UNIVERSITY of NICOSIA

Session 6

Smart Contracts

BLOC 513: Law and Regulation in Blockchain

Session objectives

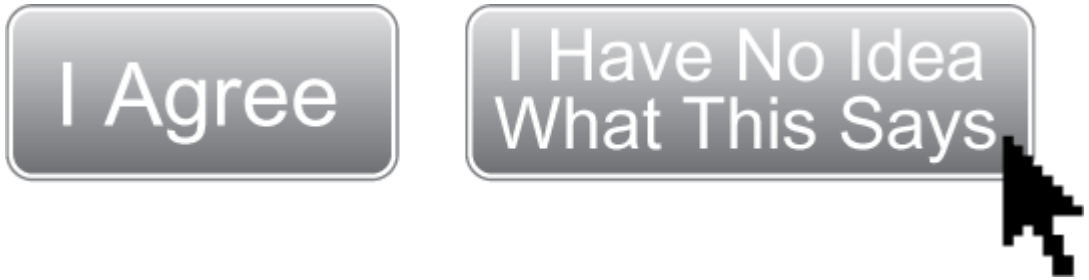
- To explain the interplay between contract law and smart contracts.
- To provide the regulatory framework/principles for smart contracts.
    - In particular, to understand:
        - how contract law morphed in the online environment;
        - what could be a smart contract;
        - the challenges smart contracts must resolve;
        - the likely (or even desired) impact of smart contracts;
        - how different jurisdictions perceive smart contracts.

Session outline

1. Contracts vs. “Smart Contracts”
2. Definition & Models of Smart Contracts
3. Use Cases / Challenges / Statutory Examples
4. Required reading
5. Further reading

Contracts vs. “Smart Contracts”

Contracts vs. “Smart Contracts”: The online environment



- Trustless: No trust is required towards an individual third party when using it
- Public: It is publically available to examine all aspects of, and permissionless to use
- Ledger: A persistent and immutable record of ownership transference

Are Trustless Public Ledgers and Smart contracts - a solution?

> “The current problem with consumer contracting online is that courts and companies have collaborated to create an online system in which consumers cannot bargain. Under the current regime, consumers have no choice but to click the “I Accept” button. Online, contract law is not the law of bargained-for exchange; it has become the law of company-dictated exchange. Smart contracts— automated computer programs able to execute trades through TPLs—may offer a solution. “
>
> Joshua Fairfield

Joshua A.T. Fairfield, *Smart Contracts, Bitcoin Bots, and Consumer Protection*, 71 WASH. & LEE L. REV. ONLINE 36 (2014), http://scholarlycommons.law.wlu.edu/wlulr-online/vol71/iss2/3

Contracts vs. “Smart Contracts”: Clickwrap – Scenario 1

Fairfield posits the following scenarios:

Scenario 1

A consumer logs onto a corporate web server, seeking to buy a widget.

She encounters the site’s standard contractual terms and conditions, which she clicks through without reading (although she has a rough idea what is in them), and concludes a purchase.

The contract is **enforceable** according to its terms, but they remain terms she has not read. This flies in the face of contract law theory as it has developed over the centuries.

*In the **European Union however Consumer Protection legislation may protect the consumer** and allow a consumer to “back out” of the contract or not proceed to its enforcement.*

Contracts vs. “Smart Contracts”: The problem to resolve

- Compensation if a trader doesn't deliver
- Get-out clause in favour of the trader
- One-sided compensation for cancellation
- Excessive compensation
- One-sided cancellation
- Cancellation at short notice
- Automatic extensions of fixed duration contracts
- Hidden terms
- One-sided changes to the contract
- One-sided changes to the product or service
- Price variations
- One-sided interpretation of the contract
- Not honouring statements made by the trader's staff
- One-sided compliance with obligations
- Transfers of contracts to other traders under less favourable conditions
- Limited rights to legal action

- *‘**consumer**’ means any **natural person** who, in contracts covered by this Directive, **is acting for purposes which are outside his trade, business or profession***
- ***Contract terms that are unfair under EU law have no legal or binding force on consumers**. As long as the unfair term is not an essential element of the contract, **the rest of your contract (but not the unfair term) remains valid**. This means, for example, **that you won't have to give up your gym membership just because one clause in the contract is unfair.***

Definition & Models of Smart Contracts

Definition of Smart Contracts

"a set of promises, specified in digital form, including protocols within which the parties perform on these promises" – Nick Szabo (1996)

De Fillippi gives the example of a vending machine as being a crude attempt at a smart contract.

'We insert a coin in the belief that the machine will accept our payment and implement the contract by delivering the desired item.'

Definition of Smart Contracts

- *Smart contracts are typically deployed on a blockchain (although it is possible for other platforms to host them too). Within a blockchain view of this, smart contract program logic sits within a "block."*
- A block is a software-generated container that bundles together the messages relating to a particular smart contract.
- Those messages may act as inputs or outputs of the smart contract programing logic and may themselves point to other computer code.

Smart Contracts: 12 Use Cases for Business & Beyond |Chamber of Digital Commerce (2016)

Definition of Smart Contracts: Understanding Szabo's definition

"a set of promises"

- Depending on the model of smart contract deployed such promises may be contractual or non-contractual
- They may consist of contractual terms and/or rules-based operations designed to carry out business logic

"specified in digital form"

- A smart contract operates electronically
- It consists of lines of code as well as the software that prescribes its conditions and outcomes
- Contractual clauses and/or functional outcomes are embedded as code within software

"protocols"

- A computer protocol in the form of an algorithm constitutes a set of rules for how each party should process data in relation to a smart contract
- Technology-enabled, rules-based operations enable actions to be performed, such as the release of payment

"within which the parties perform"

- The idea of automated performance is at the heart of a smart contract
- Driven in part by the technology that typically hosts a smart contract (that is, blockchain technology), smart contracts are traditionally regarded as irrevocable
- Once initiated, the outcomes for which a smart contract is encoded to perform cannot typically be stopped (unless an outcome depends on an unmet condition)

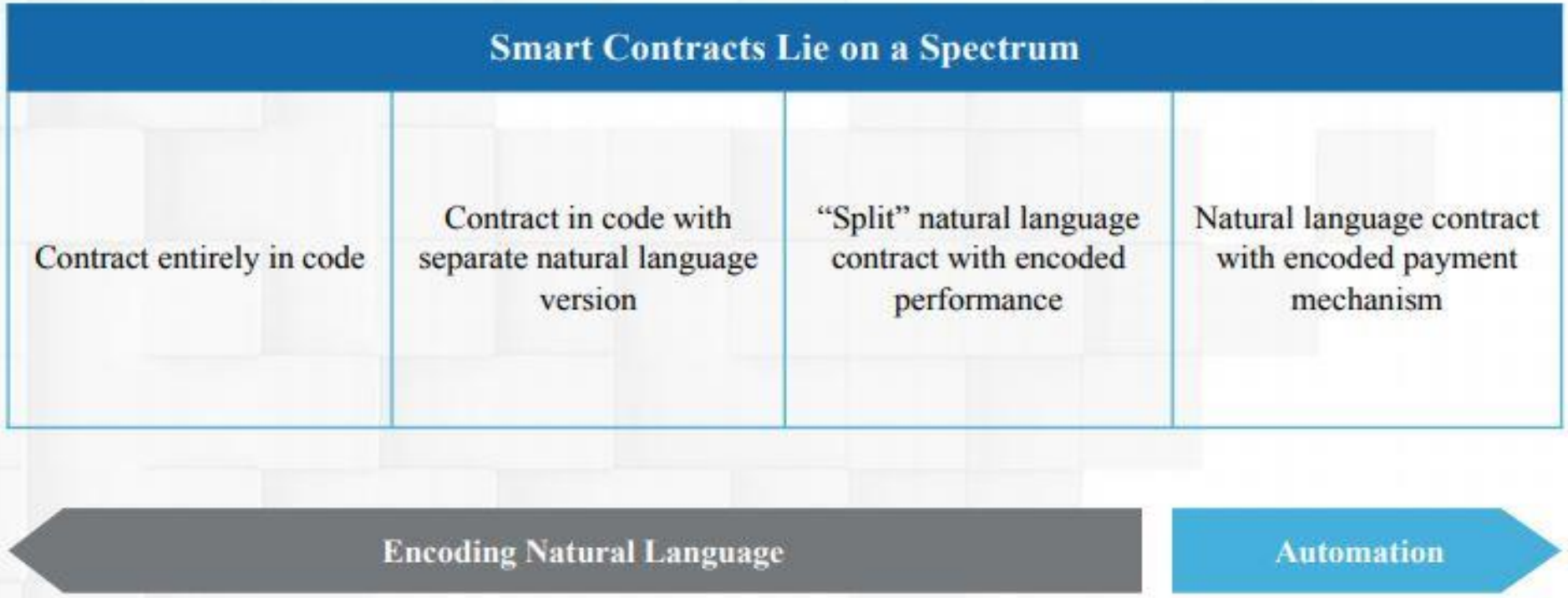
Smart Contracts: 12 Use Cases for Business & Beyond | Chamber of Digital Commerce (2016)

Models of Smart Contracts

Smart Contracts: 12 Use Cases for Business & Beyond | Chamber of Digital Commerce (2016)

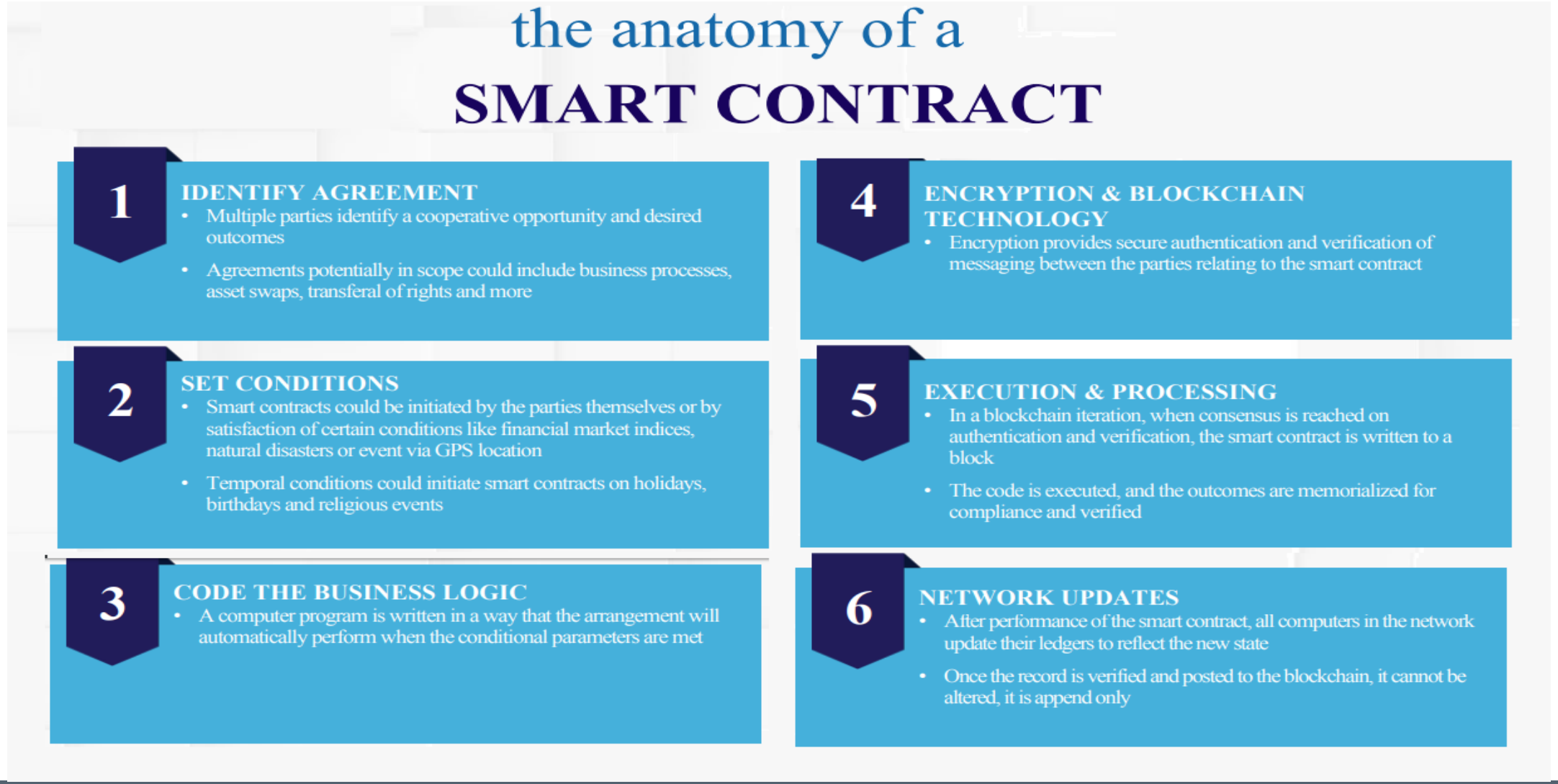
What are the different models for smart contracts?

It is a common misconception that there is only one type of smart contract. In fact, there is a spectrum of possibilities.



Other permutations are, of course, possible and are likely to emerge as smart contract applications develop.

Models of Smart Contracts

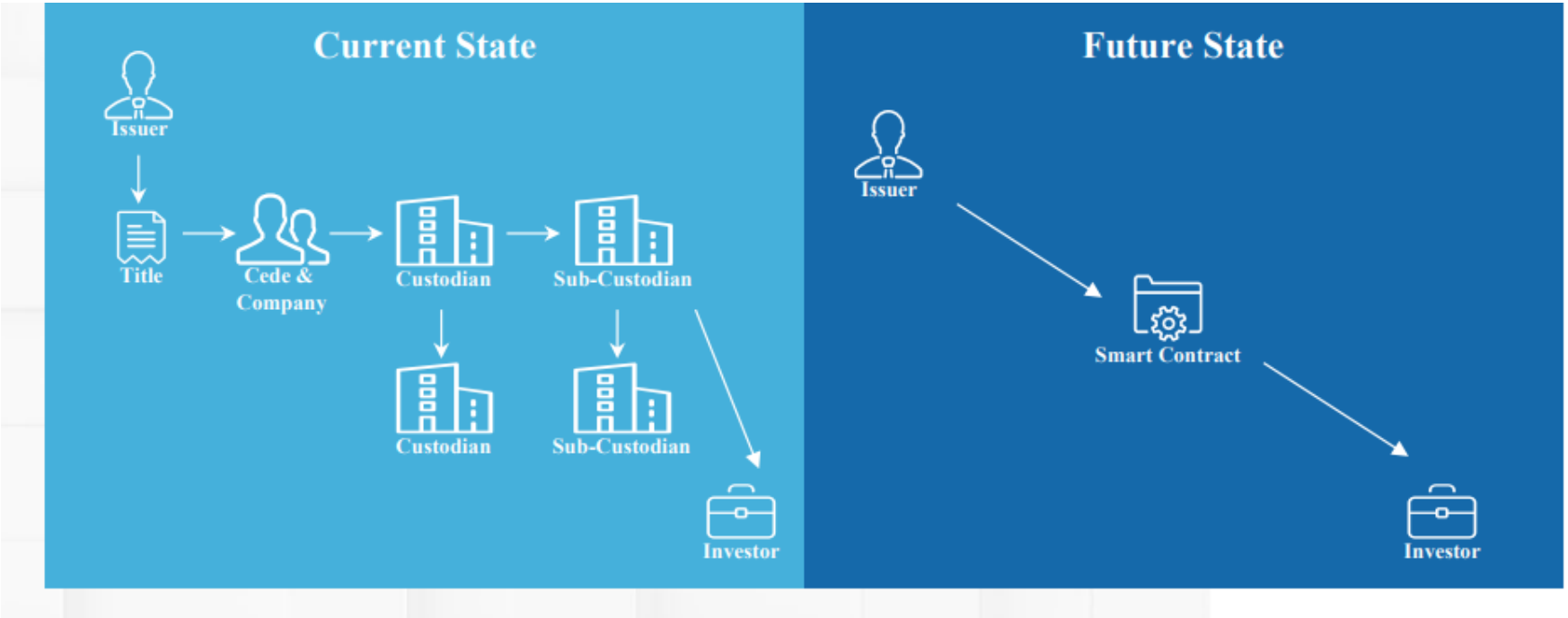


Use Cases / Challenges / Statutory Examples

Cases to use Smart Contracts

Smart Contracts for Securities

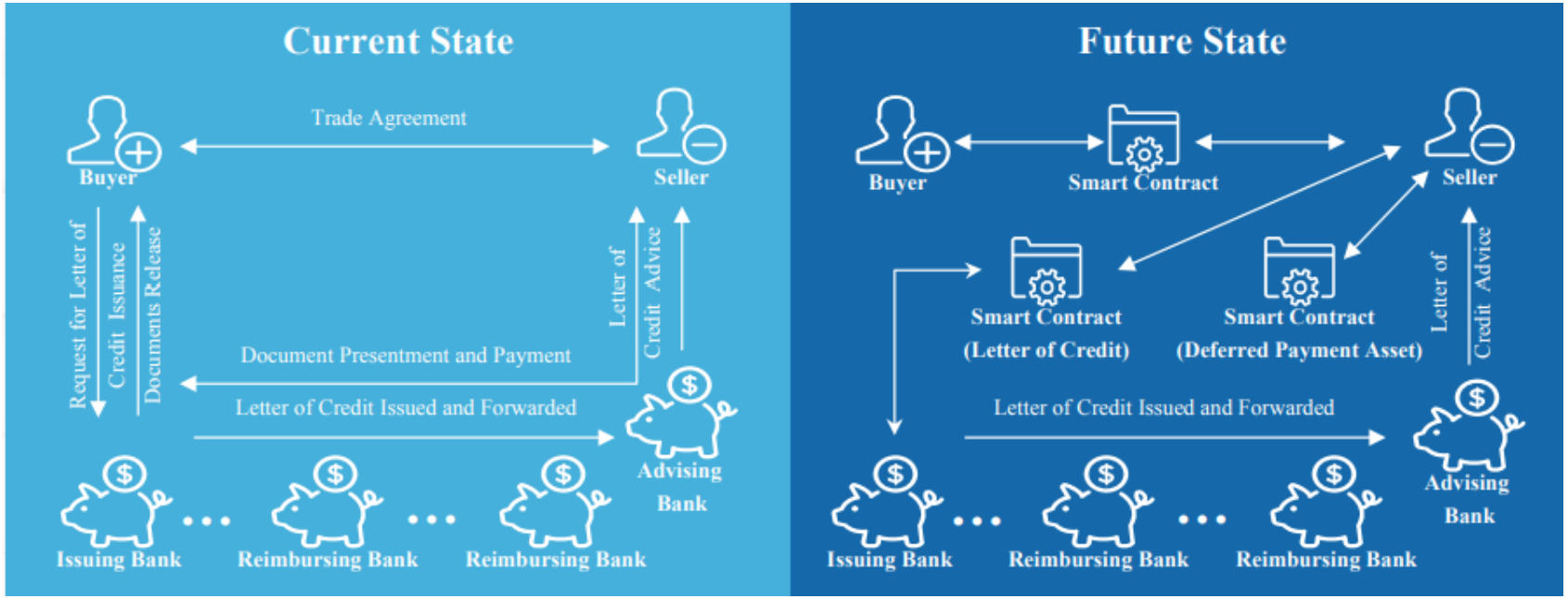
Capitalization table management can be simplified, and intermediaries circumvented in the chain of securities custody through the implementation of a smart contract. The smart contract can facilitate the automatic payment of dividends, stock splits and liability management, while reducing counterparty and operational risks.



Cases to use Smart Contracts

Smart Contracts for Trade Finance

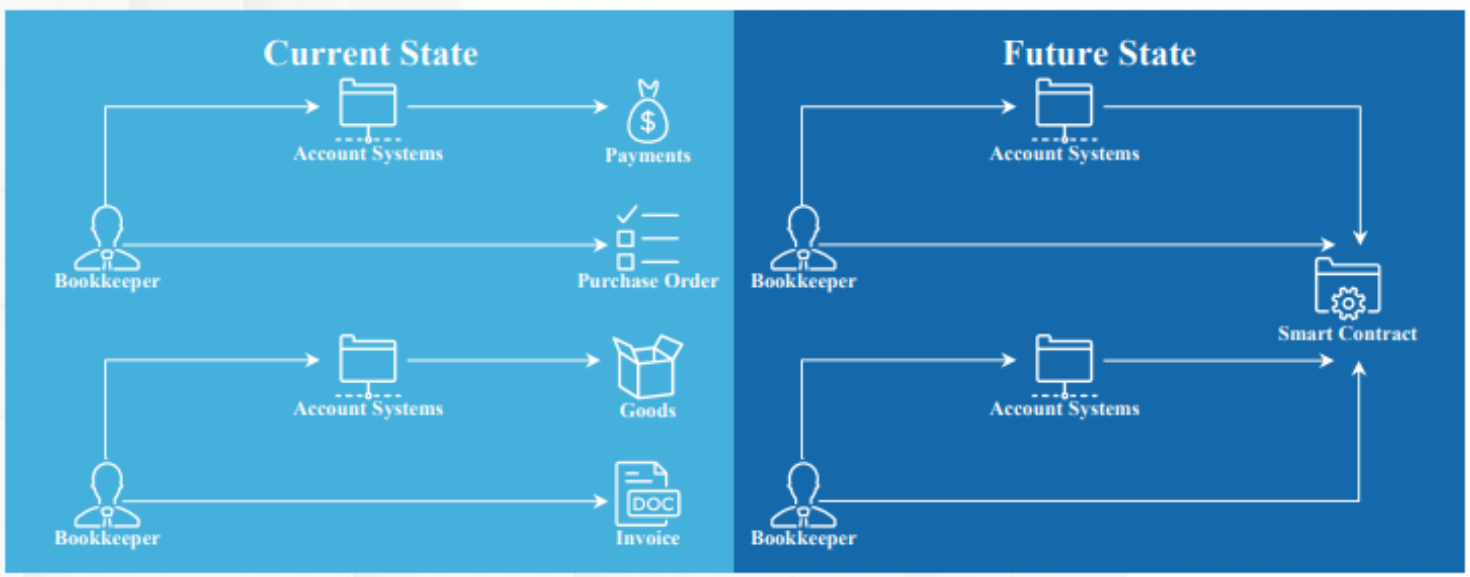
Smart contracts can facilitate streamlined international transfers of goods through faster Letter of Credit and trade payment initiation, while enabling higher liquidity of financial assets.



Cases to use Smart Contracts

Smart Contracts for Financial Data Recording

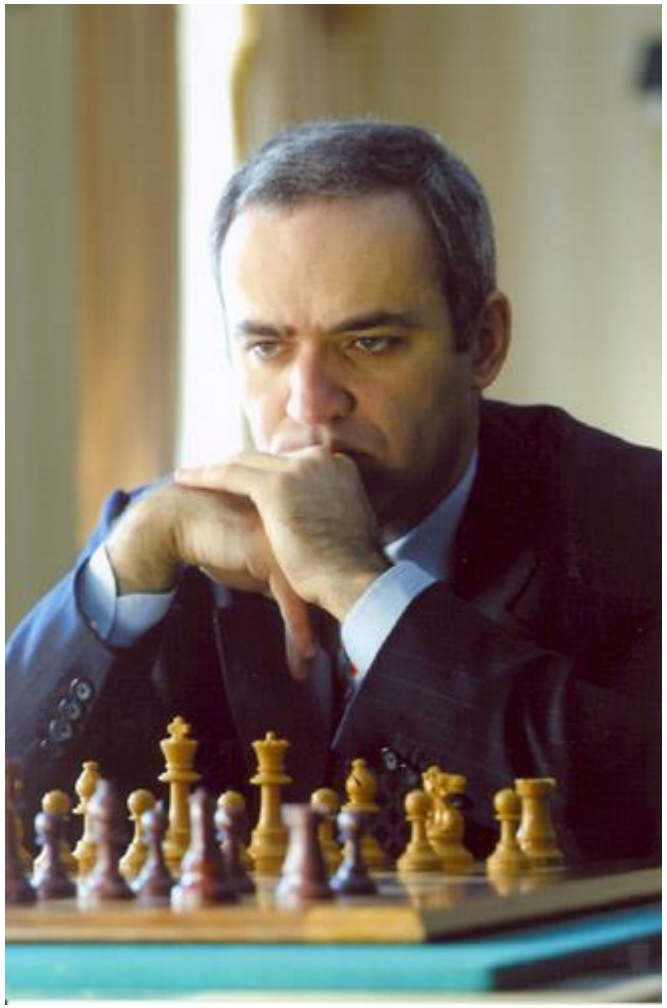
Financial organizations can leverage smart contracts for accurate, transparent recording of financial data. Smart contracts enable uniform financial data across organizations, improved financial reporting and reduced auditing and assurance costs.



Challenges for Smart Contracts

- **Contract law:**
  - Are all the elements that constitute a contract included in the smart contract?
  - Governing law? Jurisdiction?
  - Torts arising out of the contract?
  - Is it wise to cut out "intermediaries?
- **Enforceability:**
  - Are they enforceable under the jurisdiction we wish to operate in?
- **Evidential rules**
  - Are courts capable of understanding evidence that consist of code to prove the contract's existence?
- **Liability**
  - Is a smart contract service provider liable if something goes wrong ?
- **Smart contracts are "written in stone"**
  - What happens if we want to change a contract?
- **Security**
  - Is the smart contract blockchain facility used secure? Can it be hacked?
- **Personal data**
  - What kind of personal data is stored on the blockchain that supports the smart contract?
- **Consumer protection**
  - Is the consumer adequately protected by the "automatic" enforcement of a smart contract?
- **Regulatory compliance**
  - Know your customer/Anti-Money Laundering rules
- **Trust**
  - Is it still necessary in a smart contract?

Challenges for Smart Contracts



A frank assessment of cold hard reality is warranted.

Simple smart contracts may be easily conducted by a machine agent. We may only need to set: price; quantity; and warranties.

However, advanced smart contracts must also:

- be user-friendly;
- have adequate contractual safeguards,
- have adequate technical safeguards;
- have an appropriate body of laws developed;
- adequately address the real world issues of technical failures, system attacks, crime, taxes, changing legislation, and even natural disasters and war.

Much work is required on the theory, the rules, and (perhaps most of all) on the technology.

It took a long time to build a decision engine that could play chess.

Statutory Examples of Smart Contracts

The U.S "Electronic Signatures in Global and National Commerce Act"

Sec 106 of the ESIGN Act defines:

(2) ELECTRONIC– *The term 'electronic' means relating to technology having electrical, digital, magnetic, wireless, optical, electromagnetic, or similar capabilities*.

(4) ELECTRONIC RECORD– The term *'electronic record' means a contract or other record created, generated, sent, communicated, received, or stored by electronic means*.

(5) ELECTRONIC SIGNATURE– The *term 'electronic signature' means an electronic sound, symbol, or process, attached to or logically associated with a contract or other record and executed or adopted by a person with the intent to sign the record*.

Section 101(c)(1)(C) states that the consumer also *"consent electronically, in a manner that reasonably demonstrates that the consumer can access information in the electronic form that will be used to provide the information that is the subject of the consent"*

Statutory Examples of Smart Contracts

The U.S State of Nevada Revised Statutes Chapter 719 - Electronic Transactions (Uniform Act)

NRS 719.310 - Automated Transmission

"In an automated transaction, the following rules apply:

1. A contract may be formed by the interaction of electronic agents of the parties, even if no natural person was aware of or reviewed the electronic agents actions or the resulting terms and agreements.

2. A contract may be formed by the interaction of an electronic agent and a natural person, acting on his or her own behalf or for another person, as by an interaction in which the natural person performs actions that the natural person is free to refuse to perform and which the natural person knows or has reason to know will cause the electronic agent to complete the transaction or performance.

3. The terms of the contract are determined by the substantive law applicable to it."

Statutory Examples of Smart Contracts

The U.S State of Arizona HB 2417/2017 (Arizona Legislature)

A signature that is secured through blockchain technology is considered to be in an electronic form and to be an electronic signature. *Smart contracts may exist in commerce and a contract relating to a transaction may not be denied legal effect, validity or enforceability solely because the contract contains a smart contract term*."

Smart contract means an event driven program, with state, that runs on a distributed, decentralized, shared and replicated ledger and that can take custody over and instruct transfer of assets on that ledger.

Statutory Examples of Smart Contracts

The U.S State of Tennessee

SECTION 1. Tennessee Code Annotated, Title 47, Chapter 10, is amended by adding the following language as a new part: 47-10-201.

[…]

(2) "Smart contract" means an event-driven computer program, that executes on an electronic, distributed, decentralized, shared, and replicated ledger that is used to automate transactions, including, but not limited to, transactions that:

[…]

(A) Take custody over and instruct transfer of assets on that ledger; (B) Create and distribute electronic assets;

[…]

(c) Smart contracts may exist in commerce. No contract relating to a transaction shall be denied legal effect, validity, or enforceability solely because that contract is executed through a smart contract.

Statutory Examples of Smart Contracts

*"Member States **shall ensure that their legal system allows contracts to be concluded by electronic means**. Member States shall in particular ensure that the legal requirements applicable to the contractual process **neither create obstacles for the use of electronic contracts nor result in such contracts being deprived of legal effectiveness** and validity on account of their having been made by electronic means." Article 9 - Directive 2000/31/EC*

European Union

- The European Union has required its member states since 2000 to adopt all the legal measures required to provide for the drafting and execution of electronic contracts
- All 28 members have proceeded to create such legislation
- Questions that remain to be answered:
- *Will EU regulators and/or member-state regulators in the coming years regulate "smart"-blockchain contracts?*
- *Are legal systems worldwide ready to accept the use of blockchain contracts?*
- *How will the new General Data Protection Regulation (enforcement started in May 2018) apply for companies providing smart contract services?*

Required Reading

Required Reading

- Is code law? Current legal and technical adoption issues and remedies for blockchain-enabled smart contracts (2021, Drummer, D. Neumann, D. University of Freiburg, Germany)
  - https://doi.org/10.1177%2F0268396220924669
- Is Your Legal Contract Ambiguous? Convert to a Smart Legal Contract
  - https://ieeexplore.ieee.org/document/9284792
- Published in: 2020 IEEE International Conference on Blockchain (Blockchain)
  - Nick Szabo The Idea of Smart Contracts (1997)
  - http://szabo.best.vwh.net/smart_contracts_idea.html

Further reading

Further reading

- "Blockchain-based smart contract for international business – a framework", Sinha, D. and Roy Chowdhury, S. (2021), Journal of Global Operations and Strategic
  - Sourcing, Vol. 14 No. 1, pp. 224-260.
  - https://doi.org/10.1108/JGOSS-06-2020-0031
- Monax - Smart Contracts
  - https://monax.io/explainers/smart_contracts/
- Blockchain Observatory EU
  - Demystifying NFTs (pg. 11-12)
    - https://www.eublockchainforum.eu/sites/default/files/reports/Demystifying%20NFTs%20workshop%20report-%20July%202021.pdf

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Questions?

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