# Is Blockchain the Solution?

Sinclair Davidson

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# What I’m not going to talk about today

- Gory technical detail
- Do you really know how your mobile phone works?
- Investment advice
  - It is true that bitcoin is now trading at levels not seen since late last year this does not mean the technology is a dud
  - If you don’t understand the investments you are making you shouldn’t make them
  - Early investors in many new innovations lose money
  - Do not participate in ICOs/IPOs where the blockchain application is not obvious

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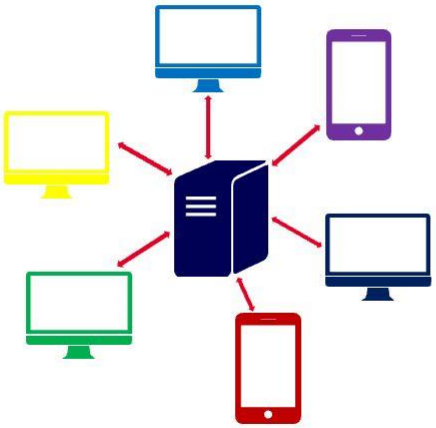
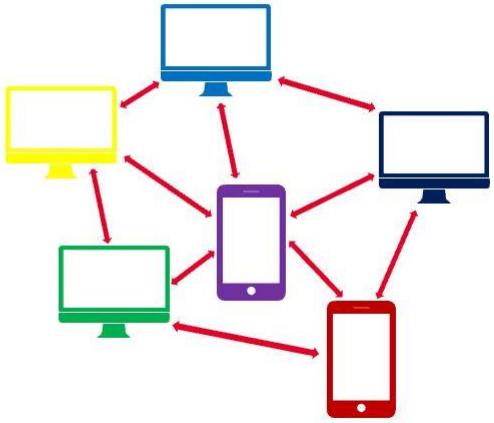
# What is a blockchain?

- A blockchain is a decentralised, distributed ledger
- The challenge with a distributed ledger is ensuring everyone agrees what the ledger says

Distributed ledger with central, trusted server



Distributed ledger with no central authority



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# Understand the Blockchain in three easy steps


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# Some major use cases

- **Money and finance** (lots of cryptocurrencies aiming for cross-border transactions).
- **Land titles and digital asset registries** (e.g. intellectual property)
- **Decentralised identity management** (e.g. for displaced peoples)
- **Supply chains**
- **Sharing economy**.
- **Democratic voting/collective decision making**
- **Healthcare** (and data markets generally)

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# The third generation of the internet

- First generation was internet of data (email, file sharing)
- Second generation was social internet (mobile phone, apps)
- Third generation is internet of value, with native property, rules, money, contracts, organisation (blockchain, DAOs)
- Digital assets move to the internet (money, stocks, titles, debt, IP, votes, securities, knowledge, records, data …) and can be exchanged P2P without intermediation.
- But is all of this really possible?

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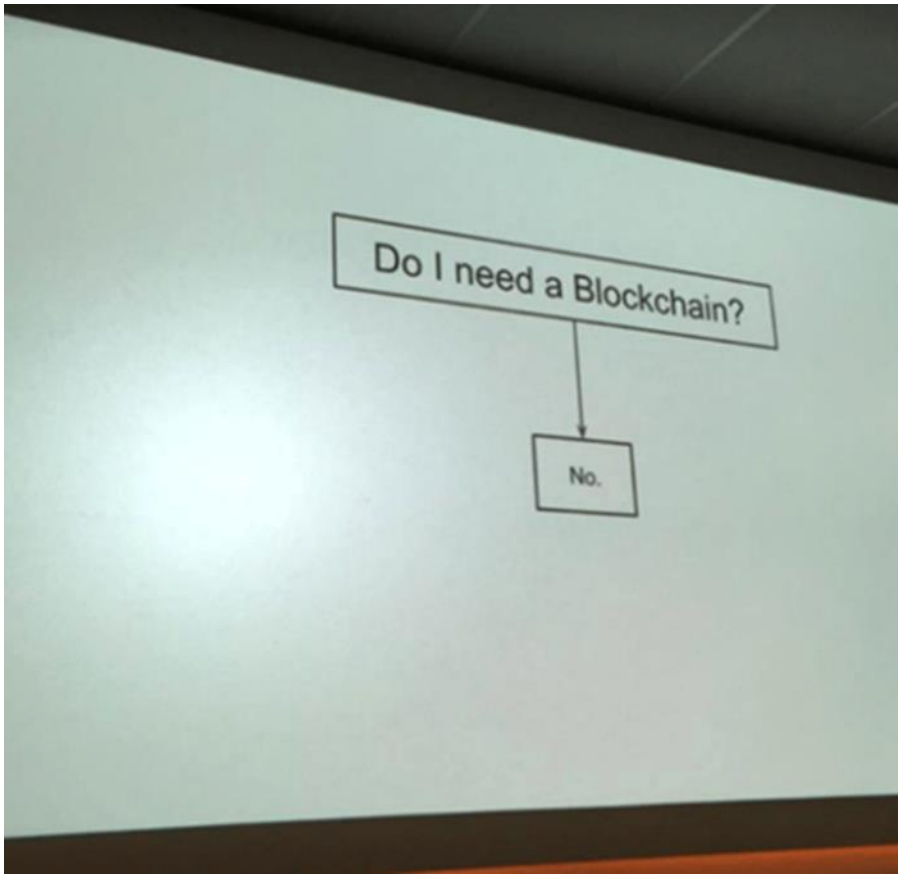
# Blockchains are incredibly inefficient

- Slow (block confirmation times)
- Expensive (mining, transaction fees, storage requirements)
- Hard to scale (transaction times)
- Horrible consumer experience (exchanges, key storage)
- Unnecessary (there are simply better databases, trusted third parties aren't that bad)
- May destroy the planet (mining)

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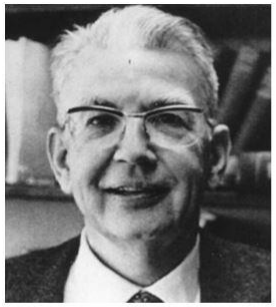
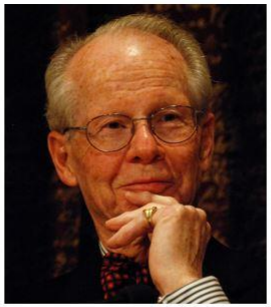
# Or the institutional cryptoeconomics view…

- We're applying a large body of economic thought (institutional economics) to understand how blockchains will change the economy and society.
- What happens to the shape and size of firms? What is the role of government? How does blockchain change civil society?



Ronald Coase
Nobel, 1991



Oliver Williamson
Nobel, 2009

Elinor Ostrom
Nobel, 2009

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# What sort of technology is blockchain?

- We started with what seems like a basic question: what kind of technology is blockchain?

1. **Production technology?**
   - Lowers production costs

2. **Exchange technology?**
   - Lowers transaction costs

3. We argue blockchain is really exciting as an **institutional technology:**
   - Lowers information costs
   - Blockchain is a technology of **governance**.

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# So when can we use blockchain?

- When the economic problem involves:
  1. Information…
  2. Moving through time…
  3. In a potentially untrustworthy environment.

- Such as:
  - Hostile governments (degrading property rights)
  - Complex contracts (layers of subcontracting)
  - Suspicious customers / producers / collaborators (certification)
  - Any environment with possible opportunism

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# Blockchains Industrialise Trust

- Blockchain limit opportunism and industrialise trust
- Convert expensive energy to economically valuable trust
- A whole lot of our economic institutions provide trust
- **35 per cent of the US labour force works in professions of trust**
  - Lawyers
  - Accountants
  - Managers
  - Law enforcement
  - Bureaucrats

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The Cost of Trust: A Pilot Study

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- Heroic assumption: trust is a $29 trillion industry

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# Trade as an information problem

- When we think supply chains we often think transportation costs.
- But **information costs** can be higher than transportation costs:
  - Where does my wine (really) come from?
  - How old is this meat?
  - Is this organic?
  - Is this is a genuine pharmaceutical product?
  - Does this present a biosecurity risk?
- Who needs this information?
  - Consumers
  - Governments / regulators
  - Firms

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# What do consumers want?

- Consumers want to know where goods are from, their characteristics, how they were transported (consumers largely want information about **provenance**).
    - Where was this fish caught?
    - Is my lobster fresh?
    - Is this diamond real?
    - Was this product produced ethically?
- This information **differentiates goods** and **gives them value**.
- Much of this information is currently produced through **brand recognition** at some level.

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# What do governments want?

- Governments increasingly demand information necessary to comply with domestic regulations
  - Biosecurity risks
  - Ethical standards.

- Governments must trust that the **information provided by the importer is true and correct**.

- As the number of **regulations in each nation grow** it becomes costlier to prove the provenance of goods and whether they comply with local regulations.

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# What do producers want?

- Companies also demand information:
  - Is there **fraudulent activity** up or down the supply chain?
  - Are there **missing markets**?
  - Can I **optimise my supply chain**? (e.g. predicting demand)
  - Who are my **final consumers**? (e.g. entertainment industry).

# Might blockchain help?

- Blockchain is a new economic infrastructure for the storage and maintenance of information about goods as they move.
- Different way to bring down information costs than passing paper-based information through a hierarchy.
- Blockchain effectively becomes a single focal point for all actors to view supply chain information.
- Captures the dynamic information about goods.

# How could blockchain be used in practice?

- Scanning through QR codes – updating of dynamic information
- Internet of Things (IoT) – smart containers that upload information as goods move.
- Smart Contracts – lead to greater accountability. Don’t pay until the good arrives. Insurance issues. Event scanning.
- New Data Markets – exciting potential for data markets here – supply chain data is worth a lot of money, might connect into AI for effective demand management and better understanding consumer preferences.
- Proof of Location – new next generation GPS technology – uses decentralised sensors to track containers.

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# Where?

Which markets and jurisdictions would we expect blockchain supply chains to be adopted?

- Markets for **differentiated goods** (perishables, agricultural products, high-end manufacturing, pharmaceuticals).
- Jurisdictions with **comparatively high information requirements.** That is, countries that have high compliance costs and large regulatory states.
- Where there's **friendly policy settings/government recognition** for the trial and testing of these solutions.

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# Early examples

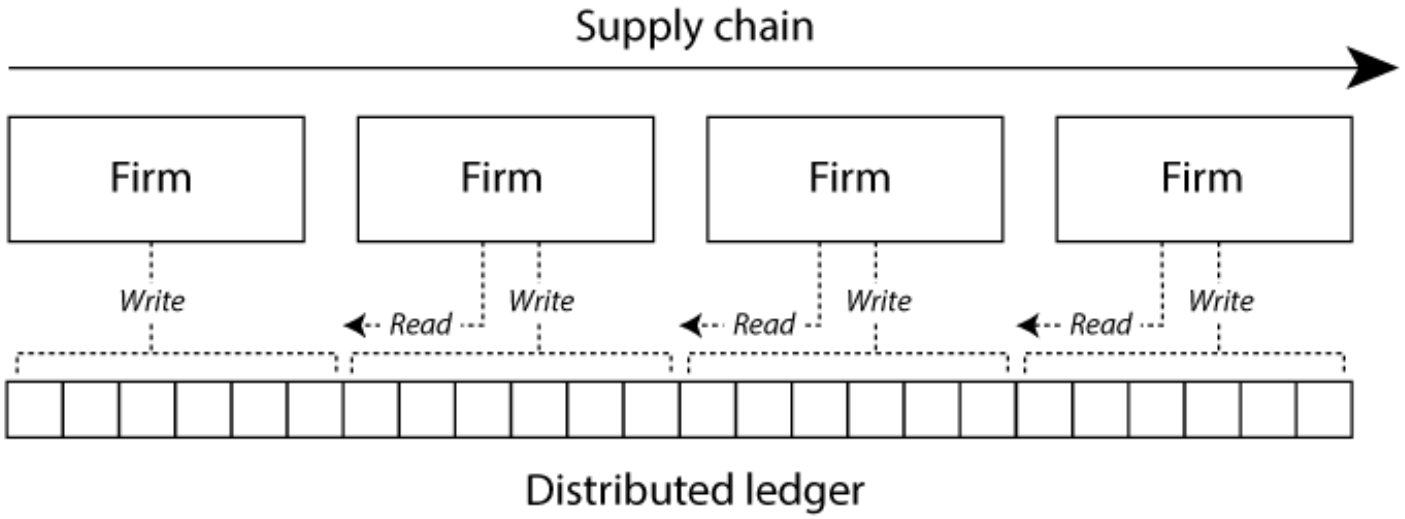
- Agridigital – agricultural products
- Everledger – diamonds, wine
- Traseable – tuna
- And now some broader predictions…


Ramon
Roqueta
2005
Tempranillo


Loseprazol 20 mg
PRO.MED.CS
Praha a.s.

# V-form networks

"V-form networks **consist of a number of fully independent companies** that **effectively operate as one vertically integrated company** through blockchain technology, **coordinated and supplied by a third party**." – Berg, Davidson and Potts

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# Conclusion

- Supply chains face an information cost problem.
- Those information costs can be ameliorated by new forms of **governance**, but institutional possibilities are **constrained by existing technologies** and **whether entrepreneurs can apply them**.
- Blockchain is a new governance technology for distributed ledgers of information, and can potentially be applied to supply chains.
- This could have longer-run impacts: de-commoditization, shifts in the value chain, etc.
- **Some policy challenges** (government recognition, coordination of standards) that may be partially overcome through a high-level policy forum.

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