

# Interpreting Smart Contracts: the Reasonable Coder and the need for a Stronger Contextual Approach

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**Abstract**— Emerging technologies are increasingly used to create 'smart contracts': computer code that can automatically monitor, execute, and enforce a legal agreement hosted on the blockchain.<sup>1</sup>

Code is a language used to give instructions to computers and is thus fundamentally different from natural (human) language. So, is English contract law able to accommodate smart contracts? It is concluded that it is not without two inevitable modifications:

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<sup>1</sup> Marcelo Corrales Compagnucci, Mark Fenwick and Stefan Wrba, 'The Technology, Use-Cases and Law of Smart Contracts', in Marcelo Corrales Compagnucci, Mark Fenwick and Stefan Wrba (eds), *Smart Contracts, Technological, Business and Legal Perspectives* (1st ed, Hart Publishing, 2021) 1.

1. Firstly, the 'reasonable person' test to determine the meaning of an agreement must be adapted to code. This is because a usual reasonable person would not be able to understand the meaning of a coded term. The solution is to ask what a person with knowledge and understanding of code would understand the coded term to mean – that is, a 'reasonable coder'.<sup>2</sup> This requires the assistance of expert coders.

2. However, this modification substantially shifts the role of adjudication away from the judge and towards expert coders. This is because the average judge is unfamiliar with the way instructions in code are interpreted by a computer – as such, the expert coder's task does not only entail the translation of code but also its interpretation.

To counteract this, we argue that there must be a backshift towards a contextual approach to interpretation in the realm of smart contracts. Admissibility of 'surrounding circumstances' (including pre-contractual negotiations) would restore the judges' role to that of determining the contractual parties' agreement which underlies the code in the smart contracts.

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<sup>2</sup> Law Commission, *Smart Legal Contracts, Advice to Government* (Law Com No 401, 2021), para 4.32.

## Introduction

A 'smart contract'<sup>3</sup> is the next step in the development and evolution of data mapping and data transfer executed based on distributed ledger technologies ('DLT') such as blockchain. By enabling parties to trade directly with each other without an 'intermediary' in between (such as a bank), smart contracts offer several benefits such as the reduction of costs and the increase of outcome certainty. Smart contracts are not a hypothetical matter only of academic interest – rather, they are already deeply embedded in digital commerce. Currently, smart legal contracts are indeed useful only in respect of 'fairly rudimentary agreements', for example for transferring an amount of cryptocurrency to a person's wallet based on distinct conditions.<sup>4</sup> One of the most well-known cryptocurrencies, Ethereum, runs mainly based on smart contracts.<sup>5</sup> Nonetheless, smart contract technology is developing rapidly and becoming increasingly complex such that more types of clauses and obligations may be encoded in smart contracts.<sup>6</sup> Thus, smart contracts are of growing

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<sup>3</sup> The term was coined by Nick Szabo in 1994, Nick Szabo, 'Smart Contracts' (1994)

<<https://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html>> accessed 1 May 2023.

<sup>4</sup> Law Commission (n 1) para 1.3.

<sup>5</sup> For example, in May 2021, around 45 million transactions were conducted by the thousands of smart contracts deployed on the Ethereum network each day, see Law Commission (n 1); Thibault Schrepel, *Smart Contracts and the Digital Single Market Through the Lens of a "Law + Technology" Approach* (1st ed, European Commission, 2021) 19; Ethereum Whitepaper <<https://ethereum.org/en/whitepaper/>>, accessed 1 May 2023.

<sup>6</sup> Law Commission (n 1) para 1.3.

importance for areas such as supply-chain-management,<sup>7</sup> life sciences, and healthcare.

The most authoritative views on smart contracts within UK contract law so far have been the Law Commission's report<sup>8</sup> and the statement published by the UK Jurisdiction Taskforce.<sup>9</sup> There is a consensus that the existing legal framework in England and Wales can accommodate smart contracts and that the existing rules of interpretation should apply.<sup>10</sup> **This** paper will critically analyse the Law Commission's conclusions and attempt to present a more nuanced view on the interpretation of smart contracts. Ultimately, while we agree that smart contracts can be interpreted, the use of the 'reasonable coder' test as suggested by the Law Commission must be adapted with an increased emphasis on a contextual approach to contractual interpretation. We further posit that precontractual negotiations may be used due to the similarities between the interpretation of smart contracts and the equitable remedy of rectification.

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<sup>7</sup> The organisation of supply chains tends to be costly, inefficient and error-prone because of their reliance on paper-based documentation. DLT-based smart legal contracts can be used to make supply chains more efficient through easy availability of documents and automaticity of transfers, see Parm Sangha, Veena Pureswaran and Smitha Soman, 'Advancing global trade with blockchain' (IBM, 2020) 16.

<sup>8</sup> Law Commission (n 1).

<sup>9</sup> UK Jurisdiction Taskforce, 'Legal Statement on cryptoassets and smart contracts' (The LawTech Delivery Panel, 2019) 135.

<sup>10</sup> The similarly important project on digital assets is still running, see Law Commission, *Digital Assets, Consultation Paper* (Law Com No 256, 2022).

## A. Code and Automaticity

Generally, smart contracts can be divided into (1) natural language contracts ('regular contracts') with automated performance, (2) contracts recorded partially in natural language and partially in code with automated performance ('hybrid smart contracts') and (3) contracts recorded solely in code with automated performance ('fully coded contracts'). Since (1) is essentially no different from a regular contract, much of the essay will focus on fully coded contracts, as they more potently highlight the differences between interpreting regular and smart contracts. Hybrid smart contracts will be addressed briefly at the end.

The obvious difference between regular contracts and smart contracts is the expression of agreed terms in code instead of natural language. Another distinction is the handling of performance: smart contracts perform the parties' obligations automatically once the conditions are fulfilled, eliminating the necessity for human intervention, while regular contracts generally rely on the parties to perform the contract's obligations.<sup>11</sup> This is known as automaticity. Consider, for example, a contract between a restaurant owner and an insurance company where the insurer must compensate the restaurant owner if one of their suppliers, carrying goods, is delayed more than three hours.<sup>12</sup> Under a regular contract, the restaurant owner would need to check when exactly the suppliers arrived with the

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<sup>11</sup> UK Jurisdiction Taskforce (n 8).

<sup>12</sup> See for a similar example, Stuart Levi, Christina Vasile and MacKenzie Neal, *Legal issues surrounding the use of smart contracts* (2nd edn, Blockchain & Cryptocurrency Regulation, 2020) 155.

goods and make a claim accordingly. Then, the insurer could either choose to accept the claim and manually pay the restaurant owner, or to contest the claim in an even longer process.<sup>13</sup> However, under a smart contract, a computer could receive a feed by a scanner to identify the time of arrival of the suppliers and then transfer the agreed amount from the insurer's account to the restaurant owner's account automatically if a supplier has been late for more than three hours. In contrast to human beings, computers and computer programs cannot fail to act or perform, unless there is an error which prevents the code from running. Once deployed on the blockchain, and the conditions for the performance are met, the program's fulfilment of the contractual obligations is inevitable and automated.<sup>14</sup>

This is possible primarily due to development of DLT such as the blockchain. The key effect of blockchain technology is that manipulating the structure of smart contracts becomes (nearly) impossible.<sup>15</sup> In essence, blockchains substitute trust with security measures. With blockchain, commercial parties can transact

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<sup>13</sup> *ibid.*

<sup>14</sup> For this reason, computer scientists sometimes refer to smart contracts as 'self-executing' contracts. From a legal perspective, the 'execution' of the computer program constitutes the performance of the contractual obligations. See Sarah Green and Adam Sanitt (n 13) 191; Law Commission (n 1) para 2.14.

<sup>15</sup> This is because on the blockchain, the data is distributed: the output of the contract is validated by everyone on the network. For example, a single person is not able to release funds in contradiction to the provisions of the smart contracts purely in fact, because other people in the network will mark it as invalid, see Matthieu Quiniou, 'Blockchain, The Advent of Disintermediation' (1st ed, Wiley-ISTE, 2019), para 1.1.1. Further, the data stored on a block chain is immutable: after its creation, a smart contract can usually not be altered again.

money directly to each other (peer-to-peer), replacing the need for intermediaries or neutral third parties such as banks, which were formerly widely used to facilitate transactions.

## **B. Legal Enforceability**

Nevertheless, it must be taken into consideration that not all smart contracts are legally binding. In English law, there is a contract when two or more parties have reached an agreement, intend to create legally binding relations, and have each provided consideration.<sup>16</sup> Smart contracts that fulfil these criteria have legal effect and may be examined by courts. However, there are also smart contracts that have not fulfilled these basic requirements for contract formation and by virtue of the technology. They could also be legally void. Consider a smart contract concluded between a seller and a buyer who is at the age of 16. Although this smart contract is effectively immutable once stored on the blockchain, the contract could be voided due to illegality because the buyer is below the age of 18. Such smart 'contracts' will continue to operate as computer programs and are naturally outside the scope of this article. Later references to smart contracts refer to 'a legally binding contract in which some or all of the contractual obligations are defined in and/or performed automatically by a computer program'.<sup>17</sup>

## **C. Significance**

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<sup>16</sup> Mindy Chen-Wishart, *Contract Law* (9th edn, Oxford University Press) 42.

<sup>17</sup> Law Commission (n 1) para 1.2.

The legal interpretation of smart contracts is crucial because they are all ultimately just programs, and it is often unclear what legal effects the actions of such programs may have. Take the above example of the restaurant owner and insurer. If supplies arrive late, but the insurer cannot pay (e.g., due to insufficient funds in the account), the smart contract may have a provision to notify both parties that payment has failed. There are two possible interpretations of such a scenario. The provision may be interpreted as a 'cure the breach' clause, thus giving the insurer time to cure the breach before he becomes liable for damages. Alternatively, it may be a termination clause, allowing the restaurateur to terminate the contract and sue for damages.

## 1. Interpreting Smart Contracts

### A. Regular contractual interpretation<sup>18</sup>

First, it is necessary to establish the standard principles of contractual interpretation. English law takes an objective approach, disregarding what the parties themselves meant by the language they used. Instead, the court asks what the language used in the contract would have meant to a reasonable person.<sup>19</sup> However, within the broad contours of the objective approach, there continues to be significant academic and judicial disagreement on the proper approach to contractual interpretation.

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<sup>18</sup> For the whole section, see Law Commission (n 1) paras 4.4, 4.5; Sarah Green, 'Smart contracts, interpretation and rectification' (2018) 2 LMCLQ 234; Sir Kim Lewison, *The Interpretation Of Contracts* (7th edn., Sweet & Maxwell Ltd, 2020).

<sup>19</sup> Law Commission (n 1) para 4.4.



This disagreement is often analogised to a pendulum between the approaches of 'textualism' and 'contextualism'. 'Textualism' is the orthodox approach where the courts are limited to the four corners of the contractual document and emphasis is thus placed on the 'plain' meaning of the language. This was changed by the decision of *ICS v West Bromwich BS*,<sup>20</sup> further discussed below, which advocated for 'contextualism' and thus the use of an extended factual matrix in contractual interpretation. Cases such as *Chartbrook v Persimmon Homes*<sup>21</sup> and *Rainy Sky SA v Kookmin Bank*<sup>22</sup> followed in the footsteps of *ICS* by choosing between competing constructions of contractual language utilising an assessment of commercial common sense.

The pendulum swung again in the case of *Arnold v Britton*.<sup>23</sup> Overall, the majority sought to restrict the use of commercial common sense in the interpretation of contracts. Lord Neuberger emphasised that, in applying the reasonable person test, primacy should be given to the 'natural' meaning of the language, which commercial common sense and surrounding circumstances should not 'undervalue'.<sup>24</sup> Further restrictions were implemented. The clearer the meaning of the words used, the more difficult it should be to depart from it.<sup>25</sup> Commercial common sense should not be invoked retrospectively, even if the contract has led to unfortunate consequences for one of the

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<sup>20</sup> [1997] UKHL 28.

<sup>21</sup> [2009] UKHL 38.

<sup>22</sup> [2011] UKSC 50.

<sup>23</sup> [2015] UKSC 36.

<sup>24</sup> *ibid* [17].

<sup>25</sup> *ibid* [18].

parties.<sup>26</sup> Similarly, '[t]he purpose of interpretation is to identify what the parties have agreed, not what the court thinks that they should have agreed.'<sup>27</sup>

In a clear attempt at reconciliation, Lord Hodge explained in *Wood v Capita Insurance Services Ltd*<sup>28</sup> that the approach in *Arnold* was consistent with *Rainy Sky*, and was the correct one to be applied:

[T]he court must consider the contract as a whole and, depending on the nature, formality and quality of drafting of the contract, give more or less weight to elements of the wider context in reaching its view as to the objective meaning. This unitary exercise involves an iterative process by which each suggested interpretation is checked against the provisions of the contract and its commercial consequences are investigated... Textualism and contextualism are not conflicting paradigms in a battle for exclusive occupation of the field of contractual interpretation... There may often therefore be provisions in a detailed professionally drawn contract which lack clarity and the lawyer or judge in interpreting such provisions may be particularly helped by considering the factual matrix and the purpose of similar provisions in contracts of the same type.<sup>29</sup>

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<sup>26</sup> *ibid* [19].

<sup>27</sup> *ibid* [20].

<sup>28</sup> [2017] UKSC 24.

<sup>29</sup> *ibid* [10], [12–13]. See also Zhong Xing Tan, *Beyond the real and the paper deal: the quest for contextual coherence in contractual interpretation* (2016) 79 MLR 623, esp 637.

Thus, the court takes a more holistic view of contractual interpretation, with an emphasis on judicial pragmatism which allows the court to adapt to different situations. Both 'textualism' and 'contextualism' are endorsed. Nonetheless, a combined reading of the *Arnold* and *Wood* signals that the Supreme Court still favours the literal approach as the starting point to contractual interpretation. Although courts are accorded flexibility, the language of the contract itself is given primacy – business common sense and context serve to assist only when a textual analysis is insufficient to interpret the contract.

## **B. Can smart contracts be interpreted?**

Before approaching a method of interpreting smart contracts, it must be clarified whether smart contracts are interpretable in the first place.

Some scholars take a hardline stance, believing that code only has an effect, leaving no room for interpretation.<sup>30</sup> 'Code is law'.<sup>31</sup>

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<sup>30</sup> Law Commission (n 1) paras 4.8, 4.9, 4.10.

<sup>31</sup> See Michel Cannarsa, 'Interpretation of Contracts and Smart Contracts: Smart Interpretation or Interpretation of Smart Contracts?' (2018) 26 ERPL 773, 780. The phrase can be traced back to Lawrence Lessig, *Code and other Laws of Cyberspace* (1st edn, Basic Books, 1999); Lawrence Lessig, 'Code is Law: On Liberty in Cyberspace' (Harvard Magazine, 1 January 2000) <<https://harvardmagazine.com/2000/01/code-is-law-html>> accessed 1 May 2023.

The Law Commission disputes this position, in particular that the code in a smart contract simply 'means what the code does when it is executed', or that code has only an effect and no meaning.<sup>32</sup> The Law Commission contends that code's meaning can deviate from the effects of the code, 'meaning' of a smart contract.<sup>33</sup> While we agree with the Law Commission that smart contracts must be interpretable, the Law Commission's reasoning for reaching this conclusion is somewhat flawed. The Law Commission cites the example of an upgrade to an operating system resulting in 'legacy code' that no longer performs in the way that it used to:

If we say that the code only means what it does when it is executed, the meaning of the code would change in every instance depending on how the code responded to the system upgrade. However, we do not think it makes sense to say that the meaning of the code has changed in each case, because the code itself has not changed; instead, it must be the outcome that has changed. If we accept this, it then follows that there can be a divergence between what the code 'means', and what it does when it is executed, which entails a distinction between meaning and effect.<sup>34</sup>

First, it must be recognised that the Law Commission adopts their definition of 'meaning' for a pragmatic reason. This is because in the alternative, 'adopting a method of interpretation based on what the coded terms "mean" to a functioning computer

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<sup>32</sup> Law Commission (n 1) paras 4.10, 4.11, 4.12.

<sup>33</sup> *ibid.*

<sup>34</sup> *ibid* para 4.11.

would leave no room for argument regarding whether the performance of the coded terms aligned with their intended meaning; the code would mean whatever the code performed.<sup>35</sup> Thus, the Law Commission's definition of the 'meaning of a smart contract fits with orthodox contract law principles of the objective interpretation of regular contracts, where courts try to determine the meaning of contractual terms according to the reasonable person test. This is problematic – in trying to apply this conception of meaning to smart contracts, the specific characteristics of smart contracts must be taken into account. At their core, smart contracts are technical tools for automaticity. Thus, unlike regular contracts, the architecture of smart contracts is focused on optimising their effects and not on providing formal evidence for an agreement – the design of coding languages is geared towards utility, not comprehensibility. To a computer, 'meaning', or what the parties intended the code to do, is a pointless distinction – barring programming errors, it will still take the code and run the program, as smart contracts are logical instructions executed in a deterministic manner. Thus, unlike regular contracts, smart contracts only have an effect – they do what they do, and this may diverge from what the parties subjectively intended. Distinguishing what code 'means' from its effects is therefore fictitious.

Second, in addition to 'meaning' in the context of a regular contract, the Law Commission's example uses 'meaning' in a common sense way to indicate what the parties intended the code to do, or their shared underlying agreement. The Law Commission then distinguishes the 'meaning' of the code from

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<sup>35</sup> Law Commission (n 1) para 4.61.

the multiple effects the code may have. This is an intuitive understanding of 'meaning' and is thus attractive. From the parties' or their coders' subjective perspective, of course the code has 'meaning' - 'meaning' merely refers to code that does exactly what they intended. Similarly, one could subjectively say that code's unintended outcomes are merely effects, similar to how unintended outcomes of code are often labelled by coders as being bugged or buggy. However, we think this attraction is superficial. In their example, the 'meaning' of the code is easily ascertainable as one can simply reverse the system upgrade. This is similar to situations where code is written with minor syntax errors and will not run, but the mistake may be easily remedied, perhaps by deleting errant punctuation (although admittedly code that does not run will never become a smart contract). In such situations, there are likewise two outcomes of the code – one that does not run due to the syntax error, and one that does run which reflects the 'meaning' of the code. Crucially, this is often not the case, for example in situations with more complex errors or bugs, where the code does run, but to a completely unintended effect. In such cases, it is impossible to distinguish between 'meaning' and the outcome of the code, as the the code which reflects the parties' subjective intentions (i.e. 'meaning') simply never existed.

It follows that the adoption of the Law Commission's understanding of the 'meaning' of smart contract causes practical difficulties. Using 'meaning' to refer to the parties' subjective intentions of how the code should work is problematic in a dispute. Consider a situation where a smart contract unintentionally benefits a party due to bugged code. Naturally, the benefitting party will argue that the code accurately displayed what the parties agreed to, while the other party will dispute that

and argue that the code is flawed and led to an unintended effect. In contrast to regular contracts, it is more difficult to 'read' smart contracts and extract what the parties might have intended the smart contract to do. If there are no indications in natural language as to what a specific chunk of code is intended to do, we can only run the given code. Running the code is most important for understanding what it 'means'. Therefore, we must differentiate between the objective meaning of a smart contract and what the parties' subjective intentions are. Although this may seem like a small semantic quibble, and situations where significant errors occur in the operation of smart contracts may be limited in practice,<sup>36</sup> in our view, it is better to acknowledge the unique characteristics of smart contracts. This is because allowing the parties to distinguish between the 'meaning' and effect of code obscures the crux of the problem – that the direct output or effect of the code may diverge from the parties' subjective intentions. This recognition forms the central theme of our paper.

The Law Commission ultimately concludes that standard contractual principles can be applied to interpret smart contracts due to their definition of 'meaning'. We agree that smart contracts can and should be interpreted – not because the code has 'meaning', but because smart contracts may not reflect the parties' subjective intentions. This is a matter of necessity. The more

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<sup>36</sup> If we categorise smart contracts by volume, smart contracts responsible for depositing and withdrawing funds, executing a trade and adding liquidity to a crypto wallet represents the majority of everyday smart contracts. These contracts have an Etherscan page that allows you to 'read' the smart contract and there is no potential for mistake or difference in interpretation when referring to these Etherscan pages. They are a faithful repository of the 'effects' a smart contract can have.

complex the parties' intentions, the more potential for divergence between the parties' subjective intentions and the code's effect. The potential for divergence will only grow as the use of fully coded contracts becomes more sophisticated. Thus, denying the possibility of interpretation would bind the parties to a smart contract that does not reflect their intentions with no recourse. This is clearly unsatisfactory. Building on this understanding of the fundamental difficulty with smart contracts, we will first consider how smart contracts can diverge from the parties' subjective before addressing the appropriate test for interpretation.

### **C. Divergence of the fully coded contract and the 'real' agreement<sup>37</sup>**

As stated previously, fully coded contracts are completely expressed in code and are thus run completely independently by machines. The starting point for our analysis is that while what is coded in the fully coded contract should exactly replicate what was agreed on by the parties and written by their coder representatives, there can be a divergence between what the code should mean (the subjective agreement between the parties) and what it does mean in reality. Put differently, the effects of the smart contract may not be what the parties expected. This divergence is precisely why the interpretation of smart contracts is problematic.

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<sup>37</sup>The linguistic differentiation bases on a distinction made by Dworkin as to the relationship between the written statute (as the source) and the subsequently constructed 'real' statute, see Ronald Dworkin, *Law's Empire* (1st edn, Harvard University Press, 1988).



Divergence can occur due to a number of reasons. The most obvious one is that coding remains a specialist skill. The vast majority of non-coders will not be able to understand how a machine would interpret coding language, nor will they be able to write code for the machine to execute.<sup>38</sup> Thus, parties cannot note down the contract themselves and will need coders to act as 'translators'. However, as will be shown below, coding is more than translation – it is a creative task carried out by coders (see example on page 13 below), thus generating some potential for divergence.

Moreover, due to the technical nature of code and computer programs, there are further cases where divergence can occur, as summarised by the Law Commission:<sup>39</sup>

- a. As alluded to above, disputes about coded terms may arise also where the 'outcome of a feature of the code'<sup>40</sup> becomes apparent only after the code has been deployed or where the code performs 'differently to how one or both of the parties had expected'.<sup>41</sup>

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<sup>38</sup> Sarah Green (n 18) 239.

<sup>39</sup> Law Commission (n 1) paras 4.29, 4.30; elaborated in Law Commission, *Smart Legal Contracts, Responses to call for evidence* (Crown Open License, 2021).

<sup>40</sup> Catherine Phillips, in Law Commission (n 1) para 4.29.

<sup>41</sup> Allen & Overy, in Law Commission (n 1) para 4.29.

- b. Similarly, predictions of how the code in a smart contract will perform could be misleading, for example due to errors or bugs in the code.<sup>42</sup>
- c. Differences between performance of the code and a reading of the code could be due to 'unforeseen unintended changes by third parties such as hackers'. However, most 'hacks' associated with blockchain technology are, in reality, only exploitations of unintended coding errors.
- d. Performance of the code can deviate from its reading if the code unintentionally performs differently due to changes in the hardware, or (per the Law Commission's example) if an 'upgrade to an operating system causes the code to perform unexpectedly'.<sup>43</sup>

The list is not exhaustive. Divergence may, for example, further occur in the context of artificial intelligence that is set up in an umbrella contract, which itself enters into new subsidiary contracts independently.

When divergence occurs, a dispute arises between the parties regarding the difference(s) between their subjective agreement

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<sup>42</sup> As with many bugs in computer code, these errors are not glaring, but rather become obvious only once they have been exploited. See the example of 'The DAO'.

<sup>43</sup> It is interesting to note that blockchains' function is precisely to obviate issues of difference in hardware/software of the end-user. Code in general might respond differently to different hardware and the BIOS that is coded into the hardware but smart contracts will never experience such issues.

and the actual implications of the smart contract. As such, a test for determining the meaning of coded terms will be key to resolve disputes.<sup>44</sup> The principles of contractual interpretation have developed with the understanding that the contract itself represents the objective intention of the parties.<sup>45</sup> Smart contracts disrupt this paradigm. This calls for a clarification as to how existing contract law can be utilized to interpret coded terms.

## 2. The Appropriate Test

### A. The reasonable coder test

According to standard principles of contractual interpretation, the court's starting point is to determine the objective meaning of the language of the smart contract.<sup>46</sup> In Lord Hodge's words, this represents 'textualism', one tool in the judge's toolbox.<sup>47</sup> The principles of contractual interpretation have been developed with traditional natural language contracts in mind. Accordingly, the reasonable person test creates certainty for contracting parties by asking what a third party would the contract understand to mean – an objective approach. However, code is written with computers in mind, not human beings. The average reasonable person does not understand code, at least to date.

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<sup>44</sup> Law Commission (n 1) para 4.76.

<sup>45</sup> see eg *GB Building Solutions Limited v SFS Fire Services Limited* [2017] EWHC 1289 (TCC) [13].

<sup>46</sup> *Wood* (n 23) [13].

<sup>47</sup> *Wood* (n 23) [13].

Thus, we agree with the Law Commission that it is necessary to modify the test to become that of a 'reasonable coder'. Naturally, this is because a reasonable person will not understand a coded term and is not able to deduce its meaning from the written code itself. For context, the Law Commission suggests asking 'what a person with knowledge and understanding of code would understand the coded term to mean – that is, a reasonable coder'.<sup>48</sup> A benefit of this test is that it provides an 'insight into what the parties intended the code to do, regardless of the computer's ultimate performance,' with the obvious caveat that courts will need the assistance of expert coders.<sup>49</sup> This modification is necessary as accommodating a reasonable person 'could significantly inhibit the use of smart contracts by steering the design of coding languages towards comprehensibility, rather than utility'.<sup>50</sup>

## **B. Issues with the reasonable coder test**

However, the necessary modification of the 'reasonable person test' towards the 'reasonable coder test' inevitably leads to a disruption of the judges' role by shifting the role of interpretation from the judge towards the coder. Thus, we argue that the reasonable coder test cannot be applied as straightforwardly as the reasonable person test. To counteract this, the courts must use the remaining tool in the judge's toolbelt: 'contextualism'.<sup>51</sup> In the context of smart contracts, this necessitates a return to ICS

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<sup>48</sup> Law Commission (n 1) para 4.32.

<sup>49</sup> *ibid* para 4.40.

<sup>50</sup> Lloyds of London, in Law Commission (n 1) para 4.36.

<sup>51</sup> *Wood* (n 23) [13].

and possibly going even further to allow the unprecedented use of pre-contractual negotiations.

On a preliminary note, the reasonable coder test builds on the premise that the contractual rights and obligations are drafted in the human-readable source code, and not in the machine code.<sup>52</sup> While this reflects the majority of smart contracts nowadays, it must be taken into consideration that smart contracts concluded by artificial intelligence or 'umbrella contracts' could state the contractual terms in machine code. Machine code, meanwhile, is unintelligible even to expert coders since it requires enormous computing power capacity.<sup>53</sup> Moreover, the 'test overlooks the reasonable coder's most natural first step of running the code' and it is 'not futureproofed for AI-generated code'.<sup>54</sup>

Even for code that coders can understand, the coder's task does not solely entail the translation of code but significant elements of interpretation as well. This is because code cannot always be translated line by line such that laymen are able to understand it. Consider, for example, the following command translated from source code into natural language: 'Go to the

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<sup>52</sup> Martin Fries and Boris P Paal, *Smart Contracts* (1st edn, Mohr Siebeck, 2019) 17; Matevž Pustišek, Nataša Živić und Andrej Kos, *Blockchain* (De Gruyter, 2022) 89; Law Commission (n 1) para 4.50.

<sup>53</sup> *ibid.*

<sup>54</sup> Harriet Jones-Fenleigh, Adam Sanitt, Jonathan Hawkins, 'Smart legal contracts under English law – Part 2: Formation & Interpretation' (Norton Rose Fulbright, 2 February 2022) <<https://www.nortonrosefulbright.com/en/inside-disputes/blog/202202-smart-legal-contracts-under-english-law-formation-and-interpretation>> accessed 1 May 2023.

shop and buy a coffee. If there are any eggs, get a dozen.'<sup>55</sup> A conventional reasonable person, including judges, would understand this as the command to buy a coffee at the shop, and if there are any eggs, to get 12 eggs. At the very least, the language is ambiguous to a reasonable person and thus open to interpretation. A computer, meanwhile, necessarily and unequivocally understands that as the command to buy twelve coffees under the condition that there are any eggs.

Hence, merely translating the code into natural language by an expert coder is insufficient to aid the court in interpreting a coded term and providing a 'natural' meaning of the code.<sup>56</sup> They will have to explain how individual components of the code relate and interact with each other. This is a complex exercise. In sophisticated programs, different coders will have different opinions on whether and how the program will operate. Moreover, just as most people are unfamiliar with code, most coders are unfamiliar with the law. There is thus another layer of translation that coders are engaged in – they must attempt to account for and navigate the legal effects that the parties hope for the smart contract to have.

Thus, the Law Commission's analogy to translating terms in a foreign language, while having certain logical force, underestimates the extent to which coders may have to interpret the smart contract.<sup>57</sup> Certainly, translators have a complex role,

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<sup>55</sup> A well-known example in the context of smart contracts, see Sarah Green and Adam Sanitt (n 13) 205.

<sup>56</sup> Again, the Law Commission considers this issue but makes an inaccurate inference, see Law Commission (n 1) para 4.42.

<sup>57</sup> Law Commission (n 1) para 3.86.

which may require them to take creative liberties to translate words and phrases that may not have direct translations. Coders, meanwhile, will have to elaborate on the 'effect of certain combinations of words, and give their reasoned opinion as to what the code appeared to instruct the computer to do.'<sup>58</sup> This task, however, cannot be done without interpreting the agreement. On the most fundamental level, explaining how the coded terms will have effect (prediction) and how they relate to each other (relation) is in and of itself an unavoidable act of interpretation. Analysing the wider matrix, the links, the nature of the code and the context constitute an inherent part of this task. This includes, however, to see the program in the context of its system – a certain chunk of a subprogram may start at one point and end hundreds of lines later. Thus, coders will need to read and summarise entire chunks of code, try to understand its effect and express what they take to be the purpose. The aforementioned 'egg' example is a drastic simplification of how entire subprograms (containing plenty of lines of code) might function; code is written in computer-logic, which is not necessarily the same as human-logic. It is not only about translating the content of certain syntax or digits, but is most importantly about translating the logic. In contrast, the significance of rephrasing sentences or circumscribing words when translating a contract from English into Hindi, as human languages following the similar patterns and logics, appears to be small.

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<sup>58</sup> See Thibault Schrepel (n 4) 36. He also refers to AI systems that may assist with interpreting smart legal contracts supplementing 'the experts capable of translating the code of smart contracts into natural language'.

In the case of an error in the code, which is typically when interpretation is required, the expert coder will likely have to go further to provide a full picture of the code to the judge. The coder will have to build upon their knowledge of the present effects of the code, their experience with common coding mistakes, and their understanding of the overall objectives of the parties to come to a version of code that better reflects the parties' subjective agreement. However, the line between this exercise (essentially a backwards construction of code) and interpretation of the code is exceedingly thin. The reconstruction of the original agreement is inevitably based on the coder's understanding of what the code 'should' do based on the commercial reality of the specific smart contract and general legal requirements for the creation of contracts. This entails mixing the coder's objective understanding of the code and subjective understanding of the agreement which underpins the smart contract.<sup>59</sup> This form of subjectivised objectivity is frequently exercised by the courts – per *Rainy Sky*, the court may utilise evidence relating to 'background knowledge which could reasonably have been available to the parties in the situation which they were at the time of the contract' when interpreting the contract.<sup>60</sup> To allow coders to do so would be to grant them judge-like powers of interpretation.

What is left to the judge is solely to linguistically reformulate the results of the coder as, for instance, an 'obligation' or a 'right'. In some cases, the judge may also have to reformulate the findings of the coder having regard to the commercial context and the principles of contract law, such as if the contract included a penalty clause (which have long been held to be unenforceable

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<sup>59</sup> This is the fundamental difference to appointing other experts.

<sup>60</sup> *Rainy Sky* (n 23) [14].



under English law<sup>61</sup>). Nonetheless, not only are such situations limited, but even in such situations, the role of the judge is dwarfed by that of the coder. Although the Law Commission recognises this shift, they fail to classify its consequences.<sup>62</sup> As many or all of the contractual terms are written in code, courts are in need of translation (and interpretation) for all of them. In contrast to the use of expertise in other areas of law,<sup>63</sup> the reasonable coder test involves the clarification of not only a certain factual question, but, essentially, the meaning of the entire smart contract.

Moreover, the fact that smart contracts do not use a language known to both their authors and their audience<sup>64</sup> breaks the analogy to, for example, industry terms. This is because if parties make use of industry terms, 'the courts' willingness to interpret those words according to a customary lexicon' arises from the point 'that both parties to the agreement would have understood the language in a particular way.'<sup>65</sup> This, however, is not the case with code: whilst the machine will certainly understand it (and experts might), the parties themselves likely will not.<sup>66</sup> This is notwithstanding the different interpretations experts might have of the code in predicting its effect in virtue of its complexity. In addition, while some draw a comparison between this scenario and hiring a lawyer to elucidate the legal

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<sup>61</sup> see eg *Vivienne Westwood Ltd v Conduit Street Development Ltd* [2017] EWHC 350 (CH).

<sup>62</sup> Law Commission (n 1) para 4.43.

<sup>63</sup> E.g. the *Bolam* test in the tort of negligence, *Bolam v Friern Hospital Management Committee* [1957] 1 WLR 582.

<sup>64</sup> Sarah Green (n 18) 241.

<sup>65</sup> *ibid.*

<sup>66</sup> *ibid* 242.

implications of a traditional contract, such an analogy is also inappropriate.<sup>67</sup> The reason for this is that non-lawyers 'typically can understand simple short-form agreements as well as many provisions of longer agreements, especially those setting forth business terms,'<sup>68</sup> though they may still hire legal counsel. In contrast, a non-programmer is 'at a total loss to understand even the most basic smart contract' and is therefore significantly more, if not completely, dependent on the explanation of an expert.<sup>69</sup>

It follows that the reasonable coder test would not be a test exercised by judges. One could argue that this does not imply that expert coders are offering an opinion on a matter of law and so there is still some room for the judges to decide.<sup>70</sup> Similar to the *Bolam-Bolitho* test for medical negligence, the Law Commission argues that the court is not bound by the outcome of a coder's examination.<sup>71</sup> However, the degree to which judges depend on the experts differ. Medical experts address a specific medical issue which is of importance for the case. Expert coders, however, would be appointed for translating (and interpreting) the entire contract. Medical opinions can usually be checked by judges on the basis of common sense and logic per *Bolitho*, which reflects the court's desire to not be completely bound by the expert evidence. However, judges are neither generally capable of

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<sup>67</sup> Stuart Levi, Christina Vasile and MacKenzie Neal (n 11) 148; Martin Fries and Boris P Paal (n 49) 88, 89.

<sup>68</sup> *ibid.*

<sup>69</sup> *ibid.*

<sup>70</sup> Law Commission (n 1) para 4.54.

<sup>71</sup> In *Bolitho v City & Hackney Health Authority* [1998] AC 232, 243, Lord Browne-Wilkinson made it clear that the court was not bound to accept the outcome of a *Bolam* inquiry, but retained the right to reject it where it 'could not be logically supported'.

scrutinising a coder's interpretation and are reliant on the coder's 'translation' of the code, nor may they refer to potential aids to contractual interpretation (such as surrounding circumstances). This is because, technically, the 'natural and ordinary meaning' of the code is clear, as the meaning of code is simply its effect. Thus, the court's ability to depart from the expert coder's opinion is fictitious.

In conclusion, the Law Commission underrepresents the extent to which interpretation of code differs from interpretation of natural language. The application of the reasonable coder test shifts power from judges to coders, subverting the orthodox role that judges play in favour of a third party. Sir Lewison stated that 'in principle, where a document has been translated, its proper interpretation is a matter for the court, and not a proper subject of expert evidence'<sup>72</sup> and 'although expert evidence may be necessary to explain technical terms to the court, it is not the function of an expert to interpret the contract. That remains the function of the judge.'<sup>73</sup> This is desirable because 'an independent, impartial, honest and competent judiciary is integral to upholding the rule of law, engendering public confidence and dispensing justice'.<sup>74</sup> It goes without saying that expert coders cannot play the role of a judge, thus making the reasonable coder test unsatisfactory.

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<sup>72</sup> Sir K Lewison, *The Interpretation of Contracts* (6th edn, Sweet & Maxwell, 2015) para 5.06; seemingly of the same opinion Slaughter & May, in: Law Commission (n 1) para 4.38.

<sup>73</sup> *ibid.*

<sup>74</sup> Commonwealth (Latimer House) Principles on the Three Branches of Government 2004 (adopted by the Commonwealth in 2003), Principle IV Independence of the Judiciary.

### 3. The Return to Contextual Interpretation

The modification towards a 'reasonable coder' test under the current law of interpretation leaves too little of the judges' function intact. Moreover, the present primacy of the language chains judges to the results of the interpretation of coders and limits the courts to accepting the effect of code, as code is unambiguous. This is probably what the Law Commissions feared and hoped to avoid by defining 'meaning' in the way that they do.<sup>75</sup>

To counteract this development, extended admissibility of 'surrounding circumstances' would restore the judges' role to determine the agreement, freed from the complex technicalities and deterministic nature of code. This represents a necessary and pragmatic compromise for the courts. It is also doctrinally sound. Fortunately, Lord Hodge notes that the nature of the contract should determine the extent to which the wider context can be considered when trying to ascertain its objective meaning.<sup>76</sup> Thus, the courts could utilise context despite the clarity of a smart contract's coded terms on the basis that it is necessary for interpretation due to the special nature of smart contracts. This is supported by the pragmatic, balanced approach of contractual interpretation suggested in *Wood*, where the use of contextualism

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<sup>75</sup> Law Commission (n 36).

<sup>76</sup> *Wood* (n 23) [10].

is not limited by specific scenarios or tests, but used whenever necessary according to the circumstances of the case.<sup>77</sup>

## **A. Vindication of ICS and the necessity of a wider factual matrix**

The Law Commission references natural language aids to interpreting smart contracts, namely business process document<sup>78</sup> ('design script'), natural language explanation of code,<sup>79</sup> and natural language comments in source code.<sup>80</sup> While these documents are significant in restoring the appropriate role of the judge, the availability of these tools vary significantly on a case-by-case basis, and commonly necessitate intentional incorporation as part of the contract by the parties. Our proposal of a return to a contextual approach that can incorporate the aforementioned natural language aids is analogous to Lord Hoffman's approach in *ICS*.

*ICS* is commonly viewed as a pivotal point that dramatically shifted English law away from a literal interpretation of contract towards contextual interpretation, constituting a radical change in the legal approach of contractual

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<sup>77</sup> *Wood* (n 23) [13].

<sup>78</sup> Law Commission (n 1) paras 4.62-4.66.

<sup>79</sup> *ibid* paras 4.67-4.74.

<sup>80</sup> *ibid* paras 4.75-4.80.

interpretation.<sup>81</sup> This view is exaggerated.<sup>82</sup> There has been recognition of the importance of context prior to *ICS* as evidenced by Lord Wilberforce's dicta in *Prenn v Simmonds*<sup>83</sup> and *Reardon Smith Line Ltd v Yngvar Hansen-Tangen*<sup>84</sup>, noting that 'the time has long passed when agreements... were isolated from the matrix of facts in which they were set and interpreted purely on internal linguistic considerations' and 'no contracts were made in a vacuum', respectively. What *ICS* does do controversially, however, is to endorse the broad-brush use of context in contractual interpretation in three of five principles outlined by Lord Hoffmann.

The fourth principle suggests that language (in the case of smart contracts, the code) is distinct from the agreement, which is what the overall contract would convey to a reasonable person. This can be contrasted with Lord Sumption's approach that 'language, properly used, should speak for itself and it usually does'.<sup>85</sup> The fourth principle allows for the 'reasonable coder test' to be applied with relative flexibility to smart contracts because there is no emphasis on the primacy of language or the code itself – it is the agreement of parties to a reasonable coder that matters. Lord Hoffman's fifth principle follows logically from the fourth, giving the court considerable power to reformulate the code to fit the parties' intentions, 'as there is not... a limit to the amount of

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<sup>81</sup> Lord Sumption, 'A Question of Taste: The Supreme Court and the Interpretation of Contracts' (2017) Harris Society Annual Lecture, Oxford.

<sup>82</sup> Lord Bingham, 'A New Thing Under the Sun? The Interpretation of Contract and the ICS Decision' (2008) EdinLR Vol 12 374, 375.

<sup>83</sup> [1971] 1 WLR 1381.

<sup>84</sup> [1976] 1 WLR 989, 995-6.

<sup>85</sup> Lord Sumption (n 76).

red ink or verbal rearrangement or correction which the court is allowed.<sup>86</sup> This principle was held to be problematic, as the ability for courts to do so is 'difficult to reconcile with the law relating to implied terms and rectification'.<sup>87</sup>

Most importantly, Lord Hoffman's second principle held that the range of facts that could serve as relevant evidence in the interpretation exercise include 'absolutely anything' which could have affected the way in which the contract would be understood. On the application of this principle, the aforementioned documents are no longer merely natural language aids to interpreting code per the view of the Law Commission. Instead, they become part of the factual matrix, and are thus instruments for the judge to evaluate the interpretation of the agreement on their own terms. The broad terms of Lord Hoffman's second principle which provided little guidance to circumscribing the scope of the factual matrix understandably led to criticism on its potential practical impact, with the fear that the vague language will encourage counsel to present great volumes of evidence to court.<sup>88</sup>

However, in the context of smart contracts, such a broad formulation can be better justified for two reasons. First, in contrast to regular contracts, the smart contract itself does not provide sufficient evidence of the parties' intentions. The risk of having too much evidence is surely better than having no evidence at all. Second, once incorporated within the factual

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<sup>86</sup> *ICS* (n 19) [912].

<sup>87</sup> Lord Sumption (n 76).

<sup>88</sup> Sir Christopher Staughton, 'How Do the Courts Interpret Commercial Contracts?' [1999] *CLJ* 303, 306-8.

matrix, the judge may utilise such aids along with considerations of commercial common sense to interpret the contract alongside the use of the reasonable coder test. The court can first establish what the code does and what the parties meant for the computer to do, having recourse to the explanation by the coder. Then, the court can build on that understanding via the court's interpretation of the parties' subjective intentions with recourse to the surrounding circumstances. This restores the role of the judge and ameliorates the aforementioned difficulties with the reasonable coder test. Should the courts still find Lord Hoffman's formulation to be too broad, limitations could be imposed as to the range of facts that can serve as the relevant surrounding circumstances, such as to the aforementioned documents and perhaps the parties' instructions to their coders.

## **B. Beyond *ICS* and into pre-contractual negotiations**

The interpretation of smart contracts may even justify utilising pre-contractual negotiations, rebuking Lord Hoffman's third principle which established that pre-contractual negotiations and information unavailable to the parties would remain inadmissible as a matter of 'practical policy'.<sup>89</sup>

There has been a longstanding exclusion of pre-contractual negotiation in contractual interpretation. Recently, the Court of Appeal has confirmed that pre-contractual materials may be used to demonstrate the background leading up to the contract and its commercial purposes, but may not be used in the

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<sup>89</sup> *ICS* (n 19) [913].



interpretation of the contract itself, or to any effect that might reflect the parties' intentions such as communications that may show a consensus as to the meaning of certain words.<sup>90</sup> However, in *Chartbrook*, Lord Hoffmann confirmed that 'it would not be inconsistent with the English objective theory of contractual interpretation to admit [evidence of pre-contractual negotiations]'<sup>91</sup> and that the existence of the exclusionary rule 'may well mean... that parties are sometimes held bound by a contract in terms which, upon a full investigation of the course of negotiations, a reasonable observer would not have taken them to have intended'.<sup>92</sup>

In coming to that conclusion, Lord Hoffman reasoned that there are no 'conceptual limits' to what can properly be regarded as background, echoing his second principle in *ICS* on the range of facts that would be considered relevant surrounding circumstances.<sup>93</sup> However, his Lordship agreed with Lord Wilberforce that 'inadmissibility [of pre-contractual negotiations] is normally based in irrelevance', and that a departure from the rule 'can be justified on pragmatic grounds'. Following a consideration of the benefits and detriments of such a departure, Lord Hoffman ultimately concluded 'that there is no clearly established case' for departing from the rule'.<sup>94</sup> However, this ruling was not definitive. His Lordship emphasised that there was insufficient material before the House to form a view, and that

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<sup>90</sup> *Merthyr (South Wales) Ltd v Merthyr Tydfil County Borough Council* [2019] EWCA Civ 526.

<sup>91</sup> *Chartbrook* (n 20) [33].

<sup>92</sup> *ibid* [41].

<sup>93</sup> *ibid* [33]. Note that this has received much of the same criticism as in (n 87).

<sup>94</sup> *ibid* [41].

'[i]t is possible that empirical study (for example, by the Law Commission) may show that the alleged disadvantages of admissibility are not in practice very significant or that they are outweighed by the advantages of doing more precise justice in exceptional cases or falling into line with international conventions.'<sup>95</sup>

The interpretation of smart contracts may form a reason for departing from the rule. While Lord Hoffman dismisses the point that the admission of pre-contractual negotiation would lead to a flood of evidence in litigation, he notes that, unlike surrounding circumstances (which may be used), pre-contractual statements may be 'drenched in subjectivity' and in dispute.<sup>96</sup> Moreover, it is difficult to determine the line between negotiation and a provisional agreement.<sup>97</sup> Such concerns apply with the same force to smart contracts as to regular contracts. However, for smart contracts, this practical difficulty becomes a practical necessity. Admitting such evidence to fully coded contracts is essential. This is because the actions and statements of the parties during their negotiations are indicative of the final position they adopted when entering into the fully coded contract.<sup>98</sup> Importantly, this position is unadulterated by any number of potential errors that may exist within the code that may lead the parties' subjective intentions to be lost in translation. In other words, pre-contractual negotiations offer the best evidence of what the Law Commission views the code to 'mean', as it is unadulterated by any number of potential errors that may exist

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<sup>95</sup> *ibid.*

<sup>96</sup> *ibid* [35]-[38].

<sup>97</sup> *ibid* [38].

<sup>98</sup> Contrasting opinion Law Commission (n 1) para. 4.98.

within the code that may lead the parties' subjective intentions to be lost in translation. Comparatively, in regular contracts, the use of pre-contractual negotiations simply muddies the water because the contract itself provides objective evidence of the parties' intentions. If, as Lord Hoffman proclaims, that the guiding principle of contract is to 'enforce promises with a high degree of predictability', then in the case of smart contracts, pre-contractual negotiations offer better predictability than the code itself.<sup>99</sup>

Moreover, while important, contextual clues such as comments in the source code are often insufficient. One reason is simply that such clues are not necessary for the smart contract to function and accordingly may not always be provided. As technology develops and smart contracts become increasingly automated, for example in an umbrella contract (see page 11 above), contextual clues will not be generated by AI for each derivative contract as the clues are utilised solely for humans. In addition, even if contextual clues exist, as complexity increases, such accompanying documents may not be adequate for judges to glean an extensive understanding of the parties' legal relationship.

Thus, examining the interactions between the parties before entering into the smart contract supplements the court's existing tools of interpreting contracts by providing additional information when natural language documents that accompany the smart contract are insufficient. In doing so, corresponding with our previous arguments, this returns the competency of interpretation to the judge.

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<sup>99</sup> *Chartbrook* (n 20) [37].

Further, Lord Hoffman notes in obiter that a key consideration for the extension of the admissible background in contractual interpretation is the 'compromise between protecting the interests of the contracting parties and those of third parties.'<sup>100</sup> This is because there is a 'risk that a third party will find that the contract does not mean what he thought.'<sup>101</sup> However, this risk is unlikely to arise in the context of smart contracts. Transparency is the principle for many technologies in the context of smart contracts, such as blockchain. However, in practice, only a limited number of people are likely to view and understand smart contracts. Moreover, in cases of complex code, the predicted outcome of smart contracts will be likely be conducive to multiple interpretations, even for expert coders. Finally, normatively, the interests of third parties who may read the smart contract must be secondary to the interests of the contracting parties when it comes to the accurate interpretation of the smart contract. To think otherwise would be to put the cart before the horse, not to mention that the contract might not have any impact on third parties at all.

### **C. Parallel to rectification**

Allowing pre-contractual negotiations to be considered as an aid in contractual interpretation would undoubtedly involve a change in the law.<sup>102</sup> The Law Commission rejects this change on the basis that it would create 'an unprincipled distinction' between the

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<sup>100</sup> *Chartbrook* (n 20) [40].

<sup>101</sup> *ibid.*

<sup>102</sup> Law Commission (n 1) para 4.102.

approach of interpreting regular contracts and smart contracts.<sup>103</sup> However, this distinction is not unprincipled when considering that, on the application of our above arguments and per a running theme in this article, smart contracts have a greater chance of diverging from the contractual parties' subjective intentions. This makes smart contracts sufficiently different from regular contracts to warrant separate treatment. Indeed, the interpretation of smart contracts parallels the equitable remedy of rectification, which does permit the use of pre-contractual negotiations.

In brief, rectification is where the court can correct the written terms of a contract to remedy the inconsistencies between the parties' agreement and the agreement's outward expression.<sup>104</sup> The rectified contract will have retrospective effect from the moment it was first created. Doctrinally, interpretation and rectification are distinct. As an equitable remedy, rectification does not happen as a matter of course, and is typically the last resort of the courts. The requirements for rectification for common mistake as summarised by Peter Gibson LJ in *Swainland Builders Ltd v Freeland Properties Ltd*<sup>105</sup> and affirmed by Lord Hoffman in *Chartbrook* are:

The party seeking rectification must show that: (1) the parties had a common continuing intention, whether or not amounting to an agreement, in respect of a particular matter in the instrument to be rectified; (2) there was an outward

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<sup>103</sup> *ibid.*

<sup>104</sup> *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361.

<sup>105</sup> [2002] 2 EGLR 71 [33].

expression of accord; (3) the intention continued at the time of the execution of the instrument sought to be rectified; (4) by mistake, the instrument did not reflect that common intention.

In *FSHC Group Holdings Limited v GLAS Trust Corporation Ltd*,<sup>106</sup> the Court of Appeal settled the long-standing debate over the nature of the continuing common intention arising from Lord Hoffmann's obiter *Chartbrook*, which held that the test for common mistake was objective and involved asking a reasonable observer what the intentions of the parties were. The Court of Appeal distinguished two types of common mistake: common agreement mistake, which is where the contract fails to give effect to a prior concluded contract, and common intention mistake, where the contract fails to accurately record the common intentions of the parties.<sup>107</sup> The former type of mistake utilises an objective test – as rectification is rooted in the principle that prior agreements should be upheld, the courts can objectively determine the contents of the prior agreement. Due to the latter type's underlying justification being the equitable principle of good faith, the Court of Appeal held that the test is subjective – rectification requires the determination of the subjective intentions of the parties as well as the 'outward expression of accord'.<sup>108</sup>

Many smart contracts parallel common intention mistakes, the subject of discussion in *FSHC*. This is because the smart contract, or the 'outward expression of accord', could fail to capture the subjective common intentions of the parties (e.g.

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<sup>106</sup> [2019] EWCA Civ 1361.

<sup>107</sup> *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* (n 99) [140]-[148].

<sup>108</sup> *ibid* [176].

in virtue of a bug), which leads to difficulty interpreting the smart contract. Thus, for smart contracts, interpretation and rectification are often interlinked. The normative force of utilising pre-contractual negotiations for the interpretation of smart contracts is highlighted by the Court of Appeal – if common intention is established, 'there is no sound justification for giving effect to the meaning that a hypothetical reasonable observer would have attributed to the words used in preference to what the parties actually intended the effect of their contract to be. Indeed, to do so will result in injustice.'<sup>109</sup> Moreover, the Court of Appeal notes that the requirement to show that the contract is inconsistent with the parties' common subjective intentions is good policy because it is a stringent test that reflects respect for contractual certainty.<sup>110</sup> Interpreting smart contracts in a way that disregards the intentions of one or more parties undermines the certainty and security of commercial transactions, which are the foremost reasons for utilising smart contracts in the first place. The utilisation of pre-contractual negotiations in conjunction with the reasonable coder test provides the court with additional certainty in determining the appropriate interpretation of smart contracts.

## **4. Interpretation of Hybrid Smart Contracts**

In principle, the interpretation of hybrid smart contracts (e.g. contracts that contain some clauses in code and other clauses in natural language) is significantly less difficult than the

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<sup>109</sup> *ibid* [151].

<sup>110</sup> *ibid* [173]-[174].

interpretation of fully coded contracts. Due to the use of both code and natural language, the court is no longer chained to the effect of the fully coded terms – it has the material in the natural language clauses to aid in the interpretation of the coded elements of the hybrid contract. Tensions between different provisions in contractual documents are regularly resolved by courts. When faced with two tenable readings of a contract, one provided by the code and one provided by the natural language, the court can evaluate the competing interpretations by considering which view aligns better with business common sense.<sup>111</sup>

With the use of the reasonable coder test in conjunction with the reasonable person test used in the interpretation of regular contracts, the role of the judge is no longer completely sidelined. While the reliance on business common sense may place a heavy burden on courts and lead to uncertainty that has been cautioned against by the recent Supreme Court cases (most prominently in *Arnold*), it is submitted that hybrid contracts, for the most part, avoid the central difficulty with the interpretation of fully-coded contracts as described above – that the code of the contract itself may fail to represent the parties' intentions.

However, in practice, it must be noted that while hybrid smart contracts contain both coded and natural language clauses, they are more similar to fully coded contracts than not. Hybrid contracts do not necessarily have the same clause expressed in both code and natural language. Whether the natural language clauses can be used to understand the coded clauses is strongly dependent on the specific hybrid contract. For example, the

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<sup>111</sup> *Wood* (n 23) [11].



natural language elements may conflict with the code, making the overall function of the smart contract unclear. Thus, the judge's ability to gain an understanding of the overall contract via the natural language elements will vary significantly from case to case. In situations where the natural language elements are not conducive to the judge's ability to understand the overall contract, the above arguments relating to the necessity of a wider contextual approach for fully coded contracts are likewise applicable to hybrid contracts.

## Conclusion

The public perception of smart contracts reflects certain aspects of 'Amara's Law,' the concept formulated by computer scientist Roy Amara that 'we tend to overestimate new technology in the short run and underestimate it in the long run.'<sup>112</sup> Some might argue that contracting parties who choose to adopt smart contracts should be forced to bear the risk of the potential failure of those contracts to accurately represent their intentions, as had they contracted in the conventional way, there would be more certainty as to how the courts will adjudicate the contract. Of course, the initial judicial foray into smart contracts will be difficult and prone to uncertainty. This is likely a necessary risk. While smart contracts may not be prevalent now, in the long run, they could revolutionise commerce. To prepare members of the judiciary for this development, it is increasingly necessary to train them on code and smart contract technology. Relatedly, it is suggested that 'specialised courts and tribunals' specifically

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<sup>112</sup> Susan Ratcliffe, *Oxford Essential Quotations, Roy Amara 1925–2007 American futurologist* (4 edn, Oxford University Press, 2016).

designated to deal with such disputes are created, perhaps as part of or akin to London's commercial courts.<sup>113</sup>

Realistically, as technology advances, all efforts made to accommodate new technologies like smart contracts may not be adequate.<sup>114</sup> Nonetheless, in the present, this article's proposed solution to address the flaws of the reasonable coder test by utilising a stronger contextual approach is a reliable way of maintaining the role of judges and striking a fair balance between contractual certainty and the parties' intentions. The interpretation of smart contracts highlights the ongoing tension between English law's objective approach to contractual interpretation<sup>115</sup> and the consideration of the explicit intentions of the contracting parties.<sup>116</sup> Rather than simply swinging the pendulum back and forth, the interpretation of smart contracts highlights the necessity of compromise and the importance of the pragmatic approach propagated in *Wood*.

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<sup>113</sup> See Thibault Schrepel (n 4) 37 for a similar view. He also argues that judges could get trained on programming languages and 'computational thinking basics'. In addition, the Law Commission also refers to 'specialised technology chambers' for dealing with smart contract disputes, see Law Commission (n 1) 4.103.

<sup>114</sup> Consider, for example, contracts between machines (artificial intelligence).

<sup>115</sup> Johan Steyn, 'Contract Law: fulfilling the reasonable expectations of honest men' (1997) 113 LQR 433, 433–434.

<sup>116</sup> Sarah Green (n 18) 242.