# Business networks and transactions

Business networks, markets, and wealth

- Business networks benefit from connectivity
  - Participants are customers, suppliers, banks, partners
  - Cross-geography and regulatory boundaries
- Wealth is generated by the flow of goods and services across business networks
- Markets are central to this process
  - Public: fruit market, car auction
  - Private: supply chain financing, bonds
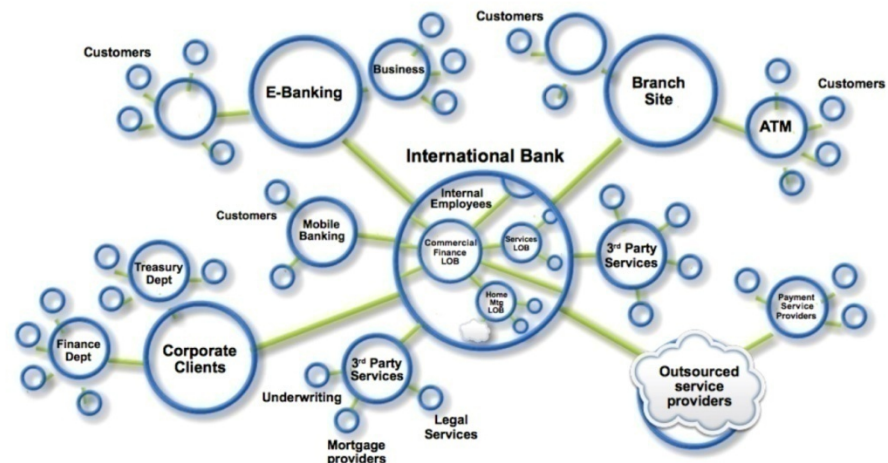
Transferring assets, building value

- Anything that is capable of being owned or controlled to produce value is an asset
- Two fundamental types of asset
  - Tangible, such as a house
  - Intangible, such as a mortgage
- Intangible assets fall into several categories
  - Financial, such as bonds
  - Intellectual, such as patents
  - Digital, such as music
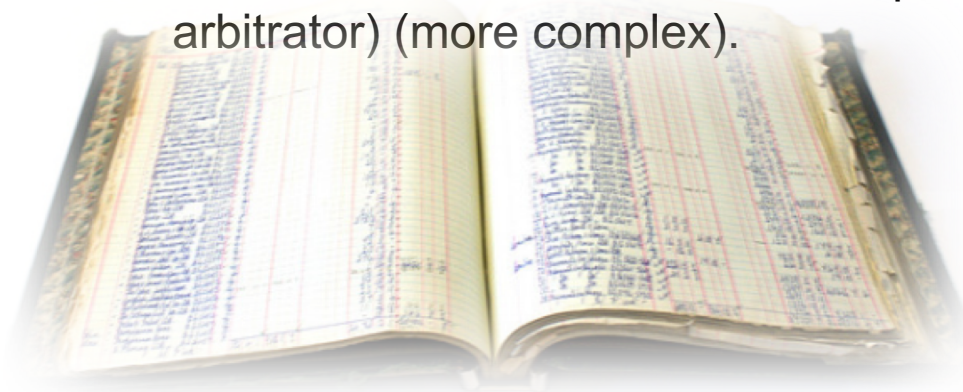- Cash is also an asset; it possesses the property of anonymity

Ledgers are key

- The **ledger** is the system of record for a business.
- A business will have a ledger for each of the multiple business networks in which it participates.
- A **transaction** is an asset transfer on or off the ledger.
  - Jane gives a car to Anthony (simple)
- A **contract** defines the conditions for a transaction to occur.
  - If Anthony pays Jane money, then the car passes from Jane to Anthony (simple).
  - If the car won't start, funds do not pass to Jane (as decided by a third-party arbitrator) (more complex).
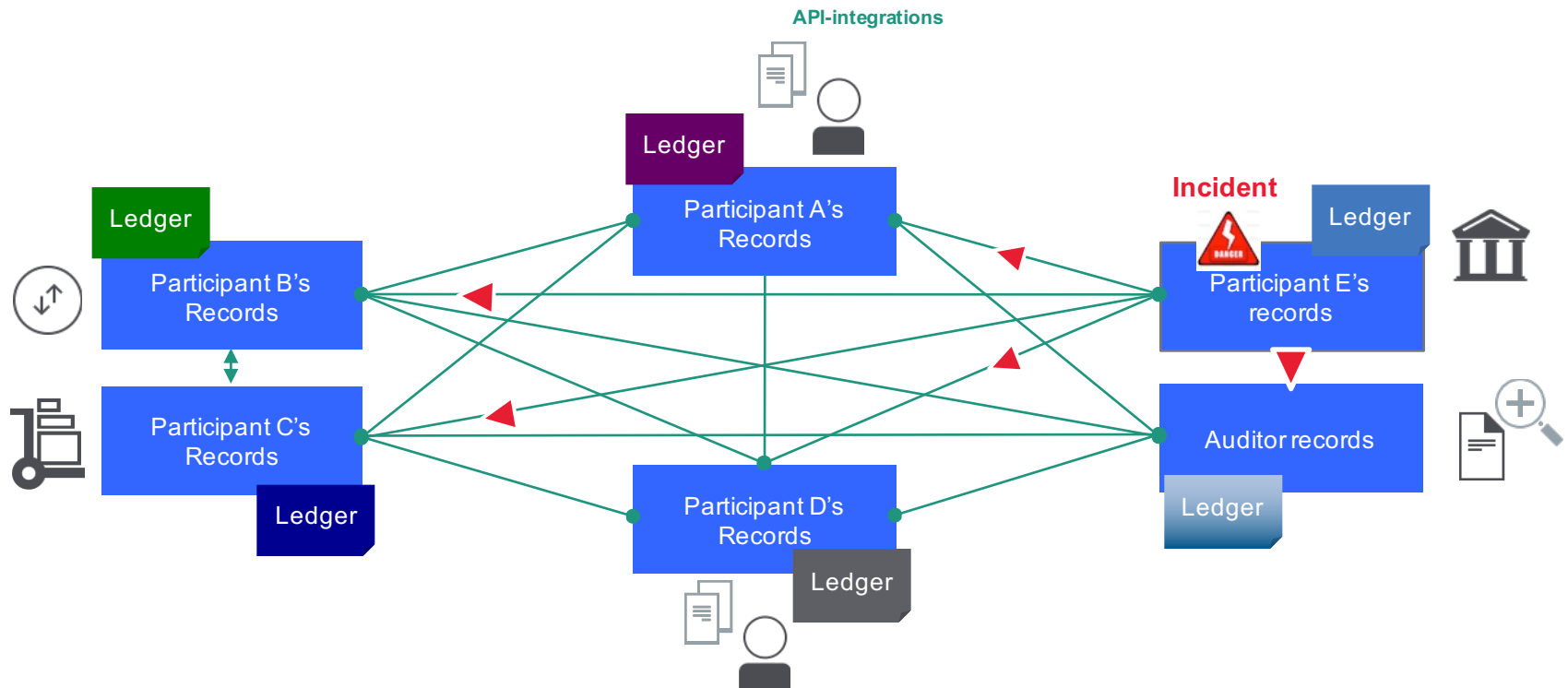
The trust problem

It is difficult to monitor asset ownership and transfers in a trusted business network.

Inefficient, **expensive**, **vulnerable**

The solution to the trust problem

A shared, replicated, permissioned ledger

Participant A's Records

Participant B's Records

Participant C's Records

Participant D's Records

Participant E's Records

Auditor records

Ledger

Participants have multiple shared ledgers.

The participants are the same as before.
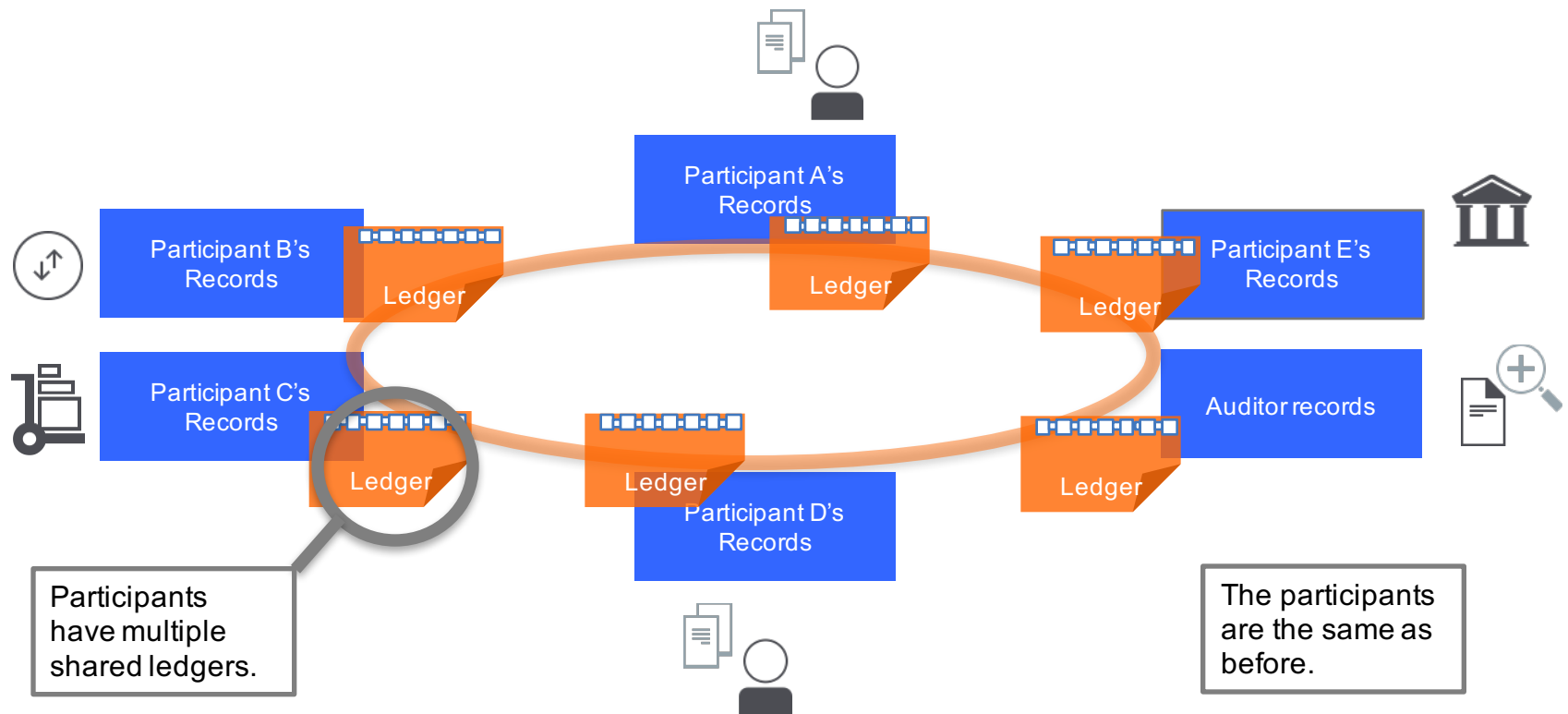
Consensus, provenance, immutability, finality

Introducing blockchain

Introducing blockchain

A shared ledger technology allowing any participant in the business network to see *THE* system of record, the ledger.
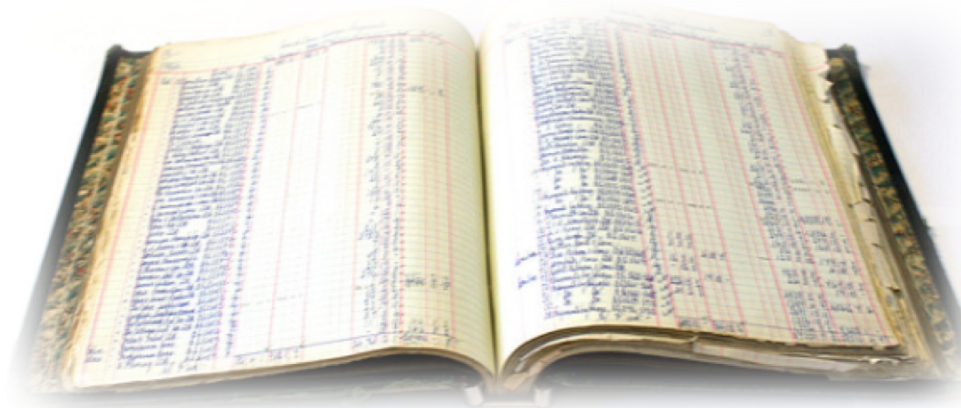
Types of blockchains

Permissionless and Public

It allows anyone to contribute data to the ledger with all participants possessing an identical copy of the ledger. Because there is no single owner of the ledger, this methodology is more suitable for censorship-resistant applications. Bitcoin is an example of this.

VS

Permissioned and Private

It distributes identical copies of a ledger, but only to a limited number of trusted participants. Because the network might have one or more owners, this methodology is better suited for applications requiring simplicity, speed, and greater transparency.

Blockchain for business

Append-only distributed **system of record** shared across business network

Shared Ledger

Smart Contract

Business terms embedded in transaction DB and executed with transactions

Ensuring appropriate visibility; transactions are secure, authenticated, and verifiable

Privacy

Consensus

All parties agree to network-verified transaction

Broader participation, lower cost, increased efficiency

Blockchain benefits

Saves	Removes	Reduces
Time	Cost	Risk
Transaction time from days to near instantaneous	Overheads and cost intermediaries	Tampering, fraud, and cybercrime
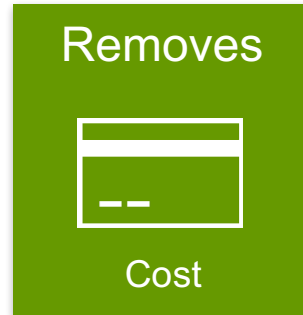
Example use cases

Consensus use case: shared routing codes

- ## What?
  - Competitors/collaborators in a business network need to share reference data, such as bank routing codes
  - Currently each member maintains his/her own codes and forwards changes to a central authority for collection and distribution

- ## How?
  - Each participant maintains his/her own codes in a blockchain network
  - Blockchain creates single view of the entire data set

- ## Benefits
  1. Consolidated, consistent data set reduces errors
  2. Near real-time of reference data
  3. Naturally supports code editing and routing code transfers between participants

Provenance use case: vehicle maintenance

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

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

- ## Benefits
  1. Trust increased because no authority "owns" provenance
  2. Improvement in system utilization
  3. Recalls "specific" rather than cross-fleet
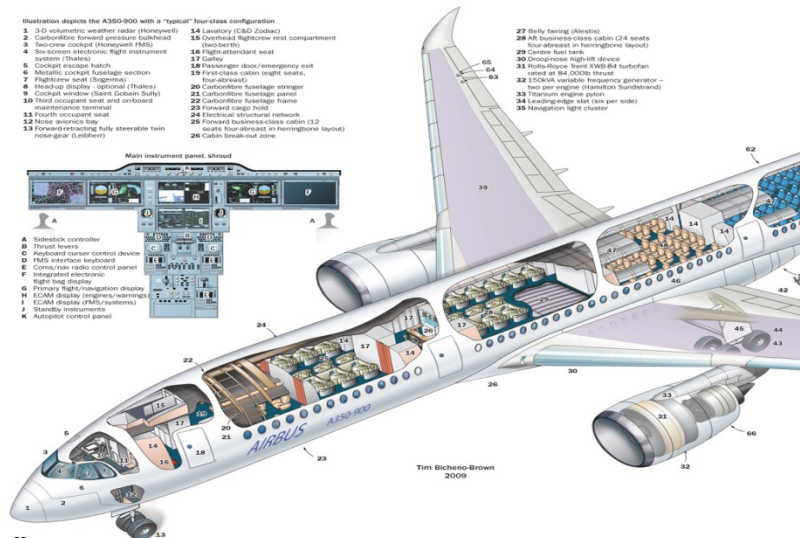
Immutability use case: financial ledger

- ## What?
  - – Financial data in a large organization dispersed throughout many divisions and geographies
  - – Audit and compliance needs indelible record of all key transactions over reporting period

- ## How?
  - – Blockchain collects transaction records from diverse set of financial systems
  - – Append-only and tamper-proof qualities create high confidence in the financial audit trail
  - – Privacy features ensure authorized user access

- ## Benefits
  1. Lowers cost of audit and regulatory compliance
  2. Provides "seek and find" access to auditors and regulators
  3. Changes nature of compliance from passive to active
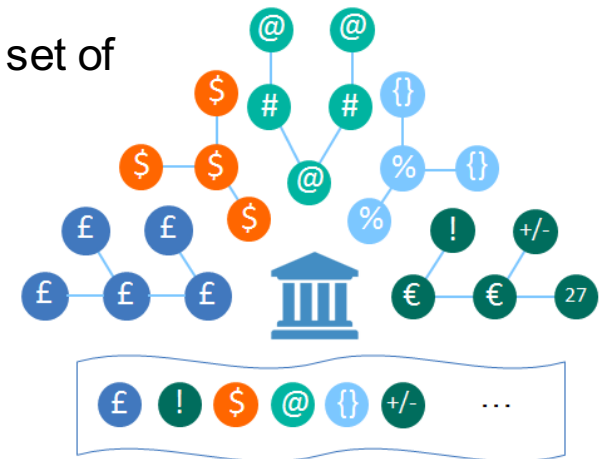
Finality use case: letter of credit

- What?
  - Bank handling letters of credit (LOC) wants to offer them to a wider range of clients, including startups
  - Currently constrained by costs and the time to execute

- How?
  - Blockchain provides common ledger for letters of credit
  - Allows all counter-parties to have the same validated record of transaction and fulfillment

- Benefits
  1. Increase speed of execution (less than one day)
  2. Vastly reduced cost
  3. Reduced risk, for example, from currency fluctuations
  4. Value-added services such as incremental payment

Letter of Credit

Republic of A — B-land

Company A: Buyer/applicant — Sales contract → Company B: Seller/beneficiary

Buyer applies for LC

Seller's bank authenticates LC and credits Company B

A Plus Bank — Buyer's bank issues LC and sends to seller's bank → Bank B
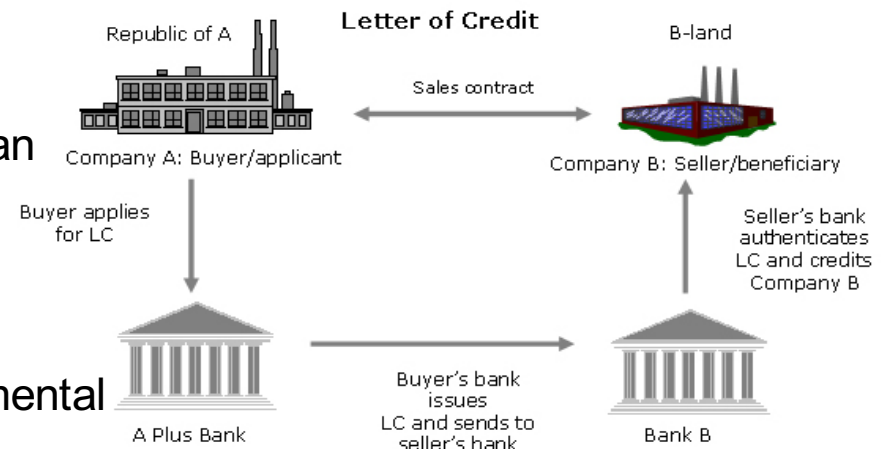
Other potential use cases

- Securities
  - Post-trade settlement
  - Derivative contracts

- Trade Finance
  - Bill of Lading
  - Cross-currency payment

- Syndicated Loans

- Supply Chain

- Retail Banking
  - Cross border remittances
  - Mortgage verification & contracts

- Public Records
  - Real estate records
  - Vehicle registrations
  - Citizen Identity

- Digital Property Management

Not for all . . .

Blockchain is NOT

✖ Suited to high performance (millisecond) transactions

✖ For just one participant (no business network)

✖ A replicated database replacement

✖ A messaging solution

✖ A transaction processing replacement

✖ Suited for low value, high volume transactions