



**DZ BANK**  
Die Initiativbank

# Smart contracts from a legal perspective

## Can Code Be Law?\*

Frankfurt, 12. Dec. 2017,

Dr. Udo Milkau, Chief Digital Officer, Transaction Banking, DZ BANK

see: Lawrence Lessig "Code Is Law - On Liberty in Cyberspace", Harvard Magazine,  
Jan. 1, 2000 (<https://harvardmagazine.com/2000/01/code-is-law-html>)



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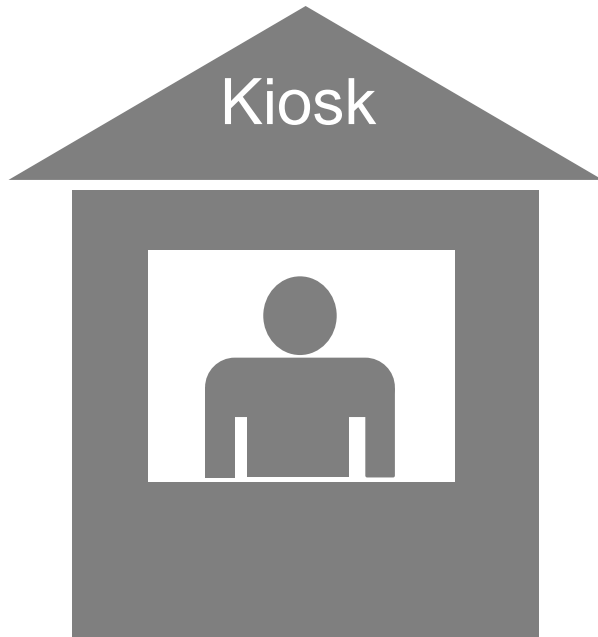
# Myth and Marketing



Smart Contracts are said to be:

- “Turing-complete language”
- “custom sophisticated logic”
- “autonomous”
- “automated digital agreements”
- “self-executing contractual states”
- “self-enforcing legal obligations”

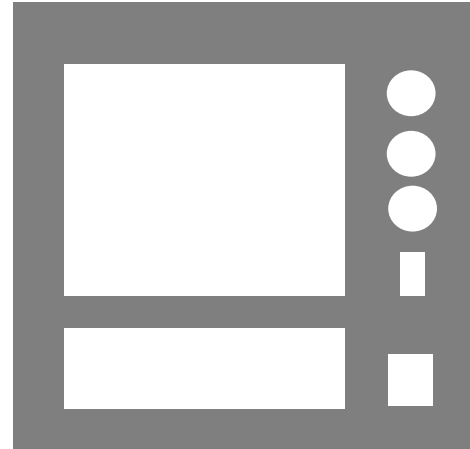
# 1. Simple contracts and communication of the declaration of will



## Protocol:

- I point to a coke.
- Merchant put it on the counter.
- I put the money on the counter.
- Both take it ("DvP").
- I get a bill.

## Vending Machine



## Protocol:

- I press on the "coke" bottom.
- I put the money in the machine.
- Machine dispenses coke automatically & autonomously.

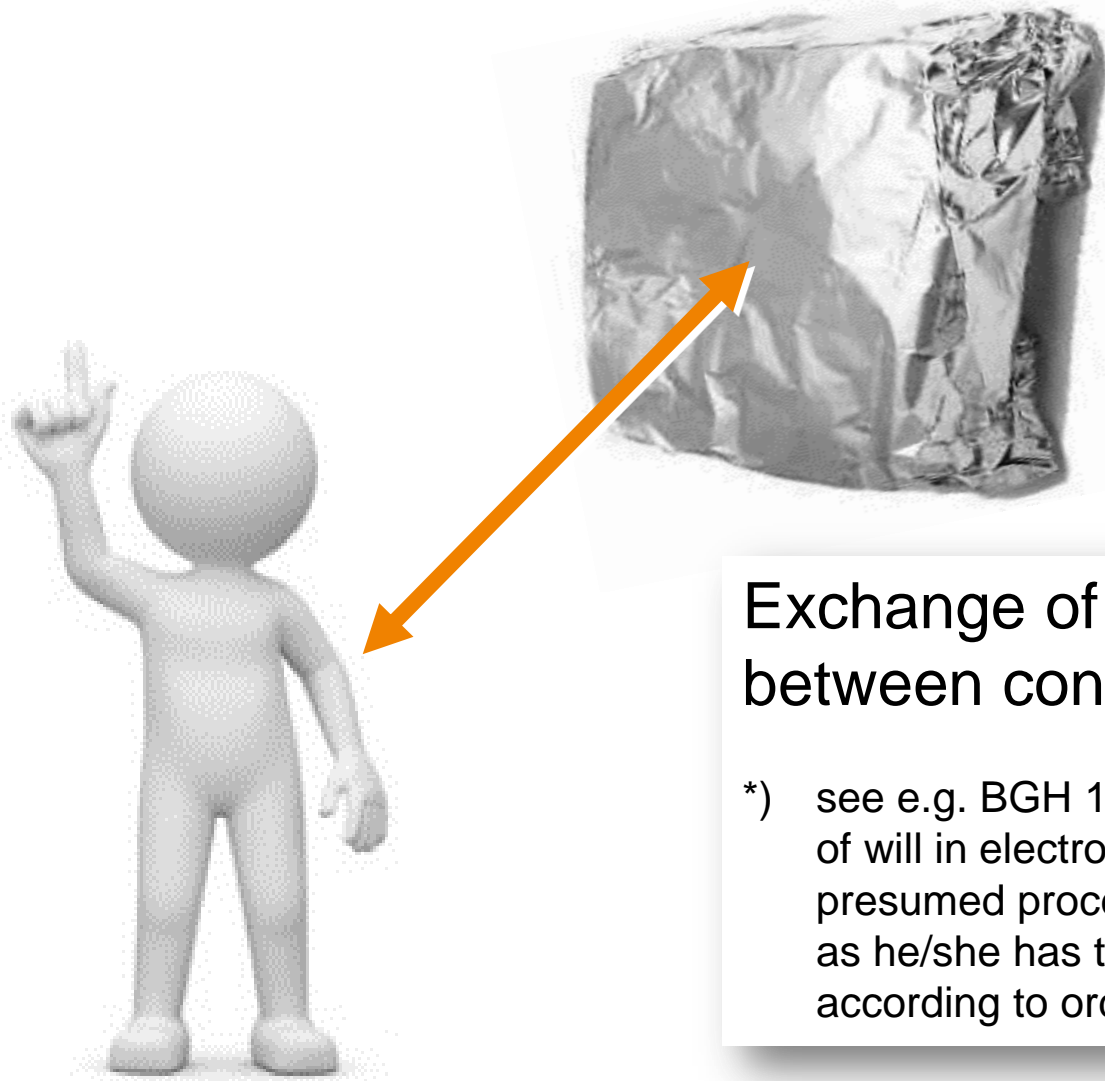
## E-Commerce



## Protocol:

- I click on the "coke" icon.
- I accept terms and conditions.
- I press "buy" and select a payment method (e.g. SDD).
- The SEPA Direct Debit (SDD) is automatically & autonomously.
- Coke will be delivered (later).

## 2. Contracts and communication with a “Wrapper“



Exchange of offer and declaration of will between contractual parties.

\*) see e.g. BGH 16.10.2012 X ZR 37/12: Offer and declaration of will in electronic communication does not result from presumed processing, but in such a way for the human party as he/she has to understand the declaration bona fide und according to ordinary usage.

### 3. Steps to a complex contract and intension of a contract

#### Freedom of contract

- Existing legal framework (superior legislation e.g. GDPR in European Union)
- Selection of applicable law (from Delaware via Zug to China; but also medieval “merchant law”)
- Selection of form (if not required by law)
- Selection of language (from English via Swahili to XML/ISO2022)
- Offer and declaration of will in the chosen form/language with identification of parties (e.g. eIDAS)
- *[active legal effect, depending on applicable law]*
- ➔ Sense of contracts: disputes to be resolved ➔ examination, evaluation and interpretation by court\* based on the *ex-ante* selected framework (in contrast to an *ex-post* “hard fork” by “community”)
- ➔ Possibility for an “*ex tunc*” ruling that a contract was invalid from the outset

\*) or by arbitration or medieval merchant courts

## 4. Smart contracts behind the “Wrapper”

Party A  
will pay  
Party B  
1.-€ on  
Jan 1, 2018.

### Mark-up language:

```
<contract>
<obligor> Party A </obligor>
<obligation> will pay </obligation>
<oblige> Party B </oblige>
<amount> 1.-€ </amount>
<date> Jan 1, 2018 </date>
</contract>
```

### Script in **Solidity** language:

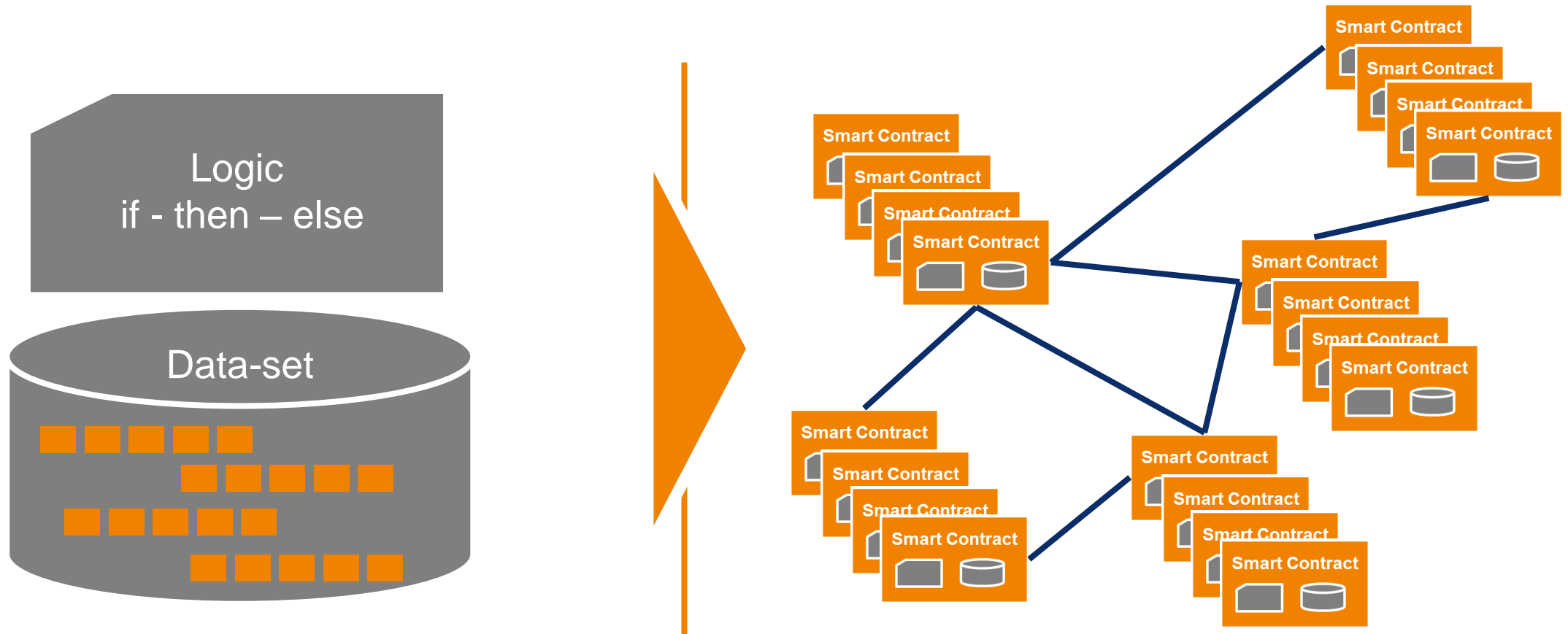
```
pragma solidity ^0.4.11;
contract owned {
    function owned() { owner = msg.sender; }
    address owner;
    modifier onlyOwner {
        require(msg.sender == owner);
        _;
    }
}
contract mortal is owned {
    function close() onlyOwner {
        selfdestruct(owner);
    }
}
contract priced {
    modifier costs(uint price) {
        if (msg.value >= price) {
            _;
        }
    }
}
...
```

### Ethereum Virtual Machine Byte Code

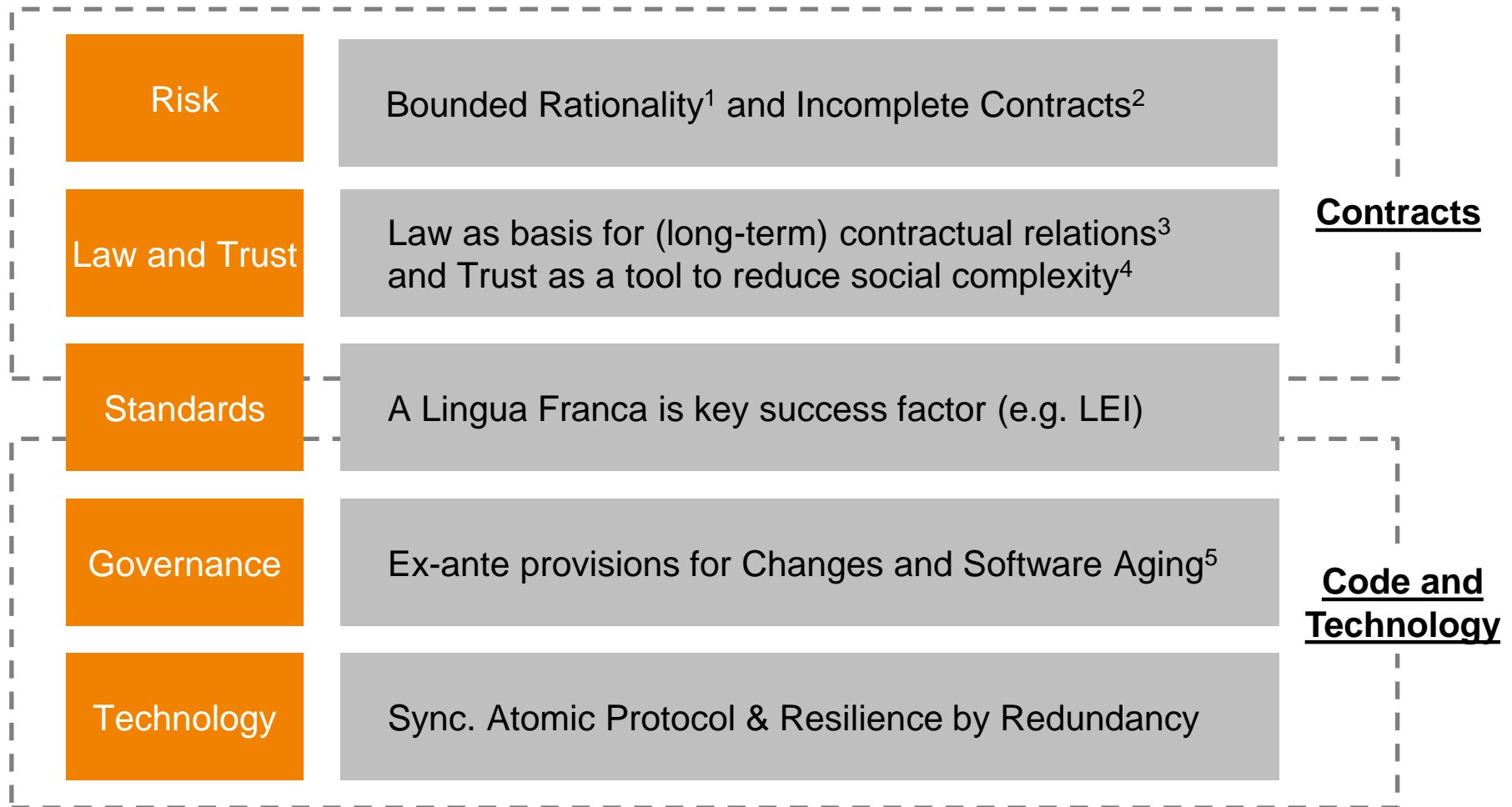
```
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```

(source: [hetherscan.io/address/0x07ee55aa48bb72dcc6e9d78256648910de513](https://etherscan.io/address/0x07ee55aa48bb72dcc6e9d78256648910de513))

## 5. Smart Contracts are a change of paradigm in software architecture with distributed code (scripts) with „if – then – else“ and „state machine“



## 6. Contracts in the context of a market society



1) Grossman and Hart (1986), Hart and Moore (1990), and Hart (1995); but also: Gödel's incompleteness theorems (1931/1951)

2) Interpretation of Contracts: see e.g. Prens v Simmonds [1971] 1 W.L.R. 1381; Incomplete Contracts: O.E. Williamson's work

3) Lessig, L. (2000). "Code is Law", Harvard Magazine, Vol. 1/2000

4) Luhmann, N. (1968). Vertrauen: Ein Mechanismus der Reduktion sozialer Komplexität

5) Parnas, D.L. (1994). Software aging, ICSE '94



**Conclusion: „smart contracts“ on the blockchain are synchronised scripts with a status concept = “self-reconciling” protocols ...**

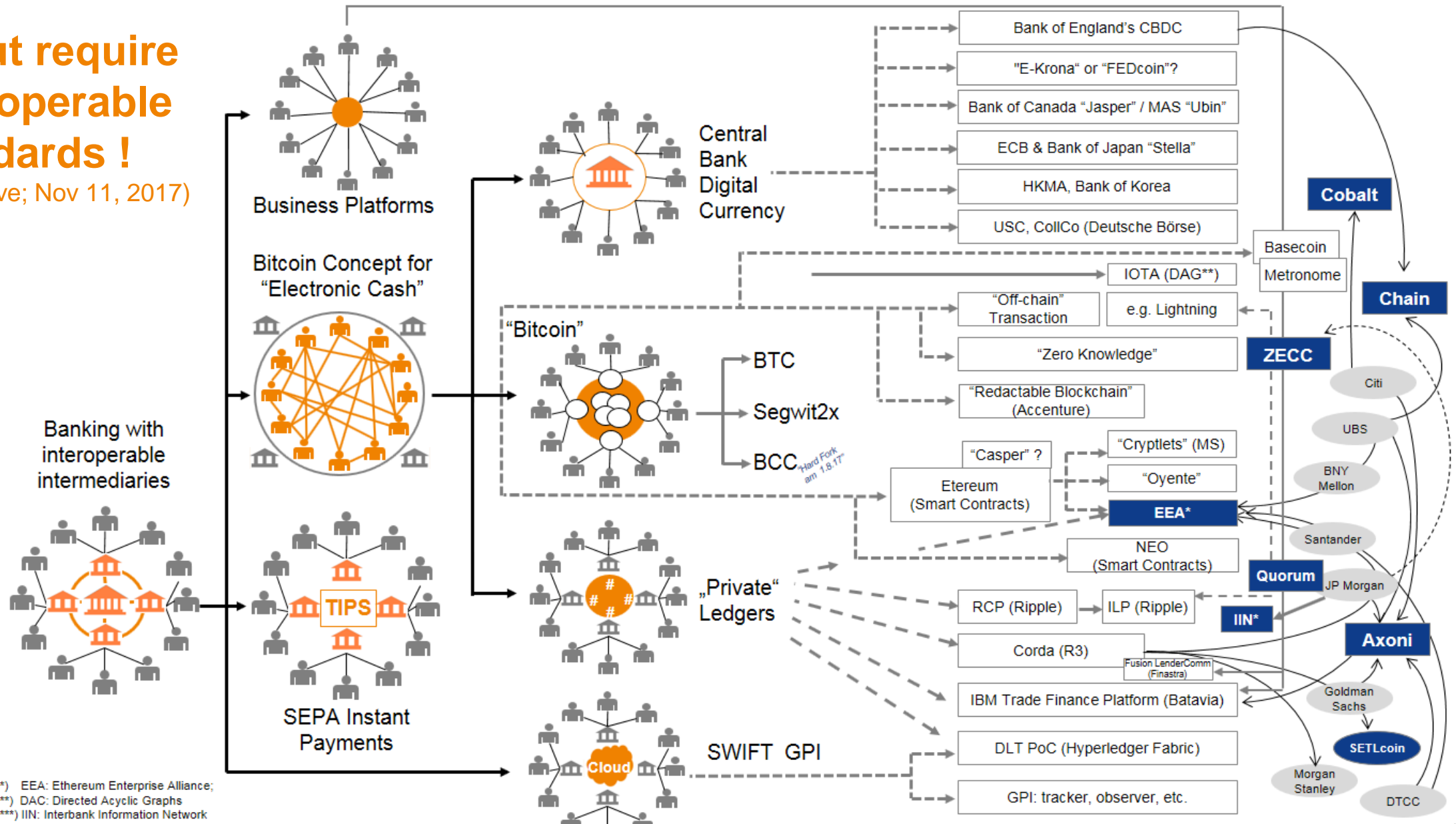


Source: Siemens-Archiv



# ... but require interoperable standards !

(illustrative; Nov 11, 2017)



\*) EEA: Ethereum Enterprise Alliance;  
 \*\*) DAC: Directed Acyclic Graphs  
 \*\*\*) IIN: Interbank Information Network