available in the system. The proposed contract will have its own identification number and ‘functions as an autonomous entity within the system, somewhat similar to how a website may operate on Internet’.<sup>34</sup> Another user may then ‘accept the proposed contract’ by communicating to it. For instance, he communicates by making a payment.

Because a decentralized, permission-less (meaning anyone with the right hardware and software can get on it) platform needs to avoid spam, Ethereum will charge a user *gas* (their unit) as a fee for contracts, which will increase based on the complexity of the contract. Sometimes, as already mentioned before, a smart contract will need information from the outside world to enable it to carry out the transaction (an example would be if the smart contract is a stock option, it will need to know the stock price). Blockchains are not connected to the Internet<sup>35</sup> and therefore, the smart contract cannot by itself check the prices. It needs an external source, which is an ‘oracle’. There are services as e.g. *Oraclize*, to bridge between Ethereum and the Internet. It allows more complexions for the contracts but at the same time it also undermines the decentralization. Furthermore, it introduces the requirement of trust in the third party, who obtains the information from the outside source.

11. The blockchain technology and its applicability is developing quickly and in the near future, another category of smart contracts will probably see the daylight: Smart contracts that are not only executed ‘smart’, but also are concluded ‘smart’ through blockchain. In other words, contract formation *and* contract execution are smart. Contrary to the first category of smart contracts, the blockchain technology will also be used to *find* a (previously unknown) contracting party and *conclude the contract* that will be executed automatically.<sup>36</sup> Here the algorithms are not only

---

32 L.H. SCHOLZ, 20. *Stanford Technology Law Review* 2017, pp 101, 108.

33 <https://ethereum.org/>.

34 E. TJONG TJIN TAI, *Force Majeure and Excuses in Smart Contracts*, Tilburg Private Law Working Paper No. 10/2018, p 4, [ssrn.com/abstract=3183637](https://ssrn.com/abstract=3183637).

35 The reason for that is that for blockchains to function at each node the result of an equation must be the same. If, using our example of a stock price as a variable in an equation, the result at each node would be different, because they would be able to verify the price of the stock in real time, the blockchain would not be able to function.

36 C. BUCHLEITNER & T. RABL, *Ecolex* 2017, p 7.

employed as a mere tool like before, but also they act as a sort of ‘artificial agent’ in the context of the formation of a contract between two or more contracting parties.<sup>37</sup> The legal questions can be quite different from the first category of smart contracts, including but not limited to the formation of contracts. For instance, can the provider of the blockchain platform legally be considered as an agent? Or can the algorithm in this scenario already *de lege lata* be considered as an independent (electronic) agent itself? Or should we at least consider to introduce the concept of an electronic agent which is legally independent from its creator for this kind of technology *de lege ferenda*?<sup>38</sup> Due to the limited space available for this article we can unfortunately only focus on the first category of smart contract and must leave the second one for later contributions.<sup>39</sup>

## 5. The Compatibility of Smart Contracts with Existing Contract Law: The Requirements of Contract Formation

12. Having established the concept of smart contract, we move the discussion to the formation of smart contracts. It must be noted that the discussion excludes the potential Private International Law problems in finding the applicable domestic law to determine the precise requirements for contract formation.<sup>40</sup> It is duly noted that numerous legal systems have different elements for a completed contract (e.g. the existence of ‘consideration’ in (English) Common Law and (German) Civil Law), we have chosen the English legal system as a focal point for this contribution. Hence, we will discuss whether a smart contract conforms with the common law requirements for formation of a valid and legally binding contract. However, we will also take the *Acquis Communautaire* into consideration if necessary (e.g. for the inclusion and validity of standard contract terms). Each ‘requirement’ for a concluded, valid and legally enforceable contract will be discussed separately: (1) offer and acceptance; (2) consideration; (3) intention to create legal relations; and (4) capacity.<sup>41</sup> We will also analyse one particular and practically very important formation of contracts problem – the inclusion and validity of standard contract terms. Our focal point for this discussion will be Directive on Unfair Contract

---

37 L.H. SCHOLZ, 20. *Stanford Technology Law Review* 2017, pp 101, 108.

38 For more details about the electronic agent discussion see A. BÖRDING, T. JÜLICHER, C. RÖTTGEN & M. VON SCHÖNFELD, *Computer und Recht (CR)* 2017, pp 134, 139; L.H. SCHOLZ, 20. *Stanford Technology Law Review* 2017, pp 101, 108, 141.

39 For more details see C. BUCHLEITNER & T. RABL, *Ecolex* 2017, p 7; L.H. SCHOLZ, 20. *Stanford Technology Law Review* 2017, p 101.

40 See for the Private International Law aspects of smart contracts S. BOURQUE & S. FUNG LING TSUI, *A Lawyer’s Introduction*, pp 4, 13; C. BUCHLEITNER & T. RABL, *Ecolex* 2017, p 12; A. DJAZAYERI, *jurisPR-BKR* 12/2016, no. 1.

41 The basic elements for a contract conclusion under German Law are (of course with the important exception of consideration) quite similar. See for German Law in the context of smart contracts M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, pp 201-204.

Terms 93/13/EEC ('Unfair Terms Directive')<sup>42</sup> which was implemented in the United Kingdom in part 2 of the Consumer Rights Act 2015.

## 5.1 Offer and Acceptance

13. The initial stage of a contractual agreement is similar between smart contracts and traditional contracts. This is because before any contractware can operate, two parties must agree to some set of contractual terms.<sup>43</sup> The rules on offer and acceptance will not in principle pose an obstacle to smart contracts' recognition as legally binding. First of all, offer and acceptance, as well as the parties' conducts, are evaluated objectively.<sup>44</sup> This means the fact that parties submit their cryptographic private keys to commit resources to a blockchain-based smart contract is proof of a commitment.<sup>45</sup> Since one party must post his (on-chain smart) 'contract' on the blockchain on platforms (for example Ethereum) and the other party accepted by the cryptographic key, such communication (the posting of the on-chain smart 'contract' onto the blockchain) will likely be held as to be an offer. Depending on the circumstances, it is argued that it is conceptually not different from an advertisement and therefore, it is only an invitation to treat.<sup>46</sup> However, as the 'offeror' posts his 'contract' onto the blockchain in a binary computer code which specifies precisely the terms of the transaction, it will regularly be held to constitute an offer not an invitation to treat.<sup>47</sup>

14. Once the proposed smart contract is posted onto the blockchain and fulfilled the requirements of being an offer (especially the identification of the *essentialia negotii* of the contract), it is capable of an acceptance by the offeree.<sup>48</sup> This acceptance can also be done by conduct. In the example on transferring control over a digital asset to the smart contract, that digital asset can be money, cryptocurrency or a digital representation of an offline asset. The action of uploading that asset to the smart contract provides an unequivocal communication of acceptance.<sup>49</sup> It is perhaps best to exemplify this point. The offeror can write a smart contract stating that for 10 *Ether* (Ethereum's digital currency), offeror will transfer ownership of a car. Offeror writes the contract, including the terms he wants, and upload it onto blockchain together with the digital token that represents

---

42 Council Directive 93/13/EEC of 5 April 1993 on unfair terms in consumer contracts.

43 M. RASKIN, 1. *Georgetown Technology Review* 2017, pp 305, 322.

44 *Smit v. Hughes* (1871) LR 6 QB 597, 607 (Blackburn J). See also M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 621.

45 K. WERBACH & N. CORNELL, 67. *Duke Law Journal* 2017, pp 313, 368.

46 M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 621.

47 Cf *Partridge v. Crittenden* [1968] 2 All ER 421; cf *Carlill v. Carbolic Smoke Ball Co Ltd* [1892] 1 QB 296.

48 Doubtful however T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, pp 43, 46.

49 P. CATCHLOVE, *Smart Contracts*, p 11.

the car, and ‘gas’, which is payment for uploading the contract. This constitutes an offer. Subsequently, the offeree, who is willing to accept, will upload the 10 Ether to the smart contract, which constitutes an acceptance. The smart contract will detect the upload of 10 Ether and automatically transfer that to the offeree’s wallet, while at the same time transferring the token to the offeror who uploaded the 10 Ether. The offeror does not need to vouch that he received the 10 Ether, the token for car is transferred without the offeror’s further verification or discretion.

Therefore, the acceptance can occur either by performance, as is argued by some scholars, or by the authorization of transfer by putting in the special cryptographic key (password).<sup>50</sup> In either case, there is a clear act of acceptance, which can be a performance of the terms in a unilateral contract<sup>51</sup> or a signature by inputting the personal cryptographic key. Another argument arises here, namely on-chain smart contracts for now are unilateral contracts, promising that if X happens I will give you Y, and thus capable of being accepted by performance. Overall, it is evident that the rules on offer and acceptance will not pose fundamental problems for the formation of smart contracts as the procedure of the formation of such agreements accommodates the elements of offer and acceptance.<sup>52</sup>

The adaptability of the contract law rules in smart contracts can again be illustrated by the vending machine example. Inserting the money creates a contract. This is not because of the technical functionality of the vending machine but a ‘wrapper contract’ is created. This is due to the law interprets the insertion of the money as a valid acceptance of an offer, which was made by the owner of the machine. Similarly, when the digital asset is uploaded to a smart contract, a contract is concluded between the two parties since that act is an acceptance of the offer made by another user irrespective to the actual transfer of the assets will be done by the smart contract. Although the performance of the smart contract is automated, it still requires the contracting parties’ will to become effective. Such intention is manifested at the moment when a party decides to enter into an agreement on the terms specified by the offeror in advance.<sup>53</sup> The point of this section is to illustrate that the requirements of offer and acceptance demanded for a valid contract by contract law are satisfied in common practice of formation of smart contracts.

---

50 G. JACCARD, ‘Smart Contracts and the Role of Law’, *Jusletter IT* 2017, p 22; J.J. SZCZERBOWSKI, ‘Place of Smart Contracts in Civil Law. A Few Comments on Form and Interpretation’ (9 November 2017). Proceedings of the 12th Annual Scientific Conference NEW TRENDS 2017, published by *Private College of Economic Studies Znojmo*, [ssrn.com/sol3/papers.cfm?abstract\\_id=3095933](https://ssrn.com/sol3/papers.cfm?abstract_id=3095933), 336.

51 *Carlill v. Carbolic Smoke Ball Co Ltd*, 262 (Lindley LJ).

52 This might as outlined already before be different for the other mentioned category of smart contract where the algorithms act as an ‘artificial agent’.

53 A. SAVELYEV, *Contract Law 2.0*, p 11.

15. One more note about English contract law on formation in relation to smart contract. The will theory once proposed by legal scholars such as *Pothier* or *von Savigny* is supposedly the underlying theoretical basis for contracts. Accordingly, a consensus ad idem – ‘a meeting of the minds’ is required for the contract to be formed.<sup>54</sup> If this is true, why should such a consensus suddenly be unenforceable when expressed in a computer code rather in a natural language? If both parties read and understand the terms written in computer code, which is also verifiable by any third party adjudicator (courts or arbitral tribunals could have expert evidence to distill the meaning of the computer code), then there is nothing preventing that meeting of the minds from being enforced.<sup>55</sup> Freedom of contract as one of the fundamental pillars of contract law dictates that parties should be free to write down their bargains in whatever form and language they want.<sup>56</sup> The chosen language can even be a dead language as Latin or a computer code<sup>57</sup> as long as it is not a business to consumer relationship (which will be discussed separately later).<sup>58</sup> Moreover, given the adaptability of English contract law to (previously) new modes of communications: letters<sup>59</sup> or telex and instantaneous communications including e-mails,<sup>60</sup> one can speculate that the same will extend to smart contracts when (or if) their use becomes widespread.<sup>61</sup> Lastly, one point should be made about contract law’s treatment of ‘automatic contracts’. It is clear from cases such as *Thornton v. Shoe Lane Parking* (similarly to *Szabo’s* vending machine analogy) that a contract is formed when the coins are inserted into the machine. The fact that the subsequent process occurs without human intervention does not

---

54 See e.g. *Scriven Bros & Co v. Hindley* [1919] 3 KB 564.

55 However, problems arise if at least one of the contracting parties does not understand the computer code but nevertheless conclude the smart contract. In this scenario the party who did not understand the computer code could try to advocate in hindsight for the existence of a ‘mistake’ and to rewind the smart contract. In German literature this case has been discussed but has always been rejected so far as an ‘Inhaltsirrtum’ according to § 119(1) BGB. It is said that in principle it is the risk of the parties to conclude a contract not knowing the underlying computer code. See M. JÜNEMANN & A. KAST, *Kreditwesen* 2017, pp 531, 533; M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 622.

56 J.J. SZCZERBOWSKI, ‘Place of Smart Contracts in Civil Law. A Few Comments on Form and Interpretation’ (9 November 2017). Proceedings of the 12<sup>th</sup> Annual Scientific Conference NEW TRENDS 2017, published by *Private College of Economic Studies Znojmo*, [ssrn.com/sol3/papers.cfm?abstract\\_id=3095933](http://ssrn.com/sol3/papers.cfm?abstract_id=3095933), p 335.

57 See with more details M. JÜNEMANN & A. KAST, *Kreditwesen* 2017, pp 531, 533; M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 622; M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, p 204.

58 See Ch. 5.5.

59 *Adams v. Lindsell* (1818) 1 B & Ald 681.

60 *Entores v. Miles Far East Corp* [1955] 2 QB 327; *Brinkibon Ltd v. Stahag Stahl und Stahlwarenhandels-gesellschaft mbH* [1983] 2 AC 34.

61 NORTON ROSE FULBRIGHT, *Can Smart Contracts be Legally Binding Contracts* p 22, <http://www.nortonrosefulbright.com/files/r3-and-norton-rose-fulbright-white-paper-full-report-144581.pdf>.

preclude the formation of a contract.<sup>62</sup> In *R (Software Solutions Partners Ltd) v. HM Customs & Excise*, it was held that an ‘automatic medium for contract formation’ can result in valid contracts.<sup>63</sup> Once the broker in that case put the criteria into a software, the software would seek and conclude contracts on the broker’s behalf with no further requirement of human action. The court found that a contract was completed. Hence, it is in fact highly likely that the formation of smart contracts on platforms including Ethereum will be held and recognized in law as valid formation of a legally enforceable contract.

## 5.2 Consideration

16. One could make an argument that since consideration just need to be sufficient but not adequate according to the English contract law,<sup>64</sup> consideration will easily be satisfied by smart contracts since, by definition, they entail an exchange of (digital) assets as provided in above example of 10 Ether for a car. While the argument is valid, and in fact courts have been perhaps laxer on consideration requirements with the development in the requirement of the intention to create legal relations and as illustrated with the ‘practical benefit’ doctrine,<sup>65</sup> that consideration will not prove to be any serious obstacle on the road of smart contracts being recognized as legally valid.

17. Yet *Werbach* and *Cornell* raise an interesting argument as they point out that smart contracts do not contain an *exchange of promises* as is usually the case in normal contracts and a requirement for a valid consideration. They illustrate their argument with an analogy, which is best cited in full:

‘If someone balances a pail of water on top of a door, he does not promise to drop water on whoever next opens the door. Rather, he has merely set up the mechanical process by which that will happen. In a similar way, a contract to transfer one bitcoin upon such-and-such event occurring is not really a promise at all. It does not say ‘I will pay you one bitcoin if such-and-such happens’, but rather something like ‘You will be paid one bitcoin if such-and-such happens’ ... the so-called ‘[smart] contract’ is not an exchange of promises or commitments. Creation of a smart contract - while setting certain events in motion - does not commit any party do no anything. There’s nothing being prospectively promised’.<sup>66</sup>

---

62 *Thornton v. Shoe Lane Parking* [1978] 2 QB 163 (Lord Denning MR).

63 *R (Software Solutions Partners Ltd) v. HM Customs & Excise* [2007] EWHC 971, para. 67.

64 Illustration case: *Chappel & Co Ltd v. Nestlé Co Ltd* [1959] AC 87.

65 *Williams v. Roffey Bros & Nicholls Contractors* [1989] 1 QB 1; *Rock Advertising Ltd v. MWB Business Exchange Centres Ltd* [2016] EWCA Civ 553, the practical benefit point was not discussed by the Supreme Court in [2018] UKSC 24.

66 K. WERBACH & N. CORNELL, 67. *Duke Law Journal* 2017, pp 313, 340.

That certainly is a departure from the realm of traditional ‘dumb’ contracts. However, that issue does not prevent the authors from reaching the conclusion that smart contracts are nevertheless legally valid contracts. *Savelyev* asks himself whether a smart contract is not a contract because it does not contain any obligations. Nonetheless, he holds that such a conclusion would be too simplistic for several reasons. First, the parties still express their will when they enter into a contract and they are bound by the result of their action. Secondly, contract law acknowledges certain types of agreements which are performed instantaneously at the moment of conclusion (executed contracts). *Savelyev* concludes that it is probably more correct to state that the main consequence of the conclusion of a smart contract is not an appearance of ‘obligations’ but the result of self-limitation in certain rights by technical means.<sup>67</sup>

*Werbach* and *Cornell* themselves argue that though such commitments might not constitute promises per se, smart contracts are agreements that purport to alter the parties’ rights and obligations and that an agreement may still count as a contract even if it leaves nothing open to be done or performed.<sup>68</sup> For them, smart contracts constitute present agreements without further promises to perform. Hence, anyone, who argues smart contracts do not involve a ‘promise’, but more of a guarantee, precludes it from being recognized a contract, has an unrealistically ‘idealistic’ view of contract law. Some considerations, such as: benefit, right or detriment, loss or responsibility etc.,<sup>69</sup> will be conveyed under smart contracts inducing a reciprocal promise,<sup>70</sup> and pragmatically, there will almost always be sufficient consideration.

18. Lastly, another interesting point raised in relation to on-chain smart contracts is that they are unilateral contracts in nature. For instance, ‘if X then I will pay you’. Thus the consideration for such contracts is in performance.<sup>71</sup> Unilateral contracts have been enforced by English courts for a long time before. As such, they should be now. That does not prevent someone from committing a gift promise onto the blockchain. Such a gift promise would be executed irrevocably in the same manner as other smart contracts.<sup>72</sup> Does this mean that smart contracts render gifts legally enforceable? It is submitted, though lack of authority on this issue should be noted, that the answer is no. Not every smart contract is a contract, and the fact that a gift executed through smart contract is irrevocable does not mean it is legally valid. A donor who changed his mind could potentially seek restitution under unjust enrichment, though the fact that the gift would be by then

---

67 A. SAVELYEV, *Contract Law 2.0*, p 18.

68 K. WERBACH & N. CORNELL, 67. *Duke Law Journal* 2017, pp 313, 341.

69 *Currie v. Misa* (1876) LR 1 App Cas 554.

70 K. WERBACH & N. CORNELL, 67. *Duke Law Journal* 2017, pp 313, 370.

71 *Carlill v. Carbolic Smoke Ball Co Ltd* [1892] 1 QB 296, 265 (Lindley LJ).

72 K. WERBACH & N. CORNELL, 67. *Duke Law Journal* 2017, pp 313, 370.

a *fait accompli* would make it substantially harder to recover. All in all, however, it is argued that both conceptually and pragmatically sufficient consideration will normally be present in smart contracts in order to render them legally enforceable.

### 5.3 *Intention to Create Legal Relations*

19. In commercial relationships, the intention to create legal relations is presumed in common law and will have to be disproved by the party alleging that there is no such intention.<sup>73</sup> Hence, it could be argued that for every smart contract entered into in commercial settings, the intention to create legal relations will be presumed regardless whether it is a business to business or a business to consumer transaction. Again, a more nuanced view can be offered. *Savelyev* comes to a conclusion that by concluding a smart contract, the contracting parties have the intention to use an alternative regulatory system and not traditional contract law. Therefore, there might not be a true intent to create legal relations.<sup>74</sup> However, he also admits that if the result is factually the same in substance to the one regulated by ‘usual contracts’, it can (and must according to us) be argued that the nature of the relations is the same.<sup>75</sup> The initial part of the argument is interesting – after all the fact of eliminating lawyers and courts from the equation is an advantage<sup>76</sup> of smart contracts, so there is no intention of *legal* relations – but rightly rebutted. The parties do *not* wish to enforce their contracts in court because they believe that such enforcement will be unnecessary since a smart contract is guaranteed to be performed. However, what certainly seems to exist, though with some limited effects in practice, is the intention of a legal relation that justifies the performance of the contract and prohibits claiming restitution of what has been executed as undue payments or unjustified enrichments.

Moreover, the fact that the parties do not wish to enforce their smart contracts in court is not the same as wishing that if the smart contracts end up in court, they will not be upheld by the court. In the conclusion of a smart contract, if the offer has been accepted, it has also commenced as being performed. On this basis, it is very unlikely that a reasonable party would not see this as a binding and enforceable agreement.<sup>77</sup> Hence, it is almost certain that the intention to create legal relations will be found in most smart contracts, especially in commercial settings. In any event, a precautionary party who wants to ensure there is an intention to create legal relations can do so by ‘wrapping’ the code up in a contract. This can

---

73 See e.g. *Esso Petroleum Limited v. Commissioners of Customs and Excise* [1975] UKHL 4.

74 A. SAVELYEV, *Contract Law 2.0*, p 11.

75 *Ibid.*

76 K. WERBACH, *Berkley Technological Law Journal* (forthcoming) 2018, p 36.

77 P. CATCHLOVE, *Smart Contracts*, p 11.

be done by writing a traditional contract acknowledging that the smart contract is a valid legal agreement.<sup>78</sup>

## 5.4 Capacity

20. Contractual relations require naturally that parties have the capacity to enter into contracts. However, Ethereum, and in fact most of the other available blockchain platforms, do not check for full legal capacity. Instead anyone in principle can open an account without having sufficient capacity to do so. As smart contracts have no means to test for capacity, they can be entered into by minors, drunks or any other incapacitated person. Therefore, people, who are in the real world lacking the capacity to sign a contract, could potentially do so on the blockchain platform. However, if there was no capacity, then a party could invalidate the transfer of any asset ex post legally through an action in unjust enrichment and technically through a reverse transaction.<sup>79</sup> That is a poor alternative due to the realm of pseudonymous users with cryptographic strings of random letters and numbers. As such, it may be hard to identify who to sue. Despite to what has been said, the bottom line remains that if someone possesses legal capacity, he will be free to enter into legally binding smart contracts.

Lastly, another small but interesting observation is that the contracting parties to a smart contract are, at a technical level, not even people but only cryptographic private keys which represent individual persons.<sup>80</sup> Could there even be a discussion of capacity because the parties are technically not human? This is not really the case since for autonomous smart contracts, the private keys do not act by themselves. They are ‘instructed’ by humans.

## 5.5 The Inclusion and Validity of Standard Contract Terms

21. As a last issue this article would like to focus on a particular but in practice highly relevant formation of contracts problem – the inclusion and validity of standard contract terms. This area of law is in the EU (at least for business to consumer transactions) governed by the Unfair Terms Directive or respectively the national laws implementing it, thus in the UK the second part of the Consumer Rights Act 2015. Like the mentioned Directive we would like to concentrate now on business to consumer transactions, which are expected to be the main sphere of applicability of smart contracts in the near future.<sup>81</sup>

---

78 More on legal ‘wrappers’ below.

79 See also M. JÜNEMANN & A. KAST, *Kreditwesen* 2017, pp 531, 532; J. SCHREY & T. THALHOFER, *Neue Juristische Wochenschrift (NJW)* 2017, pp 143, 146.

80 K. WERBACH & N. CORNELL, 67. *Duke Law Journal* 2017, pp 313, 371.

81 For the reasons see T.F.E. Tjong Tjin Tai (II), 93. *Nederlands Juristenblad* 2017, p 182. Different however A. Saveljev, *Contract Law 2.0*, p 20. He thinks the main field of applicability of smart contract are the business to business transactions and not consumer to consumer transactions. The

The initial question is before even dealing with the Unfair Terms Directive itself whether the general structure of smart contracts allows consumer protection as sometimes it is said that ‘that the whole layer of legal provisions relating to consumer law ( ... ) is non-applicable to smart contract’.<sup>82</sup> However, this opinion does not give any reason for the non-applicability of consumer law in this scenario and should be rejected.<sup>83</sup> It almost goes without saying that the EU consumer law (or the national law implementing the EU-directives on consumer protection) is in principle applicable if the requirements for its applicability are fulfilled. As such, smart contracting is not and cannot be a blind spot for consumer protection law.

22. Some argue that consumer law in principle applies to smart contracts, but the Unfair Terms Directive might not as it requires (see e.g. Art. 1(1) of the Unfair Terms Directive) an unfair contract *term* in a *textual* form (see also s. 63 of the UK Consumer Rights Act 2015) - a requirement algorithms cannot fulfil.<sup>84</sup> This train of thought is however not very convincing as the Unfair Terms Directive does not per se require text form to be applicable. In addition it would be counterproductive if the protection the Unfair Terms Directive grants could be circumvented that easily by converting unfair terms into a smart contract code. Others are questioning the applicability of the Unfair Terms Directive because not the whole content of the smart contract might be a pre-formulated but some terms could be individually negotiated.<sup>85</sup> Art. 3(2) of the Unfair Terms Directive answers this question clearly when it says that the fact that certain aspects of a term or one specific term have been individually negotiated shall not exclude the application of the Unfair Terms Directive to the rest of a contract (if an overall assessment of the contract indicates that it is nevertheless a pre-formulated standard contract). Hence, it can be concluded that the Unfair Terms Directive is in principle applicable to smart contracts.

---

exact impact of development of smart contracts on consumer law and policy is of course yet uncertain. It should also be pointed out that because to draft and enter smart contracts have high initial costs, and requires infrastructure and expert knowledge (coding), the access to it is not equal. Only those who can afford the powerful hardware, and know how to computer-code or can afford to hire a programmer can (as of now) utilize the technology, though certain startups exist to allow ‘laymen’ to draft their own smart contracts.

82 A. SAVELYEV, *Contract Law 2.0*, p 20.

83 Numerous authors do not even discuss the problem of the applicability of consumer law for smart contracts and are assuming (naturally) its applicability in this context. See e.g. C. BUCHLEITNER & T. RABL, *Ecolex* 2017, pp 4, 12; M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, pp 201, 204; T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, p 46; T.F.E. Tjong Tjin Tai (II), 93. *Nederlands Juristenblad* 2017, p 181.

84 T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, pp 43, 46.

85 M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 622 raise this question. However, they come to the conclusion that the (implemented) Unfair Contract Terms Directive is applicable in a smart contracts scenario.

The applicability of the Unfair Terms Directive triggers further legal discussions for smart contracting, and here especially Art. 5 of the Unfair Terms Directive which requires that the pre-formulated terms ‘must always be drafted in plain, intelligible language’ (see also s. 64(3) of the UK Consumer Rights Act 2015). As have been argued before parties are in principle free to choose any language for their contract they want, which includes ‘computer language’.<sup>86</sup> In a business to consumer context, this party autonomy is considerably limited due to the mentioned provision as it seems to be difficult to defend the position that the underlying computer code of a smart contract is a plain, intelligible language for the average consumers.<sup>87</sup> Does that lead to the end of smart contracting for business to consumer transaction maybe before it even really started? No, it does not. However, it obliges businesses to provide consumers with plain, intelligible translations of the computer code which are understandable to them. Only then the terms can become a valid part of the smart contract and gives smart contracting for business to consumer transactions a future.<sup>88</sup>

## 6 Conclusion

23. In summation, neither on-chain nor off-chain smart contracts are really challenging the classic elements of English Common Law on formation of contracts – offer and acceptance, consideration, intention to create legal relations, and capacity. That is at least true as long as the algorithms are exclusively employed as mere tools and not as real ‘artificial agents’ which are not only executing but also concluding contracts smart. And even the problems resulting from the applicability of the Unfair Terms Directive for business to consumer contracts can be overcome.

However, law firms are still advising their clients that for the sake of certainty, a legal ‘wrapper’ in the form of a ‘dumb’ contract ought to be created.<sup>89</sup> It has been urged that with smart contracts, reliably creating that wrapper and ensuring that a valid offer and acceptance has taken place will likely require an explicit process that incorporates the legal requirements for electronic execution of traditional, non-automated contracts – something like clicking an ‘I agree’ button before launching – rather than relying on speculative smart contract-friendly interpretations of Common Law rules.<sup>90</sup>

---

86 See Ch. 5.1.

87 Similar M. KAULARTZ & J. HECKMANN, *Computer und Recht (CR)* 2016, p 622; T. SÖBBING, *IT-Rechts-Berater (ITBR)* 2018, pp 43, 46.

88 M. KAULARTZ (I), *Zeitschrift zum Innovations- und Technikrecht (InTeR)* 2016, p 204.

89 CLIFFORD CHANCE, *Are Smart Contracts Contracts? Talking Tech Looks at the Concepts and Realities of Smart Contracts*, Talking Tech (December 2017), <https://talkingtech.cliffordchance.com/en/tech/are-smart-contracts-contracts.html>.

90 *Ibid.*

Such ‘code-and-contract’ hybrids that entail both a smart contract and a traditional contract acknowledging the smart one are perhaps the best intermediary solution at the moment. The drafting of the ‘wrapping’ may require even more than just ‘I accept that I am bound by the outcome of the smart contract’ as such a clause could be unenforceable for incompleteness or uncertainty under Common Law. In the long run, given the efficiency driven business world, the legal system should create so much legal certainty that costly ‘code-and-contract’ hybrids can be avoided.