Smart contracts and blockchain technology: challenges to contract law

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Regulators start regulating...

... but what is a ‘smart contract’?

France Accepts New ICO Framework to Become Europe’s Leading ICO Hub

Malta wants to become 'Blockchain Island'

States that are passing laws to govern “smart contracts” have no idea what they’re doing

MOTION FOR A RESOLUTION

further to Question for Oral Answer B8-0405/2018
pursuant to Rule 128(5) of the Rules of Procedure
on distributed ledger technologies and blockchains: building trust with disintermediation
(2017/2772(RSP))
BLOCKCHAIN IN A NUTSHELL

Block A

Block B

Block C

Block D

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Blockchain allows to share data and code without intermediaries to operate or maintain services

**Robust Distributed Database**
All parties share the same data and data is replicated

**Secure**
Authentication and identification via highly-secure cryptography

**Immutable**
Unchangeable audit trail with time stamps

**Programmable code + data**
Data and execution code representing contracts can sit coherently in the same distributed database

**Application Areas**

**Record Keeping**
Create an immutable shared record without reliance on a trusted third party
- **Examples:**
  - Regulatory information
  - Know Your Customer
  - Asset event history

**Transfer of Value**
Enable low-cost, near real-time value transfer without an intermediary
- **Examples:**
  - Land registry
  - Transfer of digital assets
  - Payments

**Smart Contracts**
Program shared data and code to execute transactions when a set of pre-determined conditions are met
- **Examples:**
  - Event triggered payments
  - Contract management
  - Proxy Voting
A **distributed ledger** is replicated, shared and synchronized digital data geographically spread across multiple sites, countries, or institutions.

Distributed Ledgers do not have a central administrator. They are based on peer-to-peer networks with a consensus algorithms.

**Blockchain** is a distributed ledger used to maintain a continuously growing list of records, called blocks. Each block contains a timestamp and a link to a previous block. By definition, blockchains are inherently resistant to modification of the data. Once recorded, the data in any given block cannot be altered retroactively without the alteration of all subsequent blocks and a collusion of the network majority.

*All blockchains are distributed ledgers, but not vice versa*

**Smart contracts** are computer protocols that facilitate, verify, or enforce the negotiation on performance of a contract, or that obviate the need for a contractual clause.

*Not all blockchain frameworks support smart contracts*
DEFINITION OF SMART CONTRACTS

“They are little programs that execute, If this happens then do that, Run and verified by any computers to ensure trustworthiness”

A smart contract, also known as a cryptocontract, is a self-executing contract with the terms of the agreement between buyer and seller being directly written into lines of code. A smart contract not only defines the rules and penalties around an agreement in the same way that a traditional contract does, but it can also automatically enforce those obligations.

Deterministic computer code
Published on a blockchain
Applications specific
Executed in a distributed way over the blockchain network

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**BASE CHARACTERISTICS ≠ SMART**

**Deaf and blind**
- Only knows its own status and (temporary) functional parameters
- Does not encompass / detect other data / facts in the real world “off chain”

**Distributed**
- All nodes know the smart contract and execute it
- In some permissioned blockchains reduced to a subset of nodes

**Reactive**
- Does nothing, except if the function is activated
- Always same output for certain input
- Can be linked to other smart contract reacting subsequently

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<table>
<thead>
<tr>
<th><strong>OPPORTUNITIES?</strong></th>
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<table>
<thead>
<tr>
<th>Traditional Agreement</th>
<th>Smart Contract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>Minutes</td>
</tr>
<tr>
<td>Manual checks</td>
<td>Automated checks</td>
</tr>
<tr>
<td>Physical</td>
<td>Digital</td>
</tr>
<tr>
<td>Trust required</td>
<td>Trust built in</td>
</tr>
<tr>
<td>Costly</td>
<td>Minimal cost</td>
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USE CASES

provide in a legal action (eg. notice)

provide a particular significance/certification in a certain legal environment / relationship (eg. function of proof)

Probably most relevant (legal) application: payment under condition precedent

Financial services
Insurance, trade finance, KYC, AML, transfer of securities

Consumers
Elections, smart locks, sharing economy

Real estate
(refusal/withdrawal/grant of) permits, escrow

Life sciences
Processing of medicinal prescriptions
SMART (?) CONTRACTS (?)

Legal qualification

Dissolution / suspension of obligations

Liability

Applicable law and jurisdiction

Dispute resolution
• What if?

- the unexpected
- the unforeseen
- corrupt data
- bug in code
AN EXAMPLE OF HOW IT COULD WORK...

... and the implications if it goes wrong
THE NEED FOR A CONTRACTUAL FRAMEWORK

Phase #1
From a static to a dynamic group of contracts

Phase #2
External triggers ('oracles', e.g. IoT)

Deaf and blind

Distributed

Reactive

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• Natural language can be used to determine elements that are not fit for codification, or to explain (the rationale of) the code.
• Hybrid contract where prose and code come together = so-called “Ricardian contract”
CHALLENGES TO TRADITIONAL CONTRACT LAW?

- Contract conclusion
- Code defects - Allocation of risk
- Contract interpretation
- Enforceability: international private law
- Contractual liability
Meeting of minds precedes automated execution

- Contract formation on an online forum
- Requirement of written contract
- Moment of formation of contract
- Legal capacity
- Subsequent contracts
- Legality
- Vitiated consent

Vitiated consent

Legal capacity

Requirement of written contract

Moment of formation of contract

Subsequent contracts

Legality

Vitiated consent

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CONTRACTUAL INTERPRETATION

Contract is unclear → Intention of parties → Context → Interpretation if favour of weaker contract party

Impossible to incorporate into the code
CONTRACTUAL LIABILITY

Non-performance

Code ensures performance

Defective performance

Code unable of ensuring performance

Incapable of handling:
- Seriousness of defective performance
- Causality
- Force majeure
Contract clauses needed

Anonymity of contract parties

Article 4 Rome I Regulation

Contract clauses needed

Where is a smart contract executed

Article 5 (1) Brussels I Regulation

What if no contractual wording?
Who is liable?

- Liability of contract parties?
  - Force majeure?
  - Liability for subcontractors?
  - Need for liability clauses

- Liability of smart contract provider?
  - Exoneration clauses
  - System of trust

ALLOCATION OF RISK
• Smart aspects of smart contracts is subsequent to formation of contract

• Smart contracts incapable of incorporating contextual elements
  • Smart contract suitable for simple transactions
    • Financial sector
    • Real estate sector
  • Smart contract unsuitable for complex transactions
    • Real estate sector
    • Building sector

• Conclusion: legal profession secured, but reorientation is inevitable