Blockchain & Fair Trade

A presentation by Philip Fuster

Shoutout to IBM for their extensive resources on Blockchain

What is Blockchain??

Blockchain can do for business what the internet did for communication

Blockchain is what we call a foundational technology -- meaning that it is not an end in itself, but simply a platform upon which applications are built.

Blockchain is a shared ledger technology that makes business transactions fast, precise, secure, irreversible, and transparent.

Business Backdrop

★ **Business Networks** benefit from connectivity
  ○ Consist of customers, suppliers, banks, partners
  ○ Business done globally across borders
★ The flow of goods and services across the business network in the form of transactions and contracts generates **Wealth**.
★ **Markets** are central to the process:
  ○ Public(fruit market, stock exchange)
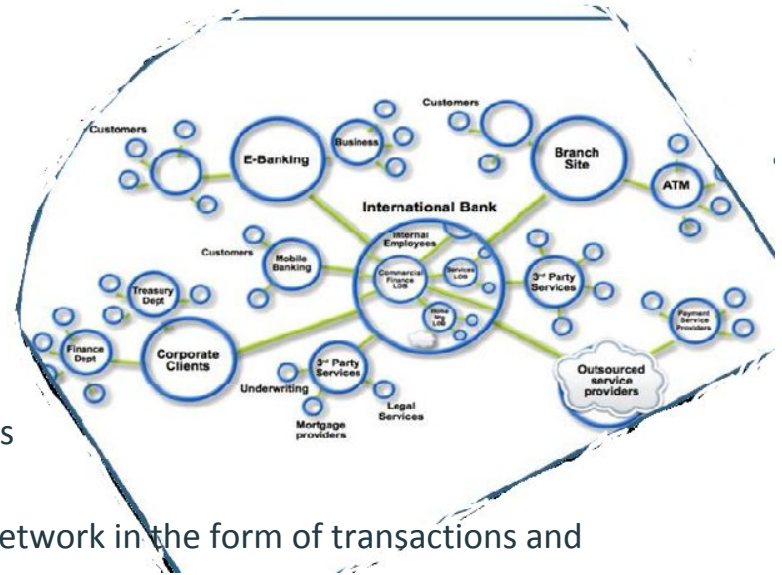 ○ Private (bonds, supply chain financing)

Image courtesy of IBM

More Terms & Concepts

★ Anything that can be owned or controlled to produce value, is an **asset**
  ○ Two fundamental types of asset
    ■ **Tangible asset** is an asset that has a physical form. e.g. IBM HQ
    ■ **Intangible asset** is an asset that is not physical in nature. e.g. the brand name IBM
      ● Types of Intangible Assets:
        ○ Financial e.g. bond
        ○ Intellectual e.g. patents
        ○ Digital, e.g. music
    ■ Cash is also an asset and has the property of anonymity

The Key...

Ledger is the system of record for a business. Businesses have multiple ledgers for multiple business networks in which they participate.
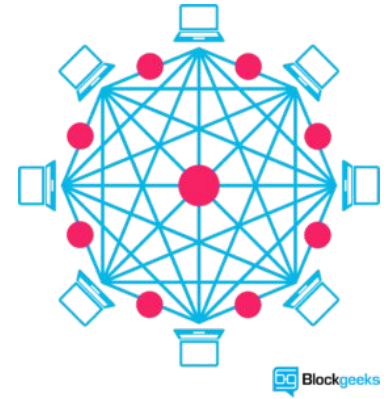
- **Transaction** - an asset transfer onto or off the ledger
    - Marvin gives a car to Philip (simple)
- **Contract** - conditions for transaction to occur
    - If Philip pays Marvin money, then car passes from Marvin to Philip
    - If car does not turn on, funds do not pass to Marvin (as decided by third party arbitrator)
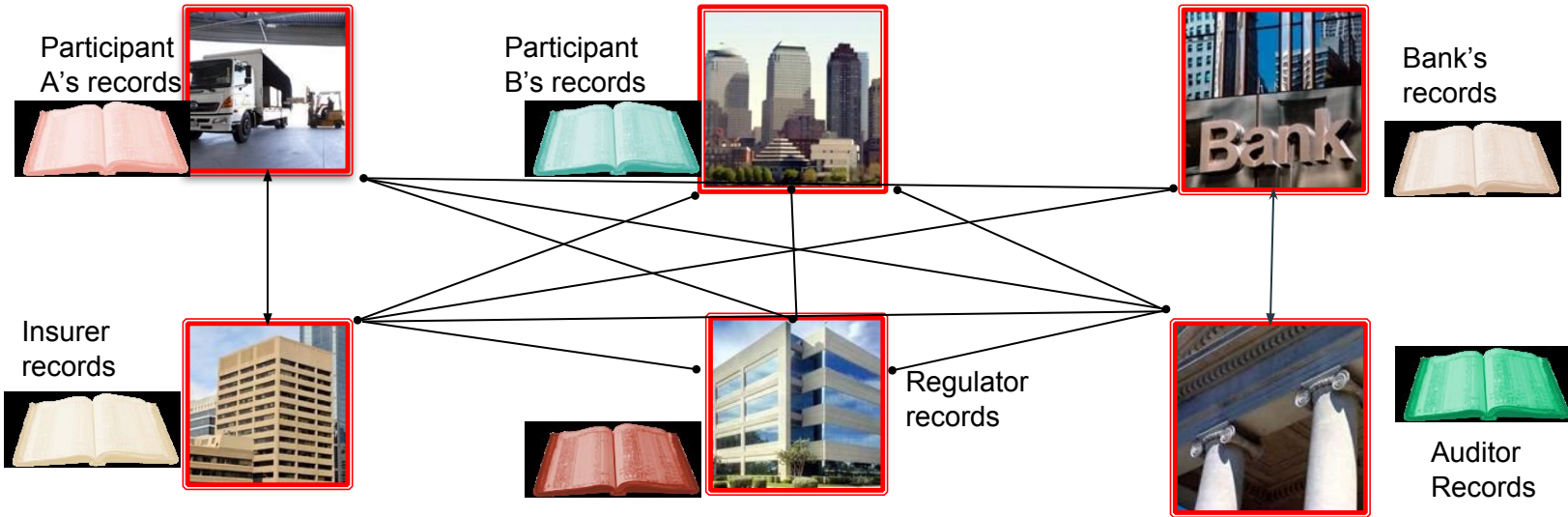
Enters blockchain!!!

Blockchain is . . .

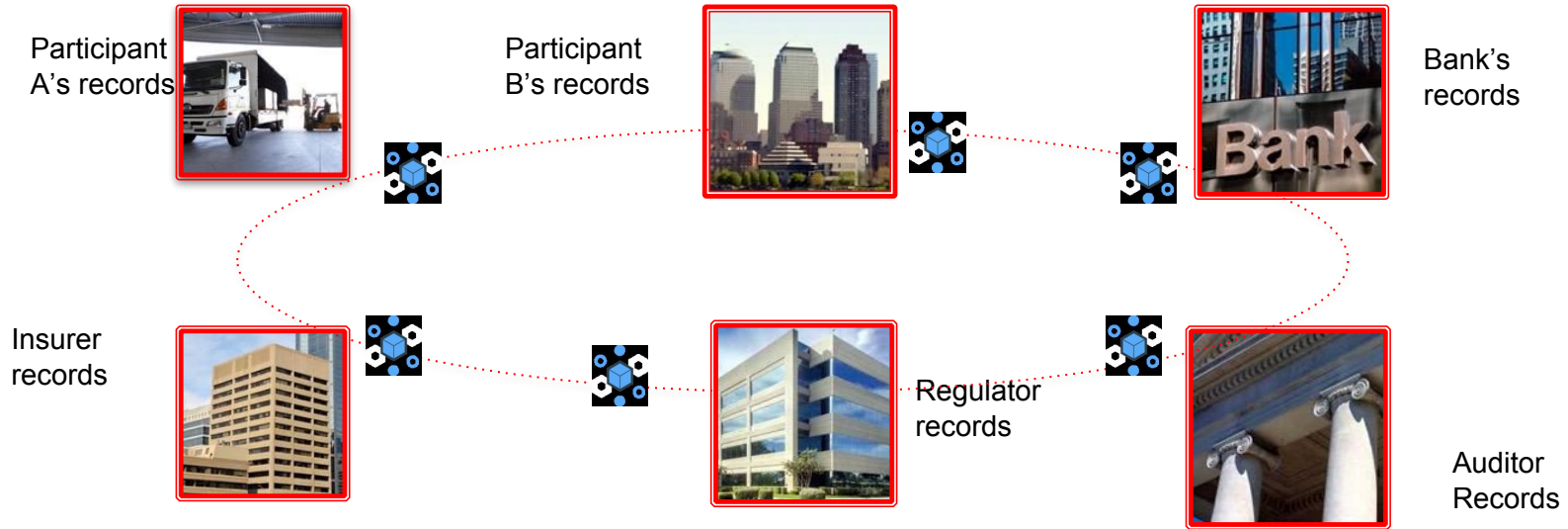**A trusted, distributed ledger, with shared business processes.**

Problem…

Participant A's records

Participant B's records

Bank's records

Insurer records

Regulator records

Auditor Records

… inefficient, expensive, vulnerable

A shared replicated, permissioned ledger…

Participant A's records

Participant B's records

Bank's records

Insurer records

Regulator records

Auditor Records

… with consensus, provenance, immutability and finality

Infographic from IBM

Blockchain underpins Bitcoin …

Bitcoin is:

- An unregulated shadow-currency
- The first blockchain application
- Resource intensive

Blockchain for business differs in key ares:

- Identity over anonymity
- Selective endorsement over proof of work
- Assets over cryptocurrency

Requirements of blockchain for business

Shared Ledger

Append-only Distributed System of record shared across business network

Smart Contract

Business terms embedded in transaction database & executed with transactions

Ensuring appropriate visibility; transactions are secure, authenticated & verifiable
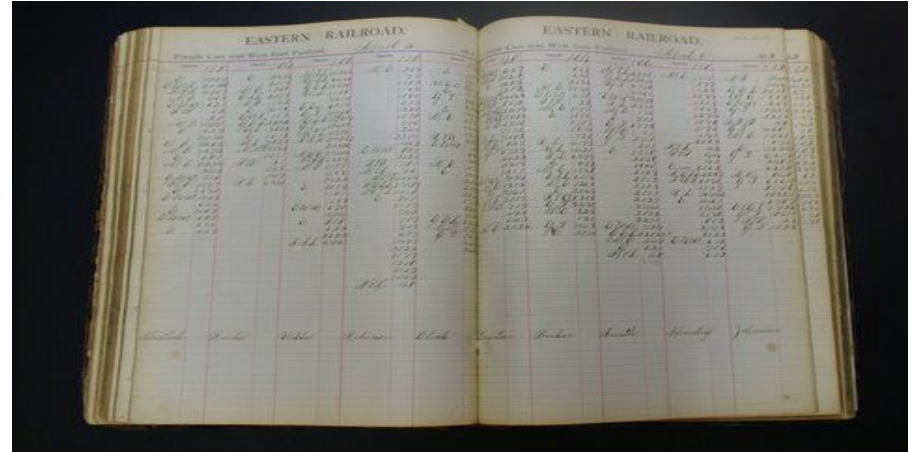
Privacy

Transactions are endorsed by relevant participants

Trust

Infographic from IBM

Shared ledger

Records all transactions across business network

- Shared between participants
- Participants have own copy through replication
- Permissions, so participants see only appropriate transactions
- THE shared system of record

Smart contract

Business rules implied by the contract … embedded in the Blockchain and executed with the transaction

- Verifiable, signed
- Encoded in programming language
- Example:
    - Defines Contractual condition under which corporate Bond transfer occurs

Privacy

The ledger is shared, but participants require privacy

- Participants need:
    - Appropriate confidentiality between subset of participants
    - Identity not linked to a transaction
- Transactions need to be authenticated
- Cryptography central to these processes

Trust

The ledger is a trusted source of information

- Participants **endorse** transactions
    - Business network decided who will endorse transactions
    - Endorsed transactions are added to the ledger with appropriate confidentiality
- Assets have verifiable audit trail
    - Transactions cannot be modified, inserted or deleted
- Achieved through consensus, provenance, immutability and finality

Blockchain benefits

- Saves time
  - Transaction time from days to near instantaneous
- Removes cost
  - Overheads and cost intermediaries
- Reduces risk
  - Tampering, fraud, & cyber crime
- Increases trust
  - Through shared processes and recordkeeping

Blockchain is a foundational technology

Blockchain is a technology as well as a way of thinking. Similar to Fair Trade the goal is to be transparent, trusted, and "fair" in transactions all across the board.

Blockchain is a foundation to build on and create a wide variety of solutions to problems.

Blockchain & Fair Trade

Provenance

Consensus

Immutability

Finality

Blockchain with Supply Chain

In what ways can Blockchain help?

- Provenance of each component part in complex system hard to track
- Manufacturer, production date, batch and even the manufacturing machine program

How does Blockchain does this?

- Blockchain holds complete provenance details of each component part
- Accessible by each manufacturer in the production process, the owners, maintainers and government regulators

Benefits??

1. Trust increased, no authority "owns" provenance
2. Improvement in system utilization
3. Recalls "specific" rather than cross fleet

Bext360

https://www.youtube.com/watch?v=Z4SwLD4frlo

References

IBM

[IBM - What Is Blockchain](#)

[IBM - Blockchain Overview PDF](#)

[Blockchain Essentials class](#)

Bext360

[Bext360 website](#)

Special Thank you

IBM for being a great resource for blockchain and a pioneering force in its research development. IBM provides all this knowledge publicly online for people to learn.

Professor Doerr for being the inspiration for Lukas and I's research.

Professor Nikhil Varma for helping with understanding the blockchain technology.

Ramapo College for being the type of school to push boundaries, give students the opportunity to do research like this, and to actually have it impact school life.