All-Party Parliamentary Group on Blockchain (APPG Blockchain)

EVIDENCE MEETING 6: SMART AND INTELLIGENT CONTRACT OVERVIEW

Boothroyd Room, Portcullis House

20th November 2018

The mission of the All-Party Parliamentary Group on Blockchain (APPG Blockchain) is to ensure that industry and society benefit from the full potential of blockchain and other distributed ledger technologies (DLT) making the UK a leader in Blockchain/DLT's innovation and implementation.

We bring evidence, use cases and future policy scenarios while considering industry and societal implications as well as environmental opportunities.

Chaired by Damien Moore MP

Watch the full evidence session, http://bit.do/EvidenceMeeting8

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1. Details

- Date: 20 November 2018
- Time: 5:30 – 7:00 pm
- Location: Boothroyd Room – Portcullis House

2. Purpose

The mission of the All-Party Parliamentary Group on Blockchain (APPG Blockchain) is to ensure that industry and society benefit from the full potential of blockchain and other distributed ledger technologies (DLT) making the UK a leader in Blockchain/DLT's innovation and implementation.

Evidence Meeting 6 explored the potential of Evidence Meeting 6: Smart and Intelligent Contracts

3. Evidence Givers

- Shirley Bailey-Wood, Director of Information Solutions, BSI Standards
- Peter Hunn, Founder, Accord Project
- Charles Kerrigan, Partner, Banking & International Finance, CMS
- Siobhan McKeering, Lawyer, The Law Commission
- Christina Blacklaws, President, The Law Society
- Kevin Gidney, CTO & Founder, Seal Software
- Vinay Gupta, CEO, Mattereum

4. Questions for Inspiration

- What is the future of contractual transactions? (Intelligent and smart contracts)
- What does it mean for financial, legal and commercial stakeholders? (people, shops, investors, banks, legal practice, insurance, others)
- How might blockchain revolutionise the legal industry, contract writing, other sectors using contracts and how IP is transacted?

5. Summary

APPG on Blockchain met on the 20th of November to discuss the impact of blockchain technology on smart and intelligent contracts. The meeting was chaired by MP Damian Moore and included,

The discussion evolved around two opposite positions towards implementation of smart and intelligent contracts with most of the speakers focusing on the positive aspects of the transformation while both Charles Kerrigan Partner, Banking & International Finance at CMS and Kevin Gidney, CTO & Founder at Seal Software from Seal Software, brought forward some negative consequences and suggested solutions. The focus was on data and smart and intelligent contracts providing an infrastructure for data transfer, but missing laws on data use to ensure availability, liability and security.

5.1 Standards and Harmonization

"*Standardization will enable the market acceptance of smart contracts*" – said Shirley Bailey-Wood, MBE, Director of Information Solutions at BSI Standards, who opened the discussion with presenting BSI and their work on smart contract standardisation. The BSI standards series in development on blockchain will aim to enable greater acceptance with businesses of blockchain as an emerging technology.

Shirley argued that one of the standards under the BSI portfolio, entitled "Smart Contract that may be Legally Binding – Technical Specification", will address how smart contracts are written, how they are enforced, and how to ensure that the automated performance of an intelligent contract is faithful to the meaning of any relevant contractual documentation.

BSI is specifically developing a new fast track standard known as Publicly Available Specification (PAS) in partnership with Accord Project. The intended outcome is a "code of practice" for the technical implementation and use of smart legal contracts.

Shirley Bailey-Wood highlighted that to gain mass market usage, smart contracts need to be taken up by the technology community, but more importantly, accepted by the judicial system and those in organisations who do not necessarily have, or need deep technical expertise.

For this to happen, the privacy and security principles need to be built into technology, so businesses and consumers are confident in blockchain.

The fact that different laws exist in different jurisdictions adds complexity ensuring smart contracts implementation.

Harmonising those was highlighted by Charles Karrigan from CMS, who pointed to the differences in English and French law. The former being based on freedom of contract, the latter on civil, commercial and mixed agreements.

Adding to that, there are hard problems of equity, good faith and fairness as well as contracts that are negotiated as opposed to regulated.

Given that smart contracts change the nature of the very transaction among people, the Law Commission, that provides recommendations and advice to Government on law reform to ensure fair, modern, simple and cost-effective laws, has started a project on smart contracts to ensure that the law is sufficiently flexible and precise to apply in a global digital context.

Siobhan McKeering, lawyer at the Law Commission, posed critical questions on which the Law Commission will seek consultations, launching a call for evidence in early 2019. These are:

- *Questions of liability – what happens when a smart contract does not execute an agreement as expected, and how is liability allocated for any resulting loss.*
- *Questions as to whether tokens are intangible property and whether legislation such as the Bills of Exchange Act 1882 should be reviewed*
- *Questions of contract law, including interpretation, applicable law and remedies.*

5.2 Legal use and framework

As a response and a possible solution, both BSI and Accord Project propose a framework that could help to ensure that a relevant environment is created in which the transformation to smart contracts can take place.

BSI is working on interoperability and compatibility frameworks standards to avoid technology lock-in, thereby reducing the risk for consumers and improving their likelihood of acceptance of the new type of contractual relations. BSI recommends that government engages directly with a wider stakeholder community via HMG to bring insights, perspectives and experiences on blockchain and to shape workable solutions.

On the other hand, Accord Project proposes a framework that would work firstly for law practitioners before consumers can take advantage of the implementation of smart contracts.

Benefits of Smart Contracts	
Peter Hunn, Founder, Accord Project Contracting stack" – a series of technical tools that enable us to fundamentally improve the functioning of legal transactions Move from "static" to "dynamic" contracts- capable of a degree of real-time state where contracts can manage property rights per their terms Reducing transactions costs in managing contracts Improving accuracy and efficiency, increasing certainty and reducing disputes Improving operation and provision of legal services	Christopher Kerrigan, Partner, CMS "Smart contracts can address issues we regularly deal with in the digital economy": Verification Authentication Security Control Audit

There are many advantages of smart contracts, as pointed by Peter Hunn Charles Kerrigan. Before we reap the benefits at the consumer level, there is work to be done to prepare the legal practice for a big change.

Peter Hunn expressed the need to facilitate conditions to allow stakeholders to use and experiment with technology safely and with an appropriate degree of certainty. He believes that smart contracts start out to:

1. Be partially computable - through a concept such as "smart clauses" and
2. Not necessarily "self-executable"

He highlighted that for this environment to exist, we must not rush into regulation and develop a three-pillar framework:

Three Pillar Framework (Accord Project)		
Establishing techno-legal foundations of smart legal contracts, addressing the aforementioned issues and more. This produces an environment with a baseline for concerted experimentation, importantly in a DLT-agnostic manner. As a fast-moving technology, we cannot afford to be bound too tightly to a given DLT implementation. The Accord Project is working on this with the leading stakeholders and DLT providers.	Technical tooling for users to begin to use the technology. The foundational technology is available and additional tooling is being built at present. This includes open source code libraries for templating and execution, a programming language engineered specifically to write legal contract logic. Future steps include methods of interfacing with court, tribunals, and arbitration bodies.	Work on establishing an appropriate legal environment, which requires an assessment of the existing common law and statutory frameworks, abilities of English law to deal with edge cases, and - ultimately - whether additional regulation is needed. The work of the LawTech Delivery Panel and the Law Commission here is absolutely the correct approach to this matter and is wholly supported by the Accord Project.

Viney Gupta, CEO at Mattereum focused on a key reason for Smart Contracts- an application for "moving things". In that, smart contracts are an extension of using a computer for drafting a contract, which he believes means that there is no need for strong regulations. He explained that what is needed is a system for identification of assets: there should be legal titles of goods/copyrights/patents of what exists and what does not. Once we develop such framework that will support commercial infrastructure to

develop, we will be able to transact in a more comprehensive manner and gain value of goods and services not yet identified- smart contracts will only allow automation of contracts and facilitation of legal transactions.

5.3 Law vs lawyers

Another difficulty in this complex environment has been noted by Charles Kerrigan when he caught everyone's attention by using the phrase: ***"Don't assume that lawyers have the answers".***

Charles Kerrigan pointed to the fact that like any other persons, lawyers have preconceptions. For example, a lawyer would always consider the fact that any specific law may contain hidden policy choices.

Charles Kerrigan added:

1. Lawyers naturally want to categorise and systematise things they deal with – it's too early for smart contracts – we need to see what they do not put them in boxes
2. Lawyers are trained that contracts have certain named features – offer and acceptance, consideration – smart contracts don't meet these criteria – it doesn't matter – the current question is what they can do in practice not what they should do
3. Contracts have these "features" because they address defects that courts have found in agreements which they believe should not be enforced – there is a major implicit assumption – that courts are required for enforcement

Christina Blacklaws from the Law Society talked about the impact on smart contracts on the legal profession and reckons that Smart Contracts "can be a lawyer's friend". Law on Smart Contracts will change both parties (…) it can reduce the workload of litigation lawyers, but it will require further understanding of computer codes by lawyers of smart contracts. It will reduce the groundwork of transaction for a lawyer but it will have to have more regulation and a safe online space, so there is more work to be done to ensure that businesses are compliant with regulations of every sector

. The key point Christina Blacklaws made is that "*the legal consequences that have to be explained to humans and not smart contracts themselves"*. Even if the contract is self-executing, it doesn't mean that the terminology will be understood by the system, e.g. *"in good faith";* the work will be simply different for lawyers, but they will not lose their professions.

5.4 Negative consequences and difficult questions

Lastly, we touched upon negative consequences of smart contracts and the need for smart contracts become more intelligent, as expressed by Kevin Gidney from Seal Software.

Kevin Gidney brought forward an issue relating to the use and availability of the data that is used within a Smart Contract. Questions of data ownership, the use of the data for teaching / learning from and where data is used beyond the original intent. Another example he described refers to the storage and security around the information.

Kevin Gidney proposed some very key questions:

1. *With contractual data potentially holding key personal information such as PKI (in the case of employment agreements or notary items), how will this information be secured in a way that is both safe and usable?*
2. *In addition, how will this information be removed when or if regulations change on how the data is managed or if at the request of users?*
3. *Finally, how will Smart Contracts deal with people passing away, and what is kept of the person's digital fingerprint?*

Furthermore, smart contracts are limited in performance and scope. They are simply a method to automate simplistic contracts so how will this eventually scale to account for more complex contracts, where a real representation of an agreement can be presented and learned from.

5.5 Oracles

One of the key issues relating to Smart Contracts is the use of Oracles. Kevin Gidney discussed how Oracles are going to be mandatory for auto-completion of contracts based on real-world events. New questions arose:

1. *Who controls those and how can they be stopped from being hacked?*
2. *Do governments control them?*
3. *And is a consensus of answers is being used?*
4. *Does this not then undermine the entire notion of decentralised and trust less systems?*

6. Recommendations

In terms of the "practical steps" that government can take, when it comes to standards the most practical step is for HMG is to get involved directly with the wider stakeholder community that is already engaged in this work, to bring their insight, perspectives and experience on blockchain to the wider community and to help shape workable solutions. In the future BSI would also welcome HMG support to encourage implementation of the resulting standards to ensure the technology reaches its full potential – Shirley Bailey-Wood, Director of Information Solutions, BSI Standards

In our view, smart contracts should become more intelligent, we all know that if quantum computing does become a reality at room temperature, blockchain and security becomes hackable. And this must be accounted for in a more intelligent way, and have this accounted for within the base design of any Intelligent Contract system – Kevin Gidney, CTO & Founder, Seal Software

Questions to work by Charles Kerrigan, Partner, CMS:

-Regulation where the regulator has less information than firms (Pigole p84)

-Automation is leading a shift from negotiated contracts to regulated contracts

-Need for a standard e.g. acceptable outcome

-A role for insurance, at least where the problems financial risk and loss

-Recognition of digital assets - should information be property?

Goverment should support the development of a framework similar to that I have outlined. Doing so enables the UK to move forward in a concerted effort to build the appropriate techno-legal foundations into our legal system that is the envy of the world Vinay Gupta, CEO, Mattereum

Annexe I – Biography& Written Evidence from Speakers

Shirley Bailey-Wood, BSI Standards

Short Company/Speaker Presentation

BSI is appointed by HMG as the UK Standards Body, providing the infrastructure for UK experts to participate in international, European and national standards development and managing the catalogue of industry standards needed for the UK economy, reflecting the public policy interest and representing industry, government and society. BSI works globally across the full breadth of business and industry sectors. BSI's methods include the full international standards process and more agile fast track processes but are consistently underpinned by these principles of open consultation, engagement and consensus.

Written Evidence

This evidence will look at the standardization that is in progress for blockchain (also known as Distributed Ledger Technology), focusing on smart contracts, and how standardization will enable the market acceptance of smart contracts.

BSI is engaged in smart contract standardization as part of a broader set of international blockchain standardization activities. BSI has strongly supported the development of an international committee focused on blockchain, steering the direction of this committee and contributing research on blockchain standards.

The standards series in development on blockchain aims to enable greater acceptance with business of this still emerging technology. In standard's parlance the international committee developing blockchain standards is known as the ISO TC 307. There are 39 countries actively participating. From the UK there are 30+ active stakeholders participating, including representation from government, the legal sector and financial services.

Amongst the international standards in development there is a standard entitled "Smart Contracts that may be Legally Binding – Technical Specification" . It will address how such smart contracts are written, how they are enforced, and how to ensure that the automated performance of a smart contract is faithful to the meaning of any relevant contractual documentation. It is important to recognize that some smart contracts may not necessarily be contracts in terms of having a legally binding intention; but, such a smart contract may still give rise to enforceable obligations.

Alongside this international committee programme, BSI is creating further standards for blockchain where principles need to be established more quickly. Specifically BSI is developing new fast track standards (known as Publicly Available Specifications (PAS)), on Initial Coin Offerings and Smart Contracts.

The PAS work on smart contracts is in partnership with Accord Project. The outcome will be a “code of practice for the technical implementation and use of smart legal contracts”, complementing the international work and ensuring that both the technical and legal angles are provided for.

Blockchain has some negative perceptions around it due to the newness of the technology, lack of regulation and the negative stories associated with Bitcoin. To gain mass market usage, smart contracts need to be taken up by the technology community, but more importantly to be accepted by consumers, the judicial system and those in organisations who do not necessarily have, or need, deep technical expertise.

Other subjects being dealt with in the international standards committee are these very standards that will aid the mass uptake of blockchain, including smart contracts. Amongst the key topics covered are the privacy and security principles that need to be built in to technology so businesses and consumers are confident in blockchain. Good governance frameworks are being developed, as are principles concerning privacy of personally identifiable information, security risks and vulnerabilities. One of the consequences of the stage in the innovation cycle for blockchain is the proliferation of blockchain companies. Indeed, the Big Innovation Centre/Deep Knowledge Analytics research earlier in 2018 noted that there were over 200 companies in the UK blockchain ecosystem alone. The interoperability and compatibility framework standards are being devised to avoid technology lock-in, thereby reducing risk for customers and improving their likelihood of acceptance.

To conclude the blockchain related evidence, BSI is devising and putting in place the standards that will aid the uptake of blockchain, including smart contracts and creating a pathway for UK expertise and influence.

In terms of the “practical steps” that government can take, when it comes to standards the most practical step is for HMG is to get involved directly with the wider stakeholder community that is already engaged in this work, to bring their insight, perspectives and experience on blockchain to the wider community and to help shape workable solutions. In the future BSI would also welcome HMG support to encourage implementation of the resulting standards to ensure the technology reaches its full potential.

Peter Hunn, Accord Project & Clause

Short Company/Speaker Presentation

Peter Hunn, a lawyer and the founder of the Accord Project and Clause. Clause is a legaltech startup that builds tooling for enterprises to form, execute, and manage smart legal contracts.

The Accord Project is an open source, non-profit initiative comprising 60+ of the world's leading law firms (including the entity of the magic circle), standards bodies, NGOs, and DLT technology providers.

Written Evidence

Smart legal contracts hold huge promise. Ultimately that promise is the creation of a "contracting stack" -- a series of technical tools that enable us to fundamentally improve the functioning of legal transactions. We can imagine a future where contracts move from static concepts to dynamic concepts capable of a degree of real-time state, where contracts can manage property rights per their terms (from the sale of a licence to creative content, to managing registered property such as the process of buying and selling real property, to executing complex derivative transactions), and where we can submit disputes and contract data to arbitration bodies near instantly. That is just the start.

At a high level this means reducing transaction costs in managing contracts, improving the accuracy and efficiency of transactions, hopefully increasing certainty and reducing disputes. The implications are that we can, by orders of magnitude, improve the operation and provision of legal services.

That future is feasible today. Indeed, to put this into context, it has been a few years since we conducted the first IoT-enabled smart legal contract. But this is a nascent technology and we need to be cognisant of that.

We need to finely balance the need to facilitate conditions to allow stakeholders to use and experiment with the technology safely and with an appropriate degree of certainty, at the same time as recognizing that we are early in the journey.

Our belief is that smart legal contracts will start out to: (a) be partially computable - through a concept such as "smart clauses" and (b) not necessarily "self-executable". Some use cases are suitable; others not so. For example, automating an escrow payment upon specified conditions occurring (particularly when initiated by a human) and connecting a wallet or account to a contract to execute transfers automatically require different risk appetites from users.

Standards are important -- building in layers; foundations first -- creates a reference framework and building from there. Doing this in a DLT agnostic manner. Without this, we risk increasing transaction costs rather than reducing them.

We must not rush into regulation - we are starting to see the issues that this 'regulation-first' approach creates in the US.

My view is that the appropriate approach to developing the technology is to develop a three pillar framework:

1.- Establishing techno-legal foundations of smart legal contracts, addressing the aforementioned issues and more. This produces an environment with a baseline for concerted experimentation, importantly in a DLT-agnostic manner. As a fast moving technology, we cannot afford to be bound too tightly to a given DLT implementation. The Accord Project is working on this with the leading stakeholders and DLT providers.

2.- Technical tooling for users to begin to use the technology. The foundational technology is available and additional tooling is being built at present. This includes open source code libraries for templating and execution, a programming language engineered specifically to write legal contract logic. Future steps include methods of interfacing with court, tribunals, and arbitration bodies.

3.- Work on establishing an appropriate legal environment, which requires an assessment of the existing common law and statutory frameworks, abilities of English law to deal with edge cases, and - ultimately - whether additional regulation is needed. The work of the LawTech Delivery Panel and the Law Commission here is absolutely the correct approach to this matter, and is wholly supported by the Accord Project.

Concluding remarks

The government should seek to facilitate the creation of this environment in a way that both recognizes the sea change that smart legal contracts enable to improve the operation of commercial transactions, whilst appreciating that the technology will develop rapidly, thus requiring an appropriate degree of flexibility.

To this end, my recommendation is that the government should support the development of a framework similar to that I have outlined. Doing so enables the UK to move forward in a concerted effort to build the appropriate techno-legal foundations into our legal system that is the envy of the world.

The risk of not moving forward in such a manner is that other State's may produce environments that rival the UK's dominant jurisdictional position. But this is not only needed to maintain our position on the world stage, but affords an opportunity to become the world's most efficient jurisdiction for commercial transactions.

Charles Kerrigan, CMS

Written Evidence

Contracts - “An agreement intended to be enforceable at law”.

1. Be clear what we’re talking about. I’ll take three examples –
    a. Big difference between, buying an ice cream, buying a house, buying a group of companies.
    b. Don’t make assumptions e.g. that the law you know doesn’t contain hidden policy choices:
        i. - English law - freedom of contract
        ii. - French law - civil contract, commercial contract, mixed contract
    c. Don’t assume that lawyers have the answers – lawyers have preconceptions – see above on assumptions:
        i. - lawyers naturally want to categorise and systematise things they deal with – it’s too early for smart contracts – we need to see what they do not put them in boxes
        ii. - lawyers are trained that contracts have certain named features – offer and acceptance, consideration – smart contracts don’t meet these criteria – it doesn’t matter – the current question is what can they do in practice not what should they do
        iii. - contracts have these “features” because they address defects that courts have found in agreements which they believe should not be enforced – there is a major implicit assumption – that courts are required for enforcement
2. Benefits of smart contracts
    a. They push back the boundaries – e.g. the assumption just above – the original Bitcoin white paper stressed the irreversible nature of transactions as a key benefit of the blockchain technology
    b. Why is this useful? It relates to the benefits of commoditisation – my career has seen the constant commoditisation of banking – in payments the goal is always reducing friction – speed, accuracy, consistency
    c. Smart contracts can address the issues we regularly deal with in the digital economy
        i. verification
        ii. authentication
        iii. security
        iv. control
        v. audit

   d. English law is well suited to smart contracts because of the doctrine of freedom of contract – you can program what you like – but is this a mixed blessing because it puts the onus on commercial parties to do more work?

3. Problems with Smart Contracts
   a. Perceived problems with smart contracts – there is a conventional list but we can suggest some answers - I'll be provocatively optimistic:
      i. - are they enforceable? – yes, by their nature you don't need a court's opinion because they are self-executing
      ii. - where do you sue if there's no agreement on jurisdiction – 1 you don't sue, see above, 2 enforcement and arbitration can be part of the rules of the club
      iii. - how are liability issues dealt with? – this can be part of the program, but you can also buy insurance
      iv. - they don't deal with complex contracts – true but more people buy ice creams than groups of companies
   b. Real problems with smart contracts
      i. - IoT – too much information – we will be too reliant on the systems operating well together – a transparency issue not because we have a black box but because we have a box which is so full of stuff that we can't begin to untangle – the Christmas lights problem
      ii. - hard problems - equity, good faith, fairness
      iii. - regulation - who is responsible and where is the off switch? take action against developer, some users, all users?
      iv. - terminology - distinguish: contracts, automation, smart contracts, blockchain etc.
4. Questions to work on:
   a. regulation where regulator has less information than firms (Pigole p84)
   b. automation leading a shift from negotiated contracts to regulated contracts
   c. need for a standard e.g. acceptable outcomes
   d. a role for insurance, at least where the problems financial risk and loss
   e. recognition of digital assets - should information be property?
5. Technology is technique not ideology

Kevin Gidney, Seal Software

Written Evidence

Many commentators talk of Smart Contracts as a key technology foundation for legal organisations in the future. However, there a number of key issues that need to be addressed with performing contracting in this way, and these are rarely aired.

One issue is relating to the use and availability of the data that is used within a Smart Contract. Questions of data ownership, the use of the data for teaching / learning from and where data is used beyond original intent.

Other issues relate more to the storage and security around the information. With contractual data potentially holding key personal information such as PKI (in the case of employment agreements or notary items), how will this information be secured in a way that is both safe and usable? In addition, how will this information be removed when or if regulations change on how the data is managed or if at the request of users. Finally how will Smart Contracts deal with people passing away, and what is kept of the person's digital fingerprint?

In addition to ethical items like the above, Smart Contracts are also limited in performance and scope. They are simply a method to automate simplistic contracts so how will this eventually scale to account for more complex contracts, where a real representation of an agreement can be presented and learned from.

One of the key issues relating to Smart Contracts is the use of Oracles. Oracles are going to be mandatory for auto completion of contracts based on real world events. But who controls those and how can they be stopped from being hacked? Do governments control them? And is a consensus of answers is being used? Does this not then undermine the entire notion of decentralised and trust less systems?

To this end Intelligent Contracts are going to be needed, with AI driving the Oracles, and intelligent storage and usage methods for information, also accounting for destruction and obfuscation of information.

In our view, smart contracts should become more intelligent, we all know that if quantum computing does become a reality at room temperature, blockchain and security becomes hackable. And this must be accounted for in a more intelligent way, and have this accounted for within the base design of any Intelligent Contract system.

Siobhan McKeering, Law Commission

Written Evidence

The Law Commission of England and Wales is a statutory body which is independent of Government. It was established by the Law Commissions Act 1965 to keep the law of England and Wales under review to recommend reform, where necessary. The Law Commission gives advice to Government and makes recommendations for law reform with the aim that the law should be fair, modern, simple and cost effective.

The Law Commission has been asked by Government to look at smart contracts. The purpose of the project is to ensure that the law is sufficiently certain and flexible to apply in a global, digital context and to highlight any topics which lack clarity or certainty.

The Law Commission is a consultative body. We are currently speaking to lawyers, computer scientists, academics and technology firms, to identify questions of legal uncertainty which the Law Commission could usefully consider. The issues which stakeholders have raised include:

- Questions of contract law, including interpretation, applicable law and remedies.
- Questions of liability – what happens when a smart contract does not execute an agreement as expected, and how is liability allocated for any resulting loss.
- Questions as to whether tokens are intangible property and whether legislation such as the Bills of Exchange Act 1882 should be reviewed.

We are keen to hear from as many stakeholders with an interest in smart contracts as possible. Therefore, in early 2019 we will publish a call for evidence, with a consultation period, followed by a symposium hosted by the Law Society. We expect that the results of the call for evidence will shape our future work on smart contracts.

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