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Blockchain and the law

An uncharted landscape

A hand is pointing at a digital financial chart on a screen. The chart features various data series, including a candlestick chart, a line graph with a red dashed trendline, and a bar chart. The background is a dark blue with glowing lines and data points, suggesting a high-tech or financial environment. The text is overlaid on a dark rectangular box in the upper left quadrant.

The financial and technological industries are coming together to explore the possibilities in blockchain, or distributed ledgers, the technology underlying the digital currency bitcoin. Blockchain offers the potential to become an essential component of the infrastructure for the Internet of Things. We explore some of the opportunities and challenges.

What is blockchain?

A blockchain is simply a database or ledger. Given its broad meaning, it can be a database of virtually any recordable information (for instance, the transfer of bitcoins). Simply, blockchains store data in “blocks”, and “chain” them together to form a cohesive, unbroken record of that information.

The joint operation of two features in particular makes blockchain revolutionary. First, identical copies of the particular blockchain (or ledger) are stored on and accessed

from many computers around the world - sometimes in the thousands or more. Any attempted addition or change to the information is authenticated by the entire network of servers, and any validated change to one ledger automatically updates the others. Second, together with this decentralised ledger system, the cryptographic technology that validates information stored and edited on the blockchain is said to make information kept on it extremely difficult to attack or corrupt.

The development of new trading infrastructure and trading mechanisms over the past 600-700 years has relied on the same broad pattern of technological developments, along with new communication chains leading to an expanse in trade.

Within new communication chains we include both

1. Direct advances such as developments in maritime navigation allowing transportation of goods and
2. Advances which go to the ability to widen relationships and communication, such as the development of double-entry ledgers and credit in Venetian banking circles in the 15th and 16th century. Each allowed a leap forward in trade

If the blockchain is indeed the missing link for the Internet of Things and the promise which it holds, the current cycle would be as follows:

**Internet /
Internet of Things + Blockchain**
**= leap forward in
internet commerce**

Alongside these structural changes, legal developments have fostered and in some cases prompted wider developments:

- Joint stock companies
- Limited liability
- Statutory recognition of insurers

This shared method of validating information largely dispenses with the need for a trusted authenticating third party for many types of transactions. Blockchain and associated technologies allow contractual counterparties – without independent verification – to know that a certain event has happened, and automatically trigger the relevant contractual consequences. By enabling trust between contracting parties, the technology has the disruptive potential to herald a flourishing new pattern of commercial behaviour and relationships. It is this “disintermediation” that has some referring to “distributed ledger technology” as the most disruptive invention since the internet. Hyperbole or not, blockchain and the associated platforms may allow the internet, and in particular the Internet of Things to realise their full potential.

Smart contracts and decentralised autonomous organisations

Arising out of the blockchain phenomenon are two further concepts.

- So called smart contracts are coded instructions which execute on the occurrence of an event. These often use blockchain technology to record and execute transactions. While their common name is arguably a misnomer (they are not necessarily contracts in the traditional legal sense), their implementation can enable, for example, insurance monies to be transferred virtually immediately on the occurrence of a verified insured event (such as a delayed plane)
- Decentralised autonomous organisations (DAOs) are entities which operate through the implementation of pre-coded rules. DAOs operate using smart contracts, and maintain their business records on a blockchain. Theoretically, once it is created and programmed, human input into its operation should be close to zero

Why should blockchain interest you?

While these are early days for the wider-use of distributed ledger technology, predictions are that it will revolutionise everything from the operation of the finance industry to the trade of precious gems. Such technology could permeate through and across industries and be used for:

- Identity verification
- Near-instant money transfer
- Recording of all kinds of property ownership (including real estate)
- Transaction certification
- Automation of contract performance
- Verifying authenticity and origins of valuable items such as diamonds and rare musical instruments
- Secure voting of all kinds, including for national politics

Insurance

The commercial insurance market has been slow to adapt to digitalisation in all forms: perhaps a reflection of its traditionally driven nature.

However, even if (as seems likely) existing structures are embedded the myriad of inter-connected relationships involving brokers, reinsurers, third-party coverholders and binding authorities - all sitting on top of or parallel to the central insurer-insured relationship - may become fertile hunting grounds for disintermediation. We see four potential areas of opportunity:

1. Administrative and process functions. The nature of many contracts, with a variety of parties and obligations being impacted by single triggers, is ripe with potential for distributed ledgers.
2. The fundamental transfer of risk from the client to the insurer's balance sheet. This area, involving complex assessments of risk and agreements as to risk transfer may be less suited to a distributed ledger or use of a DAO, but the use of such platforms alongside wrap-around contractual arrangements still offers opportunities.
3. Niches of risk transfer such as parametric insurances (e.g. crop insurance triggered by pre-determined weather data parameters) or Insurance-Linked Securities have obvious potential.
4. Hybrid products which, utilising the Internet of Things, use data through the term of a policy to update premium allocation.

As with the wider picture, if used as an execution tool then the existing legal and regulatory framework could likely be utilised, albeit that care needs to be taken over issues of ownership, responsibility and potentially

jurisdiction and dispute resolution.

If a deeper contractual basis or allocation of status is given to the DAO, then any such proposal would need to be carefully structured to fit within the regulatory landscape.

Challenges

Much attention has been paid to the challenges posed to the adoption of blockchain and associated technologies within the existing regulatory framework. These are important considerations certainly, but a creative approach to the fundamental nature and status of the organisms and platforms created by blockchain, DAOs and smart contracts is warranted. Once these have been determined, the detail of the regulatory position will follow (the UK Government has published an extensive report which touches upon these issues prepared by its Chief Scientific Advisor - see Distributed Ledger Technology: beyond block chain). We outline some of the challenges below.

Legal issues

The use of blockchain, DAOs and smart contracts raises significant legal questions, the answers to which cannot be determined with certainty in the abstract. As the technologies become more widely used, legislators, regulators and courts will have to turn their minds to these issues and provide a proper legal framework within which blockchain can be utilised. Some key legal issues are:

- Jurisdictional and applicable law issues - where servers are decentralised and can be spread around the world, pinpointing where a breach or failure occurred (and taking the appropriate cross-border action) may be complex
- The legal status of DAOs as entities - where the entity is essentially self-governing software engaging in or facilitating commerce, what legal status will attach to DAOs? Are they simple corporations or something else?
- What, if any, is the liability of DAOs and their creators? Who or what is claimed against in the case of a legal dispute?
- The legal enforceability of smart contracts - we consider the wholesale adoption of the phrase to be unhelpful, as the term 'contract' invites the traditional associated concepts such as offer and acceptance, certainty and consideration, which are unlikely to be relevant to many coded programs

For some, such questions miss the point of the technology - rather, DAOs are seen as operating so as to render traditional concepts of ownership and liability redundant. However, we consider that this perhaps more utopian view ignores the reality that coding may suffer from errors, or hosting platforms may fail. It also fails to consider the impacts of fraud at any point in the DAOs creation or operation. Courts and regulators

across the world are unlikely to allow the wholesale adoption of technology which bypasses established oversight.

There are a number of possible ways to approach the appropriate structure, dependent on the nature of the transaction.

The easiest solution may be to agree a wrap-around contractual agreement in contractual terms – perhaps a Master Supply Agreement for example – incorporated as the prevailing terms for the linked DAO. Alternatively, a split-contract could be used which incorporates elements of both a codified program and more traditional contracts, thus linking the agreement (established pattern) and the execution (non-established pattern).

In respect of the status of the platform for the DAO itself, the most straightforward option would appear to be for contracting entities to simply adopt a free-to-use platform with an agreed code. Seeking to apply a traditional view, is the DAO itself so very different from a road network used to transport goods? That network does not form part of the contract itself, but it is an implied necessity.

This of course raises questions as to the recourse in the event of technical problems and wider framework. For those wishing to enter into a more determined, traditional framework one option may be a free-standing Protected Cell Company (see box to right) type structure which is responsible for the maintenance of the DAO and for fulfilling the relevant legal obligations. The content and purpose of those DAOs would be the subject of wider agreement but the DAOs themselves could operate as self-policing and operating units.

The combination of these types of structure – separating the blockchain infrastructure from the contractual agreement leaves the DAOs or smart contracts as essentially execution methods. Again, therefore, to adopt a traditional concept, the smart contract is akin to a Letter of Credit. (see box to right) – counterpart performance is triggered automatically by the relevant act.

While uncertainty remains, the courts will seek to give effect to some kind of oversight and legally recognised status to DAOs and distributed ledgers. Continuing the road analogy, whilst we now take for granted public ownership of the road network this has grown out of a network of privately funded and managed roads dating back to turnpikes on key routes.

At this stage, however, flexibility remains and we consider that, certainly, in England, with its long tradition of the common law adapting to technological changes, an opportunity exists for those willing to furrow new ground and to take a creative approach.

Regulation

From the rise of e-commerce in the '90s to the current debates around how the world will adapt to driverless cars, the adoption of new technology gives rise to complicated regulatory issues. As already mentioned, legislatures will have to consider what legal status to grant to DAOs.

Further, the potential for anonymity on some distributed ledgers may complicate anti-money laundering compliance and taxation regulation, while consumer protection laws will need to be revised just as they were to accommodate the rise of e-commerce.

Protected Cell Companies (PCC)

Commonly used to establish turnkey captive insurance companies, PCCs are a corporate structure in which a single legal entity is comprised of a core and several cells that have separate assets and liabilities. The PCC has a similar design to a hub and spoke, with the central core organisation linked to individual cells. Each cell is independent of each other and of the company's core, but the entire unit is still a single legal entity.

Could such an organism be utilised for DAOs, so that questions of responsibility for its operation and its legal status are hived off to the entire PCC unit, while allowing each to function separately and autonomously?

Letters of Credit (LOC)

An LOC is a document, typically from a bank, assuring that a seller will receive payment up to the amount of the LOC, as long as certain conditions have been met. In the event that the buyer is unable to make payment on the purchase, the seller may make a demand for payment on the bank. The bank will examine the demand and, if it complies with the terms of the LOC, will honour the demand without looking at the detail of the underlying contract or the merits of any dispute.

LOCs are separate from the underlying transaction and English law recognises such a distinction – only in the instance of fraud will English courts look beyond the bare terms of the LOC.

Other issues

Other challenges to the wider adoption of these technologies include:

- Mistrust of bitcoin related technology due to dark-web and criminal connotations
- Questionable capability for smart contracts to accurately execute complex instructions
- Fear of disruptive potential can often lead to adoption resistance
- Privacy and data-security on public blockchains
- Software compatibility issues

Glossary of terms

In this fast-moving area of innovative technology, there is little consensus on the precise definitions, even of key terms (such as the term 'blockchain' itself).

- Bitcoin – a finite digital currency created and held in purely electronic form. As with most modern currencies, it has a fluctuating exchange rate
- Blockchain – in a narrow sense, the database of every bitcoin transaction ever made. More loosely, the term is used to describe the style of database, which sees information stored in a series of “blocks” and “chained” together. Copies of the database, or ‘ledger’ are stored on a number of servers in a decentralised fashion
- Decentralised Autonomous Organisation or DAO (also known as decentralised autonomous corporations) – a digital entity which, once pre-coded to function in a certain way, operates with minimal or no human input
- Disintermediation – the process of reducing the use of or need for intermediaries. In this context, refers to the reduced need for trusted third party intermediaries to validate and facilitate transactions, especially in the finance industry
- Distributed ledger technology – see “blockchain” above. The broader use of the term blockchain. Blockchain is one example of distributed ledger technology, although the terms are often used interchangeably
- Internet of Things – refers to the increased connectivity, or the networking of previously unconnected items embedded with technology to open communication streams between them. For example, a smart phone “talking” to a home air-conditioner and, based on the phone’s location, instructing it to begin heating a house for the owner’s arrival
- Smart contract – coded instructions which execute on the occurrence of an unequivocal event. The common example of a “primitive” smart contract is the simple vending machine. On the insertion of sufficient funds, the machine will release the requested item. Questionable whether these are truly contracts or not

Contact



Lee Bacon

Partner

E: lee.bacon@clydeco.com

T: +44 (0)20 7876 4410



Nigel Brook

Partner

E: nigel.brook@clydeco.com

T: +44 (0)20 7876 4414



James Contos

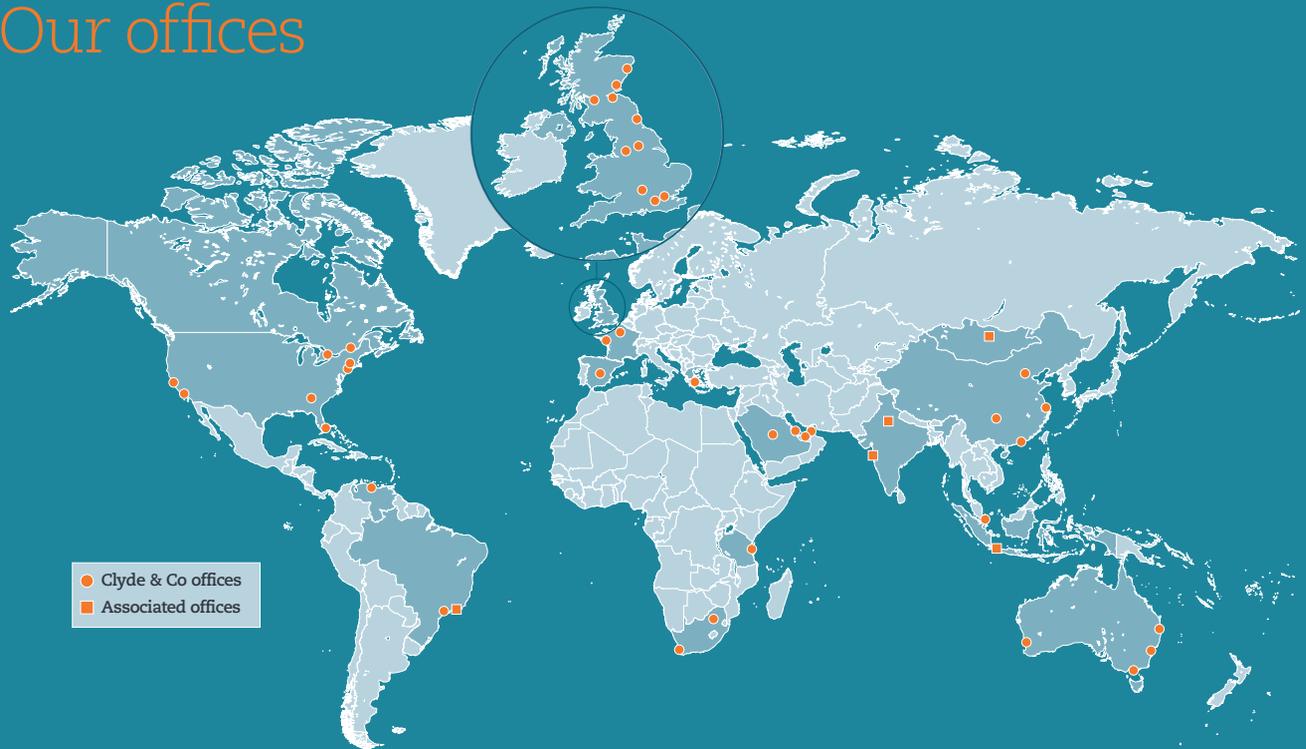
Associate

E: james.contos@clydeco.com

T: +44 (0)20 7876 4859

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