

# Blockchain Technology: Regulatory & Legal Issues

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# Topics:

1. Introduction to Bitcoin
2. Virtual Currencies and Regulation
3. Smart Contracts
4. Blockchain
5. Supply Chain example
6. Observations/Conclusions

# FinTech and blockchain are Booming!

Blockchain businesses embark on world-changing projects

The Guardian

International banking: Blockchain

**The next big thing**

*Or is it?*

The Economist

Blockchain: the answer to life, the universe and everything?

*The promise of the blockchain*

**The trust machine**

*The technology behind bitcoin could transform how the economy works*

**La blockchain remue le monde économique**

Le Temps

# Financial Technology (Fintech)

- Fintech = finance and technology coming together
- Describes innovative use of technology in the design and delivery of financial services and products
- Used in multiple business segments, including lending, advice, investment management and payments
- Fintech investment continues to grow: \$19 billion in total in 2015; global investment in fintech funding reached \$15 billion by mid-August 2016
- Challenge and opportunity for traditional financial industry players

# Bitcoin: part of Fintech galaxy

- Bitcoin released on 9 January 2009: a new form of electronic money
- Referred to as a “crypto-currency” or “virtual currency”
- Generated by using cryptographic software that solves mathematical problems in the process of generation
- Defined by a public address and a private key (containing numbers and letters)
- Bitcoin transactions recorded in public ledger of all transactions ever executed = bitcoin blockchain

# How Bitcoin Blockchain works

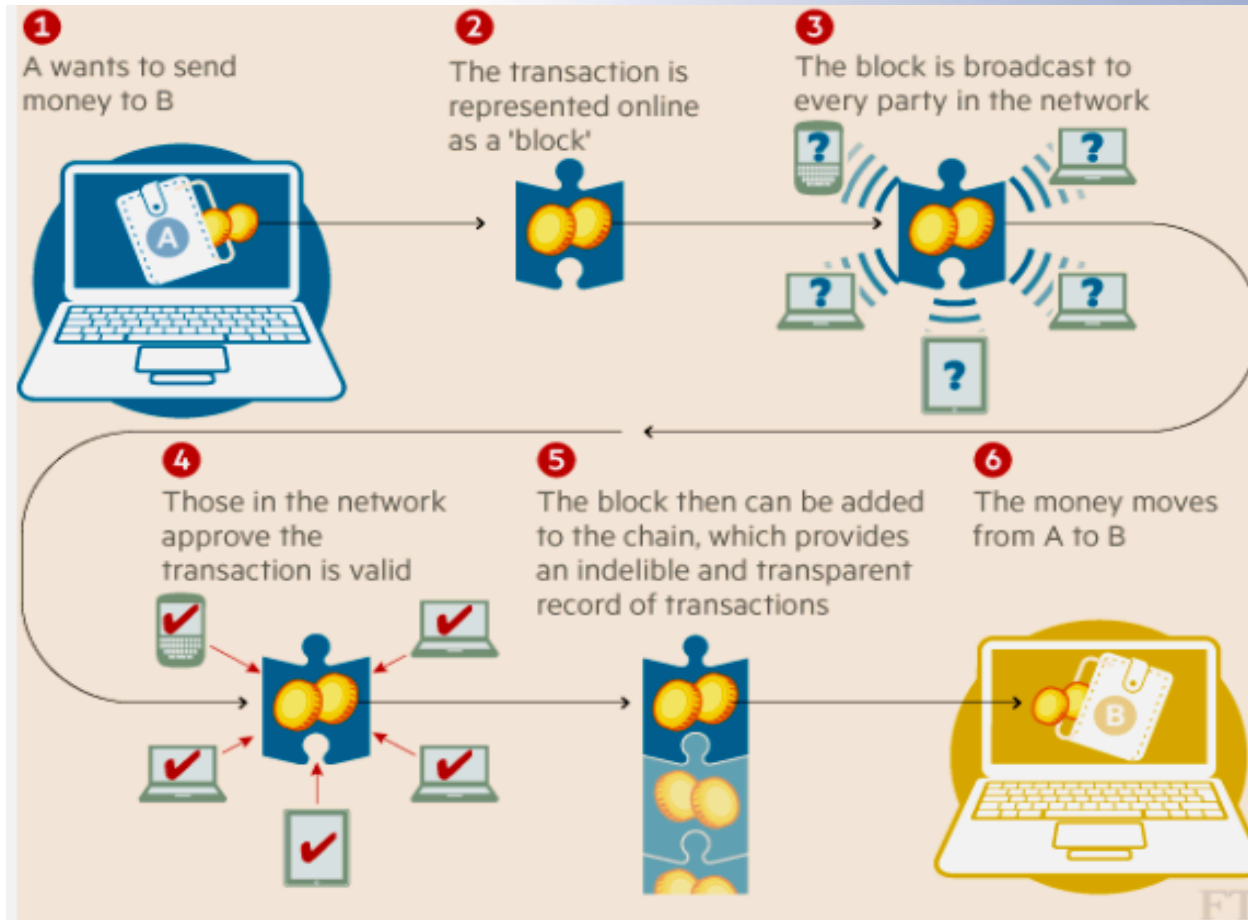


Image: Financial Times

# Bitcoin: an interesting life so far

- What is the nature of money?
- The register is the money
- It works because we believe in it!
- Characteristics of bitcoin are revolutionary:
  - a. Decentralised: no central authority underpinning
  - b. Self-verifying: cryptographic authentication by network consensus
  - c. Anonymous: but transparent; can see address on register but who owns?
  - d. Reliable: can't fake it (easy to verify legitimacy), can't break it (distributed identical copies over network)

# Bitcoin: early lessons

- Troubled past: Silk Road (October 2013) + Mt Gox (February 2014) controversies (kill me, make me stronger)
- bright future?
- What's all this about? Call the regulators!



# EU Regulation of Virtual Currencies (VC)

- 13 September 2013 – increased proliferation prompts European Banking Authority (EBA) to issue warning to consumers on “Virtual Currencies” (VC) such as Bitcoin
- Highlighted risks involved when buying, holding or trading VCs:
  - no regulatory protection - same for exchange platforms
  - money not on deposit - digital wallets can be hacked
  - exchanges can be closed without notice = money lost

# Position Luxembourg CSSF (14th February 2014)

- VCs regarded as money by Luxembourg regulator: accepted as means of payment for goods and services (“scriptual money NOT cash”)
- The issuing of VCs is not regulated from a monetary point of view
- VCs not legal tender; they entail risks for holders

# Position Luxembourg CSSF (14th February 2014)

- Authorisation/licence issued by Min. Of Finance and regulated by CSSF required when carrying out activity in financial sector
- Potential market entrants define business purpose + activity: CSSF decides on status
- Since made it clear that as soon as business exchanges VC against fiat currency subject to regulation as payment service provider under Payments Services Directive or Electronic Money Institution Directive

# Reaction of various other Institutions

- EBA Opinion of 4 July 2014
  - Definition: “VCs are a digital representation of value that is neither issued by a central bank or a public authority, nor necessarily attached to a fiat currency, but is accepted by natural or legal persons as a means of payment and can be transferred, stored or traded electronically”
- Highlighted potential advantages but also risks
- EBA provided short-term (discouraging institutions from dealing with VCs) and long-term (legislative action by EU) recommendation
- Conclusion: this approach allows VCs to innovate and develop outside financial services sector with view to satisfying regulatory demands for future

# Reaction of various other Institutions (Cont.)

- Position of l'Autorité de contrôle prudentiel et de résolution (ACPR) (Bank of France 29th January 2014)
  - Refers to warning issued by EBA (September 2013)  
Same position as Luxembourg regarding exchange of VCs against fiat currency
- CJEU Judgment (22 October 2015): Swedish VAT case
  - Ruled that Bitcon (VC) transactions “are exempt from VAT”

# Reaction of various other Institutions (Cont.)

- Commission Proposal on 5 July 2016 to amend AML Directive
  - Contains 2 main points:
    1. Definition of VC: essentially same as EBA definition
    2. Proposed an extension of scope of AMLD to catch all gatekeepers to VCs who will need to identify + verify identity of person exchanging VCs
  - Not negative for DLT development: we like the digital ledger
- Opinion of the European Central Bank (ECB) on proposed Directive (12 October 2016)
  - Stresses that it is more accurate to regard VCs as a means of exchange rather than a means of payment

# European Parliament Resolution 26<sup>th</sup> May 2016

- Based on Report of 3 May 2016 on VCs by Committee on Economic and Monetary Affairs (Rapporteur: Jacob von Weizsacker)
- Report open + positive towards VCs which it defines as money (same as Luxembourg)
- Pro-regulation report; calls for smart regulation which fosters innovation and which safeguards integrity: *approach at EU level so as not to stifle innovation or add superfluous cost*
- Noted VCs based on DLT which have transformational capacity for fintech and economy beyond: automate and standardise data driven processes at lower cost + fundamentally alter way assets transferred and records kept: implications for both private and public sector

# European Parliament Resolution 26th May 2016 (Cont.)

- Suggests revision of existing EU legislation (such as Payment Accounts Directive and Payment Service Directive)
- But key existing EU legislation may already be fit for purpose and can be adapted



# UK Scientific Report December 2015

- Distributed Ledger Technology (DLT) may assist the Government in their activities (see Estonia) reducing administrative burden: collect taxes, deliver benefits, issue passports, record land registries, assure the supply chain of goods and generally ensure integrity of government records and services
- Business example: Everledger provides distributed ledger that assures identity of diamonds from being mined to cut, sold and insured: helps avoid forgery, fraud + abuse

# Luxembourg: concrete regulatory approach

- October 2015: SnapSwap granted a license to provide services under regulatory supervision of the CSSF as electronic money institution by the Luxembourg Minister of Finance pursuant to Law of 10 November 2009 on payment services
- Allows company to use, hold and transact VC; offer payment, remittance and currency exchange using blockchain and distributed ledger technology
- First such licence in Europe; ‘passporting’ to all 28 Member States
- Similar to famous New York ‘BitLicence’: stark contrast with US regulatory system requiring state-by-state licensing

# Bitstamp: licence

- Licensed as payment institution in May 2015 under law of 10 November 2009; good example of advantages of regulation:
  - Open doors to banking partnerships + relationships
  - Puts distance between digital currency and unregulated exchange incidents: the customer gets protected
- Reward for Luxembourg's clear and early regulatory stance: industry players attracted by jurisdiction open to innovation and favourable financial environment
- As of 16 February 2017 Bitstamp launched the XRP/BTC trading pair on its exchange: XRP is a digital asset native to the Ripple Consensus Ledger; can now be traded with BTC, USD and EUR
- Ripple: targets correspondent banking system; XRP can be used as a bridge currency for real-time settlement, allowing efficient exchange of value across borders

# Smart Contracts

- Smart property:
  - Any asset can be registered on the blockchain as a digital asset = smart property
  - Ownership/control smart property = registration as digital asset + access to private (cryptographic) key to asset
  
- Smart contract: no settled definition but can be described as method of forming agreements via the blockchain
- Same element of parties agreeing to do something (which is expressed in code) but need for trust removed as contract is executed by the code
- Happens automatically in accordance with coded terms, without discretion or deviation
- Classic example: vending machine will only act as coded

# Smart Contracts (Example)

- Can be replicated in complex fields involving transfer of digital property:

- A simple option to purchase lease car (remainder) expressed in quasi-code:

Contract Option {

Strike price = €10,000

Holder = Gary

Seller = Lease company

Asset = car

Expiry date = 1 July 2017

Function trigger exercise ( ) {

If Message Sender = Holder, and

If Current Date < Expiry date, then

Holder send (€10,000) to Seller, and Seller send (Asset) to Holder

# Introduction to blockchain

## What is blockchain?

*“At its core, the blockchain is a technology that permanently records transactions in a way that cannot be later erased but can only be sequentially updated, in essence keeping a never-ending historical trail ”*

Source: Mougayar ‘The Business Blockchain’

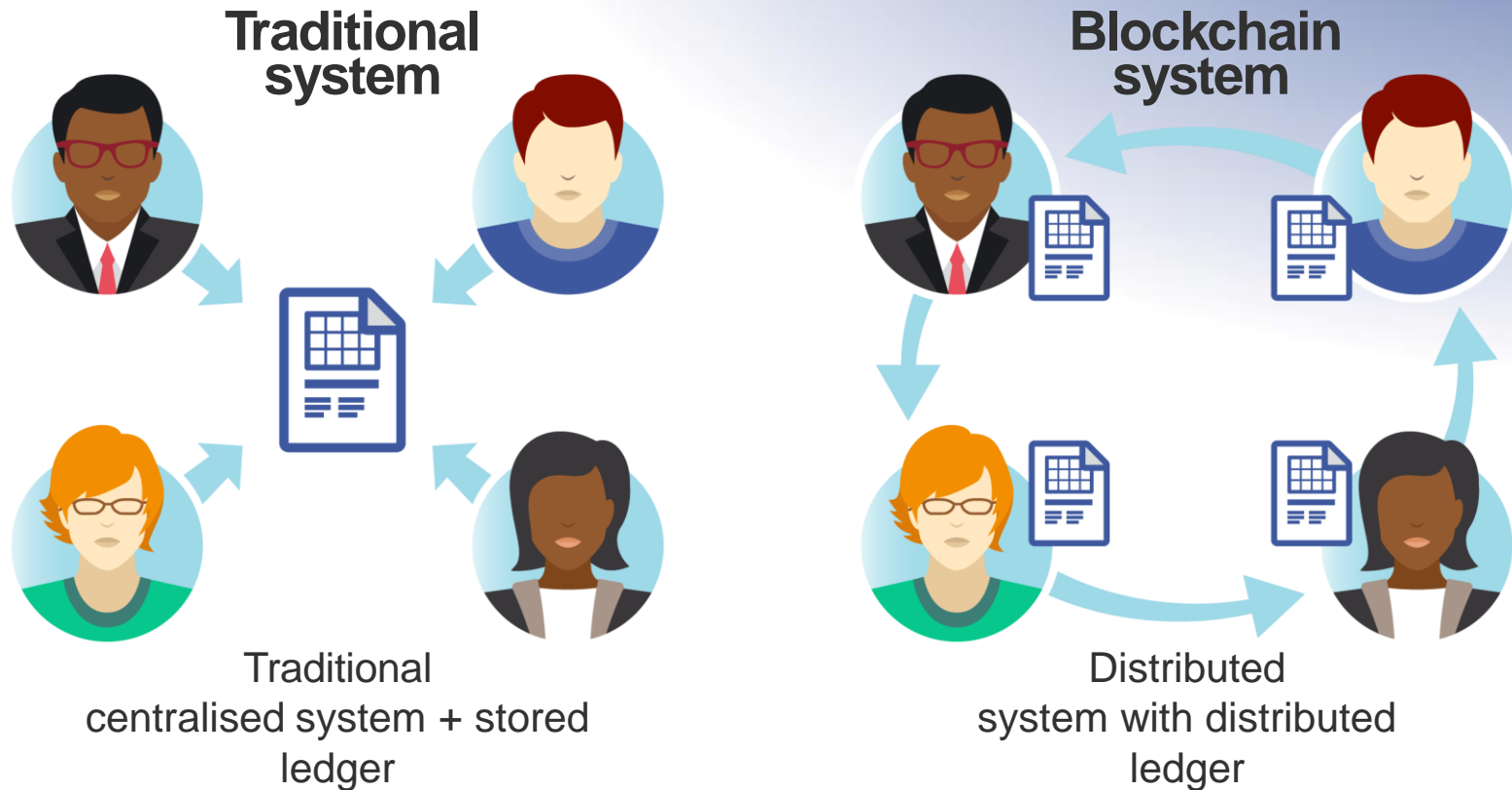
A ledger which is shared, distributed and cryptographically authentic

# Blockchain—Technical

- A network of computers
- That each accepts, confirms and stores transactions in a synchronized “chain” of confirmed transaction blocks
- Using cryptographic techniques
- That make it immutable



# Blockchain—Technical

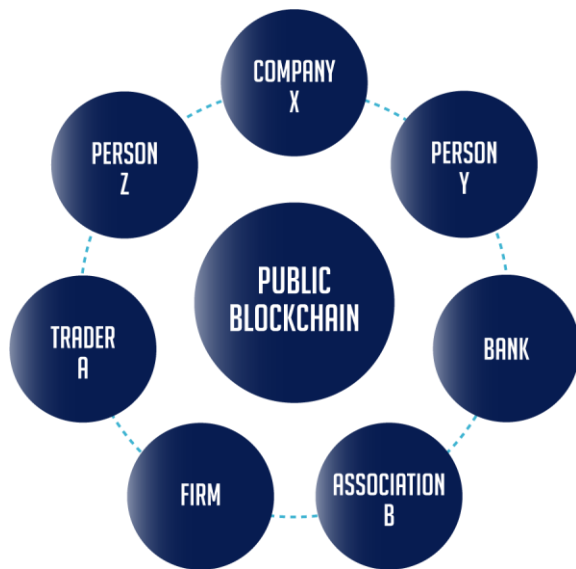


- No centralised information silo: consensus to approve and record transactions
- No intermediary in the middle necessary: safely distributes ledgers across the entire network
- All participants have exact same copy



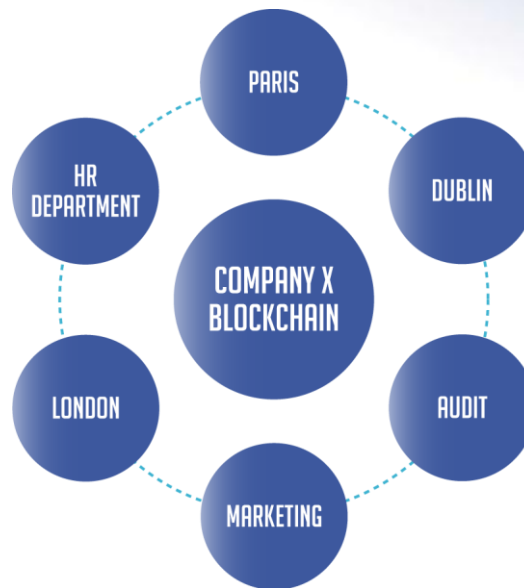
# Blockchain: different types

## PUBLIC



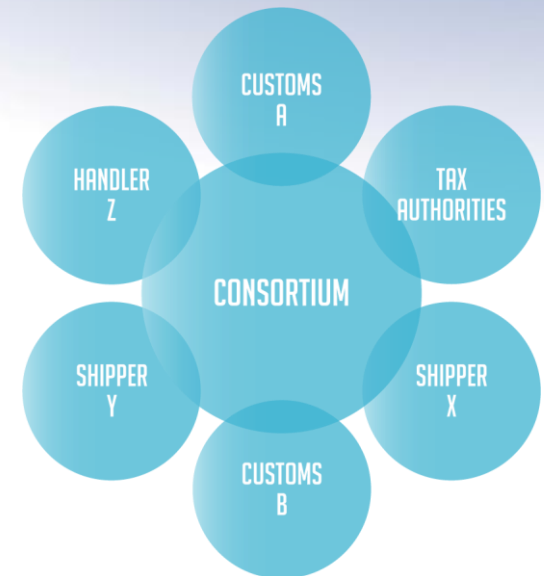
- multiple anonymous participants
- All participants can read + write
- Consensus by Proof of Work

## PRIVATE



- participants from single organisation know each other
- Centralised permissions
- Tailored consensus

## CONSORTIUM



- Known participants from multiple organisations
- Tailored permissions and consensus
- Public or restricted external reads

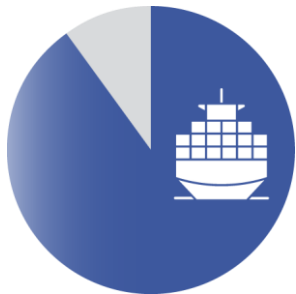
# Problem with records

- “Contracts, transactions and the record of them are among the defining structures in our economic, legal and political systems... Any yet these critical tools and the bureaucracies formed to manage them have not kept up with the economy’s digital transformation... Blockchain promises to solve this problem.” *Harvard Business Review, 2017*
- “Introducing Blockchain: a shared ledger technology allowing any participant in the business network to see THE system of record (ledger)” *IBM Corporation*

# Supply chain - real life example:



On 5 March 2017 Maersk and IBM unveiled the first blockchain based industry-wide, cross-border supply chain solution. Blockchain will be used to monitor and manage transactions among network of shippers, freight forwarders, ocean carriers, ports and custom authorities.



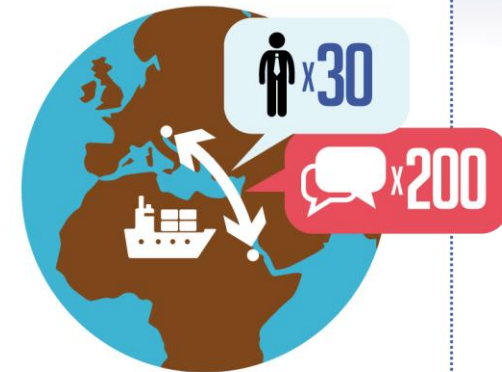
90%

of goods in global trade are carried by the global shipping industry each year.



The cost associated with trade documentation processing and administration is estimated to be up to **20%** of the actual physical transportation costs. A single vessel can carry thousands of shipments. On top of the costs to move the paperwork, the documentation to support it can be delayed, lost or misplaced. **This inevitably leads to complications and far too often to legal disputes.**

Maersk found in 2014 that just a simple shipment of refrigerated goods **from East Africa to Europe** can go through nearly **30 people and organisations**, including more than **200 different interactions and communications** among them.

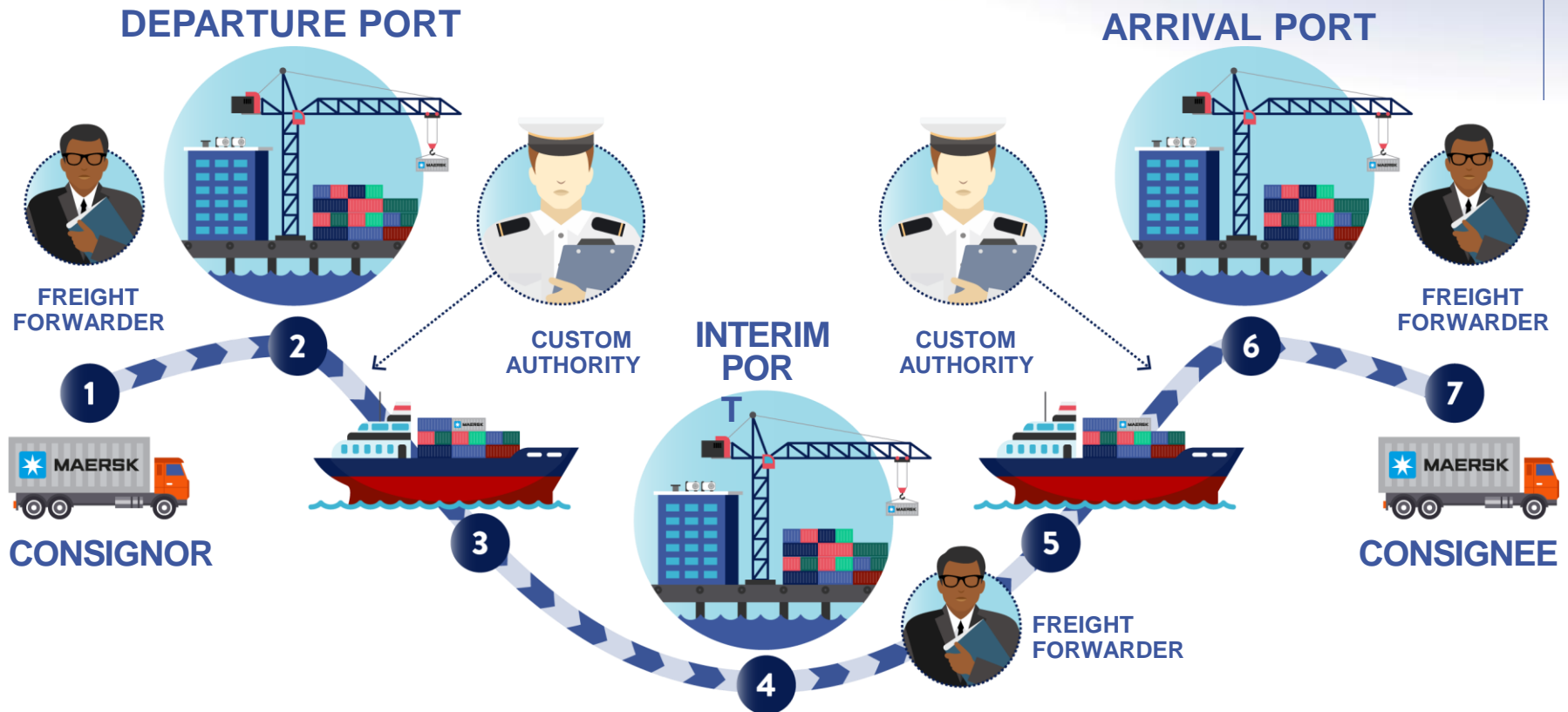


# Supply chain — how it works:



Blockchain provides each participant end-to-end visibility based on their level of permission.

A data pipeline connects the participants in the supply chain ecosystem.



# Supply chain — how it works:



Each participant in supply chain ecosystem can view progress of goods through supply chain, understanding where a container is in transit. Can also see status of custom documents, or view bills of lading and other data.



Detailed visibility of container's progress through supply chain enhanced with real time exchange of original supply chain events and documents.



No one party can modify, delete or even append any record without consensus from others on the network.



This level of transparency helps reduce fraud and errors, reduce the time products spend in the transit and shipping process and improve inventory management. Ultimately waste and cost is reduced.



In addition: balance between trade facilitation and enforcement is supported; government authorities can re-use the information flow for supervision purposes.



But the potential for reduction of costly and time-consuming legal disputes is also very significant.





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- **Luxinnovation:** One-stop-shop agency assisting innovators in setting up and developing their business



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**nyuko** —  
Start Up Nation Luxembourg

- **nyuko:** An independent initiative to boost Luxembourg's entrepreneurial ecosystem



**FIT 4  
START**

- **FIT4Start:** A €50K support and coaching programme for ICT start-ups by the Ministry of Economy and Luxinnovation in partnership with Technoport

+ a broad range of private incubators and accelerators

### Coming soon



[the  
**LHoFT**]

- **The LHoFT:** The Luxembourg House of Financial Technology is a dedicated platform where FinTechs and the financial community connect

# Observations/ Conclusions

- Bitcoin started the conversation but it has now moved on
- Blockchain /DTL is real innovation: potential will unfold beyond the payment sector and into the real economy
- Too early to set down hard regulatory rules: Regulatory “Sandboxing” is encouraged
- Existing EU legislation should be examined to see how VCs and DLT fit: existing rules are likely sufficient; no need for brand new specific rules at least initially; adapt + apply existing rules for now: example of AML rules
- Regulation of VCs appears inevitable and should be embraced for its advantages