Law Commission
Reforming the law

Smart contracts

Call for evidence

December 2020

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Reforming the law

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Call for evidence

This publication is available at https://www.lawcom.gov.uk/project/smart-contracts/.

THE LAW COMMISSION – HOW WE CONSULT

About the Law Commission: The Law Commission was set up by section 1 of the Law Commissions Act 1965 for the purpose of promoting the reform of the law. The Law Commissioners are: The Rt Hon Lord Justice Green, Chair, Professor Sarah Green, Professor Nicholas Hopkins, Professor Penney Lewis, Nicholas Paines QC. The Chief Executive is Phillip Golding.

Topic of this call for evidence: Smart contracts. This call for evidence is the first step in our smart contracts scoping study. We are seeking views about, and evidence of, the ways in which smart contracts are being used, and the extent to which the existing law can accommodate them.

Team working on the project: The following members of the Commercial and Common Law team have contributed to this call for evidence: Laura Burgoyne (team manager); Teresa Trepak (team lawyer); Matthew Barry (research assistant); William Vaudry (research assistant).

Geographical scope: This call for evidence considers the law of England and Wales.

Availability of materials: This call for evidence is available on our website at https://www.lawcom.gov.uk/project/smart-contracts/.

Duration: We invite responses from 17 December 2020 to 31 March 2021.

Comments may be sent:

Using an online form at https://consult.justice.gov.uk/law-commission/smart-contracts (where possible, it would be helpful if this form was used).

Alternatively, comments may be sent:

By email to smart-contracts@lawcommission.gov.uk.

By post to Smart contracts team, Commercial and Common Law Team, Law Commission, 1st Floor, Tower, 52 Queen Anne's Gate, London, SW1H 9AG.

(If you send your comments by post, it would be helpful if, whenever possible, you could also send them electronically.)

After the call for evidence: We will use the views and evidence received during this call for evidence to assist us in formulating our scoping study, which will be published in late 2021.

Consultation Principles: The Law Commission follows the Consultation Principles set out by the Cabinet Office, which provide guidance on type and scale of consultation, duration, timing, accessibility and transparency. The Principles are available on the Cabinet Office website at: https://www.gov.uk/government/publications/consultation-principles-guidance.

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Contents

Glossary vii

Abbreviations x

CHAPTER 1: INTRODUCTION 1

This project 2

This call for evidence 3

Stakeholder engagement 4

The team working on the project 5

Next steps 5

CHAPTER 2: WHAT IS A SMART CONTRACT? 6

Call for evidence: definition of smart contracts 6

Three forms of smart contract 15

Use cases for smart contracts 18

Potential benefits and cost savings 23

CHAPTER 3: FORMATION OF SMART CONTRACTS 25

Agreement 25

Consideration 34

Certainty and completeness 35

Intention to create legal relations 36

Formality requirements 41

CHAPTER 4: INTERPRETATION OF SMART CONTRACTS 51

The principles of contractual interpretation 51

Identifying the terms of a smart contract 52

Applying the principles of interpretation to smart contracts 53

Further questions for consultees 63

CHAPTER 5: REMEDIES AND SMART CONTRACTS 64

Rectification 64

Vitiating factors 71

Remedies for breach of contract 86

Frustration 93
Illegality 96

CHAPTER 6: CONSUMERS AND SMART CONTRACTS 98
Smart contracts in the consumer context? 98
Transparency and fairness 99
Information rights 104
A consumer's right to treat a contract as at an end 106
Is smart contract specific protection required? 107

CHAPTER 7: JURISDICTION AND SMART CONTRACTS 109
Introduction 109
Contracting parties 112
Circumstances of contract formation 113
Governing law 116
Performance, acts, and enrichment 123
Insurance contracts, consumer contracts, and employment contracts 127
Comparative appropriateness 128

CHAPTER 8: FINAL QUESTIONS 130

CHAPTER 9: LIST OF ALL QUESTIONS 131

APPENDIX 1: TERMS OF REFERENCE 145

APPENDIX 2: ACKNOWLEDGEMENTS 148

GLOSSARY

Term	Definition
Algorithm	A set of mathematical instructions that must be followed in a fixed order and, if given to a computer, will calculate an answer to a mathematical problem.
Bitcoin	A type of cryptocurrency which is supported by blockchain.
Bitcoin blockchain	A blockchain which records transactions in the bitcoin cryptocurrency.
Blockchain	A form of distributed ledger technology (DLT) which enables transactions to be recorded on a distributed ledger. In a blockchain, data on the ledger is grouped into timestamped “blocks” which are mathematically linked or “chained”, via the consensus mechanism, to the preceding block.
Code	A language used to give instructions to computers.
Computer program	A collection of instructions written in code that are executed by a computer.
Consensus mechanism	The process by which nodes on a DLT system reach consensus that a new data entry should be recorded on the ledger. The consensus mechanism is set by the software underlying the DLT system.
Cryptoassets	Digital representations of value or contractual rights that are transferred, stored or traded electronically using DLT.
Cryptocurrency	A form of cryptoasset which is used as a medium of exchange on a DLT system. Bitcoin and Ether are cryptocurrencies.
Distributed Ledger Technology (DLT)	A method of recording and sharing data across a network. A DLT system comprises a digital database (a “ledger”) which is shared (that is, “distributed”) among a network of computers (known as “nodes”). Each node holds an identical copy of the ledger on its system, which is updated instantaneously as new data is added. Nodes approve of additions to the ledger via the consensus mechanism.
Ether	The cryptocurrency used on Ethereum.
Ethereum	A permissionless DLT system on which computer programs can be recorded and executed by the computers on the network.

Term	Definition
Fiat currency	Currency that is issued by a government and is accepted to have value independently of the material from which it is made.
Hybrid contract	A smart contract, some terms of which are recorded in natural language and other terms of which are recorded in the code of a computer program.
Mining	The process by which participants on a DLT system solve a computationally intensive mathematical problem so that data can be added to the distributed ledger. Mining is typically a feature of permissionless DLT systems, which require nodes to solve mathematical problems as part of the consensus mechanism. Permissioned DLT systems use different consensus mechanisms, or may not use a consensus mechanism at all, and so may not necessarily involve mining.
Natural language	Language that has developed in the usual way as a method of communicating between people, rather than language that has been created for a specific purpose or application.
Natural language contract/traditional contract	A contract in which all of the terms are recorded in natural language, either orally or in writing.
Node	A participant in a DLT system.
Off chain / on chain	“Off chain” refers to actions or transactions that are external to the distributed ledger. “On chain” refers to actions or transactions that are recorded on the distributed ledger.
Oracle	An external data source which transmits information to a computer program deployed on a distributed ledger.
Permissioned DLT system	A DLT system in which nodes cannot participate until they receive permission from a central administrator.
Permissionless DLT system	A DLT system in which nodes do not need permission from any entity to participate in the network.
Private key	A string of data that is unique to a participant on a distributed ledger and is known only to the participant. A participant can digitally sign a transaction by combining the transaction data with their private key.

Term	Definition
Pseudonymity	The practice of using a false or fictitious identifier which conceals a person's real identity.
Public key	A string of data that is unique to a participant on a distributed ledger and is shared with other participants. A participant's public key can be used by the recipient of a transaction to confirm the authenticity of the transaction.
Smart contract	For the purposes of this call for evidence, a legally binding contract in which some or all of the terms are recorded in or performed automatically by a computer program deployed on a distributed ledger. There are three forms a smart contract can take, depending on the role played by the computer program. These are: • natural language contract with automated performance; • hybrid contract; or • solely code contract.
Solely code smart contract	A smart contract in which all the terms are recorded in the code of a computer program deployed on a distributed ledger.
Token	A type of cryptoasset. A token typically does not have intrinsic value but is linked to an underlying asset of value.
UKJT Legal Statement	UK Jurisdiction Taskforce, *Legal statement on cryptoassets and smart contracts* (2019)
Unilateral contract	A contract where one party promises to do something if the other party performs a specified act. The contract forms when that other party performs the specified act.

ABBREVIATIONS

Abbreviation	Meaning
1967 Act	Misrepresentation Act 1967
2001 Advice	Electronic commerce: formal requirements in commercial transactions – Advice from the Law Commission (2001), https://www.lawcom.gov.uk/project/electronic-commerce-formal-requirements-in-commercial-transactions/.
AES	Advanced electronic signature
API	Application programming interface
CCRs	The Consumer Contracts (Information, Cancellation and Additional Charges) Regulations 2013
CJEU	Court of Justice of the European Union
CPRs	The Consumer Protection from Unfair Trading Regulations 2008
CRA 2015	Consumer Rights Act 2015
DAML	Digital Asset Modelling Language
DAO	Decentralised autonomous organisation
DLT	Distributed Ledger Technology
ECRs	The Electronic Commerce (EC Directive) Regulations 2002
EDI	Electronic Data Interchange
eIDAS	Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC
EU	European Union
PSRs	Provision of Services Regulations 2009

Abbreviation	Meaning
QES	Qualified electronic signature
Quoine	*Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02
Software Solutions	*R (Software Solutions Partners Ltd) v HM Customs & Excise* [2007] EWHC 971 (Admin)
Thornton	*Thornton v Shoe Lane Parking Ltd* [1971] 2 QB 163
TLA	Tech London Advocates
UKJT	UK Jurisdiction Taskforce of the LawTech Delivery Panel

ONLINE CONTENT

All websites referenced in this document were last accessed on 7 December 2020.

Chapter 1: Introduction

1.1 Emerging technologies such as distributed ledgers are being promoted as a way to create smart contracts: computer programs which run automatically, in whole or in part, without the need for human intervention. Smart contracts can perform transactions on decentralised cryptocurrency exchanges, facilitate games and the exchange of collectibles between participants on a distributed ledger and run online gambling programs. They can also be used to record and perform the obligations of a legally binding contract. It is this second category of smart contracts (sometimes referred to as smart legal contracts) which is relevant to our work. When we talk about smart contracts in this paper we are therefore talking about legally binding contracts in which some or all of the terms are recorded in or performed by a computer program deployed on a distributed ledger.

1.2 Smart contracts are increasingly being considered by contracting parties as a means of automating specific processes within conventional contracts, from payment of insurance claims to managing supply chains. They also underpin emerging commercial and peer to peer arrangements such as the transfer of cryptoassets and tokens representing real world (also known as "off-chain") assets, as well as facilitating "DeFi" or decentralised finance, which aims to disrupt conventional banking and securitisation arrangements.

1.3 Smart contracts may take the form of a natural language contract with performance automated by code, a hybrid contract consisting of natural language and coded terms, or a contract which is written solely in code. They may be particularly useful in automating common contractual conditions such as payment terms. Smart contracts are expected to increase efficiency and certainty in business, and to reduce the need for contracting parties to have to trust each other; the trust resides instead in the code. Nick Szabo, who coined the term smart contract, listed their related goals as including "lowering fraud loss, arbitration and enforcement costs, and other transaction costs."[1]

1.4 However, there are questions about the circumstances in which a smart contract will be legally binding, how smart contracts are to be interpreted, how vitiating factors such as mistake can apply to smart contracts, and which remedies will be available where the smart contract does not perform as intended. The nascent state of the technology means that there are few, if any, tested solutions to the legal issues to which smarts contracts give rise.

1.5 To ensure that the jurisdiction of England and Wales remains a competitive choice for business, there is a compelling case for reviewing the current legal framework in England and Wales to ensure that it supports and facilitates the use of smart contracts. While the technology and use cases are still developing, it may not be appropriate to suggest legal reforms which could stifle innovation or risk becoming

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[1] N Szabo, "Smart Contracts" (1994), http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html.

outdated almost immediately. As discussed below, we are therefore starting with a scoping study to identify the current law and any potential issues.

THIS PROJECT

Background

1.6 The Law Commission was asked by the Lord Chancellor to include work on smart contracts as part of our 13th Programme, agreed in December 2017. After discussions with stakeholders, our initial intention was to publish a call for evidence in January 2019.

1.7 In the same period the LawTech Delivery Panel was created with the support of Government.[2] There was clearly some common ground between the proposed Law Commission work and that of the Delivery Panel, and in particular its UK Jurisdiction Taskforce ("UKJT"). In those circumstances, we agreed to pause our work until such time as the conclusions of the UKJT were known.[3]

1.8 In November 2019 the UKJT published its legal statement on cryptoassets and smart contracts.[4] The legal statement concluded that, in principle, smart contracts are capable of giving rise to binding legal obligations, enforceable in accordance with their terms. The legal statement provides a foundation on which we will build. We expand on the points made by the legal statement, consider additional legal questions that stakeholders have about smart contracts, and ask consultees for evidence and views.

A scoping paper

1.9 The Ministry of Justice has now asked us to undertake a scoping study on smart contracts. The scoping study will provide an accessible account of the current law and set out how it will, or may, apply to smart contracts. It will also discuss the use of smart contracts in practice and identify any difficulties or uncertainties which arise under the law as it stands. Our project is intended to inform public debate and seek a consensus about issues to be addressed in the future. It will not offer formal recommendations for reform.

1.10 Briefly, the scoping study will:

(1) analyse the current law as it applies to smart contracts, drawing on the conclusions of the UKJT legal statement. The analysis of the law will highlight any uncertainties or gaps, particularly in relation to:

(a) formation and enforceability, including in relation to deeds;

(b) interpretation;

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2 More information is available at https://technation.io/lawtechukpanel/.

3 The Chair of the Law Commission and the Commissioner for Commercial and Common Law both had observer status on the UKJT.

4 UK Jurisdiction Taskforce, *Legal statement on cryptoassets and smart contracts* (2019), https://technation.io/news/uk-takes-significant-step-in-legal-certainty-for-smart-contracts-and-cryptocurrencies/.

(c) remedies;

(d) vitiating factors (mistake, misrepresentation, duress and undue influence);

(e) consumer protection; and

(f) jurisdiction.

(2) identify areas in which further work or reform may be required, and provide such advice as the Law Commission considers appropriate on options for reform.

1.11 Our work at this stage does not include other areas of law insofar as they relate to smart contracts such as tax and data protection. Our full terms of reference are set out in Appendix 1.

Extent

1.12 This project will consider the law of England and Wales.

1.13 In relation to Wales, we consider that the subject matter of the project is reserved, being primarily a matter of private law.[5]

1.14 The project will not consider the law in Scotland or of Northern Ireland.

Digital assets

1.15 The UKJT legal statement also considered the legal status of cryptoassets. The Law Commission is working on a separate digital assets project drawing on this aspect of the legal statement. That project will involve a consultation and a report with formal recommendations.[6]

THIS CALL FOR EVIDENCE

1.16 This call for evidence is the first step in the smart contracts scoping study. Its primary function is to seek views about, and evidence of, the ways in which smart contracts are being used, and the extent to which the existing law can accommodate them. In each chapter, we set out our current understanding of law and practice, and ask consultees for their views. We do not make any proposals for reform of the law.

1.17 Throughout the call for evidence we use simple examples to illustrate how the legal concepts we discuss could apply in the context of smart contracts. Where we gain further insights into these issues from responses to the call for evidence, we will build on these and provide more complex and detailed examples in the scoping study.

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5 Wales Act 2006, sch 7B, para 3(1). Private law is defined for this purpose as "the law of contract, agency, bailment, tort, unjust enrichment and restitution, property, trusts and succession": sch 7B, para 3(2).

6 More information is available on the Law Commission's digital assets project page, https://www.lawcom.gov.uk/project/digital-assets/.

Structure of this paper

1.18 In Chapter 2, we set out the background to smart contracts, our working definition of what a smart contract is, along with some current use cases. We ask consultees about the benefits and cost savings associated with smart contracts, and any costs associated with their use.

1.19 The next three chapters discuss the "lifecycle" of a contract formed under the law of England and Wales (from negotiation through to remedies for breach) and explain how the law might apply to smart contracts. Chapter 3 considers the formation of a smart contract, including whether the parties intend to enter into legal relations, with all the legal rules and remedies associated with that. In Chapter 4, we consider how the courts might interpret a smart contract, looking at existing principles of interpretation. In Chapter 5, we consider the remedies which might be relevant if things "go wrong", such as where the code does not execute as one or more parties expect, or the smart contract is vitiated by mistake, misrepresentation, duress or undue influence. We ask questions throughout these chapters, to establish whether consultees agree with our views as to how the current law applies, or could be applied, to smart contracts.

1.20 Most of the legal issues raised in the call for evidence apply to all smart contracts, whether business to business commercial contracts, peer to peer arrangements such as transfers of bitcoin or Ether, or business to consumer contracts. However, in Chapter 6, we specifically consider potential issues for consumers who enter into smart contracts and consider how existing consumer protections might apply in the context of smart contracts.

1.21 In Chapter 7, we consider the factors which will or may determine whether UK courts have jurisdiction in relation to a smart contract which does not include a jurisdiction clause.

1.22 Finally, in Chapter 8, we ask for final comments, in particular:

(1) whether there are additional issues we should be considering;

(2) which jurisdictions, if any, we should look to for their approach to smart contracts, and;

(3) whether there are any issues which consultees consider to be in immediate need of reform in order to facilitate the use of smart contracts.

1.23 Chapter 9 contains a list of all the questions we pose to consultees throughout this call for evidence.

STAKEHOLDER ENGAGEMENT

1.24 Prior to publication of this call for evidence, we spoke to a number of legal and technical stakeholders, listed in Appendix 2. We are grateful to them for their time and expertise, and to all those stakeholders who have contacted us about this project. We look forward to engaging further with stakeholders as the project progresses.

THE TEAM WORKING ON THE PROJECT

1.25 The following members of the Commercial and Common Law team have contributed to this call for evidence: Laura Burgoyne (team manager); Teresa Trepak (team lawyer); Matthew Barry (research assistant); and William Vaudry (research assistant).

NEXT STEPS

1.26 This call for evidence runs until 31 March 2021. We will analyse responses from consultees and use these to inform our scoping study which we intend to publish in autumn 2021.

1.27 We intend that our scoping study will set out our views on how the current law applies to smart contracts and will identify any areas potentially in need of reform, whether immediately or in the longer term as the actual prevalence of smart contracts is better understood.

Chapter 2: What is a smart contract?

2.1 In this chapter, we explain what we mean by a smart contract in the context of this call for evidence. We begin by considering broadly what a smart contract is by reference to the characteristics of automaticity, the use of distributed ledger technology ("DLT")[7] and legal enforceability. We then identify three forms that a smart contract can take. Finally, we provide some context for the discussion on smart contracts in the rest of this paper by summarising some current and potential use cases for smart contracts and asking consultees for their views on the potential benefits and cost savings associated with the use of smart contracts.

2.2 Throughout the chapter, we ask consultees for their views.

CALL FOR EVIDENCE: DEFINITION OF SMART CONTRACTS

2.3 A smart contract is generally understood to be a computer program which runs automatically, in whole or in part, without the need for human intervention. However, within this broad definition, smart contracts can have different characteristics.

2.4 For the purposes of this call for evidence, we are concerned with what are sometimes called smart legal contracts: legally binding contracts in which some or all of the contractual obligations are recorded in or performed automatically by a computer program. We are also only concerned with smart contracts deployed on a distributed ledger. A smart contract relevant to our work and questions in this call for evidence therefore has three elements:

(1) some or all of the obligations under the contract are performed automatically by a computer program ("automaticity");

(2) the computer program is deployed on a distributed ledger; and

(3) the contract is legally enforceable.

2.5 We consider each of these characteristics in turn below.

Automaticity

2.6 A distinctive feature of smart contracts compared to traditional contracts is that some or all of the contractual obligations are performed automatically by computer programs, without the need for human intervention. The UKJT Legal Statement

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7 Distributed ledger technology ("DLT") is a method of recording and sharing data across a network. A DLT system comprises a digital database (a "ledger") which is shared (that is, "distributed") among a network of computers (known as "nodes"). Each node holds an identical copy of the ledger on its system, which is updated instantaneously as new data is added. Nodes approve of additions to the ledger via the consensus mechanism. From para 2.14 we set out a more detailed description of DLT, including the key features and potential benefits of DLT compared to centralised ledgers.

describes this feature of smart contracts as “automaticity” and we adopt that terminology in this call for evidence.[8]

2.7 The automation of a contractual obligation by a computer program requires that the obligation be converted or translated into computer code.[9] Contractual obligations which follow a conditional logic (if X, then Y) are good candidates for being drafted in code because conditional logic is inherent in computer programming. Examples of obligations that might be amenable to automation are:

(1) an obligation to transfer title to an asset on receipt of a certain amount of funds into a particular bank account; or

(2) an obligation to pay money on a particular date or upon the occurrence of a particular event.

2.8 The main benefit of automating a contractual obligation using a computer program is that it enables contractual performance to occur without the need for human intervention and can actually preclude human intervention which could hamper performance of the contract. Unlike a human being, a properly coded computer program is simply unable to refuse to act or fail to perform.[10] Once the conditions for its performance are met, the computer program will perform the contractual obligation automatically.[11]

2.9 The use of computer programs to automate the performance of contractual obligations is not a novel practice. Automated bank payments (such as direct debits and standing orders) and online shopping (including the purchase and download of digital content and the purchase and delivery of physical goods) all involve computer programs automating some element of contractual performance. However, such automation does not make the underlying contract a “smart contract” for the purposes of this call for evidence. This is because those automatic processes are under the control of at least one of the parties to the contract and can, therefore, be stopped by that party. In some cases the process of performing the contract will also involve human intervention at a variety of key stages. In the example of online shopping, although order acceptance could be automated based on transfer of funds, the picking and delivery the goods subject to the contract would still require human intervention.[12]

2.10 Automation of contractual obligations can reduce transaction costs and be more efficient for the parties involved. Take, for example, flight-delay insurance where a

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8 UK Jurisdiction Taskforce, *Legal statement on cryptoassets and smart contracts* (2019) (“UKJT Legal Statement”) at [135], https://technation.io/news/uk-takes-significant-step-in-legal-certainty-for-smart-contracts-and-cryptocurrencies/.

9 UKJT Legal Statement at [135].

10 S Green and A Sanitt, “Smart Contracts”, in P Davies and M Raczynska (eds), *The Contents of Commercial Contracts: Terms Affecting Freedoms* (2020).

11 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.

12 These examples are also not smart contracts for the purpose of this call for evidence because they do not involve the use of DLT. This is discussed further from para 2.24.

delay entitles the insured person to payment under the policy.[13] A non-smart contract arrangement may require the insured person to submit a claim under their insurance policy if they experience a flight delay. The insurance company would consider the claim and process a payment where appropriate. If a smart contract were to be used, the performance of the insurer's obligation to pay in the event of a delayed flight could be converted into computer code. The computer program could be linked to a global air traffic database which would act as an external data source or "oracle", relaying flight data to the computer program. As soon as a flight is delayed, that information would be relayed to the computer program by the oracle, triggering an automatic payment by the computer program to the policy holder. This process means that the need for the insured person to file a claim with their insurer is removed and the payment decision is delegated entirely to a computer program, eliminating the potential for disputes between the insurer and the policyholder.

2.11 Some contractual obligations may not be suitable for automation by a computer program. These may include obligations which require the exercise of discretion, reasonableness, best endeavours or some element of human judgement.[14] Artificial intelligence has the potential to be used in smart contracts to make strategic decisions akin to those a human would make. However, artificial intelligence is still in the early stages of development, so there are as yet no real-world examples of it being used in smart contracts in this way.[15] While artificial intelligence could make it possible to translate a wider range of contractual obligations into code, it is unlikely that it will entirely replace human judgement in the near future. We would like to hear from consultees about the kinds of contractual obligations that can be automated by computer programs using current technology, and the kinds of obligations that could be automated in future.

Question 1.

2.12 What kinds of contractual obligations can currently be automated using computer programs? Please provide specific examples where possible.

Distributed ledger technology

2.13 This call for evidence is concerned only with contracts which are performed automatically by computer programs using DLT. At paras 2.14 to 2.21 we include a detailed description of DLT, including its key features and the potential benefits of DLT compared to centralised ledgers. From para 2.22 we set out how smart contracts use

[13] We discuss real-world applications of smart contracts in this context from para 2.43.

[14] See also Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) pp 33, 35 (noting that automation, even if technically possible, may "inadvertently restrict the flexibility that is often expected and exercised over some contractual provisions").

[15] R De Caria, "Definitions of smart contracts" in L DiMatteo, M Cannarsa and C Poncibò (eds), *Smart contracts, blockchain technology and digital platforms* (2019) p 24.

DLT and why we have included the use of this technology in our definition of smart contracts in this call for evidence.

Distributed ledger technology ("DLT")

2.14 DLT is a method of recording and sharing data across a network.[16] A DLT system comprises a digital database (a "ledger") which is shared (that is, "distributed") among a network of computers (known as "nodes"). The ledger contains a record of data, such as a history of transactions, and each node holds a copy of the ledger on its system. When data is added to the ledger, every node's copy of the ledger is updated instantaneously. Therefore, at any point in time, every node holds an identical and up to date copy of the ledger.

2.15 The distinguishing feature of DLT compared to other shared databases is that the ledger is not maintained by a central administrator. Instead, the ledger is maintained collectively by the nodes on the network. No single node has the power unilaterally to add data to the ledger. A node can propose a new data entry, but it will only be added to the ledger when the other nodes reach "consensus" that the entry should be recorded. The process by which this occurs is known as the "consensus mechanism".

2.16 The consensus mechanism is set by the software underlying a DLT system. In general, it requires some or all of the nodes to determine the validity of a proposed data entry. If the nodes determine that the proposed entry is valid, the entry is automatically added to each node's copy of the ledger. The consensus mechanism is typically designed so that, once data is added to the ledger, the data is very difficult to amend.[17]

2.17 For example, the Bitcoin blockchain uses a consensus mechanism known as "proof of work".[18] In this DLT system, a "block" of bitcoin transactions can only be added to the distributed ledger when the nodes reach consensus on the solution to a mathematical problem. Broadly, this problem requires the nodes to generate a number (known as a "hash") for the proposed block based on the preceding block of data. The process of finding a solution is known as "mining" and requires significant computational

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16 For overviews of DLT, see P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) chs 1 and 2; World Bank, *Distributed Ledger Technology and Blockchain* (2017) chs 1 and 3.

17 The consensus mechanism may differ depending on whether the DLT system is "permissionless" or "permissioned": see paras 2.20 to 2.21.

18 Blockchain is a form of DLT which enables transactions to be recorded on a distributed ledger. In a blockchain, data on the ledger is grouped into timestamped "blocks" which are mathematically linked or "chained", via the consensus mechanism, to the preceding block. The Bitcoin blockchain is a distributed ledger which records transactions in the bitcoin cryptocurrency: see S Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) p 3, https://bitcoin.org/bitcoin.pdf.

resources.[19] When a solution is found and verified by the nodes, the block is added to the ledger.[20]

2.18 This consensus mechanism means that all the data on the Bitcoin blockchain is mathematically linked.[21] Any alteration to the data of a given block would break the link between that block and all subsequent blocks on the ledger. Essentially, two competing versions of the ledger would arise: one chain containing the altered block and one containing the unaltered block.[22] Importantly, the Bitcoin blockchain has a rule that the longest chain of mathematically linked blocks is the only "valid" record of transactions. So, if a participant wanted to alter the data on the ledger and have this recognised by the network, they would have to resolve the mathematical problem for all subsequent blocks on the ledger and add new blocks to the ledger faster than the rest of the participants could do so (so that its chain of blocks was the longest). The computing power required to do this would be enormous and beyond the capabilities of any single node.[23] Once a bitcoin transaction is recorded on the ledger, it cannot, for practical purposes, be amended.

Benefits of DLT compared to centralised ledgers

2.19 DLT offers three potential advantages over a centralised ledger.[24]

(1) *Security*: in a centralised ledger, the central administrator is a "single point of attack": if the administrator is hacked, then the hacker can gain control of the ledger and tamper with its data.[25] In contrast, in a decentralised ledger maintained by consensus, there is no single point of attack. The ledger is the collective responsibility of the nodes, which makes it more difficult for a hacker to infiltrate and tamper with the ledger.

(2) *Immutability*: as noted above, the consensus mechanism ensures that data, once recorded on the ledger, is very difficult to amend. The data is said to be "immutable". The immutability of the ledger means that nodes can trust in its veracity and transact with one another in confidence, despite the absence of a

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19 Nodes are incentivised to engage in mining because they are rewarded with bitcoins upon generating a valid hash for a proposed block: S Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) p 4, https://bitcoin.org/bitcoin.pdf; P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) pp 25-26.

20 The nodes also check that the transacting participants have sufficient bitcoin in their accounts to engage in the proposed transactions: S Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) p 3, https://bitcoin.org/bitcoin.pdf.

21 S Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) pp 1 to 3, https://bitcoin.org/bitcoin.pdf.

22 This is known as a "fork".

23 Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) p 3, https://bitcoin.org/bitcoin.pdf; World Bank, *Distributed Ledger Technology and Blockchain* (2017) p 18; P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 25.

24 See World Bank, *Distributed Ledger Technology and Blockchain* (2017) ch 5; P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) ch 2.

25 S Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) p 2; World Bank, *Distributed Ledger Technology and Blockchain* (2017) pp 5 to 6.

central administrator. For example, the immutability of transactions recorded on the Bitcoin blockchain ensures that no participant can "double spend" a bitcoin. Any attempt to double spend a bitcoin would be contradicted by the ledger (which would contain an immutable record of the previous spend), and the proposed transaction would be rejected by the nodes as invalid.[26]

(3) *Efficiency*: in a centralised ledger, participants have to rely on a central administrator to maintain and update the ledger. Inconsistencies may arise between the central ledger and the participants' copies, requiring reconciliation. In contrast, in a decentralised ledger, each participant's copy of the ledger is automatically updated as data is added and the need to reconcile data across ledgers is removed, given that participants hold identical copies of the ledger. This potentially increases the speed and reduces the cost of transactions.

Permissionless and permissioned DLT systems

2.20 DLT systems can be permissionless (sometimes referred to as a "public" system) or permissioned (sometimes referred to as a "private" system).[27] In a permissionless DLT system, nodes do not need permission from any entity to participate in the network and propose transactions. All that is required to participate is a computer installed with the relevant software. Once a participant has joined the network, it can view transactions and propose and verify new data entries. As participants on a permissionless DLT system are unknown to one another, these systems typically employ a rigorous consensus mechanism to enhance security and trust among participants.[28] The Bitcoin blockchain is an example of a permissionless DLT system.

2.21 In a permissioned DLT system, nodes cannot participate in the network until they receive permission from a central administrator, who controls network access and enforces the rules of the ledger. Participants typically have to verify their identity before they can join the network. As participants in a permissioned DLT system are typically pre-selected, known to one another, and trusted, these systems tend to employ a less rigorous consensus mechanism.[29] They may also be designed to restrict participation in the consensus mechanism to only a few nominated nodes or even to a single central entity. Even where the power to make changes to the ledger is centralised or not fully decentralised to all participants, the ledger can still be said to be decentralised, as each node will have an identical copy of the entire ledger. Permissioned DLT systems are likely to be more appropriate in certain industries, such as the finance industry, where the law requires the identities of the transacting parties to be disclosed.[30]

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26 S Nakamoto, "Bitcoin: A Peer-to-Peer Electronic Cash System" (2008) pp 1 to 2; P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 26.

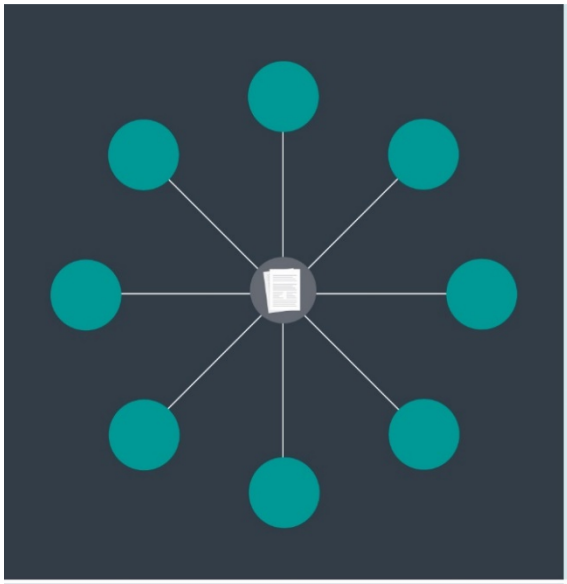
27 World Bank, *Distributed Ledger Technology and Blockchain* (2017) ch 4; P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) pp 31 to 32.

28 For example, the "proof of work" consensus mechanism described in para 2.17 above.

29 For example, some permissioned DLT systems use a "proof of stake" consensus mechanism, where transactions can be validated by a subset of nodes who hold a "stake" in the transaction: P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 57, n 90.

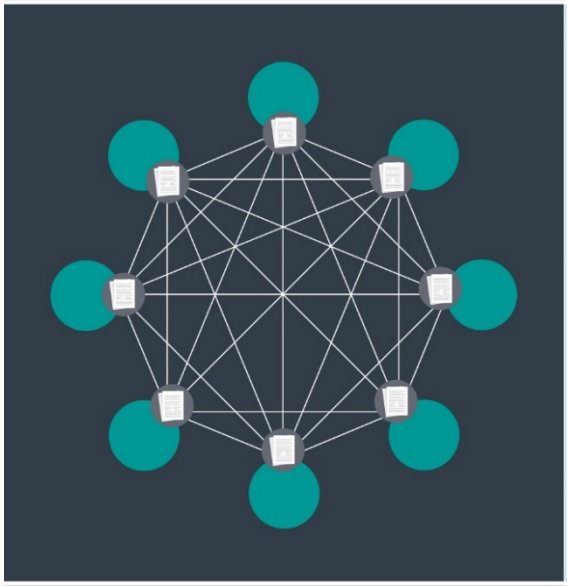
30 World Bank, *Distributed Ledger Technology and Blockchain* (2017) p 19 (referring to "Know Your Customer" laws in Anti-Money Laundering/Combating the Financing of Terrorism regulations).

Figure 1: Centralised and distributed ledgers



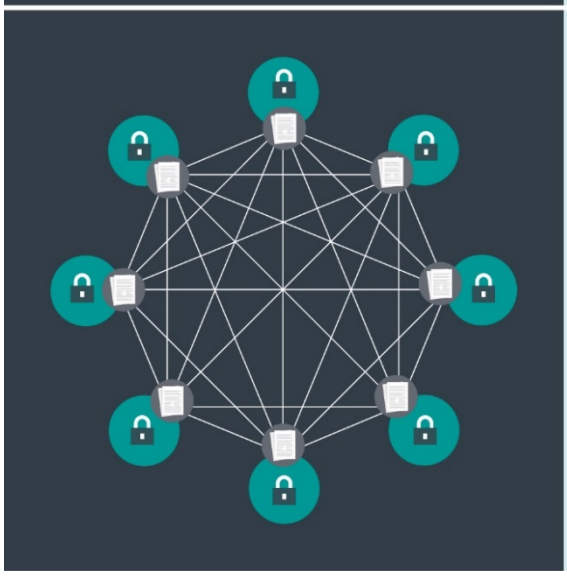
Centralised ledger

A ledger is maintained by a trusted central administrator. Each network participant must reconcile their local databases with the ledger maintained by the central administrator.



Distributed ledger (permissionless)

The ledger is maintained collectively by network participants. No single party is in control of the ledger. Data is only added to the ledger when network participants reach consensus on the validity of a proposed data entry. When data is added to the ledger, every participant's copy of the ledger is updated instantaneously.



Distributed ledger (permissioned)

Parties must obtain permission from a central entity in order to join the network and propose additions to the ledger. Typically, parties must prove their identity before joining the network. Participation in the consensus mechanism may be restricted to a subset of participants, and the central administrator may have the power to make changes to the ledger. When data is added to the ledger, each participant's copy of the ledger is updated instantaneously.

How do smart contracts use DLT?

2.22 In recent years, DLT has become more sophisticated, to the point where computer programs can be recorded on a distributed ledger and performed by the computers on the network. An example of a DLT system that permits this is the Ethereum blockchain. Like the Bitcoin blockchain, Ethereum consists of a distributed ledger which records data. However, unlike the Bitcoin blockchain, Ethereum enables not merely transactions but also computer programs to be recorded on the ledger. These computer programs are performed automatically by the computers on the Ethereum network when the conditions for their performance are satisfied. When a computer program is performed by the computers on the network, the ledger is automatically updated with the transactions executed by the computer program.[31] Like the Bitcoin blockchain, Ethereum uses a consensus mechanism for approving transactions, making the ledger immutable.

2.23 Smart contracts can be deployed on a distributed ledger so that contractual obligations expressed in computer code are performed by the computers on the network. Once the computer program is deployed on the distributed ledger, the code cannot be altered by the parties, and it will be performed automatically as soon as the conditions specified in the code are met. Performance of a smart contract is therefore "guaranteed" in the sense that no party can intervene to prevent the performance of the computer program once it is triggered. As the ledger is immutable, the parties to the contract have the security that no one, including the parties to the contract, can tamper with the computer program or the data entries recorded on the distributed ledger to stop it from performing or to reverse transactions. These features also mean that parties can transact directly with one another without having to rely on traditional intermediaries such as banks and clearing houses.[32]

2.24 Although we are focusing on smart contracts which use DLT, we are aware that some stakeholders and commentators do not consider DLT to be an essential element of a smart contract. It is true that contracts can be automatically performed by computer programs without the use of DLT. For example, one party might deploy a program on its own computer system to automate the performance of its obligations under a contract. Alternatively, the contracting parties might translate their contract into a computer program and run separate versions of that program on their own computer systems.[33] However, in these cases, the computer program is subject to the control of one or both of the contracting parties. This negates some of the benefits of DLT-based smart contracts described above.

2.25 Given the unique benefits of DLT, much attention continues to focus on DLT-based smart contracts.[34] In 2016, Nick Szabo remarked that "blockchain technology appears

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31 A Antonopoulos, *Mastering Ethereum: Building smart contracts and DApps* (2018) ch 7, https://github.com/ethereumbook/ethereumbook/blob/develop/07smart-contracts-solidity.asciidoc.

32 Participants may still use intermediaries in certain circumstances: for example, wallet providers when dealing with cryptocurrencies.

33 See ISDA, "Smart Contracts and Distributed Ledger – A Legal Perspective" (2017).

34 R De Caria, "Definitions of smart contacts" in L DiMatteo, M Cannarsa and C Poncibò (eds) *Smart Contracts, Blockchain Technology and Digital Platforms* (2019) ch 2; P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 43.

very much to be the jet fuel necessary for smart contracts to become commonplace in business transactions and beyond".[35] Further, and importantly, the distinctive features of DLT systems, including the immutability of the ledger and the guaranteed execution of code, also give rise to potentially novel legal issues. For these reasons, we focus in this call for evidence on smart contracts which use DLT. However, we are interested to hear from stakeholders as to whether they agree that our scoping study should be limited to contracts which use DLT and whether there are other technologies which could be used to support smart contracts.

Consultation Question 2.

2.26 Do you agree that the Law Commission's scoping study on smart contracts should be limited to contracts which use distributed ledger technology? If not, please provide details of other technologies which are used to support smart contracts, and their prevalence.

2.27 Some stakeholders we have spoken to have commented that permissioned DLT systems are more suitable for smart contracts entered into by commercial businesses and institutions. Reasons given included:

(1) in a permissionless system, no single node can stop the performance of a smart contract, even if there is a bug in the smart contract or it performs in an unexpected way. In a permissioned system, the central administrator could potentially have the power to stop or reverse the performance of a smart contract;

(2) in a permissionless system, it is usually not possible to know the identity of the transacting parties as they use pseudonyms. In a permissioned system, the identity of the transacting parties is known. This makes permissioned systems more suitable for transactions where the identity of the parties is important: for example, transactions to which "know your customer" requirements apply;[36] and

(3) in a permissionless system, any node can see transactions on the ledger (albeit the information is encrypted). In a permissioned system, data can be displayed to participants only on a "need-to-know basis", so that transaction data is only visible, for example, to the transacting parties.[37]

2.28 However, some stakeholders suggested that, as the technology is continuing to develop, it may be possible to incorporate permissioned elements into otherwise permissionless DLT systems, making them attractive for use by smart contracts.

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35 Chamber of Digital Commerce, "Smart contracts: 12 use cases for business and beyond" (2016), http://digitalchamber.org/assets/smart-contracts-12-use-cases-for-business-and-beyond.pdf.

36 P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 31.

37 Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 32; E Mik, "Blockchains: A technology for decentralized marketplaces", in L DiMatteo, M Cannarsa and C Poncibò (eds) *Smart Contracts, Blockchain Technology and Digital Platforms* (2019) p 163.

Question 3.

2.29 When, and why, do parties to smart contracts decide to use:

(1) permissioned DLT systems.

(2) permissionless DLT systems.

Legally enforceable

2.30 The term "smart contract" is often used to describe a standalone computer program which is not a contract in any legal sense. For example, it is estimated that nearly two million "smart contracts" have been deployed on Ethereum since its launch,[38] including decentralised cryptocurrency exchanges, games and collectibles, and online gambling programs.[39] However, these "smart contracts" are not smart contracts as we define them: they do not involve the use of computer programs to record or perform the obligations of a legally binding contract. The founder of Ethereum, Vitalik Buterin, commented in a 2018 Tweet:[40]

> I quite regret adopting the term "smart contracts" [to describe programs running on the Ethereum distributed ledger]. I should have called them something more boring and technical, perhaps something like "persistent scripts".

2.31 This call for evidence is only concerned with computer programs which record or perform the obligations of a legally binding contract.[41] Under the law of England and Wales, there are five requirements for the formation of a legally enforceable contract. These are: agreement, consideration, certainty and completeness, intention to create legal relations, and compliance with formalities. In Chapter 3, we discuss how these requirements might be applied in the context of smart contracts.

THREE FORMS OF SMART CONTRACT

2.32 In practice, there appear to be three different forms that smart contracts can take:[42]

(1) A natural language contract[43] in which some or all of the contractual obligations are performed automatically by the code of a computer program deployed on a

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38 Coin Telegraph, "Ethereum smart contracts up 75% to almost 2 million in March" (23 April 2020), https://cointelegraph.com/news/ethereum-smart-contracts-up-75-to-almost-2m-in-march.

39 EFT Trends, "3 top uses for Ethereum smart contracts" (31 August 2018), at https://www.etftrends.com/3-top-uses-ethereum-smart-contracts/.

40 Gartner, "Smart contracts are neither smart nor are they contracts" (3 March 2020), https://blogs.gartner.com/avivah-litan/2020/03/03/smart-contracts-neither-smart-contracts/.

41 These are sometimes referred to as "smart legal contracts".

42 See UKJT Legal Statement at [142] to [145].

43 By "natural language contract" we mean a legally binding agreement expressed in words, either orally or in writing. This could take different forms: for example, a single contractual document signed by all parties, an

distributed ledger. The code itself does not record any contractual obligations, but is merely a tool employed by the parties to perform those obligations.

(2) A hybrid contract in which some contractual obligations are recorded in natural language and others are recorded in the code of a computer program deployed on a distributed ledger.[44] At one end of the spectrum, the terms of a hybrid contract could be primarily written in code with natural language terms employed to add certain provisions (for example, governing law and jurisdiction clauses and dispute resolution mechanisms). At the other end of the spectrum, the terms of a hybrid contract could be primarily written in natural language and include, by reference, just one or two terms written in code.

(3) A contract that is recorded solely in the code of a computer program deployed on a distributed ledger. No natural language version of the agreement exists: all the contractual obligations are recorded in, and performed by, the code.

2.33 All three forms of smart contract involve the use of computer code deployed on a DLT system either to perform contractual obligations or both to record and perform them. What distinguishes the three forms is the role played by the code. In the first form of smart contract, the code's role is confined to performing obligations which are recorded in a natural language contract. In contrast, in the second and third forms, the code is used to record contractual obligations as well as to perform them.

2.34 The practical steps involved in concluding a smart contract are likely to differ in certain respects from those involved in concluding a traditional contract. We expect that parties will, in many cases, engage in natural language negotiations with a view to reaching an agreement on the terms of their bargain.[45] At some point, the parties will take steps to procure a piece of code which records or performs some or all of those contractual obligations.[46] Parties will also need to design a DLT system on which that code can be deployed, and configure the external data sources or "oracles" which will relay data to the DLT system to trigger the code's execution.

2.35 Where the parties do not have the skills to draft coded terms themselves, they will likely engage a third party to do this. For example, the parties may contract with a single computer coder to draft the code, based on instructions provided jointly to the computer coder by the parties. These instructions may take the form of a term sheet or business process document, setting out the details of the transaction and what the parties would like the code to do. Once the coder has drafted the code, the parties

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exchange of emails or an oral conversation. Natural language is language that has developed in the usual way as a method of communicating between people, rather than language that has been created for computers.

44 This kind of natural language agreement is sometimes referred to as a "Ricardian contract". In this call for evidence we use the term "hybrid contract".

45 Where one of the parties is expected to accept the other's standard terms and conditions, there may be no natural language negotiations between the parties. However, there may still be other natural language communications, such as an advert or information about what a smart contract deployed by one party on a distributed ledger is intended to do.

46 Negotiations may continue after this point but be partly in natural language and partly by way of amendments to the code.

may engage an additional computer coder to conduct an independent "code audit", to ensure that the code reflects the intentions of the parties.[47] Perhaps in some cases, the parties might each employ their own computer coders to negotiate and draft coded terms. Where the contracting party agrees to the contract (as produced by the coder) they will be bound by it even if the coder has made a drafting error (save for situations such as, for example, mistake and frustration). However, the parties may have an action for breach of contract against the coder, (if, for example, the coder warranted that the code was fit for purpose or would achieve a certain result, but the code fulfils neither promise). A party may also have a claim in the tort of negligence against the coder.

2.36 Where a party employs their own computer coder, and that coder has actual or ostensible authority to enter into the smart contract on the party's behalf, they might be considered to be acting as the agent of that party in the contracting process.[48] It may be possible for a coder to act as an agent for both of the contracting parties if the coder obtains each party's informed consent to act as the agent of the other party.[49]

2.37 Identifying when an agreement is reached and how it is recorded will be a matter of fact in each case. However, identifying the point of agreement may be complicated in the case of hybrid agreements where there is a natural language agreement (written or oral) and a coded computer program, which together set out the rights and obligations of the parties but separately are incomplete. Does the agreement form when the natural language agreement is concluded, when the computer program is deployed on the distributed ledger or at some other point agreed between the parties?

2.38 We are interested to understand which of the three forms of smart contract described above is the most common both in existing smart contracts and those which are being developed. We are also interested to understand better the practical steps that parties take in negotiating, drafting and entering into these forms of smart contract, including the role played by third party service providers, such as computer coders and software companies.

Question 4.

2.39 Which of the three forms of smart contract discussed in para 2.32 of the call for evidence are most commonly used in existing smart contracts or smart contracts which are in development? Please provide examples of how these forms of smart contract have been used in practice.

47 See Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 37.

48 An agent is a person who has authority to alter the legal relations of another, the principal.

49 G Watts (ed), *Bowstead & Reynolds on Agency* (21st ed 2019) paras 2-013, 6-048.

Question 5.

2.40 How do code and natural language interact in hybrid smart contracts currently in existence or in development and which terms are generally coded?

Question 6.

2.41 What process do the parties follow (or plan to follow) in negotiating, drafting and entering into a smart contract? Please explain in particular:

(1) where all the contractual obligations are contained in a natural language agreement and the code is intended merely to perform those obligations, the practical steps involved in coding the parties' rights and obligations contained in the natural language agreement;

(2) where the parties intend that there will be a hybrid contract or a solely code contract, the practical steps involved in drafting, negotiating and agreeing the code of the smart contract;

(3) where there is a hybrid contract, whether the natural language element and the coded element are entered into contemporaneously or at different times; and

(4) the role played by third party service providers (such as computer coders and software firms) in this process.

USE CASES FOR SMART CONTRACTS

2.42 During our preliminary research and discussions with stakeholders, we have looked to identify use cases for smart contracts, whether already in operation, in the development ("proof of concept") stage, or currently merely theoretical. We discuss some examples below.

Insurance

Marine insurance

2.43 Marine insurance covers loss or damage to ships and their cargo between the point of origin and destination. The risk of loss or damage can vary significantly during a ship's journey, requiring an adjustment to the insurance premium payable under the policy. Smart contracts could potentially be used to automate these and other elements of marine insurance contracts, replacing the current manual processes which are said to be slow, inefficient and prone to error.

2.44 Insurwave, launched in May 2018,[50] is a smart contract product which uses computer programs on a permissioned DLT system[51] to automate the performance of natural language marine insurance policies. GPS signals and other data sources function as oracles, relaying information about the location and status of insured ships to the distributed ledger. Based on the data provided by the oracles,[52] the computer programs can automatically adjust premiums and issue insurance payments. For example, if the ship enters a high risk zone (such as a war zone), this information can be relayed by the oracle to the distributed ledger, automatically triggering an increase in the insurance premium.

2.45 According to Ernst & Young, Insurwave enables claims "to be paid in hours rather than years", premiums to be "agreed and settled in seconds", and insurers to "track their exposures in near real-time".[53] In 2019, 40,000 events that resulted in a change to a marine insurance policy were recorded on the Insurwave distributed ledger.[54]

Parametric insurance

2.46 Parametric insurance is a type of insurance where the insurer promises to pay a specified sum upon the occurrence of a triggering event. As parametric insurance contracts contain a conditional obligation (to pay a sum on the occurrence of an event) they are arguably good candidates for automation by computer programs.

2.47 An example of the use of smart contracts in parametric insurance is AXA's Fizzy flight delay insurance product, which was offered between September 2017[55] and November 2019.[56] The insurance policy was a natural language contract between the insurer and the customer, the performance of which was automated by a computer program deployed on the permissionless DLT system, Ethereum.

2.48 When a customer purchased flight-delay insurance on the Fizzy platform, AXA's obligation to pay the customer in the event of a flight delay was translated into a computer program and deployed on Ethereum. The computer program was linked to a global air traffic database, which relayed information about the customer's flight to the computer program. The computer program was coded so that, as soon as the

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50 Ernst & Young, "World's first blockchain platform for marine insurance now in commercial use" (25 May 2018), https://www.ey.com/en_gl/news/2018/05/world-s-first-blockchain-platform-for-marine-insurance-now-in-co.

51 To which insurance brokers, insurers, ship captains and ship management companies are granted access by a central administrator.

52 See para 2.10.

53 Ernst & Young, "Insurwave: blockchain-enabled marine insurance", https://www.ey.com/en_uk/insurance/blockchain-marine-insurance.

54 See Financial Times, "Insurance sector prepares for disruption" (23 October 2019), https://www.ft.com/content/b7b3b08a-d4a3-11e9-8d46-8def889b4137.

55 AXA, "AXA goes blockchain with fizzy" (13 September 2017), https://www.axa.com/en/magazine/axa-goes-blockchain-with-fizzy.

56 Ledger Insights, "AXA withdraws blockchain flight delay compensation experiment" (2019) (noting that the product was withdrawn because demand from the travel and airline industry was "not strong enough"), https://www.ledgerinsights.com/axa-blockchain-flight-delay-compensation/.

customer's flight was delayed by two hours or more, the computer program would automatically pay the customer the sum agreed under the insurance policy.

2.49 This process meant that the need for a customer to file a claim manually was removed, and the compensation decision was delegated entirely to an automated arbitrator – the computer program – which eliminated the potential for disputes between insurer and customer. AXA also suggested that the product would bring greater transparency to the claims processing procedure and enhance trust between customers and insurers.

2.50 Smart contracts could potentially be used to automate other parametric insurance policies. If an external data source can reliably notify a computer program that an external event (such as a hurricane or flood) has occurred, then performance of a wide range of parametric insurance contracts could potentially be automated by DLT-based computer programs.

Financial sector

Derivatives contracts

2.51 Parties can potentially record certain terms of derivatives contracts (such as payment obligations) in code, so that they can be performed automatically by a computer program. As performance obligations under a derivatives contract depend on external events (such as interest rate movements), oracles could be used to relay this information to the distributed ledger, triggering the automatic performance of these obligations without the need for human intervention.[57]

2.52 We have been told by stakeholders that the scale of derivatives trading, along with increased regulation, has meant that financial institutions are struggling to store and process a high volume of transactions. The International Swaps and Derivatives Association ("ISDA") is working to increase efficiency in the derivatives market by automating certain elements of derivatives contracts using DLT-based computer programs. To achieve this, ISDA is working on further standardising the ISDA Master Agreement so that it is more amenable to translation into computer code.

Decentralised finance ("DeFi")

2.53 DeFi (sometimes known as "open finance") is an umbrella term referring to a wide range of financial activity deployed on DLT such as the Ethereum blockchain. While the traditional financial system runs on centralised infrastructure managed by central authorities such as banks and other intermediaries, DeFi allows users to interact directly. Proponents of DeFi identify it as an opportunity to remove intermediaries from sales and purchases and other cryptoassets transactions, loans, crowdfunding and betting, as well as to introduce novel forms of finance.

2.54 An example of a DeFi product which automates the performance of financial transactions is Compound.[58] Compound is a computer program deployed on Ethereum which automates borrowing and lending. A participant can deposit

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57 P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 95.

58 Gemini, "What is compound in 5 minutes", https://gemini.com/learn/what-is-compound-and-how-does-it-work.

cryptocurrency with the computer program and the computer program will automatically pay interest to the participant, using an interest rate calculated by an algorithm in the program. Participants can also borrow against the cryptocurrency they deposit with the program. The program automatically calculates the amount the participant can borrow, based on the collateral they have deposited, and if the collateral falls below a predetermined amount, the computer program will automatically realise the collateral as security. All of these transactions take place automatically, without the participant having to deal with a bank or other financial intermediaries. There are currently almost US$3bn worth of cryptoassets earning interest in Compound.[59]

2.55 Giving access to the financial markets to anyone with internet access may expose them to risk in the event that DeFi applications collapse or the computer program contains bugs. These issues are being considered by other bodies, including the Financial Conduct Authority ("FCA")[60] and HM Treasury.[61]

Real Estate

2.56 HM Land Registry has developed a prototype blockchain using the Corda platform to enable a digital transfer of a property which could automatically update the Land Register. In March 2019 conveyancing firms Mishcon de Reya and MyHomeMove, payment intermediary Shieldpay, digital identity provider Yoti and HM Revenue & Customs successfully tested the prototype. The technology has not yet gone live for property buyers and sellers to use. HM Land Registry has said: "While we have seen a real appetite for technologies such as smart contracts, it is all still very new and we want to explore all the different models and technology providers available".[62]

Trade and retail

Supply chains

2.57 A supply chain is the process by which goods or services are supplied from a producer to a consumer. Supply chains involve many different organisations, businesses and individuals and are often reliant on paper-based documentation, making them inefficient, costly and error-prone.

2.58 DLT-based smart contracts could potentially be used to make supply chains more efficient. A distributed ledger could be used to provide secure, accessible digital copies of documents (such as letters of credit and bills of lading) to relevant parties in

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59 See https://compound.finance/.

60 The FCA regulates financials services in the UK. The FCA's objectives are to protect consumers from harm, protect and enhance the integrity of the UK financial system and promote effective competition in the interests of consumers. For their current work, see https://www.fca.org.uk/firms/cryptoassets and https://www.fca.org.uk/publications/policy-statements/ps20-10-prohibiting-sale-retail-clients-investment-products-reference-cryptoassets.

61 HM Treasury, the FCA and the Bank of England's joint Cryptoassets Taskforce report considered a range of issues including ensuring high regulatory standards in financial markets and protecting consumers. See Cryptoassets Taskforce: final report (October 2018), https://www.gov.uk/government/publications/cryptoassets-taskforce.

62 HM Land Registry, "Could blockchain be the future of the property market?" (24 May 2019), https://hmlandregistry.blog.gov.uk/2019/05/24/could-blockchain-be-the-future-of-the-property-market/.

the supply chain, and computer programs deployed on the ledger could be used to transfer payments automatically upon the occurrence of certain events in the supply chain (such as a document being signed or goods being delivered).[63]

2.59 A number of companies have shown interest in this area. For example, Barclays Corporate Bank recently partnered with Wave, a platform that stores bill of lading documents on a distributed ledger and uses computer programs to record the transfer of ownership and automatically transfer payments upon arrival at port.[64]

2.60 The Law Commission is undertaking a separate project on digital assets, considering law reform to allow for the digitisation of certain trade documentation including bills of lading and bills of exchange.[65]

Peer to peer sales

2.61 E-commerce platforms such as OpenBazaar and SafeMarket facilitate the buying and selling of goods through computer programs deployed on a distributed ledger. Sellers can offer a product for sale by recording information on the distributed ledger, such as a description of the goods and their price. A buyer can purchase goods from the seller by sending bitcoin to a computer program on the distributed ledger, which holds the bitcoin in escrow pending delivery of the goods by the seller. When the buyer receives the goods and the buyer is satisfied of their condition, the buyer sends a digitally signed message to the escrow account, causing the computer program automatically to release the funds to the seller.[66] The use of DLT and automated escrow accounts mean that the transaction can take place without intermediaries (such as Amazon or eBay) so there are no fees imposed when items are listed or sold.[67]

Intellectual property

Royalty distribution

2.62 Copyright holders are entitled to receive a royalty fee every time their content is used for commercial purposes. An issue with the current process for paying royalties is knowing who owns the copyright and ensuring that royalty payments are distributed to all who are legally obliged to receive payment.

2.63 Ownership of copyright could potentially be recorded on a distributed ledger, and computer programs deployed on the ledger could automatically transfer royalty payments, in real time, when the copyrighted material is used. For example, Ujo Music uses computer programs deployed on Ethereum to facilitate the sale of digital music

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63 IBM, “Advancing global trade with blockchain” (2020), https://ibm.co/blockchain-global-trade.

64 Fintech Futures, “Barclays and fintech start-up Wave pioneer blockchain trade finance transaction”, (7 September 2016), https://www.fintechfutures.com/2016/09/barclays-and-fintech-start-up-wave-pioneer-blockchain-trade-finance-transaction/.

65 For more details, see https://www.lawcom.gov.uk/project/digital-assets/.

66 P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 76; and OpenBazaar, “Features”, https://openbazaar.org/features/.

67 OpenBazaar, “Features”, https://openbazaar.org/features/.

files and payment of royalties.[68] When a person pays digital currency to download a song from Ujo Music's website, the computer program automatically pays the artists involved in the song's creation, in accordance with the smart contract code. No central party or intermediary is involved in administering the payment.[69] This is said to be more efficient than the current streaming system, which is heavily intermediated and has been criticised for providing too little remuneration to artists.[70]

Question 7.

2.64 Are you aware of any examples of use cases for smart contracts beyond those we give in the call for evidence, or variations on the use cases we give, which are being developed, are at proof of concept stage or are already operational?

If so, please explain:

(1) the technology used to create the smart contract;

(2) the role played (if any) by oracles in the performance of the smart contract;

(3) the contractual terms (if any) performed automatically by computer programs; and

(4) whether the smart contract is a business to business commercial contract, a peer to peer contract or a business to consumer contract.

POTENTIAL BENEFITS AND COST SAVINGS

2.65 Our preliminary research and discussions with stakeholders have identified the following potential non-monetary benefits and cost savings associated with the use of smart contracts that utilise DLT:

(1) *Increased efficiency and lower transaction costs:* the automated nature of smart contracts means that they can occur without the need for human intervention.[71] Recording performance of a contract on a distributed ledger also has the benefit that every participant has an up to date copy of the ledger and therefore real time details of performance of the smart contract.[72]

(2) *Lower enforcement costs:* if properly coded, a smart contract is simply unable to refuse to act, to omit a condition or to fail to perform so long as the requisite

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68 UJO Music, https://ujomusic.com/.

69 P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 76.

70 Harvard Business Review, "Blockchain could help musicians make money again" (5 June 2017), https://hbr.org/2017/06/blockchain-could-help-musicians-make-money-again.

71 This is discussed further from para 2.8.

72 This is discussed further at para 2.19.

conditions are met.[73] Enforcement action for failure to perform obligations under a contract may therefore be less common in relation to smart contracts as compared with a traditional contract.[74]

(3) *Reduced risk of fraud:* the consensus mechanism and immutability of a distributed ledger mean that contracting parties can trust in its veracity and transact with one another in confidence, even where there is no central administrator.[75]

Question 8.

2.66 What benefits and cost savings can smart contracts provide compared with traditional contracts? Will increased use of smart contracts lead to any additional costs? Please provide details and any available qualitative and quantitative evidence.

[73] This is discussed further at para 2.8.

[74] It is unlikely that claims for breach of contract or restitution will be eliminated entirely in a smart contract context. We discuss this in more detail in Chapter 5.

[75] This is discussed further at para 2.19.

Chapter 3: Formation of smart contracts

3.1 As discussed in Chapter 2, a "smart contract", for the purposes of this call for evidence, is a legally binding contract which can be performed automatically, without the need for human intervention, using distributed ledger technology (DLT). In this chapter, we explain the following requirements for the formation of a legally binding contract:

(1) agreement;

(2) consideration;

(3) certainty and completeness;

(4) intention to create legal relations; and

(5) formality requirements.

3.2 In each case, we discuss how the requirement might be applied in the context of smart contracts. We identify areas of potential uncertainty in applying the relevant legal principles, and ask consultees for their views.

AGREEMENT

3.3 The first requirement for the formation of a legally binding contract is an agreement, comprising an offer and an acceptance. An offer is an expression of willingness to be bound by specified terms when it is accepted by the person to whom it is made.[76] An acceptance is a final and unqualified expression of assent to the terms of an offer.[77] Whether there is an offer and acceptance is determined objectively, based on the parties' words and conduct.[78] In some cases, it may not be necessary to identify an offer and acceptance.[79] For example, where the parties have signed a contractual document containing the agreed terms there is unlikely to be any dispute about whether the parties have reached an agreement.[80]

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76 *Air Transworld Ltd v Bombardier Inc* [2012] EWHC 243 (Comm), [2012] 1 Lloyd's Rep 349 at [75] by Cooke J; *Glencore Energy UK Ltd v Cirrus Oil Services Ltd* [2014] EWHC 87 (Comm), [2014] 1 All ER (Comm) 513 at [59] by Cooke J; H Beale (ed), *Chitty on Contracts* (2019) para 2-003; A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 52.

77 *Air Transworld Ltd v Bombardier Inc* [2012] 1 Lloyd's Rep 349, [2012] EWHC 243 (Comm) at [79] by Cooke J; *Arcadis Consulting (UK) Ltd v AMEC (BCS) Ltd* [2018] EWCA Civ 2222, [2019] 1 All ER (Comm) 421 at [92] to [93] by Gloster LJ; H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 2-026; A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 52.

78 *RTS Flexible Systems Ltd v Molkerei Alois Müller GmbH* [2010] UKSC 14, [2010] 1 WLR 753 at [45].

79 *New Zealand Shipping Co Ltd v AM Satterthwaite & Co Ltd* [1975] AC 154, 167, by Lord Wilberforce (noting that it may be artificial in some cases to engage in offer and acceptance analysis).

80 A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 53; J Cartwright, *Formation and Variation of Contracts* (2014) para 3.47.

3.4 The process for agreeing a smart contract can take a variety of forms. As noted in Chapter 2, the parties could conduct negotiations in natural language with a view to reaching an agreement. The parties would then arrange for certain aspects of their agreement to be performed automatically by a computer program on a distributed ledger. We do not consider that these smart contracts would give rise to any novel legal considerations in identifying an agreement between the parties. The task for the court would be to determine whether an agreement was reached by the parties in their natural language negotiations.[81] The existence and operation of the computer program would not be relevant to whether the parties had reached an agreement. Similarly, where the alleged agreement consists of terms in natural language and code (a 'hybrid' agreement), the existence of that agreement is likely to be evident from the parties' natural language negotiations. We anticipate that the parties' natural language negotiations would refer to and explain the effect of any coded terms.[82]

3.5 It is where the parties have engaged in limited or no natural language negotiations that identifying an agreement between the parties might be more difficult.[83] For example, one party might deploy a piece of code on a distributed ledger and another party might interact with that piece of code, causing the code to execute a transaction,[84] or the parties might each deploy programs on a distributed ledger which subsequently interact and execute transactions. In these cases, evidence of natural language negotiations may not be available to the court to determine whether the parties have reached an agreement. The only evidence of an agreement between the parties may be the conduct of the parties in deploying and interacting with code on a distributed ledger, or the interaction of programs deployed by the parties on the distributed ledger. The question arises whether the parties in these circumstances could be found to have reached an agreement.

Agreements formed by the conduct of the parties on a distributed ledger

3.6 Suppose Alice decides to deploy a computer program on Ethereum, the code of which provides that if 10 Ether[85] is sent to the program, the program will transfer a token[86] to the account from which the Ether was sent. Bob, who is code-literate, stumbles across Alice's program, reads the source code, and decides to interact with the program.[87] Bob sends 10 Ether to the program, and the program automatically executes,

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81 For example, the agreement could be evidenced by a natural language document signed by the parties, an exchange of emails or evidence of oral conversations between the parties.

82 For a similar view, see the UKJT Legal Statement at [144].

83 UKJT Legal Statement at [145].

84 See UKJT Legal Statement at [146].

85 The cryptocurrency used on Ethereum.

86 A token is a digital representation of an asset. A token typically does not have intrinsic value but is linked to an underlying asset, which could be anything of value: see World Bank, *Distributed Ledger Technology (DLT) and Blockchain* (2017) p iv.

87 We discuss source code and whether it can be "read" from para 3.59. We expect that someone in Alice's position may include a natural language description on the DLT system of what their program will do, for example "token transfer". However, such a high level description may not explain how the program operates. A code-literate party might nevertheless read the code, understand what it will do and decide to transact with the program on that basis.

transferring the token to his account. No natural language documents or communications are exchanged between Bob and Alice. Their interactions consist exclusively of transactions on the distributed ledger mediated by the computer program deployed by Alice. Can it be said that Alice and Bob reached an agreement for the transfer of a token by Alice in exchange for payment of 10 Ether by Bob?

3.7 There are two issues to consider. The first is whether the deployment of the computer program by Alice amounted to an offer or was merely an invitation to treat. An invitation to treat is not an expression of willingness to be bound by certain terms, but merely an invitation to negotiate.[88] An example of an invitation to treat is the display of goods for sale on a website. Generally, the trader in these circumstances is understood not to be making a binding offer, for the trader might not have the goods in stock, might need to check the buyer's age before selling the goods or might wish to be protected against having to sell goods which have been accidentally mispriced. The objective intention of the trader is rather to invite offers from consumers to buy the goods, which the trader can accept or reject.[89] By deploying the token on the distributed ledger, Alice could similarly be said to be "displaying" the token for sale, and thereby only making an invitation to treat.[90]

3.8 However, not all displays are invitations to treat, and much will depend on the circumstances surrounding the display. For example, where a website displays digital content for sale which the consumer can download instantly by clicking a box or icon on the computer screen, this may be an offer rather than an invitation to treat.[91] Similarly, although the display of goods in a shop is generally considered to be an invitation to treat,[92] the display of goods in a vending machine is generally considered to be an offer, which the consumer can accept by putting money into the machine.[93] The reason why these displays are considered to be offers is that, once the consumer clicks the 'download' button or inserts their money into the machine, the transaction takes place automatically without scope for further negotiation between the parties.

3.9 For similar reasons, the display of the token by Alice can be considered an offer, rather than an invitation to treat. The computer program Alice has deployed will automatically transfer the token upon the receipt of 10 Ether. Once the money is received, there is no scope for further negotiation between Alice and the buyer. This suggests that Alice's objective intention is to make an offer. Support for this can be found in *Thornton v Shoe Lane Parking* ("*Thornton*"),[94] where the defendant installed a machine in its car park, which would automatically grant entry to the car park upon

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88 See *Fisher v Bell* [1961] 1 QB 394; *Pharmaceutical Society of Great Britain v Boots Cash Chemists (Southern) Ltd* [1953] 1 QB 401, 802.

89 M Bridge (ed), *Benjamin's Sale of Goods* (11th ed 2020) para 2-002.

90 M Durovic and A Janssen, "Formation of smart contracts under contract law" in L DiMatteo, M Cannarsa and C Poncibò (eds), *Smart contracts, blockchain technology and digital platforms* (2020) p 67.

91 M Bridge (ed), *Benjamin's Sale of Goods* (11th ed 2020) para 2-002.

92 See *Pharmaceutical Society of Great Britain v Boots Cash Chemists (Southern) Ltd* [1953] 1 QB 401; *Esso Petroleum Ltd v Commissioners of Customs & Excise* [1976] 1 WLR 1, 11,

93 See *Thornton v Shoe Lane Parking Ltd* [1971] 2 QB 163, 169, by Lord Denning MR.

94 [1971] 2 QB 163.

the insertion of money by a customer. Lord Denning, MR explained that the defendant, in holding out the machine as being ready to receive money, was making an offer to customers to use the car park in exchange for payment.[95] The same reasoning could apply to a person who deploys a computer program which will automatically transfer an asset upon receiving payment.[96]

3.10 The second issue is whether Bob accepted Alice's offer by sending 10 Ether to the computer program. This would seem to be a clear case of acceptance by conduct. In *Thornton*, Lord Denning said that agreement was reached "at the very moment when [the customer] put his money into the machine":[97]

> It can be translated into offer and acceptance in this way: the offer is made when the proprietor of the machine holds it out as being ready to receive money. The acceptance takes place when the customer puts his money into the slot.

Just as the insertion of money into the machine in *Thornton* was an acceptance, the sending of money to the computer program by Bob could also be considered an acceptance. The law of England and Wales generally requires an acceptance to be 'communicated' to the offeror.[98] However, where a party makes a promise to do something if someone else performs a specified act (known as a "unilateral contract"), performing the act is sufficient for acceptance.[99] Accordingly, Bob could accept Alice's offer simply by sending the Ether, without having to provide a separate communication of his acceptance.

3.11 This example suggests that it is possible under current legal principles to identify an agreement between the parties based solely on their interactions on a DLT system.[100] We recognise that there may be cases where the conduct of the parties on a distributed ledger might be more equivocal. The program deployed by Alice might

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95 *Thornton v Shoe Lane Parking Ltd* [1971] 2 QB 163, 169; see also *R (Software Solutions Partners Ltd) v HM Customs & Excise* [2007] EWHC 971 (Admin), where the Court considered whether a contract of insurance was formed when a piece of software automatically generated an insurance policy on the insurer's behalf, based on information entered by an insurance broker for the customer. The Court, applying *Thornton*, reasoned at [67] that the insurer made an offer by "hold[ing] out the software as the automatic medium for contract formation", and that this offer was accepted when the broker entered the customer's information into the software.

96 For example, in *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02, a computer program deployed by a trader on a cryptocurrency exchange platform automatically placed an order to sell bitcoin in accordance with its programmed instructions. Citing *Thornton* and *Software Solutions*, the Court held that the trader made an offer to sell the bitcoin by holding out the algorithm as an automatic medium for contract formation, and that this offer was accepted when another trader's algorithm placed an order to buy the bitcoin: at [94] to [96]. See also K Werbach and N Cornell, "Contracts Ex Machina", (2017) 67 *Duke Law Journal* 313, 342-343.

97 *Thornton v Shoe Lane Parking Ltd* [1971] 2 QB 163, 169, by Lord Denning MR.

98 The reason being that it may cause hardship to hold the offeror bound before they know the offer has been accepted: see *Entores Ltd v Miles Far East Corporation* [1955] 2 QB 327 by Denning LJ; *Holwell Securities v Hughes* [1974] 1 WLR 155 by Russell LJ; H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 2-044.

99 *Carlill v Carbolic Smoke Ball Co* [1893] 1 QB 356; *Harvela Investments Ltd v Royal Trust of Canada (CI) Ltd* [1986] AC 207 by Lord Diplock; *Soulsbury v Soulsbury* [2007] EWCA Civ 969, [2008] Fam Law 13 by Longmore LJ; *Air Transworld Ltd v Bombardier Inc* [2012] EWHC 243 (Comm), [2012] 1 Lloyd's Rep 349 at [79] by Cooke J; H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 2-046.

100 For a similar view, see UKJT Legal Statement at [147].

include conditions which mean that, on proper analysis, she is not making an offer but an invitation to treat. Similarly, there may be conduct on Bob's part which falls short of an acceptance of Alice's offer. We would like to hear consultees' views about how the parties' interactions on a distributed ledger might give rise to an agreement.

3.12 We are also aware of smart contract programming languages into which the concepts of 'offer' and 'acceptance' are expressly encoded, so that the code itself could reveal an agreement between the parties. An example is the Digital Asset Modelling Language (DAML), which has been designed for the specific purpose of facilitating the creation of agreements on DLT systems.[101] Using DAML, Alice can deploy an "offer contract" on the distributed ledger, the code of which nominates Bob as the "controller". As controller, Bob has the power to exercise a "choice" on the offer contract: to accept or reject it. If Bob accepts the offer contract, the offer contract is "archived" and a new contract is created on the distributed ledger, to which Alice and Bob are party.[102] The distributed ledger at this point would contain an immutable record of Alice's initial offer contract, Bob's choice to accept the offer contract, and the contract between Bob and Alice.[103] DAML and similar programming languages could therefore enable a court to trace the negotiation of a smart contract on a distributed ledger and identify the piece of code representing the parties' agreement.[104] We would like to learn more about these programming languages and whether they are being used to conclude 'solely code' agreements on DLT systems.

Question 9.

3.13 In what ways can parties reach an agreement through their interactions on a distributed ledger?

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101 DAML, "A new language for a new paradigm: smart contracts" (17 May 2018) (noting that programs using DAML can "describe how contracts are formed, which parties have authorised this formation, and which parties have been delegated rights under a contract"), https://daml.com/daml-driven/a-new-language-for-a-new-paradigm-smart-contracts.

102 DAML, "The only valid smart contract is a voluntary one – easier said than done" (31 May 2018), https://daml.com/daml-driven/the-only-valid-smart-contract-is-a-voluntary-one-easier-said-than-done.

103 DAML, "Smart contract language: the real arbiter of truth" (31 July 2018) (noting that DAML "provides an immutable evidentiary audit trail of DLT contract execution"), https://daml.com/daml-driven/smart-contract-language-the-real-arbiter-of-truth.

104 See Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) (noting that distributed ledgers can provide an "audit trail" of contractual terms and the performance of those terms, reducing the potential for contractual disputes).

Question 10.

3.14 Are you aware of programming languages which are specifically designed to enable parties to reach agreement on a distributed ledger? If possible, please give examples of the circumstances in which they could be or have been used.

Agreements formed by computer programs deployed by the parties

3.15 The above discussion has concerned the situation where an offer and acceptance is effected by the conduct of a human being. We have seen that a party's conduct in deploying a computer program on a distributed ledger may amount to an offer, and that a party's conduct in interacting with that program (for example, transferring cryptocurrency to the program) may amount to an acceptance, leading to the formation of an agreement. However, in some cases, it may be possible for the offer and acceptance to be effected by computer programs deployed by the parties without intervention of the parties themselves.[105] For example, Alice and Bob each might deploy computer programs on a distributed ledger, and those computer programs might subsequently interact with one another, leading to a transaction between Alice and Bob. The question arises as to when (if at all) the parties in this situation could be found to have reached an agreement as a result of the operation of the computer programs deployed by them. Put another way, can the process of offer and acceptance itself be undertaken automatically by computer programs, without the need for human intervention?

3.16 The decision in *R (Software Solutions Partners Ltd) v HM Customs & Excise* ("*Software Solutions*")[106] suggests that, in principle, a contract can be formed automatically by the operation of a computer program. That case concerned a piece of software which automatically generated contracts of insurance between insurance brokers and insurers. The software was programmed so that, when an insurance broker input the details of a required insurance product into the software, the software would automatically generate an offer of insurance on behalf of the insurer. The insurer's 'qualification criteria' were expressly coded into the software, so that the offer of insurance could be automatically generated on the insurer's behalf without the need for the insurer's intervention. The insurance broker could then accept the offer of insurance by taking certain steps within the software, at which point the software would automatically generate an insurance policy to which the insurer was bound.

3.17 The judge in *Software Solutions*, Kenneth Parker QC (as he then was) observed that there was no reason in principle why a contractual offer cannot be automatically generated by a computer program.[107] The insurer, by inputting its qualification criteria into the software, "expressly or impliedly invited brokers who had access to the

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105 M Durovic and A Janssen, "Formation of smart contracts under contract law" in L DiMatteo, M Cannarsa and C Poncibò (eds), *Smart contracts, blockchain technology and digital platforms* (2020) p 66.

106 [2007] EWHC 971 (Admin) ("*Software Solutions*").

107 *Software Solutions* at [65], [67].

[software] to use the computer program for the purposes of contract formation".[108] The insurers stood in a similar position to the defendant in *Thornton*. Just as the defendant in *Thornton* made a binding offer by holding out an automatic ticket machine as being ready to receive money, the insurers in *Software Solutions* made an offer by holding out the software as an "automatic medium for contract formation".[109] And just as the offer in *Thornton* was accepted when the customer put their money into the machine, the offer in *Software Solutions* was accepted when the insurance broker took the necessary steps within the software to indicate their assent to the offer of insurance generated by the software.[110]

3.18 *Software Solutions* was a case where the offer was automatically generated by the computer program, while the acceptance remained a matter for human intervention. It is conceivable that, in some cases, both the offer and acceptance might automatically be generated by a computer program, so that the entire process of reaching an agreement occurs without human intervention. This was the case in *Quoine Pte Ltd v B2C2 Ltd ("Quoine")*,[111] where the parties each deployed computer programs on a cryptocurrency exchange platform. The parties' programs were designed so that they would automatically place orders to buy and sell cryptocurrency on the platform, according to pricing algorithms encoded into their programs. Subsequently, one party's program placed an offer to sell cryptocurrency on the platform and the other party's program automatically accepted that offer. The Singapore Court of Appeal, citing *Thornton* and *Software Solutions*, held that the operation of the parties' programs gave rise to a legally binding agreement for the sale of cryptocurrency.[112] That the parties did not have advance knowledge of the terms of the agreements that would be entered into by the programs, including the price, was irrelevant.[113] By deploying their respective programs for the purpose of transacting in cryptocurrency, the parties in *Quoine* held out their programs as a mechanism for reaching agreement and were bound by the agreements that were in fact entered into by those programs.[114]

3.19 *Software Solutions* and *Quoine* suggest that an offer and acceptance can be effected by computer programs without human intervention, at least where there is evidence that the parties have deployed those programs for the purpose of reaching an agreement. We note that, in these cases, the existence of an agreement did not depend on a conclusion that the computer programs acted as "agents" of the parties.[115] Rather, it was sufficient that the parties had "held out" their computer

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108 *Software Solutions* at [65].

109 *Software Solutions* at [67].

110 *Software Solutions* at [20].

111 [2020] SGCA(I) 02 ("*Quoine*").

112 *Quoine* at [93] to [96].

113 *Quoine* at [96].

114 *Quoine* at [96].

115 In *Software Solutions* at [67], Kenneth Parker QC said that a computer program cannot be an "agent" because only a person with a "mind" can be an agent at law. Similarly, in *Quoine* at [15], the Singapore Court of Appeal emphasised that the parties' computer programs operated "deterministically", that is, the programs did "just what they were programmed to do and did not have the capacity to develop their own

programs as a mechanism for reaching agreement.[116] We would like to hear from consultees about the circumstances in which parties might be found to have reached an agreement through the operation of computer programs deployed by them, and the legal basis for any such conclusion.

Question 11.

3.20 Do you consider that offer and acceptance can occur through the operation of autonomous computer programs deployed by the parties on a distributed ledger?

If so:

(1) in what circumstances?

(2) on what legal basis?

Agreements between anonymous or pseudonymous parties

3.21 In some cases, the parties to a smart contract may not know each other's real identities. We anticipate that, where the parties have concluded a natural language contract with performance to be automated by code, or a hybrid contract comprising natural language and coded terms, the identity of the parties is likely to be apparent from the natural language contract or as a result of emails or face to face conversations when negotiating the natural language terms. However, where the parties have entered into a smart contract solely by deploying or interacting with code on a distributed ledger, without any natural language negotiations, the identity of the contracting parties may not be known.

3.22 In a permissionless DLT system, users need not disclose their identities in order to engage in transactions. For example, on the Bitcoin and Ethereum blockchains, each user account has a public address (much like an email address) from which the user can initiate transactions using their private key.[117] While the public address linked to a particular transaction is known, the identity of the user linked to that public address is unknown.[118] Strictly speaking, the user is not wholly anonymous, because the transactions they initiate are recorded on a public ledger and analysis of those transactions may enable the user to be identified.[119] Accordingly, users of

responses to varying conditions". See also Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 40 (noting that a computer program does not have a "separate legal personality" from the contracting parties).

116 The question of whether the parties intended to be legally bound by the operation of their computer programs is discussed in more detail from para 3.47.

117 See P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) pp 38-39.

118 In contrast, in a permissioned DLT system, disclosure and verification of a party's identity is typically required before a party can join the network.

119 See D Futter and T Waters, "DLT in commercial contracts: an introduction to blockchain, DLT and smart contracts for commercial practitioners", *Practical Law* (2020); P de Filippi and A Wright, *Blockchain and the*

permissionless DLT systems are said to be 'pseudonymous': transacting under a pseudonym (the public address) makes the user difficult, but not impossible, to identify.

3.23 As the UKJT Legal Statement explained, there is no requirement under the law of England and Wales for the contracting parties to know each other's real identities.[120] In principle, an agreement reached between pseudonymous parties on a permissionless DLT system could amount to a legally binding contract. However, as a practical matter, it may be difficult for a party to that contract to obtain a remedy against the other party if the identity of the other party is unknown.[121] It may be necessary to prove the identity of the other party by extrinsic evidence.[122] The pseudonymity of the parties may also make it more difficult to establish that a court of England and Wales has jurisdiction to hear a dispute arising under the contract.[123] It could also pose challenges in transactions where the identity of the parties is important, for example, transactions to which "know your customer" requirements apply.

3.24 We would like to hear from consultees about the prevalence of pseudonymous contracting on DLT systems, and the evidence that might be used to establish the identities of the parties to these contracts.

Question 12.

3.25 How common is it for parties to enter into smart contracts on a DLT system without knowing each other's real identities and in what circumstances is this likely to arise?

Question 13.

3.26 What evidence might be available to a court to establish the identity of the parties to a smart contract entered into pseudonymously on a DLT system?

Law: The Rule of Code (2018) pp 2, 39; World Bank, *Distributed Ledger Technology and Blockchain* (2017) p 4.

120 UKJT Legal Statement at [156] (referring to sales at auctions to the highest bidder, unilateral contracts as in *Thornton v Shoe Lane Parking Ltd* [1971] 2 QB 163, and agents contracting on behalf of an undisclosed principal as examples of contracts in which the real identity of at least one of the parties is unknown).

121 UKJT Legal Statement at [157]. But see *AA v Persons Unknown* [2019] EWHC 3556 (Comm), [2020] 4 WLR 35 where the High Court granted a proprietary injunction over bitcoin contained in a cryptoasset exchange account, even though the identity of the account holder was unknown.

122 H Beale (ed), *Chitty on Contracts* (33rd 2020) para 13-132.

123 We discuss this further from para 7.12.

CONSIDERATION

3.27 The second requirement for the formation of a legally binding contract is that the agreement reached by the parties must be supported by consideration. Consideration means a promise or (in the case of a unilateral contract) performance by one party in exchange for a promise by the other party.[124] The consideration requirement means that promises made 'gratuitously' – that is, for nothing in return – are not capable of being legally binding. The exception is a promise made by deed. A deed does not require consideration to be legally binding, but the formation of a deed must comply with certain statutory requirements.[125]

3.28 Where the parties have concluded an agreement in natural language with performance to be automated by code, the existence of consideration would be determined by examining the natural language agreement.[126] The question would be whether, under the natural language agreement, a promise was made by one party in exchange for a promise by the other party. The same is likely to be true in the case of a hybrid agreement, to the extent that the natural language element of the agreement sets out the mutual promises made by the parties.

3.29 It may also be possible to identify consideration for agreements which are recorded solely in code. The consideration could be identified by examining the operation of the code. If, for example, the code provides that cryptocurrency is to be transferred from Bob to Alice on a certain date, upon which a token is to be transferred from Alice to Bob, this agreement could satisfy the requirement for consideration. The code could be interpreted as expressing a promise by Bob to pay Alice on a certain date, and a promise by Alice to transfer the token to Bob upon payment. Similarly, in the 'unilateral contract' example given in paragraph 3.6 above, the sending of Ether to the computer program by Bob would constitute consideration for the promise by Alice to transfer the token. [127] We would like to hear from consultees about whether they foresee any difficulties in applying the law on consideration to these agreements.

Question 14.

3.30 Are you aware of, or do you foresee, any difficulties in applying the law on consideration to smart contracts? If possible, please provide examples.

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124 A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 8.

125 We discuss deeds in more detail from para 3.74.

126 A natural language agreement is an agreement expressed in words, either orally or in writing. This could take different forms, for example, a single contractual document signed by all parties, an exchange of emails or an oral conversation.

127 In the case of a unilateral contract (where a party promises to do something if someone else performs a specified act) the performance of the specified act constitutes consideration for the promise: see *Carlill v Carbolic Smoke Ball Co* [1892] 2 QB 484; *Budgett v Stratford Co-operative and Industrial Society Ltd* (1916) 32 TLR 378; *Melhuish v Redbridge Citizens Advice Bureau* [2005] IRLR 419 at [18].

CERTAINTY AND COMPLETENESS

3.31 The third requirement for the formation of a legally binding contract is that the agreement must be certain and complete. An agreement is uncertain if its terms are too vague to be enforceable,[128] and incomplete if the parties have failed to agree on essential matters.[129] The law of England and Wales does not require agreements to be certain or complete in an absolute sense.[130] An agreement will only be found uncertain or incomplete if it is "legally or practically impossible" to give the agreement enforceable content.[131] Mere difficulty in interpreting the agreement or identifying its precise terms does not usually render an agreement unenforceable.[132]

3.32 We do not expect smart contracts to give rise to novel legal considerations in this area. Where a smart contract consists of a natural language agreement with automated performance by code, the certainty and completeness of the agreement can be determined in the ordinary way by examining the terms of the natural language agreement. Where the smart contract is a hybrid of natural language and coded terms, a potential source of uncertainty is that the natural language and coded terms may conflict with one another. However, an agreement is not uncertain merely because of a conflict between its terms. Conflicts between terms can be resolved through a process of interpretation by the court, and only when it is impossible to resolve the conflict by interpretation will the court hold an agreement to be uncertain.

3.33 For example, in *Scammell v Dicker*,[133] a term in a consent agreement regarding the location of a property boundary conflicted with a plan annexed to the consent agreement, which drew the boundary in a different location. The Court of Appeal held that the conflict could be resolved by interpretation, and therefore the agreement was not uncertain. Rix LJ said:[134]

> [I]nconsistencies between different parts of a document or several documents making up a contract … are the everyday stuff of contract and of commerce. If the parties cannot resolve such problems, they go to tribunals to find an answer: and the

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128 H Beale (ed), *Chitty on Contracts* (33rd 2020) para 2-148. For example, in *G Scammell & Nephew Ltd v Ouston* [1941] AC 251, the House of Lords held that an agreement to buy goods "on hire-purchase" was too vague to be enforceable. As there were various kinds of hire-purchase agreements in widely different terms, it was impossible to say on which terms the parties intended to contract.

129 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 2-120. For example, in *Bushwall Properties Ltd v Vortex Properties Ltd* [1976] 1 WLR 591, an agreement for the sale of land by instalments, with a "proportionate part" to be conveyed for each instalment, was void for incompleteness because it failed to stipulate which part of the land was to be conveyed for each instalment.

130 *Hillas & Co Ltd v Arcos Ltd* (1932) 1478 LT 503, 514, by Lord Wright; see also *Wells v Devani* [2019] UKSC 4, [2020] AC 129, where the UK Supreme Court held that an oral agreement between a vendor and estate agent for the payment of commission was sufficiently certain and complete, despite the vendor and estate agent failing to specify the circumstances in which the commission would fall due.

131 *Scammell v Dicker* [2005] EWCA Civ 405, [2005] 3 All ER 838 at [30] by Rix LJ.

132 *Scammel & Nephew Ltd v HC and JG Ouston* [1941] AC 251, 268 by Lord Wright.

133 [2005] EWCA Civ 405, [2005] 3 All ER 838.

134 *Scammell v Dicker* [2005] EWCA Civ 405, [2005] 3 All ER 838 at [31] by Rix LJ.

courts should strain to be the preserver and not the destroyer of bargains, especially where, as here, the parties have acted upon their apparent agreement.

Where the parties have performed the agreement or the code has performed, it is likely that the court would only hold the agreement to be uncertain, and therefore unenforceable, as a "last resort".[135] In Chapter 4, we consider how the principles of interpretation could be applied to smart contracts.

3.34 Where the smart contract consists solely of code, the behaviour of the code would be a strong indication of whether the agreement is certain and complete. A piece of code which contains vague or inconsistent instructions, or omits certain essential instructions, will not be performed by a computer. Conversely, code which is expressed with correct syntax and which contains all essential instructions will be performed by a computer.[136] Accordingly, where a piece of code has been performed by a computer, we consider that there may be little scope to argue that the agreement is uncertain or incomplete.

Question 15.

3.35 Are you aware of, or do you foresee, any difficulties in determining whether the parties to a smart contract have reached a certain and complete agreement? If possible, please provide examples.

INTENTION TO CREATE LEGAL RELATIONS

3.36 The fourth requirement for the formation of a legally binding contract is that the parties must have intended to create legal relations. That is, the parties must have intended their agreement to be legally enforceable. The intention of the parties is determined objectively, by reference to their words and conduct, rather than their subjective states of mind.[137]

3.37 Where a smart contract includes a natural language component, there is likely to be little difficulty in proving that the parties to a smart contract intended to create legal relations. This is because, in the case of an express agreement made in a commercial context, an intention to create legal relations is presumed under English law.[138] An

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135 *Astor Management AG v Antalaya Mining Plc* [2017] EWHC 425 (Comm), [2018] 1 All ER (Comm) 547 at [64] by Leggatt J, cited with approval in *Openwork Ltd v Forte* [2018] EWCA Civ 783 at [27] by Simon LJ.

136 We discuss this further from para 4.18.

137 *RTS Flexible Systems Limited v Molkerei Alois Müller GmbH* [2010] UKSC 14, [2010] 1 WLR 753 at [45] by Lord Clarke.

138 An agreement is made in a "commercial context" where its subject matter is "business matters" or "business relations", in contrast to "social or domestic matters": *Edwards v Skyways Ltd* [1964] 1 WLR 349, 355, by Megaw J, cited with approval in *Esso Petroleum Limited v Commissioners of Customs and Excise* [1976] 1 WLR 1, 4, by Lord Simon. Social or domestic agreements do not attract the presumption of an intention to create legal relations: examples include an agreement between two friends to take a walk together, an offer and acceptance of hospitality, or a domestic agreement between spouses: see *Balfour v Balfour* [1919] 2 KB 571, 572.

express agreement is an agreement expressed in words,[139] either orally or in writing, rather than inferred from the parties' conduct.[140] So, for example, where the parties have signed a natural language document, the terms of which are performed by a piece of code, the presumption in favour of an intention to create legal relations will apply. The party denying the legal effect of the document would bear the burden of proving that it was not intended to create legal relations.

3.38 English courts are especially reluctant to find that the parties did not intend to create legal relations where an agreement has been substantially performed.[141] For example, in *RTS Flexible Systems Limited Ltd v Molkerei Alois Muller GmbH & Co KG*,[142] the UK Supreme Court held that an agreement was intended to create legal relations, even though the agreement was expressed to be "subject to contract".[143] The subsequent conduct of the parties in performing the agreement (including one party carrying out a significant amount of work and the other paying for the work) showed that the parties intended the agreement to be legally binding.[144] By similar reasoning, where a natural language agreement is performed by a piece of code, the performance of the code would be a relevant circumstance in showing that the parties intended the natural language agreement to create legal relations.[145]

3.39 There are two situations in which smart contracts could give rise to uncertainty regarding the parties' intentions. First, the parties might expressly state in the natural language component of their agreement that they do not intend the agreement to be legally binding. The parties may be content to trust in the automatic performance of the code to give effect to their agreement and may seek to exclude the application of outside interferences including contract law; indeed, a desire to exclude institutional influence played a part in the development of DLT.[146] The issue here is whether such an express declaration of intention would be effective to deprive the agreement of legal force. Second, as discussed above, the parties' agreement might be reached entirely on a distributed ledger, without any natural language documents or

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139 It is arguable that code is a mode of "representing or reproducing words". We discuss the application of this presumption to smart contracts with no natural language agreement further from para 3.47.

140 *Baird Textile Holdings Ltd v Marks & Spencer Plc* [2001] EWCA Civ 274, [2002] 1 All ER (Comm) 737 at [61] by Mance LJ (noting that an intention to create legal relations is not presumed when the contract is inferred from the parties' conduct, but must be proven on the facts).

141 *Percy Trentham Ltd v Archital Luxfer Ltd* (1992) 63 BLR 44, 54, by Steyn LJ; *Purton (t/a Richwood Interiors) v Kilker Projects Ltd* [2015] EWHC 2624 (TCC) at [7] by Stuart-Smith J.

142 [2010] UKSC 14, [2010] 1 WLR 753.

143 The inclusion of the words "subject to contract" will often rebut the presumption that the parties intended to create legal relations, on the basis that by including these words the parties have indicated that their agreement is not final and therefore not intended to be legally binding: see eg *Winn v Bull* (1977) 7 Ch D 29.

144 *RTS Flexible Systems Limited v Molkerei Alois Müller GmbH* [2010] UKSC 14, [2010] 1 WLR 753 at [2010] at [86] by Lord Clarke.

145 See S Green and A Sanitt, "Smart contracts" in P Davies and M Raczynska (eds) *The Contents of Commercial Contracts: Terms Affecting Freedoms* (2020).

146 See P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) pp 5-8 (noting that distributed ledger technology may enable parties to create their own "private regulatory frameworks" and could precipitate a shift from "legal rules and regulations administered by government authorities to code-based rules and protocols governed by decentralised blockchain-based networks").

communications passing between the parties. The issue here is whether it would be appropriate to apply the presumption that the parties intended to create legal relations. Each of these situations is considered below.

Express terms denying contractual intention

3.40 A unique feature of smart contracts is that they can be performed in an entirely automated way without the need for human intervention. The risk of one party refusing to perform their obligations can therefore be minimised, because it is not the parties that perform the agreement, but the code which executes on the distributed ledger. Some parties may prefer to avoid the prospect of legal intervention altogether, so that their transaction is governed solely by the operation of the code and the relevant DLT protocol.[147] To that end, the parties might include a provision in the natural language component of their agreement that they do not intend to create legal relations. The motivation for this might be ideological: the parties might hold the belief that DLT can give effect to their bargain better than the legal system can. Alternatively, the motivation might be pragmatic: the parties might not be able to agree on the legal system to govern their bargain, and so they might decide that their agreement is not to be subject to any legal system.

3.41 In several cases, English courts have considered, and given effect to, terms expressly denying contractual intention. For example, in *Rose and Frank Company v J R Crompton and Brothers*,[148] an American company entered into an arrangement with an English company to sell the latter's goods in the United States as their agent. The arrangement was recorded in a document containing the following clause:[149]

> This arrangement is not entered into … as a formal or legal agreement, and shall not be subject to legal jurisdiction in the Law Courts of the United States or England, but is only a definite expression and record of the purpose and intention of the parties … to which they honestly pledge themselves.

The parties gave no explanation for why they used the clause, but the House of Lords said that "for whatever reason it was introduced", it was for the Court to give proper effect to it.[150] The Court held that the clause was effective to prevent the arrangement from being legally enforceable, and therefore dismissed a claim brought by the American company for wrongful termination of the arrangement.

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147 A "protocol" is a set of rules which governs how a distributed ledger functions. Each distributed ledger has its own protocol. The protocol specifies how the participants communicate with one another, the form that transactions take, the process for adding data to the ledger, and how that data is recorded on the ledger. The Bitcoin blockchain protocol, for example, specifies that data can only be added to the ledger when nodes complete the "proof of work": see para 2.17.

148 [1925] 1 AC 445.

149 [1925] 1 AC 445, 451.

150 *Rose and Frank Company v J R Crompton and Brothers* [1925] 1 AC 445, 451 by Lord Phillimore. The Court speculated that the clause might have been inserted to avoid the "operation of some American law discouraging monopolies".

3.42 Another case where the court gave effect to a clause denying contractual intention was *Jones v Vernon's Pools*.[151] The claimant sent a coupon to the defendant, who operated a football betting pool, and subsequently sued the defendant after the defendant failed to pay out on the coupon. A term printed on the coupon stated that the coupon was not intended to "give rise to any legal relationship, rights, duties or consequences whatsoever or be legally enforceable or subject to litigation". Mr Justice Atkinson said it was "perfectly clear from the case of *Rose*" that such clauses can be given effect.[152] He therefore dismissed the claimants claim for breach of contract on the ground that the coupon was not intended to create legal relations.

3.43 In *Appleson v H Littlewood Ltd*,[153] a case with similar facts to *Jones*, the Court of Appeal rejected the argument that clauses denying contractual intention are contrary to public policy. Lord Justice Scott said:[154]

> If there be any rule of public policy to which reference can be made, [it] is that people must be bound by the arrangements which they make when these arrangements are expressed in quite clear language. [T]his arrangement was one which in quite clear language was an arrangement in honour only, with no legal attributes at all.

3.44 In the more recent case of *Ferguson v Littlewoods Pools Ltd*,[155] also concerning a football pool coupon with a clause denying contractual intention, the Scottish Outer House took a more cautious approach. Lord Coulsfield considered that the proper approach was to consider all the communications between the parties in order to determine whether a binding contract was intended.[156] A clause expressly denying contractual intention was relevant to, but not necessarily determinative of, the parties' intentions. However, the claim in that case was dismissed on other grounds,[157] so the Court's reasoning on contractual intention was not part of its decision.

3.45 Based on these authorities, it appears that a natural language clause in a smart contract which expressly denies an intention to create legal relations might be effective under the law of England and Wales.[158] The courts appear to give effect to these clauses according to their terms. This would appear to be consistent with the general principle of the law of England and Wales, recently affirmed by the UK Supreme Court, that the parties are "the masters of their contractual fate" and it is for

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151 *Jones v Vernon's Pools Ltd* [1938] 2 All ER 626.

152 *Jones v Vernon's Pools Ltd* [1938] 2 All ER 626, 630.

153 [1939] 1 All ER 464.

154 *Appleson v H Littlewood Ltd* [1939] 1 All ER 464, 467.

155 [1997] SLT 309.

156 *Ferguson v Littlewoods Pools Ltd* [1997] SLT 309, 315.

157 Namely that gaming transactions were unenforceable under Scots law: *Ferguson v Littlewoods Pools Ltd* [1997] SLT 309 at 314.

158 See UKJT Legal Statement at [136] (noting that it would be open to the parties to agree expressly that a smart contract is not legally binding).

the parties "to decide whether they wish to be bound".[159] We would like to hear consultees' views on whether these clauses are being used in smart contracts, or might be used in future.

Question 16.

3.46 Are you aware of any instances where the parties to a smart contract have expressly agreed that they do not intend to create legal relations?

Where the agreement is reached entirely on a distributed ledger

3.47 It is possible that the parties could reach an agreement entirely through their conduct on a distributed ledger. The example was given earlier of Alice offering to sell a token on a distributed ledger through the deployment of a computer program, which Bob accepts by sending cryptocurrency to the program.[160] Further, the parties could reach an agreement through the automatic operation of computer programs deployed by them on a distributed ledger. The issue is whether the parties can be presumed to have intended to create legal relations in these circumstances.[161]

3.48 The presumption that parties intend to create legal relations applies only to 'express' agreements, that is, agreements made by words, whether orally or in writing.[162] In the example of Alice and Bob, the agreement (comprising offer and acceptance) is concluded as a result of the parties' conduct, rather than their words.[163] That being so, the presumption in favour of an intention to create legal relations may not apply. The party seeking to enforce the agreement would bear the burden of proving that the parties intended to create legal relations.

3.49 English courts have enforced agreements based solely on the parties' conduct where doing so is necessary to give "business reality" to their transaction, or where, in the circumstances, the parties would have expected "enforceable obligations to exist".[164] Whether an intention to create legal relations may be inferred from transactions on a distributed ledger might therefore depend on the expectations of those who use a particular DLT system. If, for example, it is generally understood by the users of a particular DLT system that transactions on the ledger are not to attract legally enforceable obligations, then that might be a factor weighing against finding an

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159 *Pagnan SpA v Feed Products Ltd* [1987] 2 Lloyd's Rep 601 at 619 by Lloyd LJ, cited with approval in *RTS Flexible Systems Ltd v Molkerei Alois Müller GmbH & Co* [2010] UKSC 14, [2010] 1 WLR 753 at [45] by Lord Clarke.

160 This example is introduced at para 3.6.

161 UKJT Legal Statement at [145] to [146].

162 *Baird Textile Holdings Ltd v Marks & Spencer Plc* [2001] EWCA Civ 274, [2002] 1 All ER (Comm) 737 at [61] by Mance LJ. This is discussed from para 3.37.

163 The relevant conduct being the deployment of the computer program by Alice (the offer) and the sending of cryptocurrency to the computer program by Bob (the acceptance).

164 *The Aramis* [1989] 1 Lloyd's Rep 213, 224 by Bingham LJ; *Glencore Energy UK Ltd v OMV Supply & Trading Ltd* [2018] EWHC 895 (Comm) at [51] by Sir Ross Cranston.

intention to create legal relations.[165] Equally, it could be argued that where assets are being transferred in exchange for payment, that is a classic circumstance where parties would ordinarily intend legal obligations to arise.[166]

3.50 Some agreements reached on a distributed ledger might be more appropriately characterised as express agreements rather than agreements inferred from the parties' conduct. The example was given earlier of the DAML programming language, which would enable Alice to 'offer' a piece of code to Bob, which Bob could then 'accept'. The code which is offered and accepted would represent an agreement between Alice and Bob on the distributed ledger.[167] In these circumstances, the code could be considered an 'express' agreement between Alice and Bob, to which the presumption in favour of an intention to create legal relations might apply. As we discuss below,[168] it is arguable that code is a mode of representing or reproducing words. Therefore, an agreement recorded solely in code could be characterised as an express agreement, being an agreement expressed in words. We would like to hear consultees' views on whether it would be appropriate to apply the presumption to these agreements.

Question 17.

3.51 Do you foresee any difficulties in ascertaining whether parties intend to create legal relations when they transact with one another on a distributed ledger?

FORMALITY REQUIREMENTS AND DEEDS

3.52 The final requirement for a legally binding contract is that it must comply with applicable formality requirements. The general rule is that contracts need not be made in any particular form. Contracts can be legally binding regardless of whether they are made in writing, orally or by conduct.[169]

3.53 However, there are exceptions to this general rule. For example:

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165 S Green and A Sanitt, "Smart contracts" in P Davies and M Raczynska (eds) *The Contents of Commercial Contracts: Terms Affecting Freedoms* (2020) n19 (noting that it is "possible" that DLT might one day be considered a market in which "lack of intention to create legal relations is a sustained and universal principle"); K Werbach and N Cornell, "Contracts Ex Machina", 67 *Duke Law Journal* 313 at 339 (noting that the parties may not intend a smart contract to be legally enforceable, given that the agreement is performed automatically by code).

166 For example, in *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02, where the parties' computer programs entered into an agreement for the trade of valuable cryptocurrency, there was no issue raised in the proceedings as to whether the parties intended to be bound by the operation of those computer programs.

167 See para 3.12.

168 From para 3.55.

169 *MWB Business Exchange Ltd v Rock Advertising Ltd* [2018] UKSC 24, [2019] AC 119 at [7] by Lord Sumption; UKJT Legal Statement at [136].

(1) contracts for the sale or other disposition of an interest in land are void unless the contract is made in writing and signed;[170]

(2) contracts of guarantee are unenforceable unless they are evidenced in writing and signed;[171]

(3) regulated consumer credit agreements must be made in writing and signed by the creditor and debtor;[172] and

(4) a deed, when executed by an individual, must be signed in the presence of a witness who attests to the signature[173] and, in the case of a company, must be executed either by affixing the company's common seal, by the signatures of two authorised signatories (such as a director or company secretary), or by the signature of a director attested by a witness.[174]

3.54 Below we consider whether it is possible for a smart contract to satisfy "in writing" requirements and "signature" requirements.

Can a smart contract satisfy an "in writing" requirement?

3.55 Some contracts are required by statute to be "in writing". Schedule 1 of the Interpretation Act 1978 defines "writing" as follows:[175]

> "Writing" includes typing, printing, lithography, photography and other modes of representing or reproducing words in a visible form, and expressions referring to writing are construed accordingly.

3.56 Where a smart contract takes the form of a natural language contract, performance of which is automated by code, this would meet the requirement for a contract to be made "in writing". This is the case because all the terms of the contract would be recorded in a natural language document. The question is whether a smart contract which is partly or wholly recorded in computer code could also meet the requirement for the contract to be made "in writing".

3.57 The definition of "writing" in the Interpretation Act 1978 is an inclusive one which can be interpreted to accommodate new technologies, so long as they involve "representing or reproducing words in a visible form".[176] For example, it has been held

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170 Law of Property (Miscellaneous Provisions) Act 1989 ss 2(1) and 2(3). Exceptions to the need for writing are set out in s 2(5), including for contracts to grant a short lease and a contract made in the course of a public auction.

171 Statute of Frauds 1677, s 4.

172 Consumer Credit Act 1974, ss 60 and 61; Consumer Credit (Agreements) Regulations 2010, SI 2010 No 1014, regs 3 and 4.

173 Law of Property (Miscellaneous Provisions) Act 1989 ss 1(2)(b) and 1(3)(a).

174 Companies Act 2006, s 44.

175 The definition of "writing" applies only for the purposes of Acts, Church of England Measures and subordinate legislation: Interpretation Act 1978 ss 5, 22 and 23. It does not define "writing" for the purposes of the general law, but only for the purposes of a statutory requirement for "writing".

176 2001 Advice, para 3.7.

that a contract concluded by an exchange of emails can satisfy an "in writing" requirement.[177] Email enables words to be displayed on the computer screen of the sender and receiver, and is therefore a mode of "representing or reproducing words in a visible form".[178]

3.58 However, technologies which do not permit the representation of words on a computer screen may not satisfy the definition of "writing". For example, in its 2001 Advice, the Law Commission considered that electronic data interchange (EDI) messages[179] would not satisfy an "in writing" requirement because:[180]

> EDI messages are exchanged between computers according to their programming. It is not intended that the EDI message itself should be read by any person. The EDI message is not therefore in a form (or intended to be in a form) in which it can be read (other than by another computer system according to the same EDI protocol).

As we noted, EDI messages take the form of binary data,[181] which cannot be read by a human person. EDI therefore does not enable the representation of words in a visible form.[182]

3.59 The position in relation to contracts recorded in code is therefore likely to depend on whether the code is capable of being read by a human person.[183] We understand that the process of drafting a computer program will normally involve two steps:[184]

(1) drafting the code in a 'high level' programming language, known as source code. Source code uses a combination of words and symbols and can be read by an expert coder.[185]

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177 *Golden Ocean Group Ltd v Salgaocar Mining Industries PVT Ltd* [2012] EWCA Civ 265, [2012] 1 WLR 3674.

178 Electronic commerce: formal requirements in commercial transactions – Advice from the Law Commission (2001) para 3.10, https://www.lawcom.gov.uk/project/electronic-commerce-formal-requirements-in-commercial-transactions/ ("2001 Advice").

179 EDI involves the exchange of digital information between business computers, for the purpose of automating routine business practices such as retail stock re-ordering: see 2001 Advice, para 3.2, n 2. An EDI contract is merely used to restate, in electronic form, the terms and conditions of a paper-based contract. The performance of the contract is still a matter for human intervention. In contrast, a smart contract is a contract which performs automatically on a distributed ledger, without the need for human intervention: see P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) p 73.

180 2001 Advice, para 3.19.

181 Binary data is data which can only take two possible forms, for example the digits 0 and 1.

182 Similarly, the UKJT Legal Statement at [167] concludes that if something cannot be "read", it does not satisfy an in writing requirement.

183 This requirement arises from the definition of "in writing" in Schedule 1 of the Interpretation Act 1979, discussed at para 3.54.

184 See UK Jurisdiction Taskforce, *Consultation paper: the status of cryptoassets, distributed ledger technology and smart contracts under English private law* (2019) p 31.

185 For an example of source code, see para 4.22.

(2) converting the source code into machine readable code, known as object code.[186] Generally, object code is written in binary form and is impossible even for an expert coder to read.

3.60 If the terms of a smart contract are said to reside in the source code, then the smart contract may satisfy an "in writing" requirement.[187] This is because source code can be read by a person when displayed on a screen. If, however, the terms of a smart contract are said to reside in object code, then it is more difficult to argue that the contract is "in writing". Like EDI, object code is binary data which is not capable of being read by a person.

3.61 The foregoing discussion concerns the requirement for a contract to be "made in writing".[188] Where a statute requires a contract only to be "evidenced in writing",[189] a smart contract could satisfy that requirement even if it contained coded terms which did not constitute "writing" (for example, terms recorded in object code). The issue would be whether the contract was sufficiently evidenced "in writing".[190] In the case of a hybrid contract, this requirement could be satisfied where the natural language terms refer to and explain the effect of the coded terms. Those natural language terms may provide "evidence in writing" of the coded terms of the contract. If the contract is recorded exclusively in code, however, it might be difficult to meet this requirement unless the coded terms amount to "writing".

Question 18.

3.62 Do you consider that source code could meet the definition of "writing" in the Interpretation Act 1978?

Can a smart contract be "signed"?

Signatures under general law

3.63 In most cases, contracts governed by the law of England and Wales do not require a signature. Of course, parties very often wish to record the terms of their agreement in writing, and it is common for the parties to sign the document to signify their agreement to its terms. Where the law does require a contract or agreement to be signed, the common law generally adopts a pragmatic approach and does not prescribe any particular form or type of signature.[191] A wide variety of handwritten and

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186 This process of converting source code to object code is known as "compiling".

187 For a similar view, see the UKJT Legal Statement at [165].

188 As in the Law of Property (Miscellaneous Provisions) Act 1989 ss 2(1) and 2(3).

189 As in the Statute of Frauds 1677, s 4.

190 See the UKJT Legal Statement at [161] (noting that a contract can be "evidenced in writing" if only part of the contract is in writing).

191 This is the case save where the contrary is provided for in relevant legislation or contractual arrangements, or where case law specific to the document in question leads to a contrary conclusion.

electronic signatures have been accepted as constituting valid signatures.[192] What is important is not the form of signature (unless this is prescribed by law), but whether it was applied in a manner which indicated the parties' intention to authenticate the document.[193]

3.64 Where a smart contract takes the form of a written natural language contract with automated performance by code, the question of whether the contract has been "signed" is unlikely to create difficulties. The court would consider whether the parties had indicated an intention to authenticate the agreement by signing it by hand or electronically. Where a smart contract is a hybrid agreement, the signing of the written component of the agreement may be sufficient to authenticate the coded terms. In *Golden Ocean Group Ltd v Salgaocar Mining Industries PVT Ltd*,[194] the Court of Appeal held that the parties had "signed" a contract of guarantee by signing an email which referred to, but was not itself, the contract of guarantee. By signing the email, the parties had indicated their intention to authenticate the contract of guarantee.[195] By similar reasoning, where parties sign a natural language document which refers to and explains the effect of the coded terms, the parties could be taken to have authenticated the coded terms.

3.65 Where a smart contract consists solely of code, parties could "sign" the contract using a digital signature, provided that they intend to authenticate the contract.[196] A digital signature is a type of electronic signature produced using asymmetric or public key cryptography.[197] In general, participants in a DLT system have a 'private' key, which they use to initiate transactions and which is kept secret, and a 'public' key, which is shared with other participants. A participant's private key can be combined with the data of a transaction to create a digital signature for the participant, which can be verified by the recipient of the transaction using the participant's public key. Accordingly, Alice could 'offer' a piece of code on a distributed ledger to Bob by initiating a transaction bearing her digital signature, and Bob could 'accept' that piece of code by initiating a transaction bearing his digital signature. The resulting agreement could be considered to have been "signed" by Alice and Bob, given the use of their digital signatures. We would like to hear from consultees about how digital and other forms of electronic signature could be used to authenticate a piece of code deployed on a DLT system.

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192 Electronic Execution of Documents (2019) Law Com No 386, 2-3.

193 *Golden Ocean Group Ltd v Salgaocar Mining Industries PVT Ltd* [2012] EWCA Civ 265, [2012] 1 WLR 3674 at [32] by Tomlinson LJ; UKJT Legal Statement at [160].

194 [2012] EWCA Civ 265, [2012] 1 WLR 3674.

195 *Golden Ocean Group Ltd v Salgaocar Mining Industries PVT Ltd* [2012] EWCA Civ 265, [2012] 1 WLR 3674 at [34] by Tomlinson LJ.

196 See UKJT Legal Statement at [158]. A digital signature is a type of electronic signature produced by using asymmetric or public key cryptography: Electronic Execution of Documents (2019) Law Com No 386, appendix B. An electronic signature is capable in law of being used to execute a document: Electronic Execution of Documents (2019) Law Com No 386, Statement of the Law.

197 Electronic Execution of Documents (2019) Law Com No 386, appendix B.

Question 19.

3.66 Do you consider that parties can "sign" an agreement recorded solely in code?

If so:

(1) are you aware of technologies that are currently in use or under development to facilitate the signing of agreements recorded solely in code?

(2) please provide any examples from your experience of where the parties have signed an agreement recorded solely in code.

Signatures under the eIDAS Regulation

3.67 The eIDAS Regulation ("eIDAS")[198] provides a regime for identity verification which establishes a common standard of "advanced electronic signatures" (AES) and "qualified electronic signatures" ("QES") which can be recognised across member states in the EU. These signatures are already used to execute traditional natural language agreements although, in the course of our project on the electronic execution of documents, we were told that AES and QES are not widely used in the UK compared to civil law jurisdictions.[199] We are interested to understand whether they could potentially be used in the context of smart contracts using DLT to give parties more certainty as to who they are transacting with.

3.68 As described above, parties to a smart contract deployed on a distributed ledger utilise public key cryptography (which uses a public and private key). This allows parties to "sign" a smart contract and transact with others on a distributed ledger. A digital signature using public key cryptography is capable of satisfying the requirements for an AES if it is:[200]

(1) uniquely linked to the signatory;

(2) capable of identifying the signatory;

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198 Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC ("eIDAS"). At the end of the current UK EU transition period, eIDAS will be incorporated into domestic law (with some amendments) by operation of the European Union (Withdrawal) Act 2018, s 3(1), and the amendments contained in the Electronic Identification and Trust Services for Electronic Transactions (Amendment etc.) (EU Exit) Regulations 2019, SI 2019 No 89. The amendments to the current provisions on eIDAS which will apply to the new UK regime do not affect the discussion of eIDAS in this chapter.

199 See Electronic Execution of Documents (2019) Law Com No 286, para 2.44. See also Chapters 2 and 3 of that report, and Appendix 2, for a more detailed description of the eIDAS provisions and the relevant technology.

200 eIDAS, art 26.

(3) created using electronic signature data that the signatory can, with a high level of confidence, use under their sole control; and

(4) linked to the data signed therewith in such a way that any subsequent change in the data is detectable.

3.69 The requirements described at (1) to (4) above are all capable of being satisfied by a digital signature. Commentators have argued that a digital signature can only be "uniquely" linked to a signatory's private key, not to the signatory; that is, somebody else could potentially have access to, and use, the signatory's private key.[201] It is also possible for a private key to be under the control of more than one person if it is held via a custodian arrangement.[202]

3.70 A digital signature using public key cryptography is capable of satisfying the requirements for a QES if it is:[203]

(1) compliant with the requirements for an AES (as described above);

(2) created by a qualified electronic signature creation device; and

(3) based on a qualified certificate for electronic signatures.[204]

3.71 The requirements described at (1) and (2) are capable of being satisfied by a digital signature. However, limb (3) does not appear to be satisfied under current smart contract and DLT arrangements.[205] In order to qualify as a QES, a signature must be based on a certificate, issued by a qualified trust service provider, which links electronic validation data to a natural person. The issuing of certificates for electronic signatures by qualified trust service providers is currently absent from existing distributed ledgers. We have been told that it would theoretically be possible for a distributed ledger to build in this capability.

3.72 We are interested to hear from consultees as to whether this is something that is currently under consideration by those parties who are contracting (or plan to contract) using smart contracts.

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201 Electronic Execution of Documents (2019) Law Com No 386, Appendix B, paras 2.21 and 2.22.

202 A Veerpalu et al, "The hybrid smart contract agreement challenge to European electronic signature regulation" (2020) 28 *International Journal of Law and Information Technology* 39, 74.

203 eIDAS, art 3(12). The requirements for a qualified electronic signature creation device are set out in eIDAS Annex II.

204 eIDAS, art 3(15): "qualified certificate for electronic signature" means a certificate which links the signature to a person, which is issued by a "qualified trust service provider". It is likely that it will usually be a commercial body providing this service. It must also meet the requirements set out in Annex I to eIDAS.

205 A Veerpalu et al, "The hybrid smart contract agreement challenge to European electronic signature regulation" (2020) 28 *International Journal of Law and Information Technology* 39, 75 and 78.

Question 20.

3.73 Do you think that smart contracts using DLT are currently able to utilise eIDAS compliant advanced electronic signatures and qualified electronic signatures? If not, how do you think they could be designed to accommodate these types of signatures?

Can a smart contract be used to create a legally binding deed?

3.74 A deed is a document by which an interest, a right or property passes or is confirmed, or a binding obligation is created or confirmed.[206] Deeds may be required by statute or common law. Documents which must be executed by deed include conveyances of land or interests in land and mortgages, powers of attorney, the appointment or discharge of a trustee, and agreements made without consideration.[207]

3.75 Deeds require additional formalities to be valid and enforceable. Relevantly, a deed must be in writing and be "validly executed as a deed".[208] In the case of a deed performed by an individual, the deed is validly executed if it is signed by the individual "in the presence of a witness who attests to the signature".[209] In our 2019 report on the Electronic Execution of Documents, we explained that an electronic signature can satisfy a statutory requirement for a signature.[210] An electronic signature is therefore capable in law of being used to execute a document (including a deed) provided that

(1) the person signing the document intends to authenticate the document; and

(2) any formalities relating to execution of that document are satisfied.

3.76 We explained that the formality of witnessing in relation to deeds involves "observing the execution of a document" and that, in principle, it was possible for an electronic signature to be witnessed.[211] However, we concluded that the current law does not support witnessing otherwise than by the witness being physically present when the document is signed.[212] We said:[213]

> We are not persuaded that parties can be confident that the current law would allow for a witness viewing the signing on a screen or through an electronic signature platform, without being physically present. This conclusion is based on the

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206 The Execution of Deeds and Documents by or on behalf of Bodies Corporate (1998) Law Com No 253, para 2.4; Electronic Execution of Documents (2019) Law Com No 386, para 5.1.

207 See Electronic Execution of Documents (2019) Law Com No 386, para 5.4

208 Law of Property (Miscellaneous Provisions) Act 1989, s 1(2).

209 Law of Property (Miscellaneous Provisions) Act 1989, s 1(3).

210 See Electronic Execution of Documents (2019) Law Com No 386, para 5.9.

211 Electronic Execution of Documents (2019) Law Com No 386, paras 5.14 and 5.20.

212 Electronic Execution of Documents (2019) Law Com No 386, para 5.35.

213 Electronic Execution of Documents (2019) Law Com No 386, para 5.35.

combination of the restrictive wording of the statutory provisions and the serious policy questions underlying any extension to accommodate technological developments.

3.77 Witnessing involves observing the execution of a document. Attestation involves the additional step of recording, on the document itself, that the witness has observed the execution. In our 2019 report on the Electronic Execution of Documents we noted that a witness could complete this step using an electronic signature.[214] We also noted that in *R (Mercury Tax Group Ltd) v Her Majesty's Commissioners of Revenue and Customs*, Mr Justice Underhill (as he then was) referred to a document as needing to be "a discrete physical entity (whether in a single version or in a series of counterparts) at the moment of signing".[215] He also said that section 1 of the Law of Property (Miscellaneous Provisions) Act 1989 had the effect that (in the case of a deed) "the signature and attestation must form part of the same physical document".[216]

3.78 Smart contracts could potentially be used to create deeds. A deed may be recorded in natural language, with the performance of certain terms of the deed automated by a piece of code deployed on a distributed ledger. Whether such a deed complies with the formality requirements would not give rise to novel legal issues, because the deed would be recorded entirely in natural language. If, however, some or all of the terms of the deed are recorded in code, the deed would not be valid unless it could be said that the code constituted "writing" and the code had been signed in the presence of a witness who attests to the signature.[217] As discussed above, it may be arguable that code can satisfy a statutory "in writing" requirement and that a smart contract can be "signed". Further, if a witness is physically present with an individual when they digitally sign the code, then the witnessing requirement could potentially be satisfied. However, we are interested to hear from consultees about how existing technology could allow a witness to record on the smart contract that they have observed the execution of that contract.

3.79 We would like to hear from consultees about how smart contracts might be used to create deeds, and whether the formality requirements applicable to deeds could be satisfied where the terms of a deed are recorded partly or wholly in code.

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214 Electronic Execution of Documents (2019) Law Com No 386, para 5.54.

215 *R (Mercury Tax Group Ltd) v Her Majesty's Commissioners of Revenue and Customs* [2008] EWHC 2721 (Admin), [2009] STC 743 at [39].

216 *R (Mercury Tax Group Ltd) v Her Majesty's Commissioners of Revenue and Customs* [2008] EWHC 2721 (Admin), [2009] STC 743 at [40].

217 Where a deed is executed by a corporation, a witness is not necessary in all cases: instead, the deed may be executed by the signature of two "authorised signatories" (including a director or company secretary): Companies Act 2006 s 44(3). There is no requirement for these signatures to be witnessed or for the signatures to be applied at the same time: see Electronic Execution of Documents (2019) Law Com No 386, para 5.37.

Question 21.

3.80 Are you aware of any cases in which parties have arranged for the terms of a deed to be performed by, or recorded in, computer code deployed on a distributed ledger?

Question 22.

3.81 Do you consider that a deed recorded partly or wholly in code can satisfy the statutory formality requirements applicable to deeds and address the implications of the *Mercury* decision?

Chapter 4: Interpretation of smart contracts

4.1 The previous chapter discussed how a smart contract is formed. In this chapter we consider how the principles of contractual interpretation could be applied if a court were asked to interpret a smart contract.

4.2 A court may be asked to interpret a contract where the parties disagree as to the meaning of the terms of that contract. Such a dispute would usually arise where one party has done something or has failed to do something which another party considers to be a breach of the contract. A court may also be asked to interpret a contract where a party is seeking rectification on the grounds of mistake. There are particular challenges in relation to remedies and rectification of smart contracts, and these are discussed in Chapter 5.

THE PRINCIPLES OF CONTRACTUAL INTERPRETATION

4.3 Contractual interpretation is the process by which a court determines the meaning of the language used by the parties in the express terms of a written agreement.[218] The courts of England and Wales take an objective approach to contractual interpretation. The court does not ask what the parties themselves meant by the language they used. Rather, the court asks what the language would have meant to a reasonable person, equipped with all the background knowledge available to the parties at the time the contract was made.[219]

4.4 The UK Supreme Court in recent cases[220] has emphasised that, in considering what the reasonable person would have understood the language used in a contract to mean, primacy should be given to the natural and ordinary meaning of the language.[221] If the natural and ordinary meaning of the words used by the parties is clear, then the court will generally be slow to depart from it. Consideration of the background and surrounding circumstances should not be used to "undervalue the importance of the language",[222] although these factors assume greater significance if the natural meaning of the language is unclear.[223] As Popplewell J observed in *Lukoil Asia Pacific Pte Ltd v Ocean Tankers (Pte) Ltd (The "Ocean Neptune")*:[224]

> The 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

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218 H Beale (ed), *Chitty on Contracts* (33rd ed, 2020) para 13-041.

219 *Chartbrook Ltd v Persimmon Homes Ltd* [2009] UKHL 38, [2009] 1 AC 1101 at [14] by Lord Hoffmann.

220 *Rainy Sky SA v Kookmin Bank* [2011] UKSC 50, [2011] 1 WLR 2900; *Arnold v Britton* [2015] UKSC 36, [2015] 2 WLR 1593; *Wood v Capita Insurance Services Ltd* [2017] UKSC 24, [2017] AC 1173.

221 *Arnold v Britton* [2015] UKSC 36, [2015] 2 WLR 1593 at [17] by Lord Neuberger.

222 *Arnold v Britton* [2015] UKSC 36, [2015] 2 WLR 1593 at [17] by Lord Neuberger.

223 *Arnold v Britton* [2015] UKSC 36, [2015] 2 WLR 1593 at [18] by Lord Neuberger.

224 [2018] EWHC 163 (Comm), [2018] 2 All ER (Comm) 108 at [8].

> of the wider context in reaching its view as to the objective meaning of the language used. If there are two possible constructions, the court is entitled to prefer the construction which is consistent with business common sense and to reject the other.

4.5 The language of the contract is therefore given primacy in the interpretation of the contract, with other information (such as business common sense and context) only serving to assist with the objective interpretation of the language used.[225] Evidence of the subjective intentions of the parties (including evidence of their prior negotiations) as to the meaning of the words used is not admissible.[226]

IDENTIFYING THE TERMS OF A SMART CONTRACT

4.6 In Chapter 2, we identified three forms that smart contracts can take, depending on the role played by the code:[227]

(1) Natural language contract with automated performance.

(2) Hybrid contract.

(3) Solely code contract.

4.7 The first step in interpreting a smart contract will be to identify how the terms of the agreement are recorded. Are the terms of the smart contract recorded solely in natural language, partly in natural language and partly in code, or solely in code? As the UKJT legal statement recognised, ascertaining the role played by the code itself raises a question of interpretation:[228]

> A judge's task when interpreting a smart contract is to determine … what the parties objectively intended their obligation to be. Where there is code involved, part of that exercise will be a determination of whether the code (or part of it) was intended to define the obligations or whether it was intended merely to implement them.

The answer to this question may have significant implications for the remedies that might be available to the parties, should problems arise in relation to the formation or performance of the smart contract.[229]

4.8 We expect that for the foreseeable future, smart contracts will almost always involve natural language negotiation and usually some natural language terms.[230] In these cases, the parties' intentions as to the role of the code may be apparent from the

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225 UKJT Legal Statement at [149].

226 *Chartbrook Ltd v Persimmon Homes Ltd* [2009] UKHL 38, [2009] 1 AC 1101. This is discussed further from para 4.41.

227 These are discussed from para 2.32.

228 UKJT Legal Statement at [152].

229 For example, it may be difficult to obtain the remedy of rectification if the terms of a smart contract are recorded solely in code. It may also be difficult to establish a breach of contract if the terms of the smart contract are recorded solely in code. We discuss these issues in more detail in Chapter 5.

230 See also UKJT Legal Statement at [154].

natural language terms. For example, the parties might agree expressly that the natural language terms constitute the 'entire agreement' between the parties. Such a provision would make clear that the parties objectively intended their agreement to be recorded in natural language, with the code merely being used to automate performance of the agreement. However, where the parties have not dealt with the matter expressly in the natural language element of the smart contract, it may be more difficult for a court to determine what the parties intended. The court may have to consider the wider context. For example, where the natural language terms on their own would not amount to a complete agreement, but would do so if combined with the relevant code, the court may conclude that the contract is a hybrid contract on the basis that parties do not intend to make incomplete agreements.

4.9 We would like to hear from consultees about how the principles of interpretation might be applied to identify the terms of a smart contract.

Question 23.

4.10 Are you aware of, or do you foresee, any difficulties in applying the principles of interpretation to identify whether terms of a particular smart contract are contained in the natural language component or the coded component of the smart contract, or both?

APPLYING THE PRINCIPLES OF INTERPRETATION TO SMART CONTRACTS

4.11 Novel interpretation issues are unlikely to arise where the terms of a smart contract are recorded exclusively in a natural language contract and a piece of code merely automates performance of those terms. The natural language contract will be treated as containing the terms agreed by the parties and it will be those terms that the court will be called upon to interpret. The court will only look to the code if it is asked to consider whether the code correctly implements the terms of the natural language agreement.[231]

4.12 However, where the terms of a smart contract are recorded partly or solely in code, this potentially poses difficulties in the interpretation exercise. The principles of interpretation have developed in response to courts seeking to interpret natural language terms. There is a question as to whether the existing principles can be used to interpret terms recorded in computer code. Stakeholders we have spoken to have raised the issue of interpretation as a possible concern in the use of smart contracts, which may only become more acute as parties move towards increasingly coded or solely code smart contracts.

4.13 There are several ways in which a dispute could arise about the "meaning" of the coded terms in a smart contract. For example:

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[231] If the code fails to perform the natural language contract in accordance with its terms, a party to a smart contract may have a claim for breach of contract: we discuss this from para 5.83.

(1) A party may argue that the terms recorded in code should be rectified, on the basis that they fail to give effect to the parties' actual common intention at the time the coded terms were deployed.[232] To determine whether the code should be rectified, the court may have to determine what the coded terms 'mean', and whether that meaning accords with the parties' actual common intention at the time of contracting.

(2) A dispute may arise about the meaning of the natural language terms in a hybrid smart contract. As English courts interpret the terms of the contract in the context of the contract as a whole, what the coded terms 'mean' may be relevant to the court's interpretation of the natural language terms in dispute.

(3) The coded terms of the smart contract may have been performed in a way which one of the parties did not expect. That party may argue that the performance of the code did not accord with what the coded terms 'meant' on their proper interpretation, and therefore, that the performance of those terms amounted to a breach of contract. In this situation, any natural language terms may be relevant to interpreting coded terms either because they explicitly purport to do this or because of the way the terms interact in practice.

4.14 Below we consider how the existing principles of interpretation could be applied to smart contracts and the challenges of interpreting coded terms. While the court has the tools to allow it to interpret a smart contract, do those tools need to be employed slightly differently in a smart contract context (as distinct from a natural language contract context)? Smart contracts are capable of being interpreted by the courts, but we are interested to hear from consultees about aspects of interpretation which they may have concerns about.

Question 24.

4.15 In what circumstances might disputes arise about the proper interpretation of the coded terms of a smart contract? Please provide examples where possible.

Should the court be concerned with what a computer or a reasonable person with knowledge of code would understand the code to mean?

4.16 As explained above, the courts of England and Wales approach the interpretation exercise by asking what the language of the contract would have meant to a reasonable person, equipped with all the background knowledge available to the parties at the time the contract was made. This approach makes sense where what is being interpreted is a term recorded in natural language. Natural language terms are designed to be read by human persons, and so it makes sense to ask what a reasonable person would understand those terms to mean. However, this approach makes less sense when applied to terms recorded in code. Code is not written with a reasonable person in mind. It is directed at a computer. Asking what a reasonable

[232] We discuss this scenario in more detail from para 5.13.

person would understand a coded term to mean is unlikely to provide assistance in ascertaining the meaning of a coded term.

4.17 There appear to be two avenues for ascertaining the meaning of a coded term. One approach is to ask how the coded term would be understood by the computer to which the code is directed. Another is to ask what a person who understands code – an expert coder – would understand the coded term to mean. We discuss each of these potential approaches below.

What the contract means to a computer

4.18 As computer code is designed for the special purpose of instructing computers, one potential approach to interpreting coded terms is to ask what the computer would do upon receiving the coded instructions. In almost all cases, this question will permit of only one answer. This is because computer code has very strict rules of syntax and semantics. Code which contains a syntactical error will not be recognised by a computer, and code written with correct syntax will have only one meaning to a computer.[233] From a computer's perspective, a coded term has exactly one 'meaning', or none at all.[234]

4.19 Given that the language of code can only have one meaning to a computer, interpreting the code may be as simple as observing the outcome of its performance by the computer.[235] This approach has the benefit of certainty and could be easily applied. However, a potential problem with this approach is that it could be said to pay insufficient regard to the intentions of the parties.[236] Although code may be unambiguous from the computer's perspective, there may be situations in which the code behaves in ways not expected by the parties to the smart contract.[237]

4.20 For example, this could occur where parties instruct a third party to produce the code but the resulting code is not as the parties intended because the instructions provided to the coder were insufficient or the coder misunderstood those instructions.[238] Even where a coder has sought to implement instructions correctly, the outcome of the code's execution may differ from what the parties (and therefore the coder) intended. Although code will generally execute deterministically in the sense that it will produce the same output given particular inputs, its execution can be affected by outside influences. For example, the code may execute in an unforeseen way due to a

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233 P Wentworth, A Downey, J Elkner and C Meyers, *How to think like a computer scientist: learning with Python* (2012), http://openbookproject.net/thinkcs/python/english3e/.

234 P Wentworth, A Downey, J Elkner and C Meyers, *How to think like a computer scientist: learning with Python* (2012), http://openbookproject.net/thinkcs/python/english3e/.

235 UKJT Legal Statement at [150] and [152].

236 UKJT Legal Statement at [150] (noting that examination of the code alone may not be sufficient to ascertain the parties' intentions).

237 UKJT Legal Statement at [136].

238 This latter example is, perhaps, not a novel situation as parties may entrust drafting of contracts to lawyers without reading the detail before agreeing to be bound. In such situations, a party will be bound by the contract they have agreed to and will have to seek redress separately against their lawyer.

malfunctioning oracle, a system failure on the platform on which the code is deployed, or interference by malware (such as a virus).[239]

4.21 The principles of interpretation acknowledge that context can be relevant to interpreting a contract. Interpretation is not determined in the abstract by reference to a set of semantic and syntactic rules. It is a more concrete inquiry which looks not only at the literal meaning of words but also the context in which the speaker used those words. A computer will run code as instructed so, arguably, limiting interpretation of code simply to observing the performance of that code will not give the court the opportunity to consider the context in which a coder used it.

What the contract means to a reasonable person with knowledge of code

4.22 A person unfamiliar with the language of code is very unlikely to be able to interpret it. By way of example, the following is an extract of source code from a computer program which applies a discount to the price payable under a contract for the shipment of perishable goods. The computer program instructs the computer that, if the temperature and humidity conditions on the shipment fall below a certain level (as detected by temperature and humidity sensors), the contract price is to be discounted using a formula:[240]

```
contract PerishableGoods over PerishableGoodsContract {
  clause payout(request : ShipmentReceived) : PriceCalculation emits
PaymentObligation {
    let zeroMoney = MonetaryAmount{
      doubleValue: 0.0,
      currencyCode: contract.unitPrice.currencyCode
    };
    enforce isBefore(now(),contract.dueDate)
    else
                    return PriceCalculation{
        shipment : request.shipment,
        totalPrice : zeroMoney,
        discount : zeroMoney,
        late : true
       };

    // Guard against missing temperature readings
    let readings : SensorReading[] = request.shipment.sensorReadings ?? [];
    enforce readings != []
    else throw ErgoErrorResponse{ message : "No temperature readings received"};

    // Calculates payout
    let payOut = contract.unitPrice.doubleValue *
integerToDouble(request.unitCount);

    // Calculates discount if any
    let discount =
```

239 See Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 37 (recommending that parties undertake an "independent code audit" prior to entry into the smart contract, to ensure that the code will implement the terms of the contract according to its terms and that the code reflects the parties' intentions); see also *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02, where a system failure on the platform caused the code to execute transactions at prices which deviated widely from the expectations of the parties. The *Quoine* case is discussed in more detail from para 3.18.

240 We have reproduced this example courtesy of Peter Hunn and the Accord Project.

```
      calculateTempdiscount(contract.minTemperature,
                            contract.maxTemperature,
                            contract.discountFactor,
                            readings)
    + calculateHumdiscount(contract.minHumidity,
                           contract.maxHumidity,
                           contract.discountFactor,
                           readings);

    // Returns a price calculation, applying any discounts
    let totaldiscount = MonetaryAmount{
      doubleValue: discount * integerToDouble(request.unitCount),
      currencyCode: contract.unitPrice.currencyCode
    };
    let totalPrice = MonetaryAmount{
      doubleValue: max([payOut - totaldiscount.doubleValue, 0.0]),
      currencyCode: contract.unitPrice.currencyCode
    };
    emit PaymentObligation{
                      contract: contract,
                      promisor: some(contract.importer),
                      promisee: some(contract.grower),
                      deadline: none,
                      amount: totalPrice,
                      description: contract.importer.partyId ++ " should pay
shipment amount to " ++ contract.grower.partyId
                };
    return PriceCalculation{
      shipment : request.shipment,
      totalPrice : totalPrice,
      discount : totaldiscount,
      late : false
    }
  }
}
```

4.23 Courts are accustomed to receiving expert evidence on the meaning of contractual terms drafted in a foreign language. The expert evidence received in those cases, however, does not determine the meaning or legal effect of the foreign language terms, but merely puts those terms in a language which the court can understand. It is then for the court to determine what the terms (as translated) would mean to a reasonable person, applying the principles of interpretation.[241]

4.24 An expert coder could assist the court by translating the code in the same way as any other contract written in a language not familiar to the court. Nonetheless, a court may not be able effectively to interpret that natural language translation because it is not familiar with the way instructions in code are interpreted by a computer or the way a coder might arrange instructions in order to elicit a particular outcome from the running of a code.

4.25 Take for example a very basic natural language instruction to make a purchase from a shop:

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[241] See K Lewison, *The Interpretation of Contracts* (6th ed 2019) para 5.06.

Go to the shop and buy a newspaper. If there are any eggs, get a dozen.

A likely human response to this instruction is to buy a newspaper and, in the event that the shop has eggs, to buy a dozen eggs as well. A computer, on the other hand, presented with this instruction (in code form) will buy a newspaper and, in the event that eggs are also available, will buy 12 newspapers rather than one.[242]

4.26 It is therefore unlikely to be sufficient, for the purposes of assisting the court in interpreting a contract, for an expert coder merely to translate the code into natural language. Instead they will need to explain the effect of certain combinations of words and give their reasoned opinion as to what the code appears to instruct the computer to do. This approach shifts the role of interpretation further from the judge and towards experts. This kind of shift is not entirely unprecedented and an analogy can be made with the *Bolam* test in the tort of negligence.[243] The test involves the court asking whether the defendant's actions were in accordance with a practice accepted by a responsible body of professional opinion. The logic behind the test is that trained professionals are in a far better position to give an opinion on the standards within their own profession than those trained solely in law.[244] The court is not bound by the outcome of a *Bolam* enquiry. Where the body of professional opinion "cannot be logically supported at all", the court can reject it as a standard against which to assess the defendant's conduct.[245]

4.27 The benefit of obtaining the opinion of an expert coder in this way is that it gives an insight into what the code appeared to instruct the computer to do, regardless of what the performance of the code actually achieved. This is arguably more relevant to what the parties intended the code to do than the performance of the code.

4.28 A potential difficulty in receiving evidence provided by experts engaged by each party is that the parties' experts might disagree about the likely operation or effect of coded terms. How might a court resolve that disagreement between the experts? This challenge is not a new one. The courts of England and Wales are often confronted with disputes of a highly technical nature involving conflicting expert evidence. We understand that judges often address the issue by requiring the parties' experts to meet and seek agreement, to the greatest possible extent, on the answers to a series of questions put to them and approved by the court. Where the experts remain in disagreement on one or more questions, courts will often require the experts to explain:

(1) why they are in disagreement;

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242 S Green, "Smart contracts, interpretation and rectification" (2018) 24 *Lloyd's Maritime and Commercial Law Quarterly* 234, 245.

243 *Bolam v Friern Hospital Management Committee* [1957] 1 WLR 582.

244 S Green, "Smart contracts, interpretation and rectification" (2018) 24 *Lloyd's Maritime and Commercial Law Quarterly* 234, 246.

245 *Bolitho v City & Hackney Health Authority* [1998] AC 232, 243 by Lord Browne-Wilkinson.

(2) whether the disagreement is material to the resolution of the ultimate dispute; and

(3) how the judge should approach resolving the disagreement.

4.29 The court also has the power under section 70(1) of the Senior Courts Act 1981 to appoint an "assessor" to assist the court in dealing with a matter in which the assessor has skill and experience. The assessor may take such part in the proceedings as the court may direct. In particular, the court may direct the assessor to prepare a report on a matter in issue in the proceedings, or attend the whole or any part of the trial and advise the court on a matter in issue in the proceedings.[246] For example, assessors have been used in patent cases to provide the presiding judge with a "short introductory course" about technical or scientific matters relevant to the interpretation of the patent.[247] Thereafter the assessor has played no role in the trial, it being the role of the judge to evaluate the parties' evidence and decide the case.[248] Potentially, a similar approach could be taken in a case where the court is asked to interpret the coded terms of a smart contract. The court could appoint an expert coder as an assessor and the coder could provide assistance to the court on matters relevant to the interpretation of the coded terms. For example, the assessor could provide the court with an introductory overview of the coding language and the DLT system used by the parties to the smart contract. With the benefit of that overview, the court may be in a better position to evaluate the parties' evidence and resolve the ultimate dispute about the interpretation of the coded terms.

Question 25.

4.30 Do you consider that the meaning of a coded term of a smart contract would or should be determined by asking what the term would mean to a:

(1) reasonable person;

(2) reasonable person with knowledge of the relevant code; or

(3) functioning computer?

246 Civil Procedures Rules, r 35.15(3).

247 See *Nokia v InterDigital* [2007] EWHC 3077 (Pat); *Electromagnetic Geoservices v Petroleum Geoservices* [2016] EWHC 27 (Pat) at [35] by Birss J.

248 See *Halliburton v Smith* [2006] EWCA Civ 1599 at [21] and [31]; *Electromagnetic Geoservices v Petroleum Geoservices* [2016] EWHC 27 (Pat) at [34] by Birss J.

Question 26.

4.31 Do you consider that performance of the coded terms of a smart contract cannot always be predicted based on a reading of the code?

If so, can you provide examples or specific evidence of this occurring?

Question 27.

4.32 What practical or procedural steps could the courts take to resolve disputes about the interpretation of the coded terms of a smart contract?

Inconsistencies between natural language and coded terms in a hybrid smart contract

4.33 The general approach to potential inconsistency between different terms of the same contract is that the court should try to reconcile the two, having regard to the contract as a whole. This approach applies whether the clauses of a contract are found in a single document or in two or more separate documents which together make up one contract.[249] It is particularly relevant in the context of hybrid smart contracts, which include a natural language element and a code element.

4.34 A hybrid smart contract may include a term setting out an order of precedence to deal with situations where coded terms and natural language terms conflict.[250] The starting point for interpretation in relation to agreements set out in a number of contractual documents is still to review all the elements of the contract as a whole in order to ascertain the intention of the parties. The order of precedence term will only be applied if the potentially inconsistent terms cannot be reconciled.[251]

4.35 In a hybrid smart contract, the natural language element may set out how the parties intend the code to operate. This could be in the form of a detailed term or simply a broad statement of intention. An understanding of the parties' intentions will be relevant in the event that the code performs in a way not expected by the parties. However, it is unlikely to be possible to protect against all eventualities when drafting such a term and the court will still take a whole contract approach to interpretation. It may also be relevant that the courts have found that, where standard terms are used and more specific terms are negotiated by the parties, the negotiated terms will generally take precedence.[252] Similarly, where terms are inconsistent, a more precise

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249 *Cobelfret Bulk Carriers NV v Swissmarine Services SA* [2009] EWHC 2883 (Comm), [2010] 1 Lloyd's Rep 317.

250 Such clauses are known variously as conflict, priority or prevail clauses and are used in natural language contracts to determine priority between conflicting agreements or between parts of agreements.

251 *RWE Npower Renewables Ltd v JN Bentley Ltd* [2014] EWCA Civ 150 by Moore-Bick LJ.

252 *Bravo Maritime (Chartering) Est v Alsayed Abdullah Mohamed Baroom (The "Athinoula")* [1980] 2 Lloyd's Rep 481.

or detailed term is likely to take precedence over a more general or widely expressed term.[253]

4.36 The approaches described above do not automatically give precedence to natural language terms over coded terms, or vice versa. This will turn on the facts of a particular case. We are interested to understand whether and how hybrid smart contracts aim to deal with any inconsistencies between natural language and coded terms.

Question 28.

4.37 Are parties utilising natural language in smart contracts to make their intentions clear in respect of any coded terms or the contract as a whole?

Should the court take into account prior negotiations?

4.38 Coding remains a specialist skill and it is unlikely, at least in the short to medium term, that commercial parties will be able to read, write or understand code. Parties who wish to enter a smart contract will have to engage a coder to write the coded elements of the contract.[254] This would involve:

(1) the parties reaching an understanding between themselves as to the terms of their bargain;

(2) the parties providing instructions to the coder (perhaps formulating a "business process document" with the coder which sets out in natural language what the parties would like the computer to do);[255] and

(3) the coder writing the contract, based on the parties' instructions.

4.39 Where the parties cannot understand code, it may be difficult to view the code as an expression of their intention. We could say that the coder's intentions are a proxy for the parties' intentions. But that assumes the coder has accurately 'translated' the parties' natural language bargain into computer code. The risk of translation errors is arguably high, given the differences between natural language and computer code.[256]

4.40 The natural language element of a smart contract may provide insight into the intentions of the parties (as described above in relation to hybrid smart contracts).

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253 For example, *Golden Fleece Maritime Inc v St Shipping and Transport Inc* [2018] EWCA Civ 584, [2009] 1 All ER (Comm) 908 at [22] to [23].

254 Where a smart contract is entered into between a trader and a consumer, a likely scenario is that the consumer will be required to accept the trader's standard terms and conditions (including those in code) and will have no opportunity to negotiate. We discuss the challenges posed by these kinds of smart contracts in Chapter 6.

255 S Green, "Smart contracts, interpretation and rectification" (2018) 24 *Lloyd's Maritime and Commercial Law Quarterly* 234, 246.

256 S Green, "Smart contracts, interpretation and rectification" (2018) 24 *Lloyd's Maritime and Commercial Law Quarterly* 234, 249.

There are still likely to be natural language interactions which preceded the smart contract even where the contract itself is expressed solely in code. These could include:

(1) A business process document provided by the parties to a coder.

(2) Emails or conversations between the parties as to their intentions.

(3) Where a smart contract is formed when a party downloads it from a DLT platform, a description of how the smart contract is to operate on that platform.

4.41 However, evidence of the parties' pre-contractual interactions is generally inadmissible to prove the meaning of a contract (the so-called 'exclusionary rule'). Admitting such evidence is generally thought to be unhelpful because what the parties did and said in their negotiations may not reflect the final position they took when they entered the contract.[257] There is also a concern that admitting such evidence would prejudice the interests of third parties who have relied on the meaning of the contract as written and who were not privy to the parties' negotiations.[258] Finally, it is thought that admitting such evidence would make contractual interpretation litigation more unpredictable and expensive.[259]

4.42 There is an argument that, when seeking to interpret the coded terms of a smart contract, the court should be able to examine the parties' interactions prior to entry into the smart contract. Reviewing these interactions could provide the court with a better insight into what the parties intended the code to do, especially where parties are not code literate and may have completed all negotiations in natural language. This would involve an objective assessment by the court of the parties' words and conduct. Having ascertained the parties' intentions, the court could then take evidence from an expert coder, who would give an opinion to the court as to whether the smart contract gives effect to those intentions. To the extent that there is an inconsistency between the parties' intentions and the effect of the smart contract, the parties' intentions should prevail.[260]

Question 29.

4.43 In what (if any) circumstances should courts be able to consider evidence of the parties' pre-contractual negotiations as an aid to interpretation of the coded terms of a smart contract?

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257 *Prenn v Simmonds* [1971] 1 WLR 1381 at 1384 by Lord Wilberforce.

258 *Chartbrook Homes Ltd v Persimmon Homes Ltd* [2009] UKHL 38, [2009] 1 AC 1101 at [40] by Lord Hoffmann.

259 *Chartbrook Homes Ltd v Persimmon Homes Ltd* [2009] UKHL 38, [2009] 1 AC 1101 at [32] by Lord Hoffmann.

260 We discuss remedies and rectification in Chapter 5.

FURTHER QUESTION FOR CONSULTEES

4.44 In this chapter we have given a brief overview of the principles of interpretation and how they could be applied by a court to smart contracts. We have highlighted particular areas where challenges may arise but we are interested to hear from consultees as to whether they have any particular concerns in relation to these areas or to any other aspect of interpretation.

Question 30.

4.45 Do you consider that the courts' current approach to contractual interpretation might cause problems in the context of smart contracts?

If so:

(1) Can you provide examples or specific evidence of this occurring?

(2) What could be done to solve these problems?

Chapter 5: Remedies and smart contracts

5.1 Various problems can arise in the life cycle of a contract, and in response to these problems the law provides a range of remedies. This chapter discusses the problems that might arise in the context of smart contracts, the remedies that the parties might seek, and how a court might award those remedies in practice.

5.2 In particular, this chapter discusses:

(1) how the law on rectification might be applied to smart contracts, and the practical difficulties that might arise when rectifying code;

(2) how the law on the vitiating factors of mistake, misrepresentation, duress and undue influence might be applied to smart contracts, and the remedies that might be awarded if a smart contract is void or has been set aside because of the presence of a vitiating factor;

(3) how problems with the performance of a smart contract could be remedied, including through an award of damages or an order of specific performance;

(4) how the law on frustration might be applied to smart contracts; and

(5) how principles of illegality might be applied to smart contracts.

5.3 For each of these topics, we identify areas of potential uncertainty in applying the relevant legal principles in the smart contracts context, and ask consultees for their views.[261]

RECTIFICATION

Overview

5.4 Rectification is a remedy by which the court orders the terms of a written contract to be amended so that they are consistent with what the parties have agreed.[262] It is arguable that a contract which is recorded in code is a contract which is "in writing".[263] In principle, therefore, the remedy of rectification might be available in respect of the coded terms of a smart contract, where those coded terms are said to record inaccurately the parties' agreement.[264]

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261 This chapter does not consider disputes which may arise between a party to a smart contract and any third party computer coder engaged to assist with producing coded terms. We consider this relationship from para 2.35.

262 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 3-057; C Mitchell, P Mitchell, S Watterson (eds), *Goff & Jones: The Law of Unjust Enrichment* (2019) para 40-32.

263 We discuss this further from para 3.55.

264 See also UKJT Legal Statement at [154].

5.5 There are three circumstances where the court may order rectification of a written contract.

(1) The written contract is intended by the parties to give effect to the terms of a prior contract, but the written contract, by mistake, fails to give effect to the terms of the prior contract. Here, the court may rectify the written contract so that it gives effect to the prior contract;[265]

(2) The parties enter into a written contract but, by mistake, the contract is inconsistent with the actual common intention that was held by the parties at the time the contract was made. Here, the court may rectify the written contract so that its terms are consistent with that actual common intention;[266] and

(3) The parties enter into a written contract, the terms of which are inconsistent with the actual intention that was held by one of the parties, to the knowledge of the other party, at the time the contract was made. Here, the court may rectify the written contract so that it is consistent with what the mistaken party actually intended at the time the contract was made.[267]

5.6 In considering how these legal principles might apply to smart contracts, it is important to distinguish between the different forms which a smart contract can take. As noted in Chapter 2, one form of smart contract is a natural language contract with automated performance by code. These smart contracts do not give rise to novel legal issues concerning rectification, because the code is merely a tool for implementing the terms of a contract written in natural language. The code itself does not contain contractual terms which could be the subject of a claim for rectification. Rectification of these smart contracts would involve the conventional question of whether the natural language terms accurately recorded the parties' agreement.[268]

5.7 However, the other forms of smart contract could give rise to novel legal issues in a claim for rectification. Where the smart contract takes the form of a 'hybrid' contract comprising natural language and coded terms, or a 'solely code' contract, a party might seek rectification of the coded terms of the contract. A party may argue that the coded terms of the smart contract have been inaccurately recorded, because, for example, the coded terms are inconsistent with the terms of a prior natural language contract concluded by the parties, or inconsistent with one or both of the parties' actual common intention when they concluded the smart contract.

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265 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at [176] by Leggatt LJ.

266 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at [176] by Leggatt LJ.

267 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at [103] to [104] by Leggatt LJ.

268 However, the failure of the code to perform the natural language contract in accordance with its terms may give rise to a claim for breach of contract. We discuss this further from para 5.83 below.

5.8 Below we discuss how the law on rectification might be applied where a party seeks rectification of coded terms, and identify potential practical difficulties that may arise when rectifying code. We then ask consultees for their views.

Where the code fails to reflect the terms of a prior natural language contract

5.9 The first category of rectification concerns cases where the parties conclude a contract, under which they are obliged to enter into a further written contract on certain terms. Here, the court may order rectification if the terms of the written contract are inconsistent with that prior contract. For example, if the parties enter into a written contract for the sale of property on certain terms, and then enter into a conveyance, which is inconsistent with that prior contract, the court may order rectification of the conveyance so that it conforms with the terms of the prior contract.[269] Rectification will only be ordered where the parties intended the written contract to reflect the terms of the prior contract but, by a mistake such as a drafting error, the written contract failed to do so.[270]

5.10 This category of rectification therefore has a narrow scope, and it is rarely claimed in the context of traditional contracts.[271] However, it may arise more frequently in the smart contracting context. This is because the practice of smart contracting may involve the parties first concluding a contract in natural language, which sets out the terms of a transaction, and then deploying code which is intended to give effect to those terms.[272] In some cases, the code will be deployed merely as a mechanism for automating performance of the natural language terms. But if the code itself contains contractual terms which are intended to reflect terms in a natural language contract, then the code may be rectifiable if it fails to reflect those natural language terms.[273]

5.11 Suppose Alice and Bob enter into a natural language contract, under which Alice promises to transfer a token to Bob for the price of 10 Ether. The parties agree that, pursuant to that natural language contract, they will enter into a further contract, to be drafted in code, to give effect to that transaction. A piece of code is deployed on a distributed ledger and digitally signed by Alice and Bob. It is programmed so that the token will be transferred automatically from Alice to Bob when Bob sends Ether to the program. However, due to a coding error, the program stipulates that the token will be

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269 See *Chartbrook Ltd v Persimmon Homes Ltd* [2009] UKHL 38, [2009] 1 AC 1101 at [59] by Lord Hoffmann. It has been pointed out that rectification in these circumstances is analogous to an order of specific performance of the prior contract: *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at [93], [141].

270 Rectification will not be ordered where there is evidence that the parties intended the written contract to vary or supersede the terms of the prior contract: see *PT Berlian Laju Tanker TBK v Nuse Shipping Ltd (The Aktor)* [2008] EWHC 1330 (Comm), [2008] 2 Lloyd's Rep 246 at [60] to [61] by Clarke J.

271 For a recent example, see *Milton Keynes BC v Viridor (Community Recycling MK) Ltd* [2017] EWHC 239 (TCC), [2017] BLR 216.

272 This is discussed from para 2.34.

273 If the code does not contain contractual terms, but is merely a tool used by the parties to automate the performance of their obligations under a natural language contract, then the code cannot be subject to an order of rectification. However, the failure of the code to perform the natural language contract in accordance with its terms may give rise to a claim for breach of contract. We discuss this from para 5.83.

transferred on the receipt of 5 Ether, rather than 10 Ether. Alice discovers the mistake, and seeks rectification.

5.12 Current legal principles would appear to permit the court to order rectification of that piece of code, so that it is consistent with the terms of the prior natural language contract concluded between Alice and Bob. The argument would be that Alice and Bob intended the coded contract to give effect to the terms of the transaction set out in the natural language contract. As the code failed to do so – it erroneously recorded the price of the token – the court could order rectification of the code so that it conforms with the natural language contract.[274]

Where the code fails to reflect the parties' common intention

5.13 The second category of rectification concerns the situation where the parties have concluded a standalone written contract,[275] but that contract inaccurately records the common intention held by the parties at the time the contract was made. By "common intention", what is meant is the actual – that is, subjective – intention shared by the parties at the time of entry into the contract.[276] It is not sufficient that the parties independently held intentions that happened to coincide at the point of entry into the contract.[277] Rather, the shared intention must have been the subject of an "outward expression of accord" between the parties, meaning that:[278]

> as a result of communication between them, the parties understood each other to share that intention.

5.14 For the purposes of identifying the parties' actual common intention at the time of contracting, the court may have regard to evidence of the parties' prior negotiations.[279] Where this common intention is proven, and the terms of the written contract are inconsistent with it, the court may order rectification of the written contract to remove the inconsistency.[280] The justification for this is that it would be contrary to the principle of good faith for a party to enforce a contract which it knows is inconsistent with the bargain both parties believed they were making when they entered the contract.[281]

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274 Practical difficulties in rectifying code are discussed from para 5.22.

275 That is, a contract which is not intended by the parties to give effect to the terms of a prior contract.

276 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at [176] by Leggatt LJ.

277 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at [77] by Leggatt LJ.

278 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [2020] Ch 365 at [176] by Leggatt LJ.

279 *Investors Compensation Scheme v West Bromwich Building Society* [1998] 1 WLR 896 by Lord Hoffmann; *Chartbrook Ltd v Persimmon Homes Ltd* [2009] UKHL 38, [2009] 1 AC 1101 at [64] to [67].

280 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [1998] 1 WLR 896 at [46] by Leggatt LJ (noting that "convincing proof" of the parties' common intention is required, given the "natural presumption that the written contract is an accurate record of what the parties agreed").

281 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [1998] 1 WLR 896 at [55] by Leggatt LJ.

5.15 Rectification based on common intention may be a particularly relevant remedy in the smart contracting context. A typical smart contracting scenario is likely to involve the parties first settling the terms of their bargain in natural language negotiations, and then translating that bargain into code by enlisting the services of a coder. This process of translating a bargain from natural language into code creates the risk that the code will fail correctly to state the parties' intentions. As discussed in Chapter 4, mistakes in translation may be difficult to address by applying the principles of interpretation to the coded terms. These principles focus on the objective meaning of the language used by the parties in the contract, not their actual intentions, and the objective meaning of the code will often be clear. However, where it can be shown that the code, despite being clear, is inconsistent with the parties' actual common intention at the time of contracting, rectification might be available to amend the code.

5.16 Suppose Alice and Bob negotiate a transaction and decide to effect it through a solely code smart contract. They provide a computer coder with a business process document, setting out the terms of the transaction. Based on this document, the coder drafts the code, and it is deployed on a distributed ledger and digitally signed by Alice and Bob. However, unknown to Alice and Bob, the coder makes an error, and the code fails to record accurately the terms of the business process document. In particular, the code incorrectly records a pricing formula set out in the business process document. Alice subsequently discovers the error when the code performs, and claims rectification.

5.17 In principle, rectification might be available in this scenario. The business process document provided to the coder is likely to provide strong evidence of the parties' subjective common intention at the time they concluded the smart contract.[282] As the code is inconsistent with that subjective common intention, the court could order the pricing formula recorded in the code to be rectified to reflect the pricing formula in the business process document. Rectification of the code may provide a basis for Alice to claim other remedies from Bob,[283] and would also ensure that any subsequent performance of the code would be in accordance with the parties' agreed pricing formula.

Where the code fails to reflect one of the parties' intentions

5.18 The third category of rectification concerns the situation where one of the parties was mistaken about the terms of the written contract, to the other party's knowledge, when the contract was made. Here, the court may order rectification on the basis that it would be contrary to good faith for a party to enforce a contract which it knew was inconsistent with the bargain that the other party believed was being made at the time of entry into the contract.[284]

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282 In the absence of this kind of clear statement of the parties' intentions, the court may have to look at other evidence of the parties' prior negotiations such as draft contracts, minutes, file notes, emails, and evidence given in court of conversations that took place during those negotiations.

283 If the code has performed in a way which is inconsistent with how the rectified code would have performed, then the party who has obtained rectification of the coded terms may be able to bring a claim for breach of contract. We discuss this from para 5.100.

284 *FSHC Group Holdings Ltd v GLAS Trust Corp Ltd* [2019] EWCA Civ 1361, [1998] 1 WLR 896 at [105].

5.19 Returning to the example in paragraph 5.16 above, suppose Alice employs a coder to draft the code based on the business process document Alice and Bob have agreed. Alice sends the code to Bob for review, stating that she has received assurances from her coder that the code reflects the business process document. Bob's coder notices that the pricing formula inaccurately records the pricing formula in the business process document, and informs Bob. However, Bob, realising that the erroneous pricing formula would work to his advantage, does not tell Alice. The code is deployed on the distributed ledger and digitally signed by the parties. Alice subsequently discovers the error when the code performs, and claims rectification.

5.20 In principle, Alice may have a claim to rectification in this scenario, on the basis that Alice was mistaken about the terms of the code, and Bob knew this at the time the contract was made. The argument would be that, when Alice sent the code to Bob, she expressed the belief that the code reflected the terms of the business process document. Bob knew Alice to be mistaken in this belief, but omitted to correct her. The court may therefore order rectification of the code so that it reflects Alice's understanding of the code when she and Bob entered the contract.

5.21 This kind of rectification has proven controversial, for it has the effect of imposing a contract on the non-mistaken party (here, Bob) which that party did not actually intend to make.[285] It has been suggested that 'sharp practice' by the non-mistaken party, in addition to actual knowledge of the mistake, might be necessary for rectification to be ordered in these circumstances.[286] Here, as Bob deliberately refrained from informing Alice of her mistake for his own commercial advantage, a court may take the view that it would be inequitable to allow Bob to insist on the binding force of the contract.[287] Rectification in accordance with Alice's understanding of the code may therefore be justified.

Practical difficulties in rectifying code

5.22 The above discussion suggests that rectification could in principle be ordered to amend the coded terms of a smart contract in a variety of circumstances. That a contract is partly or wholly recorded in code does not appear to prevent the application of the relevant legal principles. However, a court may face practical difficulties in ordering rectification of the coded terms of a smart contract.

5.23 One difficulty is that it may not be possible for the code to be amended if the code is recorded on a distributed ledger.[288] For example, if the code is recorded on a permissionless blockchain, then, by definition, no single entity has the power to

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285 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 3-070; *George Wimpey UK Ltd v VI Construction Ltd* [2005] EWCA Civ 77 at [65] by Sedley LJ (noting that rectification for unilateral mistake is a "drastic" remedy as it imposes a contract on the defendant that they did not intend to make); A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 191.

286 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 3-072; *Thomas Bates Ltd v Wyndham's (Lingerie) Ltd* [1981] 1 WLR 505, 515 by Buckley LJ, 522 by Brightman LJ.

287 *Riverlate Properties Ltd v Paul* [1955] Ch 133, 140; *Littman v Aspen Oil (Broking) Ltd* [2005] EWCA Civ 1579 at [23] to [24] by Jacobs LJ (noting that the defendant's conduct must be sufficiently "inequitable" to justify rectification in cases of unilateral mistake).

288 Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 33.

amend the code.[289] The court could identify the error which needs to be rectified and ask the parties to seek to agree upon a piece of revised code, which the court would then order the parties to deploy on the blockchain. Strictly speaking, however, the remedy would not be rectification of the contract, but the creation of a new contract between the parties.[290] Conversely, if the code is recorded on a permissioned DLT system, then, depending on the powers of the central administrator, it may be possible for the court to order the central administrator to amend, and thereby rectify, the code.

5.24 Another practical difficulty is that a party may only discover the error in the code, and therefore claim rectification, after the code has executed. In the context of traditional contracts, rectification is typically sought by a party who refuses to perform the contract according to its terms. The effect of rectification is to relieve that party from their liability to perform on those terms. Where, however, a smart contract has been fully performed by code, rectification will not, in itself, provide an effective remedy for the claimant, who will want to reverse the effects of the code's performance.[291] Ordering rectification may therefore be futile, unless it provides a basis for the award of other remedies.[292] Third parties may also have relied on the code's performance: for example, the code may have transferred assets to a third party. As rectification is an equitable remedy, the court has a discretion to refuse rectification. The court may, in its discretion, refuse to order rectification if doing so would prejudice the interests of innocent third parties.[293]

5.25 We would like to hear from consultees about how the various categories of rectification may be applied to smart contracts and the practical issues that may arise when rectifying code.

Question 31.

5.26 Are you aware of, or do you foresee, any practical difficulties in ordering rectification of the coded terms of a smart contract? If so, do you think that parties to a smart contract will, in practice, seek rectification?

289 This is discussed from para 2.15.

290 This could be described as a form of "novation", being the substitution of a new smart contract for the old smart contract between the same parties: see *The Tychy (No2)* [2001] 1 Lloyd's Rep 10, 24 by Steel J.

291 S Green, "Smart contracts, interpretation and rectification" (2018) 24 *Lloyd's Maritime and Commercial Law Quarterly* 234, 251.

292 These remedies are discussed from para 5.100.

293 See *Bell v Cundall* (1750) Amb 101; *Smith v Jones* [1954] 1 WLR 1089; *Lyme Valley Squash Club Ltd v Newcastle-under-Lyme BC* [1985] 2 All ER 405, 413.

VITIATING FACTORS

Overview

5.27 English law recognises various factors that render a contract defective. These are known as 'vitiating factors'. They include mistake, misrepresentation, duress and undue influence.

5.28 If a vitiating factor is established, then, depending on the vitiating factor at issue, the contract may be 'void' or 'voidable'.[294] If a contract is void, it is treated as though it never existed. An example of a vitiating factor that renders a contract void is mistake. If a contract is 'voidable', then it remains valid unless and until it is 'rescinded' by the party who has the power to do so. The effect of rescission is that the contract is set aside from the start. [295] Examples of vitiating factors that render a contract voidable include misrepresentation, duress and undue influence.

5.29 Where a contract is void, or a voidable contract has been set aside, a party may obtain remedies to unwind the performance of the contract.[296] For example, if a party has transferred money or assets under a void contract, that party may bring a restitutionary claim to recover those benefits. The court will ordinarily require that party to make 'counter restitution' of the benefits it received from the other party under the contract. The net effect is that the parties are returned, as far as possible, to the position they were in before they entered the contract. Similar remedies may be awarded when a voidable contract is rescinded.[297]

5.30 In this section, we explain how the law on mistake, misrepresentation, duress and undue influence could be applied to smart contracts. We then turn to consider the remedies that might be awarded if a smart contract is void or has been set aside because of the presence of a vitiating factor.

Mistake

5.31 Under English law, a contract can be rendered void if one or both parties laboured under a mistake when entering into the contract. A 'mistake' can be described as an erroneous belief or assumption about a matter of fact or law.[298] A mistake made by both parties is known as a 'common mistake' and a mistake made by one party is known as a 'unilateral mistake'.[299]

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294 A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) pp 178-179.

295 The term "rescission" is also sometimes used to describe the termination of the contract with prospective effect. However, today the term is more commonly used to describe the retrospective setting aside or wiping away of the contract: see C Mitchell, P Mitchell, S Watterson (eds), *Goff & Jones: The Law of Unjust Enrichment* (9th ed 2016) 40-02.

296 A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) pp 179-184.

297 This is discussed further from para 5.66.

298 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 3-007; *Pitt v Holt* [2013] UKSC 26, [2013] 2 WLR 1200 at [108] to [109] by Lord Walker.

299 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 3-001.

5.32 Not all mistakes made by the parties in entering into a contract will render the contract void. Mistake is a common law doctrine which has a narrow scope under English law. However, a mistake may provide a basis for claiming the remedy of rectification, even though the mistake is not one which voids the contract.[300] Further, where a party has entered a contract under a mistake induced by the other party, the contract may be voidable for misrepresentation, even if not void for mistake.[301]

5.33 In this section, we are concerned only with common mistake and unilateral mistake which, if proven, render the contract void at common law. We discuss how the relevant legal principles might be applied in the context of smart contracts and ask consultees for their views.

Common mistake

5.34 The doctrine of common mistake concerns the situation where the parties enter into a contract under a mistaken belief or assumption about a matter of fact or law which is relevant to the performance of the contract. The doctrine does not apply when the parties are mistaken about the meaning of the terms of the contract.[302] Such a mistake may support a claim for rectification, but it is not a ground for the contract being void at common law. The doctrine also does not apply where the contract makes provision about who is to bear the risk of the mistake made by the parties. In that case, the consequences of the mistake are determined by reference to what the contract says.[303]

5.35 English law recognises only a very limited range of common mistakes that will render a contract void.[304] In *The Great Peace*, the Court of Appeal held that a contract is void for common mistake only if:[305]

(1) the parties shared a belief or assumption as to the existence of a state of affairs when they entered into the contract;

(2) contrary to that belief or assumption, the state of affairs did not exist; and

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300 This is discussed further from para 5.5.

301 This is discussed further from para 5.57.

302 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 3-021.

303 *Great Peace Shipping Ltd v Tsavliris Salvage (International) Ltd (The Great Peace)* [2002] EWCA Civ 1407, [2003] QB 679 at [80] by Lord Phillips MR; *Associated Japanese Bank (International) Ltd v Credit du Nord* [1994] 1 WLR 255, 268 by Steyn J.

304 In addition to the doctrine of common mistake, a contract may also be void where the parties make a "mutual mistake". A mutual mistake occurs where the parties are at cross-purposes about the subject matter of the contract, so that there is an objective ambiguity about what the parties have agreed. If the ambiguity cannot be resolved by recourse to extrinsic evidence, the contract is void for lack of agreement: see *Raffles v Wichelhaus* (1864) 2 H&C 906.

305 *Great Peace Shipping Ltd v Tsavliris Salvage (International) Ltd (The Great Peace)* [2002] EWCA Civ 1407, [2003] QB 679 at [76] by Lord Phillips MR.

(3) the non-existence of the state of affairs renders performance of the contract, or the achievement of the purpose of the contract, impossible.[306]

5.36 In stating these principles, the Court rejected the existence of a separate equitable doctrine of common mistake, under which a contract would be voidable if the parties made a mistake that was "fundamental" or "material" to the performance of the contract.[307] That performance of the contract turns out to be more onerous than what the parties anticipated, because they were mistaken about some matter when they entered the contract, is not sufficient to void the contract. The mistake made by the parties must go to the possibility of performance. So, in the *The Great Peace*, a contract to tow a ship to safety was not vitiated when the parties entered the contract under a mistaken assumption as to the distance between the rescuing ship and the wrecked ship. It remained possible to perform the contract according to its terms, and so the contract was not void for common mistake.[308]

5.37 When parties enter into a smart contract, they may hold beliefs or assumptions about the performance of the code. Should the code execute in a way contrary to those beliefs or assumptions, could the smart contract be vitiated on the ground of common mistake? In many cases, we think the answer is likely to be no, for three reasons. First, where the parties conclude an accompanying natural language contract, that contract may contain detailed terms about the operation of the code and who is to bear the risk of mistakes made by the parties about the code's performance.[309] In that event, the question of common mistake would not be reached. Second, where it is not possible to know in advance precisely how the code will execute, a 'mistake' about the execution of the code may be better characterised as a mere misprediction about how the future will turn out, rather than a mistake as to a present matter of fact or law.[310] Third, even if the parties did make a mistake, the performance of the code may itself demonstrate the possibility of performing the contract or achieving the contractual purpose, so that the mistake is not sufficient to vitiate the contract.

5.38 Suppose Alice and Bob decide to effect a series of transactions via a piece of code deployed on Ethereum. Ethereum charges a fee, based on the amount of computing

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306 In addition, the mistake must not be attributable to the fault of either party, and there must be no warranty by either party that the state of affairs exists; *Great Peace Shipping Ltd v Tsavliris Salvage (International) Ltd (The Great Peace)* [2002] EWCA Civ 1407, [2003] QB 679 at [76].

307 *Great Peace Shipping Ltd v Tsavliris Salvage (International) Ltd (The Great Peace)* [2002] EWCA Civ 1407, [2003] QB 679 at [34], [160] to [161] by Lord Phillips MR, overruling *Solle v Butcher* [1950] 1 KB 671.

308 *Great Peace Shipping Ltd v Tsavliris Salvage (International) Ltd (The Great Peace)* [2002] EWCA Civ 1407, [2003] QB 679 at [162] to [166] by Lord Phillips MR.

309 For example, if a party warrants under the natural language contract that the code will operate in a certain way, and the code turns out to operate in a different way, that party is likely to be held to have assumed the risk of being mistaken about the operation of the code, and will be precluded from relying on the doctrine of mistake. *Great Peace Shipping Ltd v Tsavliris Salvage (International) Ltd (The Great Peace)* [2002] EWCA Civ 1407, [2003] QB 679 at [76] by Lord Phillips MR (noting that common mistake is unavailable where one of the party warrants that the state of affairs exists); see also J Neuberger, W Choy, K Milewski, "Smart contracts: best practices", *Practical Law* (2020) (noting that contractual representations and warranties are likely to be critical to allocating risk in the creation and deployment of a smart contracts).

310 *Pitt v Holt* [2013] UKSC 2, [2013] 2 WLR 1200 at [108] to [109] by Lord Walker.

power required to effect transactions.[311] In an accompanying natural language contract, Alice promises to pay the fees to Ethereum in respect of the transactions. Alice and Bob believe that these fees will amount to no more than 10 Ether, based on a shared assumption about the amount of computing power required to execute the code. However, the execution of the code in fact requires much greater computing power than Alice and Bob believe. The code begins to execute, and Alice, noticing the size of the platform fees, refuses to pay any further fees. The execution of the code is halted by the platform, pending payment. Bob insists that Alice is obliged to pay the fees under the natural language contract; Alice claims that the contract is void for common mistake.

5.39 Here, the contract is unlikely to be void on the ground of common mistake, for similar reasons to those given in *The Great Peace*. It could be argued that Alice and Bob shared a mistaken belief about a fact at the time of contracting: the computing power required to execute the code.[312] As a result of that mistake, performance of the contract differed from what the parties anticipated: Alice would have to pay much larger platform fees. However, despite Alice and Bob's mistake, it remains possible to perform the contract according to its terms, and therefore the contract is not void.[313] In *Bell v Lever Bros Ltd*, Lord Atkin commented that English law's restrictive approach to common mistake may impose hardship in some cases, but said that:[314]

> It is of paramount importance that contracts should be observed. [I]f parties honestly comply with the essentials of the formation of contracts … they are bound, and must rely on the stipulations of the contract for protection from the effect of facts unknown to them.

5.40 The current law therefore places the onus on the parties to address the risk of common mistakes through appropriately drafted contractual terms.[315] We would like to hear from consultees about how the law on common mistake might be applied to smart contracts.

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311 This is known as "gas": see A Antonopoulos, *Mastering Ethereum: Building smart contracts and DApps* (2018) ch 1, https://github.com/ethereumbook/ethereumbook/blob/develop/01what-is.asciidoc.

312 If the computing power required for the code's performance could not be known at the time of contracting, it would be more accurate to say that Alice and Bob merely made a misprediction, not a mistake.

313 It could also be argued the risk of the mistake was allocated to Alice by the natural language contract, because Alice promised to pay those fees unconditionally under the natural language contract.

314 [1932] AC 161, 224.

315 See also Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 37 (recommending that parties undertake an "independent code audit" prior to entry into the smart contract, to ensure that the code will implement the terms of the contract according to its terms and that it reflects the parties' intentions).

Question 32.

5.41 Are you aware of, or do you foresee, any difficulties in applying the existing law to determine whether the parties have made a common mistake when entering into a smart contract?

Question 33.

5.42 What steps or precautions (if any) do parties typically take before entering into a smart contract to satisfy themselves that the code will execute as intended?

Unilateral mistake

5.43 The doctrine of unilateral mistake concerns the situation where only one of the parties is mistaken at the time the contract is made. Ordinarily, such a mistake provides no basis for a party to avoid their contractual obligations. However, if it can be shown that, at the time of entry into the contract, a party was mistaken as to a term of the contract, and the other party knew of this mistake, the contract is void. This is because the parties cannot be said to have reached an agreement, which is an essential requirement for the formation of a legally binding contract.[316]

5.44 A classic example of the doctrine of unilateral mistake is *Hartog v Colin & Shields*.[317] There, a seller offered to sell goods to a buyer. However, by mistake, the seller misquoted the price of the goods. The buyer purported to accept the seller's offer, and then sued when the seller refused to deliver the goods. The King's Bench held that the contract was void for unilateral mistake, because the buyer knew that the seller was mistaken about the price of the goods when the contract was made. Singleton J observed that "anyone with knowledge of the trade must have realised that there was a mistake" in the terms of the seller's offer, and therefore the buyer "could not reasonably have supposed that the offer contained the [seller's] real intention".[318] It followed that there was no agreement between the parties, and therefore no contract, because the buyer's acceptance did not correspond with how the seller's offer would be understood by a reasonable person.

5.45 In the context of smart contracts, a similar situation could arise where one party makes an offer to contract on terms set out in code, but is mistaken about those terms to the knowledge of the other party. In considering how the law of unilateral mistake might apply, it is useful to distinguish between situations where coded terms are

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316 This is discussed from para 3.3; H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 3-018; A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 186.

317 [1939] 3 All ER 566.

318 *Hartog v Colin & Shields* [1939] 3 All ER 566, 568 by Singleton J.

offered and accepted by human beings, and situations where they are offered and accepted by computer programs.

(1) Where the code is offered and accepted by human beings

5.46 Suppose Alice deploys a program on Ethereum, the code of which provides that if a specified amount of Ether is sent to the program, the program will transfer a token to the person who sent the Ether.[319] By mistake, Alice codes the program so that it will transfer the token on the receipt of 10 Ether, instead of 100 Ether. Bob notices the program Alice has deployed and realises, given his experience of the crypto trade, that Alice must be offering to sell this token for 10 Ether by mistake. Nevertheless, he decides to snap up Alice's offer by sending 10 Ether to the program. The code performs and the token is transferred to Bob. Alice, realising what has happened, claims that the contract is void for unilateral mistake and seeks to recover the token from Bob.

5.47 In principle, the smart contract in this example may be void for unilateral mistake, for the same reason that the contract was void in *Hartog*.[320] When Alice deployed the program, Alice was mistaken about a term of her offer, namely the price, and Bob knew of this mistake when he accepted Alice's offer. A reasonable person in Bob's position would not have understood Alice to be intending to sell the cryptoasset for 10 Ether. Bob's purported acceptance is therefore not effective to create a binding contract. As discussed earlier, a unilateral mistake about the code may provide a basis for claiming rectification of the code. However, where, as here, the code has performed, the preferred course for Alice may be to seek to avoid the contract on the ground of unilateral mistake and claim restitution of the value of the token.[321]

5.48 Further support for this analysis, in the context of electronic contracting, can be found in the case of *Digilandmall*,[322] where a retailer mistakenly offered printers for sale on its website for a fraction of their normal retail price. A group of consumers ordered the goods, knowing that the printers must have been displayed at the advertised price by mistake. The Singapore Court of Appeal held that the resulting sales contracts were void for unilateral mistake, on the basis that the retailer was mistaken as to a term of the contract (the price) and the consumers knew of this mistake when they placed their orders.[323] We see no reason why a similar analysis might not be applied where an offer on mistaken terms is displayed, not on a website, but on a distributed ledger or other smart contracting platform.

(2) Where the code is offered and accepted by computer programs

5.49 In other smart contracting scenarios, it may be more difficult to apply the principles of unilateral mistake. One situation which may pose challenges is where the coded terms

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319 The formation of a legally binding contract through the deployment of a computer program on a distributed ledger is discussed in more detail in from para 3.6.

320 [1939] 3 All ER 566.

321 The ability to claim restitution of benefits transferred under void contracts is discussed from para 5.68.

322 *Chwee Kin Keong and others v Digilandmall.com Pte Ltd* [2005] 1 SLR(R) 502.

323 *Chwee Kin Keong and others v Digilandmall.com Pte Ltd* [2005] 1 SLR(R) 502 at [88] to [99].

of a smart contract are offered and accepted by computer programs on behalf of the parties.[324]

5.50 Suppose Alice deploys a computer program on a cryptocurrency exchange platform. The program is coded to purchase bitcoin on Alice's behalf at the best available price on the platform. Bob also deploys a computer program on the platform, which is designed to sell bitcoin. Bob's program is coded so that, if there are no other offers to sell bitcoin on the platform, the program is to offer bitcoin at a highly inflated price. A system error occurs on the platform, which dramatically reduces the number of offers to sell bitcoin on the platform. As a result, Bob's program automatically offers bitcoin at the highly inflated price and Alice's program automatically accepts that offer, it being the best available price for bitcoin on the platform. A contract for the sale of bitcoin is formed and the transaction is performed by the parties' programs. Alice, realising what has happened, claims that the contract is void for unilateral mistake. She says she believed, mistakenly, that bitcoin transactions on the platform would be concluded at prices approximating market rates, and Bob took advantage of this mistake by embedding a highly inflated price in his program.

5.51 This fact pattern was considered recently by the Singapore Court of Appeal in *Quoine*.[325] In that case, the majority rejected the argument that the contract was void for unilateral mistake. The Court reasoned that there was no mistake as to the terms of the contract (namely, the price of the bitcoin), because the parties' computer programs had operated exactly as designed.[326] The purchaser of the bitcoin (Alice, in the above example) had merely made a mistake as to how the programs would behave in the event of a system failure on the platform.[327] This was not sufficient for a unilateral mistake. Even if this were a relevant mistake, the seller (Bob, in the above example) did not have knowledge of it. As the contract was made by computer programs, which cannot possess 'knowledge' of a mistake, the relevant inquiry was whether the seller designed its program specifically to take advantage of the type of system failure that occurred.[328] The evidence in *Quoine* fell short of establishing that the seller had this state of mind when designing its program.

5.52 Mance IJ,[329] in dissent, commented that the principles of unilateral mistake should be adapted to accommodate smart contracts concluded automatically by computer programs.[330] As computer programs always operate deterministically according to their instructions, it is inappropriate in this context to insist on a mistake as to the terms of the contract. A fundamental mistake as to how the computer programs would

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324 As discussed from para 3.15, it may be possible under English law for a legally binding agreement to be concluded automatically by computer programs.

325 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02.

326 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [114] to [115].

327 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [115].

328 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [98], [104].

329 International Judge.

330 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [183].

operate should be sufficient, and the buyer in *Quoine* had made such a mistake.[331] In assessing whether the seller had knowledge of this mistake, the Court did not need to examine the state of mind of the seller when designing its program. The Court could instead take a practical approach and ask whether a reasonable person in the seller's position, with knowledge of the circumstances surrounding the transactions, would have concluded that the transactions were the result of a fundamental computer error.[332]

5.53 Applying these principles, Mance IJ was satisfied that the contract in *Quoine* was vitiated on the ground of unilateral mistake. He added:[333]

> The law must be adapted to the new world of algorithmic programmes … in a way which gives rise to the results that reason and justice would lead one to expect. The introduction of computers no doubt carries risks, but I do not consider that these include the risk of being bound by an algorithmic contract, which anyone learning of would at once see could only be the result of some fundamental error in the normal operation of the computers involved.

5.54 Jonathan Mance IJ's approach was based on the existence of an equitable doctrine of unilateral mistake under Singapore law, which recognises mistakes other than those concerning the terms of the contract.[334] However, the existence of an equitable jurisdiction to set aside contracts for mistake has been rejected in England.[335] Under English law, unilateral mistake is exclusively a common law doctrine, and the mistake must be about the terms of the contract.[336] This poses an obstacle to English courts adopting the approach advocated by Mance IJ in *Quoine*.

5.55 We would like to hear from consultees about how the legal principles concerning unilateral mistake could be applied to smart contracts.

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331 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [201].

332 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [192].

333 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [193].

334 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [162] to [163].

335 *Great Peace Shipping Ltd v Tsavliris Salvage (International) Ltd (The Great Peace)* [2002] EWCA Civ 1407, [2003] QB 679 (in relation to common mistake); *Statoil ASA v Louis Dreyfus Energy Services LP (The Harriette N)* [2008] EWHC 2257 (Comm), [2008] 2 Lloyd's Rep 685 (in relation to unilateral mistake).

336 *Statoil ASA v Louis Dreyfus Energy Services LP (The Harriette N)* [2008] EWHC 2257 (Comm), [2008] 2 Lloyd's Rep 685.

Question 34.

5.56 Do you consider that the legal principles concerning unilateral mistake might need to be adapted to accommodate smart contracts concluded by computer programs without human intervention?

In particular:

(1) is it appropriate to confine a unilateral mistake to a mistake about a term of the contract?

(2) what test should the court apply in determining whether the non-mistaken party had knowledge of the mistaken party's mistake?

Misrepresentation

5.57 Under English law, a contract is vitiated if a party was induced to enter into the contract by a misrepresentation made by the other party. A 'misrepresentation' can be defined as a false representation, by words or conduct, about a matter of fact or law.[337] A misrepresentation can be fraudulent,[338] negligent[339] or innocent.[340] In cases of negligent and innocent misrepresentation, the claimant must prove that, but for the misrepresentation, they would not have entered the contract.[341] In cases of fraudulent misrepresentation, it is sufficient that the misrepresentation was merely a reason for the claimant deciding to enter into the contract.[342]

5.58 In all cases where misrepresentation is established, the contract is voidable: the claimant has the power to rescind the contract and the court may award remedies to restore the parties to the position they were in before the contract was made.[343]

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337 Whether a representation is "false" depends upon how the words or conduct would be understood by a reasonable person in the factual context: H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 7-006; *IFE Fund SA v Goldman Sachs International* [2006] EWHC 2887 (Comm), [2007] 1 Lloyd's Rep 264, by Toulson J at [50].

338 Where the party making the representation knows that it is false or is reckless as to whether it is true or false: *Derry v Peek* (1889) 14 App Cas 337

339 Where the party making the representation did not have reasonable grounds for believing it to be true: *Hedley Byrne & Co Ltd v Heller & Partners Ltd* [1964] AC 465, *Esso Petroleum Co Ltd v Mardon* [1976] QB 801.

340 Where the party making the representation was neither fraudulent nor negligent.

341 *JEB Fasteners Ltd v Marks Bloom & Co* [1983] 1 All ER 583. This includes the situation where the claimant, but for the misrepresentation, would not have entered into the contract on the same terms: *Raiffeisen Zentralbank Osterreich AG v Royal Bank of Scotland plc* [2010] EWHC 1392 (Comm), [2011] 1 Lloyd's Rep 123, [171] to [172] by Christopher Clarke J.

342 *Edgington v Fitzmaurice* (1885) 29 Ch D 459.

343 The bars to rescission are discussed from para 5.75. In addition, where a consumer has been induced by a misrepresentation by a trader to enter into a contract, the misrepresentation may amount to an "unfair commercial practice" under the Consumer Protection from Unfair Trading Regulations 2008 and the

Where the claimant has suffered loss as a result of entering the contract, the claimant may also be entitled to damages under tort law[344] or under the Misrepresentation Act 1967 (the "1967 Act").[345] Under the 1967 Act, it is not necessary for the claimant to prove that the losses were a reasonably foreseeable consequence of the misrepresentation.[346] The defendant is liable for all losses directly suffered by the claimant as a result of the misrepresentation.[347]

5.59 It is open to the parties to agree to a term which excludes or restricts liability for misrepresentation. However, section 3(1) of the 1967 Act provides that such a term is of no effect unless it satisfies the requirement of "reasonableness" in the Unfair Contract Terms Act 1977.[348] To meet the reasonableness requirement, the term must have been a "fair and reasonable one" to include, having regard to the circumstances which were, or ought reasonably to have been, known to or in the contemplation of the parties when the contract was made.[349] Whether a clause excluding or restricting liability for misrepresentation is "fair and reasonable" is necessarily a fact-sensitive question. In general, courts will not strike down such a clause as unreasonable where the parties were of equal bargaining power and were legally advised when entering into the contract.[350]

5.60 Section 3(1) of the 1967 Act does not apply to "consumer contracts".[351] However, under the Consumer Rights Act 2015 (CRA 2015), a term in a consumer contract which excludes or limits liability for misrepresentation will not be binding on the consumer if the term is "unfair".[352] We discuss the unfairness test in more detail in Chapter 6.[353]

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consumer may be entitled to unwind the contract or claim damages. We discuss the unfair commercial practices prohibition from para 6.18.

344 The tort of deceit (in the case of fraudulent misrepresentation) and the tort of negligence (in the case of negligent misrepresentation).

345 Misrepresentation Act 1967, s 2(1).

346 Misrepresentation Act 1967, s 2(1).

347 *Royscot Trust Ltd v Rogerson* [1991] 2 QB 297.

348 Whether a term excludes or limits liability for misrepresentation is a question of substance, not form. The clause need not exclude or limit liability for misrepresentation by its express terms. A clause which has the effect of preventing liability for misrepresentation from arising may be sufficient. An example is a "no reliance" clause, where a party agrees that they have not relied upon any representation made by the other party in entering into the contract. If, but for the no reliance clause, the claimant would have a claim in misrepresentation against the other party, the Court will treat the no reliance clause as a term which excludes or restricts liability for misrepresentation, so that it is subject to the reasonableness requirement in the Unfair Contract Terms Act 1977: see *First Tower Trustees Ltd v CDS (Superstores International) Ltd* [2018] EWCA Civ 1396, [2019] 1 WLR 637.

349 Unfair Contract Terms Act 1977, s 11(1).

350 A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 106; *Watford Electronics Ltd v Sanderson CFL Ltd* [2001] EWCA Civ 317, [2001] 1 All ER (Comm) 696.

351 Misrepresentation Act 1967 s 3(2). A "consumer contract" is a "contract between a trader and a consumer": Consumer Rights Act 2015, ss 61(1) and (3).

352 CRA 2015, s 62(1).

353 From para 6.14.

5.61 We do not anticipate that smart contracts will give rise to novel legal issues in determining whether a party has been induced to enter into the smart contract by a misrepresentation made by the other party. Like traditional contracts, the entry into a smart contract will typically be preceded by a period of negotiation or other interaction between the parties. The question of whether one party, by their words or conduct, made a misrepresentation in those pre-contractual interactions which induced the other party to enter into the smart contract can be determined by applying existing legal principles.[354] If the parties have included clauses in the natural language element of their smart contract which seek to exclude or limit liability for misrepresentation, the existing law could be applied to determine whether those clauses were "fair and reasonable" under the Unfair Contract Terms Act 1977 or, in the case of consumer contracts, "unfair" under the CRA 2015.

Question 35.

5.62 Are you aware of, or do you foresee, any difficulties in applying the existing law to determine whether a smart contract has been entered into as a result of a misrepresentation?

Duress and undue influence

5.63 Under English law, a contract is vitiated for duress where a party was induced to enter into the contract by an illegitimate threat made by the other party. Examples of illegitimate threats are threats of violence against the person,[355] wrongful threats to destroy or damage property,[356] and threats to commit a breach of contract.[357] Where it is proven that, but for the illegitimate threat, the claimant would not have entered the contract, the claimant can rescind the contract.

5.64 A contract can also be vitiated where a party enters into a contract under the undue influence of the other party. Undue influence arises in situations where, because of the relationship between the parties, the claimant is unable to exercise free and independent judgement when entering into the contract. In the context of certain relationships, it will be presumed that the claimant entered into the contract under the undue influence of the other party, if the contract was concluded on disadvantageous

354 The remedies that might be awarded when a smart contract is found to be vitiated by misrepresentation are discussed from para 5.58.

355 *Barton v Armstrong* [1976] AC 104.

356 *Occidental Worldwide Investment Corporation v Skibs A/S Avanti* [1976] Lloyd Rep 293.

357 *North Ocean Shipping Co Ltd v Hyundai Construction Co Ltd* [1979] QB 705; *Pao On v Lau Yiu Long* [1979] UKPC 17.

terms to the claimant.[358] In other cases, undue influence may be proven on the facts.[359] Where undue influence is established, the claimant can rescind the contract.

5.65 We do not anticipate that smart contracts will give rise to any novel legal issues in determining whether a contract has been entered into under duress or undue influence. As in the case of traditional contracts, the question will be whether the claimant entered into the smart contract because of illegitimate threats made by the other party or under the undue influence of the other party.[360]

Remedies where the contract has been vitiated

5.66 As explained above, a contract which is vitiated may be either void or voidable. In the case of void contracts, a party may claim a restitutionary remedy to recover benefits transferred under the void contract. In the case of voidable contracts, a party can also claim restitutionary remedies, provided the contract is validly rescinded.

5.67 We anticipate that restitutionary remedies may be particularly relevant in the context of smart contracts. In a traditional contracting scenario, parties are likely to cease performing the contract when they discover the factor rendering the contract void or voidable. However, in a smart contract, some or all of the terms are performed automatically by code on a distributed ledger.[361] Depending on the nature of the distributed ledger, there may be no mechanism for the parties to stop the execution of the code.[362] The code may continue to execute (and fully execute), regardless of the fact that the contract has been vitiated. In these circumstances, the parties are likely to rely on restitutionary remedies to recover benefits transferred by the code under the defective smart contract. Below we consider how restitutionary remedies might be awarded in this situation.

Remedies where the contract is void

5.68 If a contract is void, the contract is non-existent from the start and creates no legal obligations between the parties. However, a party may have rendered performance under the void contract: for example, the party may have transferred property, paid

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358 See *Mitchell v Homfray* (1881) 8 QBD 587 (presumed relationship of influence between doctor and patient); *Wright v Carter* [1903] 1 Ch 27 (presumed relationship of influence between solicitor and client); *Lancashire Loans Ltd v Black* [1934] 1 KB 380 (presumed relationship of influence between parent and child).

359 See eg *Lloyds Bank Ltd v Bundy* [1975] QB 326 (factual relationship of influence between a bank and its elderly customer) and *Credit Lyonnais Bank Nederland v Burch* [1997] 1 All ER 144 (factual relationship of influence between an employer and junior employee).

360 We discuss from para [5.73] the remedies that might be available where a smart contract has been vitiated for duress or undue influence.

361 Distributed ledger technology ("DLT") is a method of recording and sharing data across a network. A DLT system comprises a digital database (a "ledger") which is shared (that is, "distributed") among a network of computers (known as "nodes"). Each node holds an identical copy of the ledger on its system, which is updated instantaneously as new data is added. Nodes approve of additions to the ledger via the consensus mechanism. From para 2.14 we set out a more detailed description of DLT, including the key features and potential benefits of DLT compared to centralised ledgers.

362 This is likely to be the case where the code is deployed on a permissionless DLT system, because the code will be immutable. In contrast, if the code is deployed on a permissioned DLT system, the central administrator may have the power to halt the performance of the code or reverse transactions performed by the code.

money or provided services to the other party. Under English law, that party may be entitled to recover these benefits under the law of unjust enrichment. To succeed in an unjust enrichment claim, the claimant must establish the following:[363]

(1) *enrichment of the defendant*: the defendant must have received a benefit from the claimant that is objectively valuable: for example, money, property or a service;

(2) *at the claimant's expense:* the claimant must have incurred a loss through the provision of the benefit to the defendant; and

(3) *an "unjust factor"*: the claimant must prove that the benefit was transferred in circumstances which the law recognises as unjust: these include that the benefit was transferred to the defendant by mistake or upon a basis which has failed.

5.69 Where a party has transferred a benefit to another party under a void contract, the above requirements for a claim in unjust enrichment are likely to be satisfied. The benefit transferred under the void contract would constitute an enrichment, received by one party at the expense of the other. If the party who transferred the benefit believed, mistakenly, that the contract was valid, the unjust factor of mistake is likely to apply. Alternatively, the unjust factor could be failure of basis. The argument would be that the basis for the transfer of the benefit was that there was a valid contract in existence between the parties. As the contract was void, that basis for the transfer failed, and it would therefore be unjust for the defendant to retain the benefit.[364]

5.70 The remedy for unjust enrichment is restitution. The purpose of a restitutionary remedy is to reverse the defendant's enrichment. It usually takes the form of a monetary award, representing the value of the defendant's enrichment.[365] It may be possible to obtain a proprietary remedy for unjust enrichment: for example, an order that the defendant holds property transferred under the void contract on trust for the claimant. However, the availability of proprietary remedies for unjust enrichment has not been authoritatively determined under English law.[366]

5.71 In some cases, the defendant may also have transferred benefits to the claimant under the void contract. In that case, the claimant's ability to obtain restitution will be conditional on the claimant providing "counter restitution" of any benefits it received from the defendant under the contract.[367] Otherwise, the claimant would be unjustly enriched at the expense of the defendant.

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363 See *Banque Financière de la Cité v Parc (Battersea) Ltd* [1999] 1 AC 221, 227 by Lord Steyn.

364 See *Guinness Mahon & Co Ltd v Kensington and Chelsea RLBC* [1999] QB 215; C Mitchell, P Mitchell, S Watterson (eds), *Goff & Jones: The Law of Unjust Enrichment* (9th ed 2015) para 13-027.

365 *Bank of Cyprus UK Limited v Menelaou* [2015] UKSC 66, [2016] AC 176 at [81] by Lord Neuberger.

366 C Mitchell, P Mitchell, S Watterson (eds), *Goff & Jones: The Law of Unjust Enrichment* (9th ed 2015) paras 40-18 to 40-30.

367 C Mitchell, P Mitchell, S Watterson (eds), *Goff & Jones: The Law of Unjust Enrichment* (9th ed 2015) para 31-01.

5.72 We do not anticipate that English courts will encounter novel legal issues or practical difficulties in awarding restitutionary remedies if a smart contract is void. The questions in the smart contracting context would be the same: namely, whether one party has been enriched at the other party's expense in circumstances which are unjust. In *Quoine v B2C2*, discussed above, the claimant argued that because the smart contract was void for unilateral mistake, it was entitled to restitution of the bitcoin that was transferred to the defendant by the smart contract. The Singapore Court of Appeal had no difficulty in characterising the receipt of the bitcoin as an "enrichment".[368] Further, it observed that the enrichment was "at the expense of" the claimant, whose bitcoin was transferred to the defendant by the smart contract.[369] However, as the Court found that the claimant was not mistaken and therefore that the smart contract remained valid, it was not possible to identify an unjust factor.[370] The claim for restitution in *Quoine* therefore failed. However, the case indicates that it may be possible to apply the relevant legal principles without difficulty.

Remedies where the contract is voidable

5.73 If a contract is voidable, it remains valid unless and until it is rescinded by the party who has the power to do so. Once rescinded, the contract is set aside from the start and the parties are restored to the position they were in before the contract was made.

5.74 Rescission does not necessarily require an order from the court. In some cases a party can rescind a contract simply by informing the other party that the contract is rescinded, or, where that is not possible, by making clear through any other act that the contract is rescinded.[371] In practice, however, if the claimant's entitlement to rescind the contract is disputed by the other party, the court will need to decide the matter. The court's assistance may also be required to facilitate the unwinding of the contract.

5.75 As the purpose of rescission is to unwind the contract, the right to rescind cannot be exercised unless the parties can be restored to their pre-contractual positions.[372] Traditionally, English courts strictly enforced this requirement, so that, unless the performance of the contract could literally be unwound, rescission was barred and the

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368 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [133].

369 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [133].

370 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02 at [134] to [135].

371 The right to rescind a contract for fraudulent misrepresentation and duress arises at common law, and does not require an order from the court. In contrast, the right to rescind a contract for non-fraudulent misrepresentation or undue influence arises in equity. The authorities are unclear on whether a contract can be rescinded in equity by an election by the claimant, or only by an order of the court: see C Mitchell, P Mitchell, S Watterson (eds), *Goff & Jones: The Law of Unjust Enrichment* (9th ed 2015) paras 40-11 to 40-12.

372 There are other bars to rescission. These include: (1) where the claimant, despite becoming aware of the vitiating factor, decides to affirm the contract; (2) where there has been such a delay by the claimant in seeking rescission that it would be unjust to permit rescission; and (3) where property transferred under the contract has been purchased by a third party, without notice of the vitiating factor rendering the contract voidable. In cases of non-fraudulent misrepresentation, the court also has a discretion to refuse rescission and order damages in lieu if it considers "that it would be equitable to do so", having regard to the nature of the misrepresentation, the loss caused to the claimant if the contract were upheld, and the loss that rescission would cause to the defendant: Misrepresentation Act 1967, s 2(2).

contract remained valid.[373] However, the modern approach is to permit rescission so long as the court can achieve "practical justice" between the parties. For example, in *O'Sullivan v Management Agency and Music Ltd*,[374] the Court permitted the claimant to rescind a management services contract, even though the services performed by the defendant under the contract could not literally be restored to the defendant. Restoration could be achieved by requiring the claimant to pay the defendant a sum of money representing the value of the services.[375] Given that almost any benefit provided under a contract can be valued in money, it appears that rescission will rarely be barred on the basis that restoration is impossible.[376]

5.76 Where a smart contract is voidable on the ground of misrepresentation, duress or undue influence, a party to the smart contract may seek rescission of the smart contract. If the smart contract has been partly or wholly performed by code, the question arises how the parties could be returned to their pre-contractual positions. Some authors have noted that, if the code of a smart contract has performed transactions on a blockchain, those transactions may not be capable of literally being unwound because they are immutably recorded.[377] It is true that the blockchain itself could not be amended to reverse the effects of the code's performance. However, there may be other ways in which the court could achieve "practical justice" between the parties. For example:[378]

(1) the court could order the parties to enter into an "equal and opposite" second transaction on the blockchain. The first transaction would remain on the blockchain, but its effects would be reversed by the second transaction; or

(2) the court could identify the benefits transferred by the code, value those benefits in money, and then order the parties to make restitution to each other of the value of those benefits. While the precise benefits transferred by the code (for example, a token transferred by Alice to Bob) would not be restored, the value of those benefits would be, so that practical justice is achieved between the parties.

5.77 The approach taken will necessarily depend on the facts of the case, including the features of the smart contracting platform used. For example, if the smart contracting

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373 This was the case where the right to rescind arose at common law. See eg, *Clarke v Dickson* (1858) EB & E 148, where the claimant was refused rescission of a contract to purchase shares in a partnership, because the partnership had been converted into a limited liability company, making it impossible for the claimant to return shares "in a partnership" to the defendant. See also *Vigers v Pike* (1842) 8 CL & Fin 562, where the Court refused rescission of a lease of a mine, because the claimant had extracted minerals from the mine, making it impossible for the mine to be returned to the defendant in its original condition.

374 [1985] QB 428.

375 See also *Smith New Court Securities Ltd v Scrimgeour Vickers (Asset Management) Ltd* [1994] 1 WLR 1271; *Halpern v Halpern (No.2)* [2007] EWCA Civ 291, [2008] QB 195.

376 A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 182.

377 See M Durovic and A Janssen, "Formation of smart contracts under contract law" in L DiMatteo, M Cannarsa and C Poncibò (eds), *Smart Contracts, Blockchain Technology and Digital Platforms* (2020) p 73; P Paech, "What is a smart contract?" *Oxford Business Law Blog* (2018).

378 N Yeo and A Taylor, "Avoiding blockchain contracts" (2019) 9 *Butterworths Journal of International Banking and Financial Law* 586.

platform is maintained by a central administrator, the central administrator may have the power to reverse or cancel transactions and thereby restore benefits transferred by the code to the parties' respective transaction accounts. This is what happened in *Quoine*, where the platform operator purported to cancel the bitcoin transactions upon being notified of them.[379]

5.78 We would like to hear from consultees about the legal or practical issues that might arise where a party seeks to rescind a smart contract.

Question 36.

5.79 Are you aware of, or do you foresee, any difficulties in applying the legal principles concerning rescission to smart contracts which have been vitiated for misrepresentation, duress or undue influence?

REMEDIES FOR BREACH OF CONTRACT

Overview

5.80 A party commits a breach of contract when it fails to perform the contract in accordance with its terms. Where a contract is breached, the innocent party may obtain a remedy. The principal remedy is compensatory damages,[380] which aim to put the innocent party, so far as money can do, in the position it would have been in had the contract been performed according to its terms.[381] Depending on the nature of the breach and the terms of the contract, the innocent party may be entitled to terminate the contract, in addition to claiming damages. In exceptional cases where damages are an "inadequate" remedy,[382] the innocent party may seek an order of specific

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379 However, the Singapore Court of Appeal held that the platform operator had acted in breach of its terms and conditions in doing so.

380 That is, damages which compensate the claimant for the loss they have suffered as a result of the breach of contract. In exceptional cases, damages for breach of contract may be awarded by reference to the gain made by the defendant as a result of the breach: see *Attorney-General v Blake* [2001] 1 AC 268.

381 *Robinson v Harman* (1848) 1 Exch 850, 855. Damages can be measured either by reference to the claimant's "expectation loss" or the claimant's "reliance loss". The claimant's expectation loss is the difference between the claimant's position after breach and the position that the claimant would have been in had the contract been performed. The claimant's reliance loss refers to the wasted expenses or other losses incurred by the claimant in relying on, or in anticipation of, the performance of the contract. The claimant must choose between these measures of compensation: it cannot claim compensation for both its expectation and reliance losses. See A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) pp 129 to 130. Recently, the Supreme Court has recognised that damages in certain cases may be assessed on the basis of what the claimant could reasonably have charged the defendant to commit the breach in question ("negotiating damages"). These damages are designed to compensate the claimant for the loss of an economically valuable asset protected by the contract: *Morris-Garner and another v One Step (Support) Ltd* [2018] UKSC 20, [2019] AC 649 by Lord Reed.

382 The main circumstance where damages are inadequate is where the subject matter of the contract is unique, such as a piece of land or a physically unique good: A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) pp 156 to 157.

performance, which compels the party in breach to perform its obligations under the contract.[383]

5.81 It is often said that smart contracts dramatically reduce the possibility of breach of contract.[384] In a traditional contract, the performance of the contract usually depends directly on human beings. There is always the possibility that one of the parties might perform its obligations defectively or refuse to perform them at all. In contrast, in a smart contract, some or all of the contractual obligations are performed by computer code, without the need for human intervention. Where the computer code is deployed on a distributed ledger, it cannot be amended by the parties and will execute automatically when the conditions for its execution are met. For this reason, the performance of smart contracts is often said to be "guaranteed".[385]

5.82 In some cases, the use of computer code to perform contractual obligations may reduce the scope for disputes about the performance of the contract.[386] However, we think it would be premature to conclude that breach of contract is of minimal relevance to smart contracts. In considering this issue, it is useful to distinguish between smart contracts where the code merely automates performance of contractual obligations recorded in natural language, and smart contracts where the contractual obligations are recorded in, and performed by, code.

Where contractual obligations are performed by code

5.83 As explained in Chapter 2, smart contracts can take a variety of forms, depending on the role played by the code. One form of smart contract – and perhaps the most common form currently in use or in development – is a natural language contract with automated performance by code. In these smart contracts, the obligations of the parties are defined by the terms of the natural language contract. The code is merely a mechanism employed by the parties to perform those obligations.[387] In principle, if the code fails to perform, or defectively performs, the obligations of one of the parties

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383 Specific performance is an equitable remedy. Even if damages are inadequate, the court will not order specific performance if, for example, the contract is one for the provision of personal services, if the order would require constant supervision by the court, if performance would be physically or legally impossible, or if performance would entail severe hardship for the defendant: A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 156.

384 P Paech, "What is a smart contract?" *Oxford Business Law Blog* (2018); World Bank, *Smart contract technology and Financial Inclusion* (2020) p 14; K Werbach and N Cornell, "Contracts Ex Machina" 67 *Duke Law Journal* 313, p 318; A Savelyev, "Contract law 2.0: 'Smart' contracts as the beginning of the end of classic contract law" (2017) 26 *Information & Communications Technology Law* 116, p 130; M Durovic and A Janssen, "Formation of smart contracts under contract law" in L DiMatteo, M Cannarsa and C Poncibò (eds), *Smart contracts, blockchain technology and digital platforms* (2020) p 73; T Cutts, "Smart Contracts and Consumers" (2019) p 3.

385 See eg T Cutts, "Smart Contracts and Consumers" (2019), p 1; R Herian, "Smart contract performance and the rise of restitution" (2019) p 4; O Meyer, "Stopping the unstoppable" (2020) p 15; M Durovic and A Janssen, "Formation of smart contracts under contract law" in L DiMatteo, M Cannarsa and C Poncibò (eds), *Smart contracts, blockchain technology and digital platforms* (2020) p 71.

386 UKJT Legal Statement at [136].

387 See UKJT Legal Statement at [143].

under the natural language contract, that party may be liable for breach of the natural language contract.

5.84 It is well established in English law that a contracting party remains liable for the performance of its obligations under a contract, even though the performance of those obligations has been delegated to a third party.[388] For example, where a contracting party delegates the performance of its obligations to a subcontractor, and the subcontractor renders defective performance, it is no defence to a claim of breach of contract that the contracting party was not personally responsible or at fault for the breach.[389] Liability for breach of contract is generally strict.[390] We think the same reasoning applies where parties delegate the performance of their contractual obligations, not to another human being, but to a piece of computer code. A party who delegates the performance of its contractual obligations to computer code would be liable under the contract for any failures or defects in the performance of those obligations by the computer code.

5.85 Below we consider how the legal principles concerning damages, termination and specific performance might be applied where the code fails to perform a natural language contract in accordance with its terms.

Damages

5.86 Suppose Alice and Bob enter into a natural language contract, under which Alice promises to transfer a token to Bob on 1 January for the price of 10 Ether. The parties agree that the transaction will take place on Ethereum: Bob will send the Ether to a computer program deployed by Alice, and the program will automatically transfer the token to Bob on 1 January. Bob sends the Ether to the program, but due to a bug in the program, the program sends the token to Chris, instead of Bob. On 2 January, Bob decides to purchase an equivalent token from another party, but the best price he can obtain for the token on Ethereum is 20 Ether. Alice returns the 10 Ether to Bob, but Bob proceeds to sue Alice, claiming damages for breach of contract.

5.87 In principle, Bob may be able to obtain damages for breach of contract in this example. As a result of the defective performance of the code, Alice breached her obligation under the natural language contract to transfer the token to Bob on 1 January. Bob lost the opportunity to obtain the token for 10 Ether and instead had to spend 20 Ether to obtain the token. Bob is therefore entitled to damages of 10 Ether (or its equivalent in fiat currency), being the additional cost incurred by Bob to obtain the performance Alice had promised.[391] This remedy would place Bob in the same

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388 This is known as "vicarious performance": see H Beale (ed), *Chitty on Contracts* (33rd ed 2020) paras 19-082 to 19-085; E Peel (ed), *Treitel on the Law of Contract* (15th ed 2020) paras 17-007 to 17-012.

389 *Stewart v Reavell's Garage* [1952] 2 QB 545; *Chitty on Contracts* (2019) para 19-082; E Peel (ed), *Treitel on the Law of Contract* (15th ed 2020) para 17-012.

390 E Peel (ed), *Treitel on the Law of Contract* (15th ed 2020) para 17-065. The principle of strict liability may be modified by the terms of the contract. For example, the parties may include a "force majeure" clause which relieves the parties from their liability to perform due to the occurrence of a subsequent event. This is discussed from para 5.108.

391 This method of assessing damages is known as the "cost of cure": see *Tito v Waddell (No 2)* [1977] Ch 106; *Radford v de Froberville* [1977] 1 WLR 1262; but see *Ruxley Electronics and Construction Ltd v Forsyth*

financial position he would have been in had the code properly performed Alice's obligations under the natural language contract.

5.88 In practice, the parties may include terms in the natural language contract which seek to limit or exclude their liability for a breach of contract arising from the performance of the code. Subject to the provisions of the Unfair Contract Terms Act 1977,[392] commercial parties are free to agree to terms which exclude or limit their liability for breach of contract.[393] In contracts entered into between businesses and consumers, the Consumer Rights Act 2015 requires that contracts must be fair, in that they must not cause a significant imbalance in the parties' rights and obligations to the detriment of the consumer.[394]

5.89 Parties may also include terms which stipulate a sum that is to be payable as damages in the event of a breach of contract. The court will enforce these terms upon breach, but not if the term amounts to a penalty. A penalty is a term which imposes a detriment on the defendant which is out of all proportion to any legitimate interest of the claimant in the performance of the contract.[395]

5.90 We are interested in consultees' views about how damages might be awarded where the terms of a natural language contract are performed automatically by code.

Question 37.

5.91 Are you aware of, or do you foresee, any difficulties in awarding damages for breach of contract where the terms of a natural language contract are performed automatically by computer code?

Termination

5.92 In some cases, the breach of the natural language contract may entitle the innocent party to terminate the contract, in addition to claiming damages. The natural language contract may expressly provide that breach of a particular term confers a right to terminate upon the innocent party, or the nature of the breach might be such that the

[1996] AC 344 (damages based on the cost of cure were refused because the claimant had no intention in incurring the cost of cure and awarding the cost of cure would have been unreasonable in the circumstances).

392 See Unfair Contract Terms Act 1977, ss 2, 3, 6 and 7.

393 In addition, the parties may include a force majeure clause which excuses one or both of the parties from performing their obligations under the contract if a specified event occurs. We discuss force majeure clauses in more detail from para 5.108.

394 Consumer Rights Act 2015, s 62 and see Chapter 6 for a fuller discussion of consumer protection provisions. The 2015 Act also sets out terms which may be considered unfair, including terms which inappropriately exclude or limit the legal rights of the consumer in the event of total or partial non-performance or inadequate performance by the business: s 63 and sch 2, part 1, para 2.

395 See *Cavendish Square Holding BV v Talal El Makdessi* [2015] UKSC 67, [2016] AC 1171 at [32]. In accordance with this test, a term will not be a penalty if it is a genuine pre-estimate of the loss that the claimant will suffer as a result of the breach.

innocent party has the right to terminate the natural language contract at common law.[396]

5.93 In principle, we see no reason why a natural language contract, the performance of which is automated by code, could not be terminated for breach. As in the case of a traditional contract, the innocent party could elect to terminate the natural language contract by making clear, through its words or conduct, that the contract is at an end. The effect of termination would be that the parties are discharged from performance of their remaining obligations under the natural language contract. However, as a practical matter, the party who elects to terminate the natural language contract may not have the power to terminate the performance of the code, particularly if the code is immutably recorded on a distributed ledger.[397] This may lead to practical difficulties if the code continues to execute transactions or confer benefits after the natural language contract has been terminated for breach.[398]

5.94 We understand that, in some cases, it may be possible to design the coded element of a smart contract so that the parties can initiate a "kill" or "self-destruct" mechanism, which terminates the performance of the code.[399] The innocent party who elects to terminate the contract could potentially initiate this mechanism to ensure that the performance of the code is also brought to an end when the natural language contract is terminated. We would like to hear from consultees about how the legal principles concerning termination could be applied to natural language contracts which are performed automatically by code.

Question 38.

5.95 Are you aware of, or do you foresee, any difficulties in applying the legal principles concerning termination where the terms of a natural language contract are performed automatically by computer code?

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396 A breach of a term which is a "condition" of the contract entitles the innocent party to terminate the contract. A "condition" is a term of such importance that any breach of it would deprive the claimant of substantially the whole benefit of the contract. In contrast, a breach of a mere "warranty" does not give rise to a right to terminate, but only a right to damages. A warranty is a minor term, the breach of which would never deprive the claimant of substantially the whole benefit of the contract. A term which is neither a condition nor a warranty is an "innominate" term. Breach of an innominate term may confer a right to terminate if, in the circumstances, the consequences of the breach deprive the innocent party of substantially the whole benefit of the contract. See *Hongkong Fir Shipping Co Ltd v Kawasaki Kisen Kaisha Ltd* [1962] 2 QB 26; A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 115.

397 Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 43.

398 Benefits conferred by the code after discharge of the natural language contract for breach might be recoverable by the parties under the law of unjust enrichment, on the ground of failure of basis.

399 See D Futter and T Waters, "DLT in commercial contracts: an introduction to blockchain, DLT and smart contracts for commercial practitioners", *Practical Law* (2020); J Neuberger, W Choy, K Milewski, "Smart contracts: best practices", *Practical Law* (2020).

Specific performance

5.96 It is conceivable that, in some cases, an award of damages may not be adequate to remedy the defective performance of the natural language contract by the code. To return to the above example, suppose that Alice had promised under the natural language contract to transfer a token to Bob which represented ownership of a unique asset, such as a piece of land. If, for one reason or another, the code failed to transfer that token to Bob, Bob could potentially seek an order that Alice specifically perform her obligation under the natural language contract to transfer the token to Bob. As in the case of a traditional contract for the sale of land, Bob's argument would be that an award of damages would not enable him to obtain the performance promised by Alice, because Bob could not use a damages award to obtain a sufficient substitute. In principle, the court could order Alice specifically to perform her obligations by compelling her to deploy a new piece of code on the distributed ledger, which corrects the defective performance of the old piece of code.

Where contractual obligations are recorded in code

5.97 In some cases, the coded element of a smart contract may not merely be a tool for performing the parties' contractual obligations. The code may itself record, and therefore define, the parties' contractual obligations. As discussed in Chapter 2, a smart contract could take a "hybrid" form, where some contractual obligations are recorded in natural language, and others recorded in code, or it could take a "solely code" form, where all of the contractual obligations are recorded in code. In Chapter 4 we discussed the potential challenges for interpretation of coded terms. Would a court base its interpretation of a contract on what the words mean to a computer or what the words mean to a reasonable person with knowledge of code? In that chapter we ask consultees for their views on which approach a court would take. Below we consider each approach in turn and how that could affect a claim for breach of contract.

5.98 Suppose that Alice and Bob decide to enter into a solely code smart contract to give effect to a transaction. They provide a non-binding business process document to a coder, setting out the terms of the transaction. The coder translates those terms into code, and the code is deployed on the distributed ledger as a legally binding contract.[400] However, due to an error by the coder, the code fails to reflect the pricing formula in the parties' business process document. Subsequently, the code is performed according to its instructions by the computers on the network. Alice, discovering what has happened, argues that there has been a "breach of contract" and seeks compensation for her losses under the transaction.

If terms are interpreted according to what they mean to a computer

5.99 If the court would base its interpretation of contractual terms on what the coded obligations mean to a computer,[401] it is difficult to see how a coded obligation could be breached by the computer that performs it. A functioning computer will generally always perform in accordance with its instructions: it will "simply do what it is

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400 This is discussed from para 4.38.

401 This approach to interpretation is discussed from para 4.18.

programmed to do".[402] On this interpretation, Alice's claim for breach of contract could not succeed.[403] The terms of the contract, including the pricing formula, were defined by the code, not by the business process document, and the computers on the DLT network performed those coded terms. There was no divergence between what the terms of the smart contract required the computers to do, and what the computers did.[404]

5.100 Assuming that the court would base their interpretation of contractual terms on what the coded obligations mean to a computer, it might be possible to establish a breach of a solely code smart contract if the court decides to rectify the smart contract after it has been performed. An order of rectification has retrospective effect: the contract will be read "as if it had always been in its rectified form".[405] In principle, if a solely code smart contract is performed by a computer in a way which is inconsistent with how the smart contract, as rectified, would have been performed, then this could give rise to a breach of contract. Returning to the above example, Alice could argue that the solely code smart contract should be rectified, on the basis that the pricing formula in the code failed to reflect the common intention of the parties as expressed in the business process document.[406] If the court ordered rectification, the smart contract would be treated as if it had contained the correct pricing formula from the moment it was deployed on the distributed ledger. As a result, Alice may be able to establish that the smart contract was not performed by the computers on the DLT network in accordance with its terms as rectified. To the extent that it was Bob's obligations that were defectively performed by the computers on the DLT network, Alice may have a claim for breach of contract against Bob.

5.101 As discussed above,[407] there may be practical difficulties in rectifying the coded terms of a smart contract, especially where the code is immutably recorded on a distributed ledger. Where the code has been performed according to its terms and the code cannot be rectified, an argument that a solely code smart contract has been breached is unlikely to be available. In practice, the aggrieved party may have to argue that the solely code smart contract has been vitiated (for example, because of a mistake or a misrepresentation) and therefore that its performance should be unwound through the award of restitutionary remedies.[408]

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402 UKJT Legal Statement at [136].

403 As discussed from para 5.13, the parties may have a claim to rectification of the smart contract. In addition, the coder may be liable under a separate contract with the parties, or potentially in negligence: see Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 40.

404 If the business process document were a legally binding contract, and the code was merely a mechanism for performing that contract, then Alice might have a breach of contract claim against Bob. The argument would be that the code failed to perform Bob's obligations under the business process document, and therefore that Bob is liable to pay damages to Alice to put her in the position she would have been in had the code used the correct pricing formula: see paras 5.86 to 5.90.

405 *Cherry Tree Investments Ltd v Landmain Ltd* [2012] EWCA Civ 736, [2013] Ch 304 at [121] by Lewison LJ; *Goff & Jones, The Law of Unjust Enrichment* (9th ed 2015) para 40-32.

406 Rectification based on common intention is discussed from para 5.13.

407 From para 5.22.

408 This is discussed further from para 5.66.

If terms are interpreted according to what they mean to a reasonable coder

5.102 There is an alternative argument that a court could seek to interpret contractual obligations by reference to what a reasonable person with knowledge of code would understand them to mean.[409] An expert coder would be able to assist the court by translating the code and explaining what that the code appears to instruct the computer to do. Alice could argue that the true interpretation of the coded terms is what the code appears to instruct the computer to do rather than the way in which the code actually performed. The performance of the code by the computer could therefore amount to a breach of contract even though the computer did what it was instructed to do.

5.103 We would like to hear from consultees about the potential difficulties in applying the principles concerning breach of contract, where the terms of the contract are recorded wholly or partly in code.

Question 39.

5.104 Are you aware of, or do you foresee, any difficulties in applying the legal principles concerning breach of contract to contracts recorded wholly or partly in computer code?

FRUSTRATION

5.105 The doctrine of frustration concerns the situation where the parties have entered into a contract, but by reason of a subsequent event, performance has become physically or legally impossible or something "radically different" from what was contemplated by the contract.[410] If a contract is frustrated, the contract is automatically terminated and the parties are excused from further performance under the contract.[411] The rationale for the doctrine is that it is unjust to insist on the literal performance of a contract after a radical change in circumstances.[412]

5.106 As the effect of frustration is to terminate an otherwise binding contract, the doctrine has a narrow scope under English law. A subsequent event will not frustrate the contract if its occurrence is due to the fault of one of the parties.[413] The event must be "some outside event or extraneous change in circumstances", which takes place

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409 This is discussed from para 4.22.

410 *Davis Contractors Ltd v Fareham Urban DC* [1956] AC 696, 729 by Lord Radcliffe.

411 *National Carriers v Panalpina* [1981] AC 675 by Lord Simon. Under the Law Reform (Frustrated Contracts) Act 1943, a party may claim restitution of benefits conferred prior to the frustrating event, provided that appropriate counter restitution is given for benefits conferred by the other party: see ss 1(2) and 1(3); *BP Exploration v Hunt (No 2)* [1982] 1 All ER 925 by Goff J.

412 *J Lauritzen AS v Wijsmuller BV* [1990] 1 Lloyd's Rep 1, 8 by Bingham LJ; *National Carriers Ltd v Panalpina (Northern) Ltd* [1981] 1 AC 675, 700 by Lord Simon.

413 This is known as "self-induced frustration": A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) p 175; *J Lauritzen AS v Wijsmuller BV* [1990] 1 Lloyd's Rep 1, 8 by Bingham LJ.

without the fault of the party seeking to rely on it.[414] That the event merely makes performance of the contract more onerous or expensive for one of the parties is not sufficient for frustration; the event must render performance of the contract impossible or "radically different" from that contemplated by the contract.[415] Whether performance would be "radically different" is a fact sensitive question, which depends on the terms of the contract itself and its context, the parties' mutual expectations as to risk at the time the contract was made, and the nature of the supervening event.[416]

5.107 The classic circumstance in which a contract is frustrated is where the subject matter of the contract is destroyed or the mutually understood purpose of the contract becomes impossible to achieve. For example, in *Taylor v Caldwell*,[417] the lease of a music hall was held to be frustrated because the hall subsequently burnt down, making it impossible to perform the contract. And in *Krell v Henry*,[418] the lease of a room for the purpose of viewing a forthcoming coronation was frustrated because the coronation was cancelled, making it impossible to achieve the purpose of the contract as mutually understood by the parties. By contrast, in *Davis Contractors Ltd v Fareham UDC*,[419] the House of Lords held that a fixed price building contract was not frustrated where, due to an unforeseen labour shortage, the project could only be completed at great delay and expense. Lord Reid observed that the subsequent event had merely made performance of the contract more onerous; it did not fundamentally change the nature of the building work contemplated by the contract.[420]

5.108 In many cases, the question of frustration is not reached, because the consequences of the subsequent event are dealt with by the terms of the contract. It is common for commercial parties to agree to a "force majeure" provision. A force majeure provision typically identifies a range of subsequent events that might affect the performance of the contract and specifies their effect on the contract and the remedies available to the parties.[421] If the subsequent event falls within a force majeure clause on its proper interpretation, the consequences of the event will be determined by reference to what provision says; the doctrine of frustration will have no application.[422]

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414 *J Lauritzen AS v Wijsmuller BV* [1990] 1 Lloyd's Rep 1, 8 by Bingham LJ.

415 *National Carriers Ltd v Panalpina (Northern) Ltd* [1981] 1 AC 675, 700 by Lord Simon.

416 *Edwinton Commercial Corporation v Tsavliris Russ (Worldwide Salvage and Towage) Ltd* [2007] EWCA Civ 547, [2007] 2 All ER (Comm) 634 at [111] by Rix LJ; *Canary Wharf (BP4) T1 Ltd & Ors v European Medicines Agency* [2019] EWHC 335 (Ch) at [31] by Marcus Smith J.

417 (1863) 3 B&S 826.

418 [1903] 2 KB 740.

419 [1956] AC 696.

420 *Davis Contractors Ltd v Fareham UDC* [1956] AC 696.

421 For example, that the parties have the right to terminate the contract, that the contract is suspended for the duration of the subsequent event, or that neither party is to be liable for delay or non-performance as a result of the event.

422 A Burrows, *A Restatement of the English Law of Contract* (2nd ed 2020) pp 175 to 176.

5.109 In the context of smart contracts, there is a risk that events beyond the parties' control may affect the performance of the code.[423] For example, there may be a system breakdown on the platform on which the code is deployed, which means that the code cannot execute or that the code executes in a different way than the parties anticipated. External data sources or "oracles", which relay information to the smart contract, may also break down, affecting the performance of the code.[424] We anticipate that, in many cases, parties to smart contracts will deal with these risks in an accompanying natural language contract, containing an appropriately drafted force majeure provision.

5.110 However, if an event affecting the performance of the code is not dealt with by natural language terms, a party might argue that the smart contract is frustrated at common law. In principle, a smart contract could be frustrated where, by reason of a subsequent event, further performance of the code becomes impossible. For example, if the platform on which the code is deployed is shut down due to some unforeseen event, this might be seen as a case involving the impossibility of further performance due to destruction of the subject matter of the smart contract. In other cases, the subsequent event might not prevent the code's performance, but cause the code to execute in a different way than the parties contemplated. In principle, the doctrine of frustration could be applied in these circumstances. The task would be to identify the subsequent event, determine if it rendered the code's performance "radically different" from what the contract contemplated and, if it did, treat the contract as discharged from that point. The parties may then seek to recover benefits which continue to be conferred by the code after the discharge of the frustrated smart contract[425] under the law of unjust enrichment.[426]

5.111 We would like to hear from consultees about how the law of frustration might be applied to smart contracts and the terms that parties might include in the natural language component of a smart contract to deal with subsequent events affecting the performance of the code.

Question 40.

5.112 Are you aware of, or do you foresee, any difficulties in applying the law on frustration to smart contracts?

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423 UKJT Legal Statement at [136].

424 See Tech London Advocates, *Blockchain: Legal & Regulatory Guidance* (2020) p 34.

425 And benefits conferred before discharge, under the Law Reform (Frustrated Contracts) Act 1943.

426 This is what occurred in *Davis Contractors Ltd v Fareham UDC* [1956] AC 696, where the builder fully performed the contract, but claimed that it should be remunerated for the work on a restitutionary basis, rather than at the contract price, because the contract had been discharged for frustration.

Question 41.

5.113 Can you provide examples of terms that parties have included (or might include) in the natural language element of the smart contract to address the risk that subsequent events might affect the performance of the code?

Please explain:

(1) the drafting of the provision;

(2) the subsequent events covered by the provision;

(3) the effect, under the provision, of the subsequent event on the contract; and

(4) the remedies available to the parties under the provision.

ILLEGALITY

5.114 Under English law, if the purpose or performance of a contract involves conduct that is illegal, then the contract may be unenforceable. The rationale for this principle (known as the "illegality doctrine") is that it would be contrary to the public interest to enforce a claim if doing so would harm the integrity of the legal system.[427] Whether a claim falls within the scope of the illegality doctrine depends on:[428]

(1) the underlying purpose of the law that has been transgressed and whether that purpose would be enhanced by refusing to enforce the claim;

(2) any other relevant public policy which may be affected by denying the claim; and

(3) whether refusing to enforce the claim would be a proportionate response to the illegality, bearing in mind that punishment is a matter for the criminal courts.

5.115 A concern that is sometimes expressed about smart contracts is that they may facilitate illegal activity.[429] As discussed earlier, some DLT systems enable the parties to transact using pseudonyms, without disclosing their real identities. Further, DLT enables participants to transact directly with one another, without the need for intermediaries, such as banks, who would traditionally play a role in detecting illegal activity. Finally, the immutability of data on a DLT system may make it difficult for authorities to halt the code's performance, even once the illegal activity is detected.

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427 *Patel v Mirza* [2016] UKSC 42, [2017] AC 467 at [120].

428 *Patel v Mirza* [2016] UKSC 42, [2017] AC 467 at [120].

429 See eg P de Filippi and A Wright, *Blockchain and the Law: The Rule of Code* (2018) pp 86 to 88 (noting that smart contracts could be used to enter into commercial transactions for the sale of illicit products, for illegal gambling, and for money laundering).

These features potentially make smart contracts attractive to parties seeking to engage in illegal transactions.

5.116 If a party were to bring a claim under a smart contract which was tainted by illegality, the ability to enforce that claim would depend on the court's evaluation of the three considerations outlined above. Given that the coded element of a smart contract performs automatically, it is perhaps unlikely that a party would seek to enforce the performance of the smart contract in an English court.[430] It seems more likely that a party might bring a restitutionary claim to recover money or property transferred under a smart contract tainted by illegality.[431] In *Patel v Mirza*,[432] the UK Supreme Court allowed an unjust enrichment claim to recover money paid under an agreement amounting to a conspiracy to commit insider dealing, even though that agreement was tainted by illegality.[433] We would like to hear from consultees about how the illegality doctrine might be applied to smart contracts.

Question 42.

5.117 Are you aware of, or do you foresee, any difficulties in applying the illegality doctrine to claims made in relation to smart contracts?

430 For example, by seeking damages for breach of contract or an order for specific performance.

431 For example, because the counterparty has failed to provide the promised counter-performance, so that there was a failure of basis for the conferral of the benefit: see *Patel v Mirza* [2016] UKSC 42.

432 [2016] UKSC 42, [2017] AC 467.

433 See A Burrows, "Illegality after *Patel v Mirza*" 70(1) *Current Legal Problems* 55, p 60 (noting that following *Patel v Mirza* it "will be rare for illegality to succeed as a defence to an otherwise successful claim for restitution of an unjust enrichment").

Chapter 6: Consumers and smart contracts

6.1 The legal issues raised so far in this call for evidence apply to all smart contracts, whether business to business commercial contracts, peer to peer arrangements such as transfers of bitcoin or Ether tokens, or business to consumer ("B2C") contracts. In this chapter we specifically consider B2C contracts and look at existing consumer law protections in three broad categories:

(1) transparency and fairness requirements;

(2) information rights; and

(3) consumers' right to treat the contract as at an end.

6.2 We consider how these measures may assist consumers who enter smart contracts and ask consultees what challenges they foresee in applying existing consumer protection laws to smart contracts. We ask to what extent smart contracts are already being used or developed in the context of consumer contracts, and whether any smart contract specific protections may be required if B2C smart contracts become more prevalent.

SMART CONTRACTS IN THE CONSUMER CONTEXT

6.3 Specific consumer protections apply only to "consumer contracts" which, depending on the particular definitions in the relevant legislation, are generally B2C contracts between a trader and a consumer.

6.4 An example of smart contracts being used in the B2C context was Fizzy, the AXA travel insurance policy which we discuss elsewhere and which is no longer on the market. We are interested in examples of any other B2C smart contract use cases, whether currently in use or in development, and views as to whether B2C smart contracts will be used routinely.

Question 43.

6.5 Are you aware of any business to consumer smart contracts currently in use or in development? Please give details.

Question 44.

6.6 When would you estimate that smart contracts might be in common use in business to consumer contracts?

TRANSPARENCY AND FAIRNESS

6.7 When a trader and consumer enter into a contract, for example for the sale of goods or services, there will usually be little room for negotiation of terms and conditions on the part of a consumer. For example, consumers shopping online will usually be required to agree to a trader's standard terms and conditions on the trader's website before placing an order.[434]

6.8 If the trader's terms are fully or partly in code, there is an obvious risk that a consumer who is not code-literate may not understand some or any of what they are asked to agree to. This is, perhaps, not a completely novel situation. Some consumers may not understand terms and conditions presented to them by a trader even in natural language, particularly if they use legalistic language or jargon, or terms are complex because of the nature of the transaction being entered into. How does the current law protect consumers in this situation? Would existing protections also assist non-code literate consumers entering into a smart contract?

6.9 The current law includes a number of requirements for traders and service providers to provide information to consumers about the contracts they have or are considering entering into. Below is a brief summary of some of the requirements in this area.

Requirement for transparency in written terms

6.10 Under the Consumer Rights Act 2015 ("CRA 2015"),[435] a trader[436] must ensure that the written terms of a consumer contract[437] or consumer notice[438] are transparent.[439] In order to be transparent, the terms must be expressed in plain and intelligible language and be legible.[440] The Court of Justice of the European Union ("CJEU") has explained that this means that it should not only make grammatical sense to the average consumer,[441] but also put the consumer into the position of being able to

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434 We discuss this in more detail in Chapter 4 of our recent consultation paper, Consumer sales contracts: transfer of ownership (2020) Law Commission Consultation Paper No 246.

435 The Consumer Rights Act 2015 is due to be amended at the end of the EU exit transition period. These amendments do not affect the analysis of the Consumer Rights Act 2015 in this chapter.

436 "Trader" means a person acting for purposes relating to that person's trade, business, craft or profession, whether acting personally or through another person acting in the trader's name or on the trader's behalf: Consumer Rights Act 2015, s 2(2).

437 A consumer contract is a contract between a trader and a consumer: Consumer Rights Act 2015, ss 61(1) and (3).

438 A consumer notice is a notice that relates to the rights or obligations as between a trader and a consumer, or purports to exclude or restrict a trader's liability to a consumer. It includes an announcement and any other communication or purported communication: Consumer Rights Act 2015, ss 61(4) and (8).

439 Consumer Rights Act 2015, s 68(1).

440 Unfair Contract Terms Directive (93/13/EEC) and Consumer Rights Act 2015 s 64(3) and s 68(2) (specifically in relation to consumer notices). The Consumer Rights Act 2015 implements the Directive and so courts will interpret the rules in light of the Directive and relevant EU case law.

441 The "average consumer" is "a consumer who is reasonably well informed, observant and circumspect": Competition and Markets Authority, *Unfair contract terms guidance: Guidance on the unfair terms provisions in the Consumer Rights Act 2015* (2015),

"evaluate, on the basis of clear, intelligible criteria, the consequences for him which derive from [the term]".[442]

6.11 In the context of smart contracts, it is difficult to see how terms which are only contained in code could be considered to be "transparent" to a non-code literate consumer. Equally, where a contract contains both natural language and coded terms, a non-code literate consumer may not be able to see how the terms relate to each other without some additional explanation (although this may be provided in the natural language terms). Even where a consumer is code literate, they may still not have the level of expertise required effectively to understand the relevant code.

6.12 However, this does not necessarily mean that it is not possible for consumer contracts to be hybrid or solely code smart contracts and yet still comply with the requirement for transparency. Traders in this situation could include a natural language element in the smart contract which sets out the terms and conditions in full, or they could potentially use pre-contractual literature to explain the terms and conditions used.[443] Such literature would be classed as a "consumer notice" which must be transparent in the same way as a consumer contract.[444]

6.13 Unlike some other consumer rights under the CRA 2015, the failure by a trader to comply with the transparency requirement does not amount to a breach of contract or make such a term unenforceable against a consumer. Further, the consumer cannot bring an action against the trader on the basis that the contract was not transparent. Instead, it is up to the Competition and Markets Authority ("CMA") to use its enforcement powers to prevent traders from using terms which are not transparent,[445] and the CMA is likely to take this action only where there is a systemic issue in the market or large numbers of consumers are affected. This may be of limited assistance to a consumer who has already entered into such a contract, although the terms of that contract could still be deemed unfair if they are not transparent.[446] Also, in any interpretation exercise by the court, if a term could have different meanings then the meaning that is most favourable to the consumer will prevail.[447]

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https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/450440/Unfair_Terms_Main_Guidance.pdf, para 2.64.

442 Competition and Markets Authority, *Unfair contract terms guidance: Guidance on the unfair terms provisions in the Consumer Rights Act 2015* (2015) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/450440/Unfair_Terms_Main_Guidance.pdf, para 2.45, referring to *Case C-26/13 Árpád Kásler and Hajnalka Káslerné Rábai v OTP Jelzálogbank Zrt.*, para 75. See also *Case C-143/13 Bogdan Matei and Ioana Ofelia Matei v SC Volksbank România SA* at [73] to [77] and *Case C-96/14 Jean-Claude Van Hove v CNP Assurances SA* at[40] to [49].

443 The CMA suggests the use of pre-contractual literature to aid transparency in: Competition and Markets Authority, *Unfair contract terms explained* (2015) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/450410/Unfair_Terms_Explained.pdf, para 40.

444 Consumer Rights Act 2015, ss 61(4) and (8) and 68(1).

445 Consumer Rights Act 2015, s 70 and sch 3.

446 This is discussed from para 6.17.

447 Consumer Rights Act 2015, s 69(1).

Unfair contract terms

6.14 Under section 62 of the CRA 2015, a term of a consumer contract or a consumer notice is not binding on the consumer if it is "unfair".[448] The term or notice will be unfair if "contrary to the requirement of good faith, it causes a significant imbalance in the parties' rights and obligations to the detriment of the consumer".[449] In applying this test it is therefore necessary to consider all of the following elements.

(1) *Significant imbalance in the parties' rights and obligations*. A term or notice may be unfair if it "is so weighted in favour of the supplier as to tilt the parties' rights and obligations […] significantly in its favour".[450]

(2) *Contrary to good faith*. This test looks at whether the trader has engaged in conduct which is inconsistent with principles of "fair and open dealing".[451] Open dealing means that terms and notices should be "expressed fully, clearly and legibly, containing no concealed pitfalls or traps".[452] Fair dealing means that the trader should not take advantage of the consumer's lack of experience, unfamiliarity with the subject matter of the contract or inferior bargaining position.[453]

(3) *Detriment.* This test is met if the significant imbalance in the parties' rights and obligations is to the consumer's detriment. It is not necessary to prove actual detriment to the consumer; the potential for detriment is sufficient.[454]

6.15 All three elements of this test (good faith, significant imbalance and detriment) are relevant to assessing whether a term is unfair. The test is a unitary one which is applied as a whole. The CMA has noted that, "a rigid approach to assessing fairness, involving an artificial exercise broken into separate parts, is not appropriate".[455]

6.16 The CMA has enforcement powers under the CRA 2015 and a consumer can also challenge the fairness of a term directly in a dispute which arises between them and a

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448 Consumer Rights Act 2015, ss 61(1) and (2).

449 Consumer Rights Act 2015, ss 62(4) and (6).

450 *Director-General Fair Trading v First National Bank* [2001] UKHL 52, [17] by Lord Bingham.

451 *Director-General Fair Trading v First National Bank* [2001] UKHL 52, [17] by Lord Bingham.

452 *Director-General Fair Trading v First National Bank* [2001] UKHL 52, [17] by Lord Bingham. See also CRA 2015, ss 64(1) and 69(1).

453 *Director-General Fair Trading v First National Bank* [2001] UKHL 52, [17] by Lord Bingham. See also CRA 2015, ss 64(1) and 69(1).

454 Competition and Markets Authority, *Unfair contract terms guidance: Guidance on the unfair terms provisions in the Consumer Rights Act 2015* (2015),https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/450440/Unfair_Terms_Main_Guidance.pdf, para 2.45.

455 Competition and Markets Authority, *Unfair contract terms guidance: Guidance on the unfair terms provisions in the Consumer Rights Act 2015* (2015), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/450440/Unfair_Terms_Main_Guidance.pdf, para 2.10.

trader. In considering whether a term or notice meets these criteria for unfairness, the court or regulator is to have regard to:[456]

(1) the nature of the subject matter of the term or notice;

(2) in the case of a contract term, all the circumstances existing when the contract was agreed and the other terms of the contract; and

(3) in the case of a notice, all the circumstances existing when the rights or obligations to which the notice relates arose.

6.17 In the context of smart contracts, contract terms which are wholly or partly in code could be contrary to good faith if those terms are not clear or legible to consumers. An unclear term of a consumer contract or a consumer notice will not automatically be unfair under the CRA 2015 but, if it is found to be an unfair term (as set out above), it will not be legally binding on a consumer.[457] The unfair terms provisions in the CRA 2015 therefore provide consumers with protection if they enter into a contract with a trader and seek to challenge a particular term in that contract.

Prohibition of unfair commercial practices

6.18 The Consumer Protection from Unfair Trading Regulations 2008[458] ("CPRs") prohibit unfair commercial practices in relation to the promotion, sale or supply of a "product", which includes[459] goods, a service, digital content, immoveable property and rights or obligations.[460] The CPRs do not just cover the terms of a contract and instead are concerned with relevant practices before, during and after any transaction. The definition of "commercial practice" is broad and includes any act, omission or representation by a trader which is connected with the promotion or supply of a product to consumers.[461] It includes commercial communications such as advertising.

6.19 A commercial practice is unfair if it contravenes the requirements of professional diligence and it materially distorts or is likely materially to distort the economic behaviour of the average consumer with regard to the product.[462] A commercial practice is unfair if it is a misleading action, a misleading omission or aggressive and it causes or is likely to cause the average consumer[463] to take a transactional decision they would not have taken otherwise.[464] The CPRs also include a list of commercial

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456 Consumer Rights Act 2015, ss 62(5) and (7).

457 Consumer Rights Act 2015, ss 62(1) and (2).

458 The CPRs are is due to be amended at the end of the EU exit transition period. These amendments do not affect the analysis of the CPRs in this chapter.

459 The Consumer Protection from Unfair Trading Regulations 2008 (SI 2008/1277) ("CPRs"), reg 3(1) and reg 2(1) (definition of "commercial practice").

460 Consumer Protection from Unfair Trading Regulations 2008, reg 2(1).

461 Consumer Protection from Unfair Trading Regulations 2008, reg 2(1).

462 Consumer Protection from Unfair Trading Regulations 2008, reg 3(3).

463 The "average consumer" is discussed further from para 6.21.

464 Consumer Protection from Unfair Trading Regulations 2008, regs 3(4), 5, 6 and 7 and sch 1.

practices which are automatically unfair.[465] An isolated act or omission by a trader may constitute an unfair commercial practice.[466]

6.20 In the context of smart contracts, the prohibition against misleading omissions and misleading actions in the CPRs may be particularly relevant. This could be the case where a non-code literate consumer only has access to a wholly or partly coded contract or a consumer is relying on pre-contractual information to understand the contract. For example, a misleading omission could include the provision of material information (which the average consumer needs to take an informed transactional decision) in a manner which is unclear, unintelligible, ambiguous or untimely.[467] A misleading action could include a representation or commercial communication which contains false information and is therefore untruthful in relation to the extent of the trader's commitments, the nature of the sales process or the consumer's rights or the risks they may face.[468] For example, a pre-contractual explanation of the proposed transaction could misstate the effect of the coded terms of the contract.

6.21 The concept of the "average consumer" is also relevant. When determining the effect of a commercial practice on an average consumer, material characteristics shall be taken into account, including being reasonably well informed, reasonably observant and circumspect.[469] Where a commercial practice is directed to a particular group of consumers, the average consumer is read as referring to the average member of that group.[470] The Unfair Commercial Practices Directive, which the CPRs implement, suggests that social, cultural and linguistic factors should also be taken into account when considering the average consumer.[471] Although code literacy is likely to increase over time, at the moment the average consumer is unlikely to be code literate. It may be that certain groups of consumers may be more code literate than others: for example, those who are involved in drafting smart contracts or regularly conducting transactions using Distributed Ledger Technology ("DLT"). A court would therefore have to exercise judgement to determine the typical reaction of the average consumer in a given case.[472]

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465 For example, claiming that products are able to facilitate winning in games or chance (CPRs, sch 1 para 16) and making persistent and unwanted solicitations by telephone, fax, e-mail or other remote media except in circumstances and to the extent justified to enforce a contractual obligation (CPRs, sch 1 para 26)

466 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 38-167; *Nemzeti Fogyasztóvédelmi Hatóság v UPC Magyarország* (C-388/13) of 16 April 2015.

467 This is only an example. Section 6 of the CPRs sets out the full definition of a misleading omission.

468 This is only an example. Section 5 of the CPRs sets out the full definition of a misleading action.

469 Consumer Protection from Unfair Trading Regulations 2008, s 2(1) (definition of "average consumer") and s 2(2).

470 Consumer Protection from Unfair Trading Regulations 2008, ss 2(4) to 2(6).

471 Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC, 98/27/EC and 2002/65/EC of the European Parliament and of the Council and Regulation (EC) No 2006/2004 of the European Parliament and of the Council ("Unfair Commercial Practices Directive"), recital 18.

472 Unfair Commercial Practices Directive, recital 18. See also H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 38-169 citing *Criminal Proceedings against Canal Digital Denmark A/S* (C-611/14) para 39 and *R (on*

6.22 The CPRs provide consumers with rights of redress in respect of misleading omissions and aggressive commercial practices[473] where these are a significant factor in the consumer's decision to enter into a contract or make a payment.[474] A consumer may have the right to unwind the contract or payment,[475] obtain a discount[476] or claim damages.[477] The consumer can enforce these rights by a claim in civil proceedings.[478] In the context of smart contracts, a discount or damages could be enforced either on chain or off chain. However, unwinding the contract or a payment under it may prove less straightforward. The CPRs provide that where a consumer has the right to unwind a contract, the contract comes to an end so that the consumer and trader are released from their obligations under it. As we have discussed elsewhere,[479] it is not clear how such a remedy could be enforced where the contract is recorded on an immutable ledger unless it has a kill function which can be triggered to halt the performance of the contract.

6.23 Engaging in certain commercial practices covered by the CPRs could result in the CMA taking enforcement action against a trader.[480] A trader may also be found to have committed a criminal offence.[481] A trader may be ordered to pay compensation to the consumer if convicted of offences under the CPRs, although this power has in general been little used.[482]

INFORMATION RIGHTS

Current law

6.24 Various pieces of legislation contain similar requirements on traders to provide consumers with certain information before they enter into a contract. We include a brief summary below, and then consider how they apply in the smart contracts context.

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the application of Cityfibre Ltd) v Advertising Standards Authority [2019] EWHC 950 (Admin), in particular [101] to [114].

473 Consumer Protection from Unfair Trading Regulations 2008, ss 27A and 27B. There are no consumer rights to redress in relation to misleading omissions or commercial practices listed in schedule 1 of the regulations.

474 The rights to redress apply where a consumer enters into a contract for the sale or supply of a product by a trader or makes a payment to a trader for supply of a product: CPRs, s 27A(2). The rights do not apply to certain "products", including immoveable property other than certain leases and some services provided in the course of carrying on an activity regulated by the Financial Services and Markets Act 2000: The Consumer Protection from Unfair Trading Regulations 2008 (SI 2008/1277), ss 27C and 27D.

475 Consumer Protection from Unfair Trading Regulations 2008, ss 27E, 27F and 27H.

476 Consumer Protection from Unfair Trading Regulations 2008, s 27I.

477 Consumer Protection from Unfair Trading Regulations 2008, s 27J.

478 Consumer Protection from Unfair Trading Regulations 2008, s 27K.

479 This is discussed from para 5.92.

480 Consumer Protection from Unfair Trading Regulations 2008, s 19.

481 Consumer Protection from Unfair Trading Regulations 2008, ss 8 to 12.

482 Law Commission, Scottish Law Commission, Consumer Redress for Misleading and Aggressive Practices (2012) Law Com No 332; Scot Law Com No 226, Cm 8323, paras 2.44 and 2.46. This payment of compensation is separate to a consumer's right to damages under s 27J of the CPRs.

The Consumer Contracts (Information, Cancellation and Additional Charges) Regulations 2013 ("CCRs")

6.25 The CCRs implement an EU Directive.[483] They require traders to give consumers certain information before they enter into a distance contract (such as an online contract or a contract made by mail order or telephone) for goods, services or digital content.[484]

6.26 Traders must provide, in a clear and comprehensible manner,[485] information including the main characteristics of the goods, services or digital content, the price and any additional costs, and details of the consumer's cancellation rights.[486] The Directive suggests that a trader should take into account any particular vulnerability of consumers because of their mental, physical or psychological infirmity, age or credulity in a way which the trader can reasonably be expected to foresee.[487] A trader must also give a consumer confirmation of the contract they have entered into on a durable medium.[488]

6.27 A trader's failure to provide the information required by the CCRs may amount to a breach of contract,[489] or a "misleading omission" or "misleading action" under the CPRs.[490] It therefore appears that the rights of redress described above under the CPRs may be available to consumers where a trader attempts to put some or all of the terms in code without a natural language explanation. This would amount to a failure to comply with the information requirements under the CCRs.

The Electronic Commerce (EC Directive) Regulations 2002[491] ("ECRs")

6.28 The ECRs require a provider of "information society services", such as online shopping, to provide information on certain matters before an order is placed. An "information society service" is "any service normally provided for remuneration", provided digitally and at a distance.[492] There is no requirement for a contract to be

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483 Directive 2011/83/EU of the European Parliament and of the Council of 25 October 2011 on consumer rights, amending Council Directive 93/13/EEC and Directive 1999/44/EC of the European Parliament and of the Council and repealing Council Directive 85/577/EEC and Directive 97/7/EC of the European Parliament and of the Council ("2011 Directive"). The CCRs are due to be amended at the end of the EU exit transition period. These amendments do not affect the analysis of the CCRs in this chapter.

484 2011 Directive, recital 20. See also CCRs, reg 5.

485 Consumer Contracts (Information, Cancellation and Additional Charges) Regulations 2013, reg 13.

486 Consumer Contracts (Information, Cancellation and Additional Charges) Regulations 2013, reg 13, sch 2 and sch 3.

487 2011 Directive, recital 34. See also H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 38-094.

488 Consumer Contracts (Information, Cancellation and Additional Charges) Regulations 2013, reg 16.

489 Under CCRs, reg 18, distance contracts are treated as including a term that the trader has complied with the requirements described above.

490 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) paras 38-109 to 38-111.

491 The ECRs are due to be amended at the end of the EU-UK transition period. These amendments do not affect the analysis of the ECRs in this chapter.

492 "Information society services" are defined in the ECRs, reg 2(1) by reference to art 2(a) of Directive 2000/31/EC of the European Parliament and of the Council on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ("the 2000 Directive") (which itself refers

formed between the provider and the user of the services. An "information society service" can include "economic activity" even if the user does not pay, such as websites and search engines.

6.29 The information which the service provider must give includes information about the different technical steps to follow to conclude a contract and the terms and conditions applicable to the contract. The information must be provided in "a clear, comprehensible and unambiguous manner".[493] Depending on what the service provider has failed to do, the consumer may have an action for damages for breach of statutory duty[494] or may seek a court order requiring the service provider to comply with the relevant requirement. The CMA may also take enforcement action under the Enterprise Act 2002.

Provision of Services Regulations 2009[495] ("PSRs")

6.30 The PSRs require service providers[496] under certain contracts for services[497] to supply certain information to consumers in a clear and unambiguous way. This includes information about the identity of the business, the nature of the service, general terms and conditions and the price.[498] The information should be provided in good time before the contract is concluded or before the service is provided, if there is no written contract.

6.31 These information requirements are enforceable by the CMA under the Enterprise Act 2002. The PSRs do not give consumers any separate rights of redress.

Information rights and smart contracts

6.32 These information rights appear to preclude the ability of a trader to offer goods or services to consumers without setting out, in advance of the consumer entering the contract, the key terms in a clear and comprehensible way – at least where such goods or services are offered on a distance basis. It appears therefore that businesses could already be seen to be under an obligation to provide a clear, natural language explanation of any coded terms in a consumer contract.

A CONSUMER'S RIGHT TO TREAT A CONTRACT AS AT AN END

6.33 A consumer has various statutory rights to treat a consumer contract as at an end in certain circumstances. The CRA 2015 provides that a consumer can treat a consumer

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to art 1(2) of Directive 98/34/EC laying down a procedure for the provision of technical standards and regulations).

493 The Electronic Commerce (EC Directive) Regulations 2002 ("ECRs"), reg 9.

494 Electronic Commerce (EC Directive) Regulations 2002, reg 13.

495 The PSRs are due to be amended at the end of the transition period. These amendments do not affect the analysis of the PSRs in this chapter.

496 Provision of Services Regulations 2009 (SI 2009/2999), regs 2 and 4.

497 Regulation 2(2) of the PSRs sets out those services excluded from the scope of the Regulations.

498 Provision of Services Regulations 2009, regs 7 to 11.

contract to supply goods as at an end where, for example, a consumer rejects goods which are not as described[499] or goods are not delivered within an agreed period.[500]

6.34 Consumers have a right to withdraw an offer or cancel certain distance contracts[501] within the timeframes set out in the CCRs without giving any reason.[502] This is a standalone right and does not require the trader to have breached any of the information provision requirements under the CCRs described above. If a contract is cancelled or an offer withdrawn, the cancellation ends the obligations of the parties to perform the contract and the CCRs set out the arrangements for reimbursement by the trader and return of goods by the consumer.[503]

Challenges for smart contracts

6.35 The nature of smart contracts is that they perform automatically and are immutable where recorded on a distributed ledger. Where a consumer contract is a smart contract, it will be necessary to consider how to ensure that a consumer can effectively exercise their rights to treat a contract as at an end, withdraw an offer and cancel a distance contract.

IS SMART CONTRACT SPECIFIC PROTECTION REQUIRED?

6.36 Under the current law, consumers can already expect to receive information about contractual terms and conditions in a clear and understandable form. They also have various rights to cancel contracts or withdraw offers, although it will be necessary to consider how these rights can be exercised when the contract is a smart contract.

6.37 Some commentators have suggested that, in spite of the general protections which already exist, specific protections should be put in place in relation to smart contracts. One suggestion is a regulation system based on monitoring and marks of conformity granted by certification bodies, to provide comfort to consumers who do not have the resources or skills to check coded terms.[504] The same author also suggests allowing government authorities to access distributed ledgers in order to intervene in cases of abuse or fraud. Others have been more cautious, suggesting that the current law can be applied to new technologies and forms of contract and that any legislative reforms may quickly become out of date as the technology evolves.[505]

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499 Consumer Rights Act 2015, s 20(4).

500 Consumer Rights Act 2015, s 28(6).

501 Certain consumer contracts are excluded from this right, including certain contracts for the supply of medicinal products or products by a health care professional and contracts that are for passenger transport services: Electronic Commerce (EC Directive) Regulations 2002reg 27.

502 Electronic Commerce (EC Directive) Regulations 2002, reg 29.

503 Electronic Commerce (EC Directive) Regulations 2002, regs 33 to 35.

504 O Borgogno, "Usefulness and Dangers of Smart Contracts in Consumer Transactions", in L DiMatteo, M Cannarsa and C Poncibò (eds) *Smart contracts, blockchain technology and digital platforms* (2020) p 288.

505 G Howells, "Protecting consumer protection values in the fourth industrial revolution" (2020) 43 *Journal of Consumer Policy* 145-175.

6.38 Assuming that existing customer protections can be applied to smart contracts in much the same way as traditional contracts, complications may still arise with enforcement of remedies, for example if the trader is pseudonymous.

Question 45.

6.39 What challenges do you foresee in applying consumer protection laws to consumer contracts entered into wholly or partly in code? Are there any additional existing protections, beyond those we have discussed, which you think are or will be particularly important in the smart contract context?

Question 46.

6.40 What, if any, additional protections do you think are required for consumers entering into smart contracts? In particular, do you consider that there is a case for an explicit legal requirement that terms of a consumer contract which are fully or partly in code must be explained in natural language before the conclusion of the contract?

Chapter 7: Jurisdiction and smart contracts

INTRODUCTION

7.1 In this chapter, we consider the factors that will determine whether the courts of England and Wales will have jurisdiction to hear a dispute in relation to a smart contract in the absence of a choice-of-court clause in the relevant contract.

7.2 In light of the uncertainty about the private international law rules that will operate to determine jurisdiction in the UK after it leaves the EU customs union and single market on 31 December 2020, we have adopted a thematic approach to this issue.

7.3 Instead of looking directly at the particular rules contained in specific private international law frameworks, our approach is informed by certain common themes that are consistent across different jurisdiction-allocating regimes. In particular, we have focussed on private international law concepts the application of which may pose novel difficulties in the smart contract context.

7.4 We also note that novel problems of private international law may require international cooperation to resolve. As the Law Commission of England and Wales, it will not be for us alone in any future work to suggest how jurisdiction should be determined in relation to smart contracts for all courts. Nevertheless, it is useful for the purposes of a scoping study to discuss the challenges which may arise under the rules and concepts as they are currently understood and applied by the courts of England and Wales.

Jurisdiction regimes

7.5 To determine whether a domestic court has jurisdiction, it is first necessary to know which jurisdiction regime (and so which set of jurisdiction-allocating rules) applies to the claim.

7.6 Although the UK is no longer an EU member state, the current framework of European rules will continue to apply for the duration of the transition period.[506] This means that, at present, a court of England and Wales considering a contractual dispute may have to apply:

(1) *Brussels Recast*.[507] This regime applies when:

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506 The "transition period" is the period between the UK's exit from the European Union on 31 January 2020 and the time when the UK will leave the EU customs union and single market on 31 December 2020.

507 Regulation on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters (EU) No 1215/2012, Official Journal 2012 L 351 of 12.12.2012 p 1 ("Brussels Recast"). The allocation of intra-UK jurisdiction is currently determined in accordance with the modified version of Brussels Recast contained in sch 4 of the Civil Jurisdiction and Judgments Act 1982: see s 16. The Civil Jurisdiction and Judgments Act 1982 (as amended by the Civil Jurisdiction and Judgments (Amendment) (EU Exit) Regulations 2019/479) will continue to determine the allocation of intra-UK jurisdiction after the transition period for civil and commercial matters where the courts of two or more parts of the UK would have had jurisdiction under their domestic regimes.

(a) the defendant is domiciled in the UK or in an EU member state;[508]

(b) there is a specific subject matter connection between the claim and the UK or an EU member state, which gives that state exclusive jurisdiction;[509] or

(c) the defendant has consented to the EU or an EU member state having jurisdiction (for example, through a choice-of-court agreement[510] or by submitting to the jurisdiction).[511]

(2) *The Lugano Convention*.[512] This regime applies when:

(a) the defendant is domiciled in Iceland, Norway or Switzerland;[513]

(b) there is a specific subject matter connection between the claim and Iceland, Norway or Switzerland, which gives that state exclusive jurisdiction;[514] or

(c) the defendant has consented to Iceland, Norway or Switzerland having jurisdiction (for example, through a choice-of-court agreement[515] or by submitting to the jurisdiction).[516]

(3) *The common law rules.* This regime applies by default in the absence of any superseding regime (such as Brussels Recast and the Lugano Convention).

7.7 It is currently an open question as to what the position will be when the transition period ends on 31 December 2020. The Withdrawal Agreement[517] stipulates that Brussels Recast will continue to apply to ongoing claims commenced prior to the end of the transition period. For claims commenced after 31 December 2020, however, the position is less clear. While the UK has submitted an application to accede to the

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508 Brussels Recast, art 4. Strictly speaking, Brussels Recast is not directly applicable to Denmark. However, under the Agreement between the European Community and the Kingdom of Denmark on jurisdiction and the recognition and enforcement of judgments, Official Journal L 299 of 16.11.2005 p 62, Denmark applies Brussels Recast.

509 Brussels Recast, art 24.

510 Brussels Recast, art 25(1). In line with our terms of reference, this chapter considers the question of jurisdiction in the absence of a choice-of-court agreement.

511 Brussels Recast, art 26.

512 Convention on jurisdiction and the recognition and enforcement of judgments in civil and commercial matters, Official Journal L 339 of 21.12.2007 p 3 ("Lugano Convention").

513 Lugano Convention, art 2.

514 Lugano Convention, art 22.

515 Lugano Convention, art 23.

516 Lugano Convention, art 24.

517 Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community (10 October 2019) ("Withdrawal Agreement"), art 67.

Lugano Convention, that application (and any terms of accession) remains to be negotiated and approved by the Convention's signatories.

7.8 In the absence of an agreement between the UK and EU to the contrary, the European framework of rules will cease to apply from the end of the transition period.[518] This means that questions of jurisdiction will fall to be resolved by the application of domestic private international law rules. In England and Wales this consists primarily of the common law rules.[519]

7.9 In light of the ambiguity about precisely what rules of private international law will apply to determine jurisdiction after the end of the transition period, we consider the issue of jurisdiction thematically, by reference to the following themes:

(1) *Contracting parties*: we consider the problems that arise from the increased prevalence of pseudonymous contracting in the context of smart contracts. We discuss issues relating to identity, domicile, and presence.

(2) *Circumstances of contract formation*: we consider issues relating to identifying a smart contract's place of formation and the actions of agents.

(3) *Governing law*: we consider how concepts like party autonomy, presumptively applicable law, and the contract's characteristic performer might apply in the smart contract context. We also discuss the problem of localising a smart contract to a single legal system.

(4) *Performance, acts, and enrichment*: we look at difficulties in relation to identifying a smart contract's place of performance, as well as the problem of locating the place of any acts giving rise to a liability to make restitution, and the place in which a party is enriched.

(5) *Insurance contracts, consumer contracts and employment contracts:* we discuss specific issues that relate to these types of contract.[520]

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518 Ministry of Justice, *Cross-border civil and commercial legal cases: guidance for legal professionals from 1 January 2020* (2020), https://www.gov.uk/government/publications/cross-border-civil-and-commercial-legal-cases-guidance-for-legal-professionals-from-1-january-2021/cross-border-civil-and-commercial-legal-cases-guidance-for-legal-professionals-from-1-january-2021.

519 Together with the procedural rules contained in Part 6 of the Civil Procedure Rules 1998, and certain provisions of the Civil Jurisdiction and Judgments Act 1982, particularly as amended by the Civil Jurisdiction and Judgments (Amendment) (EU Exit) Regulations 2019 (SI 2019 No 479). Significant amendments include changes to the applicable jurisdiction rules in consumer and employment contexts: Civil Jurisdiction and Judgments Act 1982, ss 15B-15D. Additionally, a Private International Law (Implementation of Agreements) Bill – which would incorporate three international private international law agreements into domestic law – is currently making its way through Parliament.

520 These types of contract, which commonly involve a significant asymmetry in information or (economic) power, often engage specialised jurisdiction rules. These rules are usually tailored towards giving the weaker party either more choice of where they can sue or more protection in relation to where they can be sued.

(6) *Comparative appropriateness:* we consider different factors that make a jurisdiction comparatively more appropriate to hear a dispute in relation to a smart contract.

7.10 In each case, we explain whether and how the rules could be applied to smart contracts.

7.11 We are interested to hear whether consultees agree with our analysis, and whether there are other novel issues or difficulties which we have not considered. In addition to some targeted questions through the discussion, we ask broad questions on these matters at the end of this chapter.

CONTRACTING PARTIES

Identity, domicile and presence

7.12 As we have previously discussed, the pseudonymous nature of some distributed ledger technology (DLT) systems may make it comparatively more common for parties to enter into smart contracts without knowing the real identity of their counterparty.[521]

7.13 Where parties have not included a choice-of-court agreement clause in their smart contract, and for cases that do not engage rules of exclusive jurisdiction, the applicable jurisdiction regime is normally determined by the defendant's domicile.[522]

7.14 A preliminary issue is that a party seeking to commence a claim in relation to a smart contract may not know, and may never be able to discover, the domicile of their intended defendant.[523] As Bryan J recently observed in *AA v Persons Unknown*:[524]

> Because [the defendants] are persons unknown it is not as yet known what jurisdiction they are in.

7.15 In these circumstances, it may not be possible to know whether jurisdiction should be determined by the rules of an international framework. In the absence of information about a defendant's domicile, the issue will be determined by the application of the

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521 We discuss whether legally binding agreements can be concluded between anonymous or pseudonymous parties from paras 3.15.

522 An example of a rule of exclusive jurisdiction is Brussels Recast, art 24(1). For disputes that concern title to (or tenancies in) immovable property, this rule allocates jurisdiction exclusively to the courts of the member state in which the property is situated. This rule applies irrespective of the defendant's domicile. The rationale underlying rules of exclusive jurisdiction is that certain courts are uniquely well placed to hear disputes over certain subject matter: P Torremans (ed), *Cheshire, North & Fawcett, Private International Law* (15th ed 2017) p 217.

523 In Case C-327/10 *Hypoteční banka as v Lindner* [2011] ECR I-11543, the CJEU indicated that a defendant whose domicile is presently unknown may be treated as domiciled in their last known place of domicile. However, this is inapplicable to a situation where the defendant's domicile has never been known.

524 [2019] EWHC 3556 (Comm), [2020] 4 WLR 35 at [73]. This was a claim brought by a Canadian insurance company against four defendants, two of which were anonymous. The claimant had been hacked, and the hackers demanded payment in bitcoin to reverse the effects of the malware that had been installed on the claimant's computers.

default domestic private international law rules.[525] This could disadvantage a claimant seeking to commence a claim before an English and Welsh court if the common law rules are comparatively more discretionary than the non-discretionary rules of the international framework that would have applied had the defendant's domicile been known.[526]

7.16 Alternatively, jurisdiction can be grounded in the mere presence of a party within a country. In England and Wales, for example, a court will have jurisdiction to hear a claim if the defendant is served with a claim at a moment in time when they are present in England or Wales.[527] However, when parties have contracted without knowing each other's real identities, it will not be possible to use this basis of jurisdiction.

7.17 In the cryptocurrency context, Dickinson has noted that:[528]

> The pseudonymity of users within cryptocurrency systems (one of the features that makes them attractive to their participants) may make it difficult to locate not only the rights and act in question but also the actors.

CIRCUMSTANCES OF CONTRACT FORMATION

Place of formation

7.18 A court's jurisdiction to hear a contractual dispute may be based on the fact that the contract was formed within the country. This is a basis of jurisdiction in England and Wales.[529]

7.19 Conventionally, a contract is formed at the moment when, and in the place that, the acceptance of an offer is communicated to the offeror.[530] Accordingly, a contract is

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525 Bryan J approached the jurisdiction issue in this way in *AA v Persons Unknown* [2019] EWHC 3556 (Comm), [2020] 4 WLR 35 at [67] to [71].

526 For example, under the common law rules a claim is liable to being stayed on the basis that there is a clearly more appropriate jurisdiction in which it should be heard. In contrast, courts have no discretionary power to stay a claim where jurisdiction is grounded in Brussels Recast: Case C281/02 *Owusu v Jackson* [2005] ECR I-1383.

527 For natural persons, "presence" means simply being in England, however transitory that period may be: *Maharanee of Baroda v Wildenstein* [1972] QB 283 (CA). For legal persons, "presence" generally means having a fixed place of business.

528 A Dickinson, "Cryptocurrencies and the Conflict of Laws" in D Fox and S Green (eds), *Cryptocurrencies in Public and Private Law* (2019) p 97.

529 Civil Procedure Rules 1998, Practice Direction 6B, para 3.1(6)(a).

530 As long as the agreement is sufficiently complete and certain, compliant with any required formalities, made with consideration, and intended to create legal relations between the parties: H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 2-001. Normally this communication must be actual, but in some circumstances the law will deem an acceptance to take effect (and so a contract to be formed) at a point in time when it has not in fact been communicated. The classic example being that a posted acceptance takes effect when and where it is posted, rather than when and where it is received: *Adams v Lindsell* (1818) 1 B & Ald 681. On a contemporary basis, the rule relating to posted acceptance applies only where the postal service is a reasonable or agreed medium: H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 2-049. Additional exceptions are where the terms of the offer expressly or impliedly waive the requirement (for

made within England if the communication of the offeree's acceptance is received in England.[531]

7.20 As we discussed in Chapter 3, the analysis of the formation of a smart contract will depend upon the form that the smart contract takes. For smart contracts which involve a natural language contract with automated performance by code, the place of formation will be determined by reference to the parties' natural language negotiations and the ordinary rules of contract formation. For example, if the natural language contract is concluded by exchange of emails then the contract will be formed, on the currently prevailing view, when and where the emailed acceptance arrives on the offeror's email server.[532]

7.21 In contrast, determining the place of formation for solely code smart contracts poses greater difficulty.[533] In Chapter 3 we identified two methods of formation for solely code smart contracts:[534]

(1) an offer is deployed on a distributed ledger which an offeree accepts by performing a specified act; and

(2) a computer program deployed on a distributed ledger makes an offer which another computer program (also deployed on the distributed ledger) accepts.

7.22 Suppose that Alice has deployed a piece of code on a distributed ledger and Bob has then interacted with that piece of code in a specified way. It seems that the (unilateral) smart contract could be formed either:

(1) at the place where Bob performs the act specified in the code that Alice has deployed on the distributed ledger;

(2) at the place where Alice has the acceptance communicated to her; or

(3) at some other place(s).[535]

7.23 The situation is further complicated in circumstances where the contract is formed by the autonomous interactions of two computer programs. Suppose that Alice has deployed a computer program on a distributed ledger which makes an offer that is

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example, where an offer invites acceptance by conduct), or where an acceptance only fails to be communicated to the offeror through their own fault.

531 Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018) para 11-181.

532 H Beale (ed), *Chitty on Contracts* (33rd ed 2020) paras 2-046(4) and 2-081. There is, however, no authoritative precedent for this view.

533 We discuss the difficulty of identifying the place of formation for hybrid smart contracts at para 7.24.

534 We discuss these different ways in which a solely code smart contract can be formed from para 3.6.

535 We note that it has been accepted as a matter of principle, at least for jurisdictional purposes, that a contract can be made in two (or more) places at once: *Conductive Inkjet Technology Ltd v Uni-Pixel Displays Inc* [2013] EWHC 2968 (Ch), [2014] 1 All ER (Comm) at [72] to [73]; *Apple Corps Ltd v Apple Computer Inc* [2004] EWHC 768 (Ch), [2004] 2 CLC 720 at [36] to [42].

accepted by a computer program that has been deployed by Bob. Here, it seems that the smart contract could be formed either:

(1) at the place where Bob, who has deployed the computer program that accepts the offer, is situated when that acceptance takes place;

(2) at the place where Alice, who has deployed the computer program that makes the offer, is situated when that acceptance takes place;

(3) at the place(s) where the node(s) running the computer program that accepts the offer is/are situated;

(4) at the place(s) where the node(s) running the computer program that makes the offer is/are situated;

(5) at some other place(s).

7.24 For a hybrid smart contract – a contract comprising terms recorded in natural language and terms recorded in code – the task of determining the place of formation will be a fact-sensitive inquiry.

7.25 For example, a hybrid smart contract might be formed when a document containing the natural language terms is signed by the parties. In this case, the place of formation poses no novel difficulties. Alternatively, a hybrid smart contract might be formed when the coded terms are deployed by the parties on a distributed ledger. In this case, determining the place of formation will necessitate overcoming the sorts of challenges identified above in relation solely code smart contracts. All will depend on the facts of the particular case.

7.26 We would like to hear consultees' views on the place of formation of different types of smart contract.

Question 47.

7.27 Are you aware of, or do you foresee, any difficulties in identifying the place of formation of a smart contract?

Agents

7.28 A court's jurisdiction to hear a dispute can be based on the location of an agent who has been involved in the contractual process. For example, under the common law rules the courts of England and Wales have jurisdiction if a contract was made by or through an agent trading or residing in the territory.[536]

[536] Civil Procedure Rules 1998, Practice Direction 6B, para 3.1(6)(b).

7.29 In Chapter 3, we considered whether two computer programs who autonomously reach an agreement could be said to have acted as the parties' "agents".[537] Following the decision of the Singapore Court of Appeals in *Quoine*,[538] we are minded not to regard computers as being capable of being contracting parties' agents. In Chapter 2 we considered whether a third party computer coder engaged to produce coded terms for a smart contract could be acting as an agent of one or both of the parties to that contract.[539] We are interested in understanding whether there are any third parties commonly involved in the formation of smart contracts who could be considered agents for this purpose.

Question 48.

7.30 In what circumstances do you think that jurisdiction to hear a dispute in relation to a smart contract could be based on the actions and location of an agent?

GOVERNING LAW

7.31 A motivating factor in the early development of smart contracts (and DLT in particular) was a desire to exclude institutional influences; to decentralise control and disintermediate transactions. The law is, amongst other things, a regulatory institution. Parties entering into smart contracts underpinned by DLT may do so in the hope or expectations that such agreements are, in a meaningful way, beyond the reach of the law.[540] Perhaps for this reason, as Rühl has written:[541]

> The law applicable to smart contracts is a neglected topic. At times it is even discarded as irrelevant or unnecessary. In fact, many authors claim that smart contracts especially when stored and executed with the help of blockchain technology make contract law and, in fact, the entire legal system obsolete. "Code is law" is a frequently cited catchphrase.

7.32 Nevertheless, we have suggested that smart contracts, of various kinds, can be a source of enforceable legal obligations. When these obligations are breached or when

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537 We discuss this from para 3.19.

538 *Quoine Pte Ltd v B2C2 Ltd* [2020] SGCA(I) 02.

539 We discuss this from para 2.36.

540 "Smart contracts do not need a legal system for their existence: they may operate without any overarching legal framework. De facto, they represent a technological alternative to the whole legal system": A Savelyev, "Contract Law 2.0: 'Smart' contracts as the beginning of the end of classic contract law" (2017) 26 *Information & Communication Technology Law* 116, 132. We discuss the necessity of an intention to create legal relations from para 3.36.

541 G Rühl, "Smart (legal) contracts, or: Which (contract) law for smart contracts?", in B Cappiello and G Carullo (eds), *Blockchain, Law and Governance* (forthcoming) p 1.

something goes awry (for example, the code does not operate as the parties intended),[542] the law will be invoked to resolve disputes.[543]

7.33 Whilst courts will always apply their own procedural law, it is common for them to apply foreign substantive law to resolve contractual disputes. There are a number of ways in which the governing law of a contract can be relevant (and sometimes determinative) of the question of jurisdiction. For example, a contract's governing law can be:

(1) a basis upon which jurisdiction is founded;[544]

(2) a factor in determining the comparative appropriateness of a particular court;[545] or

(3) a necessary precursor to identifying some other basis upon which jurisdiction can be founded, such as the contract's place of performance.[546]

The Rome I Regulation

7.34 The choice of law rules that determine the law applicable to contractual obligations are contained in the Rome I Regulation, which applies to contractual obligations assumed after 17 December 2009 and will continue to apply after the transition period comes to an end on 31 December 2020.[547]

7.35 The Rome I Regulation applies to "contractual obligations". In *Ergo Insurance v If P&C Insurance*, the CJEU explained that:[548]

> The concept of "contractual obligation" within the meaning of Article 1 of the Rome I Regulation designates a legal obligation freely consented to by one person towards another.

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542 We discuss the various remedies that might be available in this situation in Chapter 5.

543 While smart contracts are, to varying degrees, code-based, "this code will not operate in a legal vacuum. Deployment of smart contracts in commercial setting will inevitably lead to disputes. For example, if smart contract code is flawed, incorporates a poorly drafted provision, or executes in a manner not intended by one of the parties, parties will likely turn to the legal system to resolve the contractual dispute": Cardozo Blockchain Project, *Smart Contracts and Legal Enforceability* (October 2018) p 9.

544 For example, under the Civil Procedure Rules 1998, Practice Direction 6B, para 3.1(6)(c).

545 For example, under the common law's *forum (non) conveniens* (literally "inappropriate forum") doctrine, a relevant connecting factor is a contract's governing law: see Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018) para 12-034.

546 For example, under art 7 of Brussels Recast (other than in relation to contracts for the sale of goods or the provision of services) a contractual obligation's place of performance is identified by determining which national law governs the contract, and then applying that governing law to determine the place of performance: Case 12/76 *Industrie Tessili Italiana Como v Dunlop AG* [1976] ECR 1473.

547 Regulation on the law applicable to contractual obligations (EU) No 593/2008 Official Journal L 177 of 04.07.2008 p 6 ("Rome I Regulation"). The Rome I Regulation's continued effect is provided for in art 66 of the Withdrawal Agreement and in the Law Applicable to Contractual Obligations and Non-Contractual Obligations (Amendment etc) (EU Exit) Regulations 2019 (SI 2019 No 834).

548 Case C-359/14 *Ergo Insurance SE v If P&C Insurance AS* [2016] RTR 14, at [44].

7.36 We have suggested that smart contracts can embody contractual obligations. Accordingly, the law applicable to such obligations will be determined by the Rome I Regulation. For smart contracts involving code that automates the performance of an obligation contained within a natural language contract, the contractual obligations are found within the natural language contract. For coded obligations without a natural language counterpart, the code is *itself* the source of contractual obligation.[549]

Party autonomy

7.37 Under the Rome I Regulation, where parties have (expressly or impliedly) chosen the law applicable to their contractual obligations, courts will give effect to that choice.[550]

7.38 A preliminary issue is whether parties can choose for their agreement to be governed by the protocol of a DLT platform.[551] This is a separate question from the issue of intention to create legal relations. In the absence of any intention for their agreement to be legally enforceable, then there is no contract: the governing law issue does not arise. However, if the parties did intend to create legal relations but have chosen for their obligations to be governed by the protocol of a distributed ledger (rather than by a system of national law), is this a choice to which a court can give effect?

7.39 Article 3(1) of the Rome I Regulation stipulates that:[552]

> A contractual obligation shall be governed by the *law* chosen by the parties.

7.40 A platform's protocol constitutes a system of rules by which participating individuals agree to be bound. However, it is not "law" for the purposes of the Rome I Regulation. We agree with Dickinson's statement that Article 3(1) will "only validate a choice of a national legal system and not a choice of a non-State rules".[553]

7.41 We are interested to hear consultees' views on this issue.

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549 This analysis is consistent with the view by G Rühl, "Smart (legal) contracts, or: Which (contract) law for smart contracts?", in B Cappiello and G Carullo (eds), *Blockchain, Law and Governance* (forthcoming) p 9.

550 Rome I Regulation, art 3(1). This is subject to the overriding application of certain mandatory rules: Rome I Regulation, art 9(1).

551 We discuss platform protocols in para 3.40.

552 Rome I Regulation, art 3(1) (emphasis added).

553 A Dickinson, "Cryptocurrencies and the Conflict of Laws" in D Fox and S Green (eds), *Cryptocurrencies in Public and Private Law* (2019) p 107. Additionally, "the parties' right to choose the applicable *law* refers to the law of a *country*": P Torremans (ed), *Cheshire, North & Fawcett, Private International Law* (15th Ed, 2017) p 715. The authors explain that whilst it was originally proposed that the Rome I Regulation would empower parties to choose recognised bodies of non-state law (such as the UNIDROIT principles or the UN Convention on the International Sale of Goods), this provision was deleted from the final version of the Regulation. See also *Shamil Bank of Bahrain v Beximco Pharmaceuticals Ltd* [2004] EWCA Civ 19, [2004] 1 WLR 1784.

Question 49.

7.42 Do you think that a rejection of state law in favour of the rules contained in the platform's protocol is or should be a choice that can be given effect to under article 3(1) of the Rome I Regulation?

7.43 We think that if parties agree upon a governing law and express this choice in the natural language element of a smart contract, that is unlikely to pose any particular problems for the Rome I Regulation's choice of law rules.

7.44 However, the position may be different in relation to an encoded governing law clause. It has been suggested that "a choice of law can hardly be represented in algorithmic fashion – 'if this, then that'".[554] If correct, this would mean that solely code smart contracts may not be able to contain express choices as to applicable law. Given that an implied choice of law must be "clearly demonstrated", it may be difficult for the parties to choose, expressly or impliedly, a governing law for a solely code smart contract.[555]

Question 50.

7.45 Can an express choice of applicable law be embodied in computer code? If possible, please provide any practical examples of a coded clause expressing a choice of applicable law.

Presumptively applicable law

7.46 Where parties to a smart contract have not chosen a governing law, then the law applicable to their contract will be determined by a connecting factor.

7.47 Article 4(1) of the Rome I Regulation sets out a series of presumptions that apply to different types of contract:[556]

(1) A sale of goods contract is governed by the law of the seller's habitual residence.

(2) A contract for the provision of services is governed by the law of the service provider's habitual residence.

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554 G Rühl, "Smart (legal) contracts, or: Which (contract) law for smart contracts?", in B Cappiello and G Carullo (eds), *Blockchain, Law and Governance* (forthcoming) p 12.

555 An implied choice must be "clearly demonstrated by the terms of the contract or the circumstances of the case": Rome I Regulation, art 3(1). A choice cannot be imputed to the parties.

556 Rome I Regulation, art 4(1).

(3) A contract relating to a property right in immovable property or to a tenancy of immovable property is governed by the law of the country where the property is situated.

(4) A short-term private tenancy of immovable property is governed by the law of the landlord's habitual residence.

(5) A franchise contract is governed by the law of the franchisee's habitual residence.

(6) A distribution contract is governed by the law of the distributor's habitual residence.

(7) An auction contract is governed by the law of the jurisdiction in which the auction takes place, if such a place can be determined.[557]

(8) A contract concluded within a multilateral system which brings together or facilitates the bringing together of multiple third-party buying and selling interests in financial instruments, to be governed by a single law, is governed by that law.

7.48 These presumptions have as their connecting factor either one party's habitual residence or the place of a real-world event (such as the location of an auction). Subject to novel difficulties in identifying counterparties (and so identifying their place of habitual residence), these presumptions would appear to pose no special difficulties in the smart contract context.[558] For example, a rule that a sale of goods contract is governed by the law of the seller's habitual residence will, where applicable, operate in the same way for a smart sale of goods contract as for a traditional sale of goods contract.

Characteristic performer

7.49 If none of the presumptions contained within article 4(1) of the Rome I Regulation applies, then the law applicable to a smart contract is that of the jurisdiction where the party required to effect the characteristic performance of the contract (the "characteristic performer") has their habitual residence.[559]

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557 Where an auction is conducted from a fixed, physical location, for example an auction house, determining the location of the auction is likely to be straightforward even where some bidders participate by telephone or make electronic bids. However, where there is not the case, for example where an auction is conducted by conference call or on an internet site, it may be more difficult to determine the location of the auction. See Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018) para 33-011.

558 See G Rühl, "The Law Applicable to Smart Contracts, or Much Ado About Nothing?", *Oxford Business Law Blog* (23 January 2019), https://www.law.ox.ac.uk/business-law-blog/blog/2019/01/law-applicable-smart-contracts-or-much-ado-about-nothing.

559 Rome I Regulation, art 4(2).

7.50 A contract's characteristic performer is identified by looking for the party whose performance is characteristic of the contract.[560] This involves identifying the particular obligation that is peculiar to the type of contract under consideration, and that distinguishes such a contract from other types of contract.[561] Generally, in contracts involving a payment obligation, the characteristic performance is the performance for which payment is due.[562]

7.51 However, given the automated nature of certain aspects of performance in the smart contract context, it seems slightly counterintuitive to look for a smart contract's characteristic performer. The more automated a smart contract, the more that that is so.

7.52 Consider the following example: Alice deploys a computer program on Ethereum, the code of which provides that if 10 Ether are sent to the program, the program will transfer a token to the account from which the Ether were sent. Bob decides to send 10 Ether to the program, and the program automatically performs, transferring the token to his account. If Bob's sending of 10 Ether is the "payment", then the transferring of the token to his account is the performance that is characteristic of this type of smart contract. Given that the transfer takes place automatically without human intervention, is it accurate to describe Alice – who would, in a traditional contract, have otherwise performed that obligation – as the characteristic performer of the smart contract?[563] In Chapter 5 we noted that the law already recognises that parties need not personally perform their contractual obligations.[564] For example, a party may effect performance by employing a sub-contractor or by deploying a computer program. We think that insofar as it is Alice who is under the obligation to transfer the token, and who will ultimately receive the 10 Ether from Bob, she is likely to be recognised as the contract's characteristic performer. And this is notwithstanding the fact that the actual transfer of the token takes place automatically.

Localising a smart contract to a system of law

7.53 The default choice of law rules contained in articles 4(1) and 4(2) of the Rome I Regulation can be overridden by article 4(3). This article provides that if it is "clear from all the circumstances of the case" that a contract is "manifestly more closely

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560 Recital 19 of the Rome I Regulation stipulates that "the characteristic performer of the contract should be determined having regard to its centre of gravity".

561 "The object of the doctrine of characteristic performance is to isolate the obligation incumbent on one of the parties which is peculiar to the type of contract in issue, or which marks the nature of the contract, and thereby links the contract to the social and economic environment of which it will form a part.": Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018) para 32-077.

562 Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018) para 32-077; also, "characteristic performance is a somewhat abstract notion: it is not the payment of money but performance for which such payment is due": H Beale (ed), *Chitty on Contracts* (33rd ed 2020) para 30-111.

563 Such that the law applicable to the smart contract would be the law of Alice's place of habitual residence.

564 At para 5.84.

connected" with some other jurisdiction, then that jurisdiction's law governs the contract.[565]

7.54 Relatedly, if it is not possible to determine the law applicable to a contract by looking either to the contract's characteristic performer, or by identifying a legal system with which the contract is manifestly more closely connected, then article 4(4) of the Rome I Regulation provides that the contract is governed by the law of the jurisdiction with which it is "most closely connected".[566]

7.55 Both of these rules raise the question of how to evaluate the connections between a smart contract and different legal systems. Referring to the comparable provisions of the Rome Convention 1980,[567] the CJEU explained that this task requires a court to:[568]

> conduct an overall assessment of all the objective factors characterising the contractual relationship and determine which of those factors are, in its view, most significant.

7.56 In principle, there is no limit to the range of connecting factors that can be considered.[569] Generally, courts will look to the circumstances of the parties' residence and business, and to the details of their contractual arrangement. This includes matters like the place(s) of performance and place(s) of intended performance, as well as the language of the contract. Smart contracts and the underlying distributed ledger will likely have a variety of connections to a variety of jurisdictions. This complicates the task of considering whether a contract is sufficiently closely connected to a particular jurisdiction to justify disapplying the default rules in articles 4(1) and 4(2) of the Rome I Regulation.

7.57 The editors of the European Association of Private International Law Blog recently expressed the problem in the following terms:[570]

> It will be challenging to find proper connecting factors … the information is spread on computers and servers all around the world and often there is no operator controlling the process. For these reasons, finding the most significant or closest connection for

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565 Rome I Regulation, art 4(3).

566 Rome I Regulation, art 4(4).

567 This continues to apply to contracts that were entered into between 1 April 1991 and 17 December 2009.

568 Case C-305/13 *Haeger & Schmidt GmbH v Mutuelles du Mans Assurances IARD* (23 October 2014) para 49.

569 Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018) para 32-080.

570 Editors, "Destination Aarhus: Lehmann on Blockchains and Smart Contracts", European Association of Private International Law Blog (28 February 2020), https://eapil.org/2020/02/28/destination-aarhus-lehmann-on-blockchains-and-smart-contracts/. Also, Durovic has observed that "what makes the regulation of smart contracts particularly complex is their cross-border nature, given that they are generally operated by different computers located in different jurisdictions. This may make it more difficult to identify the law … applicable to the contract.": M Durovic, "How to Resolve Smart Contract Disputes – Smart Arbitration as a Solution", Oxford Business Law Blog (1 June 2018), https://www.law.ox.ac.uk/business-law-blog/blog/2018/06/law-and-autonomous-systems-series-how-resolve-smart-contract-disputes.

the blockchain and smart contracts creates significant headaches, more so than the internet did at the time of its introduction.[571]

7.58 We would like to hear consultees' views on novel factors that can connect a smart contract to a particular jurisdiction. For example, it has been argued that for a smart contract underpinned by blockchain technology, the location of the majority of mining nodes[572] could be a relevant connecting factor.[573]

Question 51.

7.59 What factors are capable of connecting a smart contract to a particular jurisdiction, for the purposes of article 4(3) and 4(4) of the Rome I Regulation?

7.60 The Rome I Regulation also stipulates certain special choice of law rules that apply to particular types of contract. Specifically: contracts of carriage (article 5); consumer contracts (article 6); insurance contracts (article 7); and individual employment contracts (article 8). Broadly speaking, these special rules aim to provider more protection for the weaker party in the contractual relationship, by limiting the parties' capacity to choose the law applicable to their contract.[574]

Question 52.

7.61 Are you aware of, or do you foresee, any difficulties in the context of smart contracts in applying the choice of law rules that apply under the Rome I Regulation to contracts of carriage (article 5), consumer contracts (article 6), insurance contracts (article 7) and individual employment contracts (article 8)?

PERFORMANCE, ACTS, AND ENRICHMENT

7.62 Jurisdiction rules are often based on the identification of a substantive connecting factor between a contractual dispute and a particular legal system. For example, a

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571 Writing in the context of contracts concluded over the internet, Lutzi has said that "courts are confronted with an overwhelming amount of increasingly tenuous connections to a multitude of legal systems": T Lutzi, "Internet Cases in EU Private International Law: Developing a Coherent Approach" (2017) 66(3) *International & Comparative Law Quarterly* 687, 693.

572 That is, the participants on a DLT system that are involved in the process of validating a proposed transaction so that it can be recorded on the distributed ledger.

573 A Dickinson, "Cryptocurrencies and the Conflict of Laws" in D Fox and S Green (eds), *Cryptocurrencies in Public and Private Law* (2019) p 115. However, the location of a system's nodes has also been described as "arbitrary" and its relevance as a connecting factor doubted: G Rühl, "Smart (legal) contracts, or: Which (contract) law for smart contracts?", in B Cappiello and G Carullo (eds), *Blockchain, Law and Governance* (forthcoming) p 12.

574 Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018), ch 33.

country may be where one or both of the contracting parties are domiciled, where their bargain was struck, or where they were due to perform their obligations.[575] It is that connection which is supposed to justify a court's assertion of jurisdiction over a contractual dispute.

7.63 However, the process of identifying connecting factors is complicated for smart contracts which inevitably involve a virtual element. As Dickinson has written:[576]

> Rules of jurisdiction and applicable law operate principally on the basis of territorial connecting factors whose efficacy depends on the ability to locate acts and actors within the territory of a particular legal system, and whose rationale depends on the existence of a real and substantial connection to that legal system. Incorporeal (intangible) property and, more recently, internet activities have placed a strain upon this territorial paradigm. How does one ascribe a location to a thing which exists only in law or to acts which take place in a virtual environment and which may be communicated instantaneously across the globe?

7.64 In this section, we consider the operation of rules that ground jurisdiction in the place of contractual performance, the place of acts giving rise to a liability to make restitution, or the place of enrichment.

Place of performance

7.65 A prominent connecting factor between a contractual dispute and a jurisdiction is that the latter is (or was supposed to be) the place of performance of the obligation upon which the claimant is suing. Rules that ground jurisdiction on this basis can be seen in, for example, article 7(1)(a) of Brussels Recast, article 5(1)(a) of the Lugano Convention, and under para 3.1(7) of Practice Direction 6B of the Civil Procedure Rules.[577]

7.66 The European frameworks provide specific definitions for "place of performance of the obligation in question" for two types of contracts, those for the sale of goods, and those for the provision of services.[578] We do not anticipate that these will cause any novel difficulties in the smart contract context.

7.67 For smart contracts that automate the sale and delivery of goods, the place of performance is the country where the goods were (or should have been) delivered. The fact that, for example, an obligation to give notice to a warehouse to dispatch certain goods is automated does not alter that analysis. Similarly, for smart contracts that automate the provision of services, the place of performance is the country where the service was (or should have been) provided. Again, introducing an element of

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575 This is intended to be an illustrative, rather than an exhaustive, list of the connecting factors on which jurisdiction can be based.

576 A Dickinson, "Cryptocurrencies and the Conflict of Laws" in D Fox and S Green (eds), *Cryptocurrencies in Public and Private Law* (2019) pp 96-97.

577 Under the latter, jurisdiction can be grounded in the fact that England and Wales is the "place of breach". As a breach is a failure to perform, this concept covers the same ground as the "place of performance".

578 Brussels Recast, art 7(1)(b); Lugano Convention, art 5(1)(b).

automation into such a contract does not cause any novel difficulties for identifying the place of performance.

7.68 For smart contracts which are not for the sale or delivery of goods or the provision of services, a court will have to identify the place of performance of the breached obligation by reference to the law applicable to the contract. Consider the following example: a smart contract under which Alice is (automatically) to receive a payment X, from Bob, in the event of Bob receiving payment Y from a third-party. Assume that this is not a contract for the sale of goods or for the provision of services.[579] If, after Bob receives payment Y, Alice does not receive payment X, a court considering Alice's claim will have to determine – by reference to the contract's governing law – the place of performance of Bob's obligation.

7.69 Generally speaking, we think that insofar as a smart contract automates the performance of an obligation that would otherwise have had to be physically performed in the real world, the task of identifying the place of performance should not pose any special challenges.

7.70 However, for particular types of smart contract, the place of performance of an encoded obligation may prove more difficult to discern. Consider the example of an on-chain transfer of cryptocurrency in exchange for payment in fiat currency.[580] It seems difficult to say precisely where the on-chain transaction is performed. A few options seem arguable, but none are free from difficulty.

(1) When a cryptocurrency is credited to a particular private key, one view could be to say that the transaction takes place in the country where the person with knowledge of the private key is situated. However, that could lead to a degree of arbitrariness. If a person receiving cryptocurrency happened to be on holiday in Country X at the relevant moment in time, should that be sufficient to ground jurisdiction in Country X? Additionally, if two people, situated in different countries, know the private key, should this ground jurisdiction in the courts of both countries?

(2) A second view might be to say that as a transaction, in order to be validated and added to a decentralised ledger, has to be communicated to all participating nodes, a transaction takes place in every country with a

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579 See, eg, *Masri v Consolidated Contractors International (UK) Ltd* [2005] EWHC 944 (Comm). This case concerned an oil concession contract under which the claimant was to be paid a particular sum of money. Cresswell J noted that the specific rules concerning sale of goods and provision of services contracts "have no application in the present case" and held that the relevant contractual obligation was the payment obligation: para 99. Therefore, it was "necessary to consider as a matter of English law where that obligation was to be performed": ibid.

580 We have assumed that such a contract would not be interpreted as a contract for the sale of goods, on the basis that cryptocurrency is unlikely to fall within the meaning of the word "goods". This type of contract should also be distinguished from a contract for the supply of tangible goods in exchange for payment in cryptocurrency.

participating node – albeit this could potentially ground jurisdiction in a very large number of countries.[581]

(3) A third view could be to say that for these types of smart contracts a court should look to alternative connecting factors such as a claimant's centre of interests, or the countries that offerors have targeted with their offers.[582]

7.71 These difficulties are indicative of the broader challenge of determining jurisdiction in relation to contracts that do not involve physical performance. We would like to hear consultees' views on whether a rule of jurisdiction that is based on performance is applicable to a situation where performance takes place on a distributed ledger.

Question 53.

7.72 Do you think that a rule of jurisdiction based on the place of contractual performance can be applied where the performance takes place on a distributed ledger?

Place of acts giving rise to an alleged liability to make restitution, and place of enrichment

7.73 We have suggested that restitutionary remedies may assume greater relevance in relation to smart contracts than traditional contracts.[583] This is because it is a distinctive feature of smart contracts that performance can be both automatic and unstoppable.

7.74 Under the common law rules, a court may have jurisdiction to hear a restitutionary claim that is connected to a contract under the contractual gateways in para 3.1(6) of Practice Direction 6B of the Civil Procedure Rules.[584] Additionally, jurisdiction can be based on restitutionary factors such as a country being the place of acts giving rise to an alleged liability to make restitution, or the place of enrichment.[585] We envisage that identifying such locations for the purposes of restitutionary remedies would present similar challenges to locating the place where a smart contract is formed.

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581 Related alternatives might be that the transaction takes place in every country with a mining node, or that the transaction takes place in the country with the greatest number of mining nodes. Not every DLT system involves mining. Mining is typically seen in permissionless DLT systems, such as the Bitcoin blockchain. Mining is the process by which nodes solve a complex mathematical problem set by the DLT software in order for a clock of data to be added to the ledger.

582 Possible alternative connecting factors for contracts that do not involve physical performance are discussed in T Lutzi, "Internet Cases in EU Private International Law: Developing a Coherent Approach" (2017) 66(3) *International & Comparative Law Quarterly* 687, 703-708.

583 We discuss the increased relevance of restitutionary remedies in the smart contract context in Chapter 5 from para 5.67. The law applicable to restitutionary obligations which relate to a contractual relationship between parties is the law applicable to that contract: see Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018), para 36R-001.

584 *Albon v Nazar Motor Trading* [2007] EWHC 9 (Ch), [2007] 1 WLR 2489.

585 Civil Procedure Rules 1998, Practice Direction 6B, para 3.1(16).

INSURANCE CONTRACTS, CONSUMER CONTRACTS, AND EMPLOYMENT CONTRACTS

7.75 Certain types of contract, which commonly involve a significant asymmetry in information or (economic) power between the parties, engage specialised jurisdiction rules. These rules are usually tailored towards giving the weaker party either more choice of where they can sue or more protection in relation to where they can be sued. In this section we discuss insurance contracts, consumer contracts, and employment contracts by reference to the currently applicable Brussels Recast rules.

7.76 A well-known example of a smart contract was AXA's flight-delay insurance product "fizzy".[586] This type of smart contract raises no special jurisdictional problems. A policyholder would be able to commence proceedings against AXA in the courts of either party's domicile.[587] Conversely, AXA would only be able to bring proceedings against the policyholder in the courts of the latter's domicile.[588] The smart nature of the insurance product would not seem to affect the operation of these rules.

7.77 Similarly, in disputes in relation to consumer contracts,[589] the consumer is given the choice of suing the trader in either the courts of their own domicile or the courts of the trader's domicile.[590] Conversely, a trader can only bring proceedings against a consumer in the courts of the consumer's domicile.[591] Again, the smart nature of the consumer contract would not seem to affect the operation of these rules.

7.78 Finally, in disputes in relation to employment contracts, the employee may commence proceedings against their employer in either the courts of the employer's domicile or the courts of the place where the employee habitually carries out their work (or last did so).[592] Conversely, an employer may only sue their employee in the courts of the employee's domicile.[593] It does not seem that the smart nature of an employment contract would affect the operation of these rules.

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586 We discuss AXA's "fizzy" product from para 2.47.

587 Brussels Recast, art 11(1). See P Torremans (ed), *Cheshire, North & Fawcett, Private International Law* (15th ed, 2017) p 290.

588 Brussels Recast, art 14(1).

589 A consumer contract is "a contract concluded by a person, the consumer, for a purpose which can be regarded as being outside his trade or profession" with "a person who pursues commercial or professional activities in the Member State of the consumer's domicile or, by any means, directs such activities to that Member State or to several States including that Member State, and the contract and the contract falls within the scope of such activities.": Brussels Recast, art 17(1). The CJEU has commented that only contracts "concluded for the purpose of satisfying an individual's own needs in terms of private consumption come under the provisions designed to protect the consumer as the party deemed to be the weaker party economically": Case C-269/95 *Benincasa v Dentalkit Srl* [1997] ECR-3767 at [17].

590 Brussels Recast, art 18(1).

591 Brussels Recast, art 18(2).

592 Brussels Recast, art 21.

593 Brussels Recast, art 22(1).

COMPARATIVE APPROPRIATENESS

7.79 When two or more courts have jurisdiction to hear a contractual dispute, a court may be required to evaluate the comparative appropriateness of competing jurisdictions. The approach to this question is a key difference between the operation of the European frameworks and the common law rules.

7.80 The European frameworks aim to allocate jurisdiction through the systematic application of clear, certain, and predictable rules. If a basis of jurisdiction is made out, the court has no discretion to decline to exercise that jurisdiction.[594] In contrast, the common law rules aim to ensure that each dispute is litigated in its most appropriate jurisdiction. Expansive bases of jurisdiction are counter-balanced by a discretion to refuse to exercise jurisdiction.

7.81 Under the common law rules, the exercise of a discretion to hear or refuse to hear a dispute is referred to as the *forum (non) conveniens* doctrine (literally "inappropriate forum"). If a basis of jurisdiction is made out, an English and Welsh court will only hear a contractual claim if:[595]

(1) there is no clearly more appropriate court to hear the dispute; or

(2) there is another clearly more appropriate court to hear the dispute, but the claimant would be denied justice if they were refused access to the English and Welsh courts.

7.82 This question of comparative appropriateness is a practical and fact-sensitive inquiry.[596] Of potential relevance in the smart contract context, are the following connecting factors:

(1) *The place of formation of the smart contract.* The difficulties associated with this issue have been discussed at paras 7.18 to 7.26.

(2) *The location of the contractual subject matter.* There are particular difficulties with identifying the location of virtual subject matter, as discussed at para 7.63.

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594 Case C-281/02 *Owusu v Jackson* [2005] ECR I-1383. See also the concise discussion of the philosophical differences between the European frameworks and the common law rules in *Yukinson International UK BV v Merinson* [2020] QB 336 at [1] (Gross LJ).

595 The classic articulation of the *forum (non) conveniens* test is the judgment of Lord Goff in *The Spiliada* [1987] AC 460. The burden of proof at the first stage is on the claimant. The burden of proof at the second stage is on the defendant. However, in *VTB Capital Plc v Nutritek International Corp* [2013] UKSC 5, the Supreme Court held that whilst that remained true for cases where jurisdiction was based on the defendant's presence in England and Wales, for "service out" cases (where the court is being asked for permission to serve the claim form on a defendant out of the jurisdiction) the position is different. Here, the two stages of the test are combined into one – the claimant must prove that England and Wales is "clearly or distinctly the appropriate forum": at [44] (Lord Mance).

596 Lord Collins of Mapesbury and J Harris (eds), *Dicey, Morris & Collins, The Conflict of Laws* (15th ed 2018) paras 12-030, 12-034.

(3) *The place of performance.* The issues arising in relation to this factor are discussed at paras 7.65 to 7.71.

(4) *The location of the nodes participating in the distributed ledger.* In particular, the location of the nodes engaging in the computationally intensive process of validating new transactions.

(5) *The location of the contracting parties, and any other relevant witnesses and evidence.*

(6) *The smart contract's governing law, and the complexities of the legal issues raised.* The problems with identifying a smart contract's governing law are discussed at paras 7.31 to 7.60.

7.83 Determining whether a claimant would be denied justice if refused access to the English and Welsh courts is similarly fact-sensitive; the court can consider "all of the circumstances of the case".[597] In the smart contract context, a relevant consideration could be that, as a matter of procedure, certain types of claim in relation to the smart contract are barred in the otherwise clearly more appropriate jurisdiction.

7.84 We are interested to hear from consultees about the factors that can connect a smart contract to a jurisdiction, and about how the comparative appropriateness inquiry would be conducted in the smart contract context.

Question 54.

7.85 What factors do you think are capable of connecting a claim in relation to a smart contract to a particular jurisdiction?

Question 55.

7.86 Which, if any, rules for establishing jurisdiction do you consider will be most problematic in the smart contracts context? Do you agree with our analysis of the issues as described in this call for evidence?

[597] *The Spiliada* [1987] AC 460, 478D (Lord Goff).

Chapter 8: Final questions

8.1 In this call for evidence we have set out our understanding of how the current law might be applied to smart contracts under the following headings.

(1) Formation

(2) Interpretation

(3) Remedies

(4) Consumer protection

(5) Jurisdiction

8.2 In this brief concluding chapter, we ask consultees three final questions in order to ensure that we are focusing on the correct issues when we begin work on our scoping study.

Question 56.

8.3 Are there any issues we should be considering on smart contracts beyond those we discuss and ask about in this call for evidence?

Question 57.

8.4 Which other jurisdictions should we look to for their approach to smart contracts, and why?

Question 58.

8.5 Are there any legal reforms that you consider immediately necessary to remove uncertainty and unlock some of the potential benefits and cost savings of smart contracts?

Chapter 9: List of all questions

Question 1.

9.1 What kinds of contractual obligations can currently be automated using computer programs? Please provide specific examples where possible.

Paragraph 2.12

Question 2.

9.2 Do you agree that the Law Commission's scoping study on smart contracts should be limited to contracts which use distributed ledger technology? If not, please provide details of other technologies which are used to support smart contracts, and their prevalence.

Paragraph 2.26

Question 3.

9.3 When, and why, do parties to smart contracts decide to use:

(1) permissioned DLT systems?

(2) permissionless DLT systems?

Paragraph 2.29

Question 4.

9.4 Which of the three forms of smart contract discussed in para 2.32 of the call for evidence are most commonly used in existing smart contracts or smart contracts which are in development? Please provide examples of how these forms of smart contract have been used in practice.

Paragraph 2.39

Question 5.

9.5 How do code and natural language interact in hybrid smart contracts currently in existence or in development and which terms are generally coded?

Paragraph 2.40

Question 6.

9.6 What process do the parties follow (or plan to follow) in negotiating, drafting and entering into a smart contract? Please explain in particular:

(1) where all the contractual obligations are contained in a natural language agreement and the code is intended merely to perform those obligations, the practical steps involved in coding the parties' rights and obligations contained in the natural language agreement;

(2) where the parties intend that there will be a hybrid contract or a code only contract, the practical steps involved in drafting, negotiating and agreeing the code of the smart contract;

(3) where there is a hybrid contract, whether the natural language element and the coded element are entered into contemporaneously or at different times; and

(4) the role played by third party service providers (such as computer coders and software firms) in this process.

Paragraph 2.41

Question 7.

9.7 Are you aware of any examples of use cases for smart contracts beyond those we give in the call for evidence, or variations on the use cases we give, which are being developed, are at proof of concept stage or are already operational?

If so, please explain:

(1) the technology used to create the smart contract;

(2) the role played (if any) by oracles in the performance of the smart contract;

(3) the contractual terms (if any) performed automatically by computer programs; and

(4) whether the smart contract is a business to business commercial contract, a peer to peer contract or a business to consumer contract.

Paragraph 2.64

Question 8.

9.8 What benefits and cost savings can smart contracts provide compared with traditional contracts? Will increased use of smart contracts lead to any additional costs? Please provide details and any available qualitative and quantitative evidence.

Paragraph 2.66

Question 9.

9.9 In what ways can parties reach an agreement through their interactions on a distributed ledger?

Paragraph 3.13

Question 10.

9.10 Are you aware of programming languages which are specifically designed to enable parties to reach agreement on a distributed ledger? If possible, please give examples of the circumstances in which they could be or have been used.

Paragraph 3.14

Question 11.

9.11 Do you consider that offer and acceptance can occur through the operation of autonomous computer programs deployed by the parties on a distributed ledger?

If so:

(1) in what circumstances?

(2) on what legal basis?

Paragraph 3.20

Question 12.

9.12 How common is it for parties to enter into smart contracts on a DLT system without knowing each other's real identities and in what circumstances is this likely to arise?

Paragraph 3.25

Question 13.

9.13 What evidence might be available to a court to establish the identity of the parties to a smart contract entered into pseudonymously on a DLT system?

Paragraph 3.26

Question 14.

9.14 Are you aware of, or do you foresee, any difficulties in applying the law on consideration to smart contracts? If possible, please provide examples.

Paragraph 3.30

Question 15.

9.15 Are you aware of, or do you foresee, any difficulties in determining whether the parties to a smart contract have reached a certain and complete agreement? If possible, please provide examples.

Paragraph 3.35

Question 16.

9.16 Are you aware of any instances where the parties to a smart contract have expressly agreed that they do not intend to create legal relations?

Paragraph 3.46

Question 17.

9.17 Do you foresee any difficulties in ascertaining whether parties intend to create legal relations when they transact with one another on a distributed ledger?

Paragraph 3.51

Question 18.

9.18 Do you consider that source code could meet the definition of “writing” in the Interpretation Act 1978?

Paragraph 3.62

Question 19.

9.19 Do you consider that parties can "sign" an agreement recorded solely in code?

If so:

(1) are you aware of technologies that are currently in use or under development to facilitate the signing of agreements recorded solely in code?

(2) please provide any examples from your experience of where the parties have signed an agreement recorded solely in code.

Paragraph 3.66

Question 20.

9.20 Do you think that smart contracts using DLT are currently able to utilise eIDAS compliant advanced electronic signatures and qualified electronic signatures? If not, how do you think they could be designed to accommodate these types of signatures?

Paragraph 3.73

Question 21.

9.21 Are you aware of any cases in which parties have arranged for the terms of a deed to be performed by, or recorded in, computer code deployed on a distributed ledger?

Paragraph 3.79

Question 22.

9.22 Do you consider that a deed recorded partly or wholly in code can satisfy the statutory formality requirements applicable to deeds and address the implications of the *Mercury* decision?

Paragraph 3.80

Question 23.

9.23 Are you aware of, or do you foresee, any difficulties in applying the principles of interpretation to identify whether terms of a particular smart contract are contained in the natural language component or the coded component of the smart contract, or both?

Paragraph 4.10

Question 24.

9.24 In what circumstances might disputes arise about the proper interpretation of the coded terms of a smart contract? Please provide examples where possible.

Paragraph 4.15

Question 25.

9.25 Do you consider that the meaning of a coded term of a smart contract would or should be determined by asking what the term would mean to a:

(1) reasonable person;

(2) reasonable person with knowledge of the relevant code; or

(3) functioning computer?

Paragraph 4.30

Question 26.

9.26 Do you consider that performance of the coded terms of a smart contract cannot always be predicted based on a reading of the code?

If so, can you provide examples or specific evidence of this occurring?

Paragraph 4.31

Question 27.

9.27 What practical or procedural steps could the courts take to resolve disputes about the interpretation of the coded terms of a smart contract?

Paragraph 4.32

Question 28.

9.28 Are parties utilising natural language in smart contracts to make their intentions clear in respect of any coded terms or the contract as a whole?

Paragraph 4.37

Question 29.

9.29 In what (if any) circumstances should courts be able to consider evidence of the parties' pre-contractual negotiations as an aid to interpretation of the coded terms of a smart contract?

Paragraph 4.43

Question 30.

9.30 Do you consider that the courts' current approach to contractual interpretation might cause problems in the context of smart contracts?

If so:

(1) Can you provide examples or specific evidence of this occurring?

(2) What could be done to solve these problems?

Paragraph 4.45

Question 31.

9.31 Are you aware of, or do you foresee, any practical difficulties in ordering rectification of the coded terms of a smart contract? If so, do you think that parties to a smart contract will, in practice, seek rectification?

Paragraph 5.26

Question 32.

9.32 Are you aware of, or do you foresee, any difficulties in applying the existing law to determine whether the parties have made a common mistake when entering into a smart contract?

Paragraph 5.41

Question 33.

9.33 What steps or precautions (if any) do parties typically take before entering into a smart contract to satisfy themselves that the code will execute as intended?

Paragraph 5.42

Question 34.

9.34 Do you consider that the legal principles concerning unilateral mistake might need to be adapted to accommodate smart contracts concluded by computer programs without human intervention?

In particular:

(1) is it appropriate to confine a unilateral mistake to a mistake about a term of the contract?

(2) what test should the court apply in determining whether the non-mistaken party had knowledge of the mistaken party's mistake?

Paragraph 5.56

Question 35.

9.35 Are you aware of, or do you foresee, any difficulties in applying the existing law to determine whether a smart contract has been entered into as a result of a misrepresentation?

Paragraph 5.62

Question 36.

9.36 Are you aware of, or do you foresee, any difficulties in applying the legal principles concerning rescission to smart contracts which have been vitiated for misrepresentation, duress or undue influence?

Paragraph 5.79

Question 37.

9.37 Are you aware of, or do you foresee, any difficulties in awarding damages for breach of contract where the terms of a natural language contract are performed automatically by computer code?

Paragraph 5.91

Question 38.

9.38 Are you aware of, or do you foresee, any difficulties in applying the legal principles concerning termination where the terms of a natural language contract are performed automatically by computer code?

Paragraph 5.95

Question 39.

9.39 Are you aware of, or do you foresee, any difficulties in applying the legal principles concerning breach of contract to contracts recorded wholly or partly in computer code?

Paragraph 5.104

Question 40.

9.40 Are you aware of, or do you foresee, any difficulties in applying the law on frustration to smart contracts?

Paragraph 5.112

Question 41.

9.41 Can you provide examples of terms that parties have included (or might include) in the natural language element of the smart contract to address the risk that subsequent events might affect the performance of the code?

Please explain:

(1) the drafting of the provision;

(2) the subsequent events covered by the provision;

(3) the effect, under the provision, of the subsequent event on the contract; and

(4) the remedies available to the parties under the provision.

Paragraph 5.113

Question 42.

9.42 Are you aware of, or do you foresee, any difficulties in applying the illegality doctrine to claims made in relation to smart contracts?

Paragraph 5.117

Question 43.

9.43 Are you aware of any business to consumer smart contracts currently in use or in development? Please give details.

Paragraph 6.5

Question 44.

9.44 When would you estimate that smart contracts might be in common use in business to consumer contracts?

Paragraph 6.6

Question 45.

9.45 What challenges do you foresee in applying consumer protection laws to consumer contracts entered into wholly or partly in code? Are there any additional existing protections, beyond those we have discussed, which you think are or will be particularly important in the smart contract context?

Paragraph 6.39

Question 46.

9.46 What, if any, additional protections do you think are required for consumers entering into smart contracts? In particular, do you consider that there is a case for an explicit legal requirement that terms of a consumer contract which are fully or partly in code must be explained in natural language before the conclusion of the contract?

Paragraph 6.40

Question 47.

9.47 Are you aware of, or do you foresee, any difficulties in identifying the place of formation of a smart contract?

Paragraph 7.27

Question 48.

9.48 In what circumstances do you think that jurisdiction to hear a dispute in relation to a smart contract could be based on the actions and location of an agent?

Paragraph 7.30

Question 49.

9.49 Do you think that a rejection of state law in favour of the rules contained in the platform's protocol is or should be a choice that can be given effect to under article 3(1) of the Rome I Regulation?

Paragraph 7.42

Question 50.

9.50 Can an express choice of applicable law be embodied in computer code? If possible, please provide any practical examples of a coded clause expressing a choice of applicable law.

Paragraph 7.45

Question 51.

9.51 What factors are capable of connecting a smart contract to a particular jurisdiction, for the purposes of article 4(3) and 4(4) of the Rome I Regulation?

Paragraph 7.59

Question 52.

9.52 Are you aware of, or do you foresee, any difficulties in the context of smart contracts in applying the choice of law rules that apply under the Rome I Regulation to contracts of carriage (article 5), consumer contracts (article 6), insurance contracts (article 7) and individual employment contracts (article 8)?

Paragraph 7.61

Question 53.

9.53 Do you think that a rule of jurisdiction based on the place of contractual performance can be applied where the performance takes place on a distributed ledger?

Paragraph 7.72

Question 54.

9.54 What factors do you think are capable of connecting a claim in relation to a smart contract to a particular jurisdiction?

Paragraph 7.85

Question 55.

9.55 Which, if any, rules for establishing jurisdiction do you consider will be most problematic in the smart contracts context? Do you agree with our analysis of the issues as described in this call for evidence?

Paragraph 7.86

Question 56.

9.56 Are there any issues we should be considering on smart contracts beyond those we discuss and ask about in this call for evidence?

Paragraph 8.3

Question 57.

9.57 Which other jurisdictions should we look to for their approach to smart contracts, and why?

Paragraph 8.4

Question 58.

9.58 Are there any legal reforms that you consider immediately necessary to remove uncertainty and unlock some of the potential benefits and cost savings of smart contracts?

Paragraph 8.5

Appendix 1: Terms of reference

The Law Commission is asked to conduct a twelve-month scoping study into the law around smart contracts.

The scoping study will:

(1) Provide an analysis of the current law as it applies to smart contracts, drawing on the conclusions of the UK Jurisdiction Taskforce's legal statement. The analysis of the law will highlight any uncertainties or gaps, with reference in particular to the questions listed in part A of the Annex, and the questions in part B where the Law Commission considers this to be appropriate; and

(2) Identify areas in which further work or reform may be required, and provide such advice as the Law Commission considers appropriate on options for reform.

The Law Commission's work at this stage will not include other areas of law insofar as they relate to smart contracts such as tax, data protection etc.

Annex

Part A: key questions

The Law Commission will consider smart contracts under four principal headings:

(1) Formation and enforceability

(a) In what circumstances is a smart contract capable of giving rise to binding legal obligations, enforceable in accordance with its terms?

(b) Is a smart contract between anonymous or pseudo-anonymous parties capable of giving rise to binding legal obligations?

(c) In which circumstances will a statutory signature or "in writing" requirement be met in the context of smart contracts?

(d) How do the principles apply to a smart contract executed as a deed (which require additional legal requirements to be satisfied to be binding)? Would 'smart deeds' be valid and enforceable?

(e) Will the unilateral model of contract formation fit the situation in which strangers "accept" rights and obligations through interaction with a coded "offer"?

(2) Interpretation

(a) How would a court apply general principles of contractual interpretation to a smart contract written wholly or in part in computer code?

(b) Under what circumstances would a court look beyond the mere outcome of the running of a computer code that is or is part of a smart contract in determining the agreement between the parties?

(c) Should concepts such as “objective meaning of words” be revisited in the context of smart contracts composed of code?

(3) Performance of code as written v performance of contractual obligations

(a) How are errors in code to be treated? Should we differentiate between what the code was intended to perform and what it actually performs (bearing in mind code may behave in unintended ways)?

(b) Is the performance of the code as it is written fulfilment of the smart contract, even if the code does not execute as the developer (or one or all parties) intended?

(4) Remedies/Vitiation

(a) Where an agreement has been incorrectly recorded, which remedy or remedies provide the most appropriate alternative to rectification of the contract, when code recorded on most distributed ledgers will be immutable?

(b) In what circumstances will a smart contract be vitiated on the grounds of, for instance, mistake, frustration, duress or unconscionability?

(c) How will the law on misstatements apply to smart contracts?

(d) To what extent would or should remedies have to be provided “on chain”? Should the choice between various remedies be one made by the parties, left to the discretion of the court, set out in statutory form, or a combination of these?

Part B: possible additional questions for consideration

(1) Formation and security

(a) How do smart contracts and private keys relate to the standards for e-authentication and e-signatures set out in The Electronic Identification and Trust Services for Electronic Transactions (Amendment etc.) (EU Exit) Regulations 2019? (These are the post Brexit regulations for Regulation (EU) No 910/2014 – “eIDAS”.)

(b) Would providing standards for smart contracts in a similar way to eIDAS be beneficial?

(2) Other issues

(a) What factors will determine whether UK courts have jurisdiction, in the absence of a jurisdiction clause in the smart contract?

(b) Are there consumer protection issues for non-code literate parties who enter into smart contracts and should this be addressed by legislation?

Appendix 2: Acknowledgements

In preparing this call for evidence, the Law Commission met or corresponded with the following people and organisations with respect to this project between September 2020 and December 2020. We are grateful for their time and for the information they have provided.

PROFESSIONAL MEMBERSHIP ORGANISATIONS

International Swaps and Derivatives Association

GOVERNMENT AND PUBLIC BODIES

Bank of England

Department for Digital, Culture, Media and Sport

HM Land Revenue

HM Revenue and Customs

LAW FIRMS

Baker McKenzie

Clyde & Co

Herbert Smith Freehills

Linklaters

Mishcon de Reya

Norton Rose Fulbright

Thrings

BUSINESSES

IBM

Innovative Integrations

INDIVIDUALS

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Professor Andrew Dickinson, University of Oxford

Professor Jonathan Harris QC (Hon), King's College, London

Dr Robert Herian, The Open University

Professor Alex Mills, University College London

OTHER

tScheme

The Law Commission also met with the following people and organisations with respect to this project between January 2018 and March 2019. We are grateful for their time and the information they provided.

PROFESSIONAL MEMBERSHIP ORGANISATIONS

Chamber of Digital Commerce

International Swaps and Derivatives Association

The Law Society

TheCityUK

GOVERNMENT AND PUBLIC BODIES

Department for Business, Energy and Industrial Strategy

Department for Digital, Culture, Media and Sport

LAW FIRMS

Allen & Overy

Baker McKenzie

Bird & Bird

Clyde & Co

CMS

Fox Williams LLP

Freshfields Bruckhaus Deringer

Gowling WLG

Herbert Smith Freehills

Linklaters LLP

Mishcon de Reya

Norton Rose Fulbright

Reed Smith LLP

Womble Bond Dickinson

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Barclays Eagle Labs

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ConsenSys

D2 Legal Technology

Franklin Templeton Investments

IBM

Mattereum

PricewaterhouseCoopers

R3

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Transpact

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Professor Christopher Clack, University College London

Professor George Danezis, University College London

Professor Hugh Beale, University of Warwick

Professor Ian Walden, Queen Mary University of London

Professor Ross Anderson, Cambridge University

OTHER

Artificial Lawyer

City of London Corporation

European Bank for Reconstruction and Development

Lexon.Tech