

# Blockchain

Keeping Up with the Speed of Disruption

# Jonathan Baha'i

- A pioneer in the Canadian blockchain industry with over 20 years experience in server hosting and telecommunications
- Founder of eXeBlock Technology Corp, a publicly traded blockchain software developer
- Founder of Peerplays blockchain, raised over \$10M in bitcoin crowdfunding to build a provably fair e-gaming platform
- Frequent commentator on blockchain stories in print, radio and television media





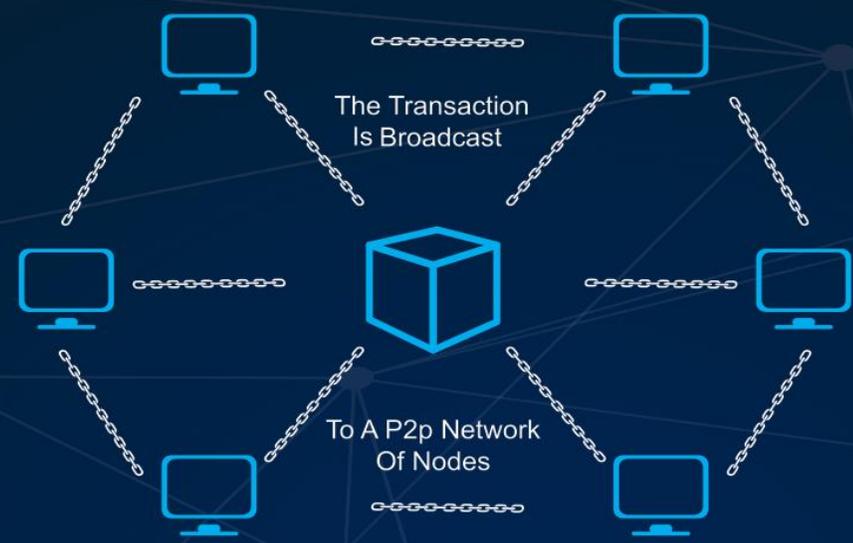
# Blockchain 101

Blockchain uses a decentralized system where information is stored in multiple locations using digital ledgers. These ledgers are constantly in contact with each other to assure that all ledgers are correct. When a new “block” is made it cannot be altered, eliminating the possibility of compromised data within a blockchain structure.



Initiate The Transaction  
Multiple Parties Transact

Someone Decides To Transfer A Security



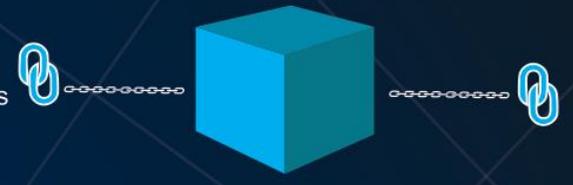
The Transaction Is Broadcast

To A P2p Network Of Nodes

Validation Via Consensus

The Network Of Nodes Validates, Verifies Using Know Consensus Algorithm

A Valld Transaction Will Transfer The Title Of The Security



# HOW BLOCKCHAIN WORKS

The Transaction Is Complete



The New Block Is Then Added To The Existing Blockchian



Once Verified, The Transaction Becomes A Part Of New Block For The Ledger

# Topics I will cover:

- 1 Blockchain Consensus
- 2 Incentive Structure
- 3 Distributed Ledgers
- 4 Smart Contracts
- 5 Disruption in the Economy
- 6 Regulating Blockchain
- 7 Moderated Q&A

# 1. Blockchain Consensus

# Blockchain technology replaces age-old concept of trust with mathematical proofs

- Central databases don't need consensus because there is only one copy, but they are vulnerable to hacking, can be inefficient, and lack transparency for users
- Traditional business models spend a great deal of time achieving consensus
  - Accountants perform audits
  - Banking back office processes
  - Issuing and paying invoices



# Consensus is agreement on 'true' state of the information in the network

**Blockchain technology solves the problem of trust in a clever new way**

- Blockchains use a 'consensus mechanism' to achieve agreement on the 'true' state of the information recorded
  - Account balances
  - Transaction histories
  - Non-monetary information
- Consensus algorithms ensure that the next block in the blockchain is the only version of the truth, and keep cheaters from derailing the system for their own advantage

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# Q. Why do we need consensus?

A. For secure record keeping without a central database

No one party can modify, delete or add records to the shared ledger without consensus, making this system ideal for financial transactions, immutable contracts and storing information



**Transaction:**  
Input from participants in network describing changes in asset ownership

**Block:**  
Contains a list of validated transactions timestamped when the block is created

**Blockchain:**  
A ledger of records organized into sequential blocks linked by cryptography

## 2. Incentive Structure

# What is blockchain mining?

The term mining is misleading, the process is more like bookkeeping.

Computational processing of information is exchanged for value or incentives from the blockchain.



# Blockchain Incentives

## Proof of Work

- Miners validate transactions by solving difficult cryptographic puzzles
- Process is slow and consumes huge amounts of electricity

## Proof of Stake

- Validators are chosen at random to create the next block based on how many coins they own
- Cheaters are punished by losing the coins they have 'staked' for the privilege of being a validator
- Faster and more efficient than Proof of Work

# 3. Distributed Ledger

# We are surrounded by centralized ledgers

Bank accounts

Credit cards

Company financial statements

Ownership of stocks

Land title registry



Hotel reservations

Citizenship

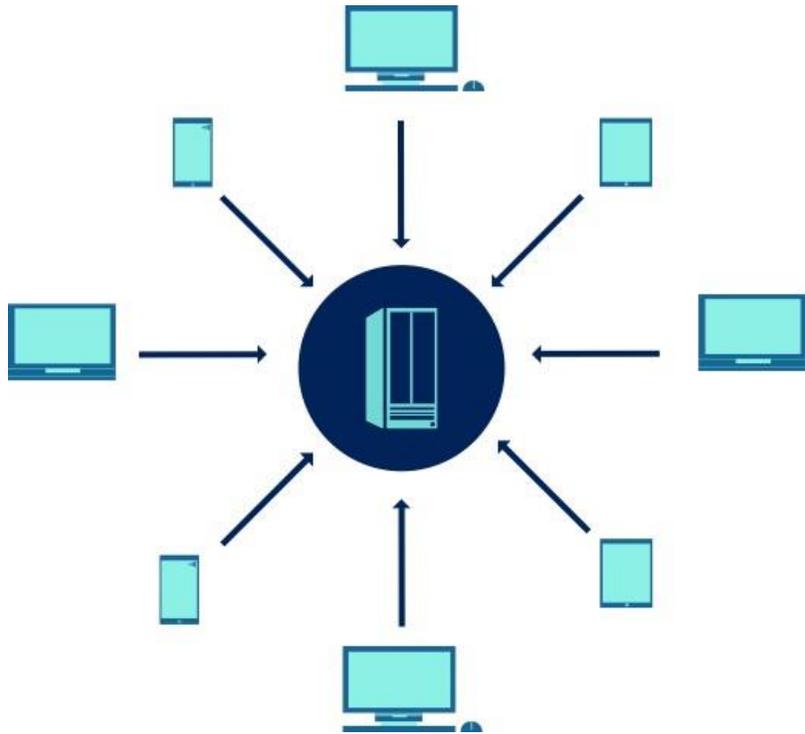
Driving records

Medical records

Phone book

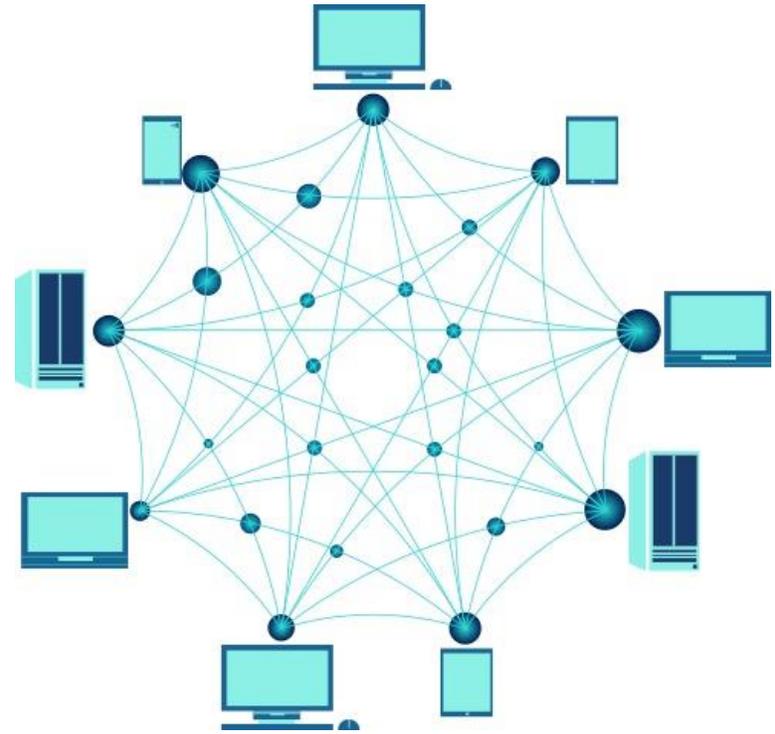
# Blockchains are distributed ledgers

Traceable → Transparent → Immutable



Centralized

VS.



Distributed (peer-to-peer)

# Distributed Ledger Technology (DLT)

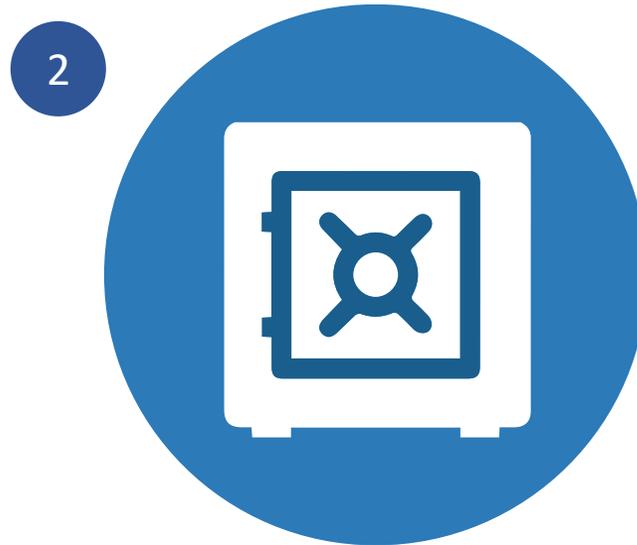
- A publicly reviewable ledger containing a verified record of every transaction
- Imagine a room full of accountants who each have a copy of a ledger book, each new page in the ledger is verified by each accountant, and each page is linked to all previous pages
- Each page in the ledger is a collection of transactions processed as a batch, that is like the contents of a block
- If any copy of the ledger is tampered with and no longer matches the others, it is rejected by the network

# 4. Smart Contracts

# Smart contracts are programmable agreements



A self-executing contract is created with terms of agreement directly written into lines of code on the blockchain. The parties are anonymous but the contract is on a public ledger.



The smart contract wallet holds funds until the agreed terms are met, like a lawyer's escrow service.

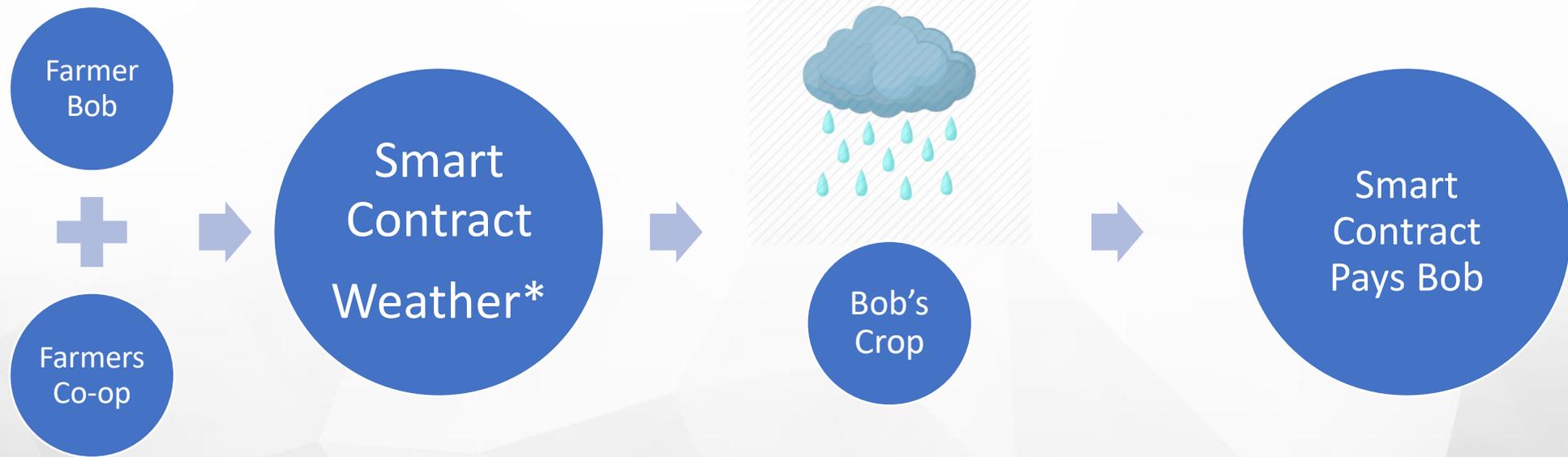


A triggering event occurs and the smart contract executes itself according to coded terms.

# Why do we need Smart Contracts?

Because blockchains are decentralized systems that exist between all parties, there is no need to pay intermediaries in transactions

Example: Crop Insurance



True 'mutual' insurance P2P  
No insurance company required



*DApps enable greater privacy and edge network security for users*

## Decentralized Applications (DApps)

- Blockchain “DApps” control and distribute packets of encrypted information around the network. Blocks of data are relayed to all the devices connected to the network. The network operates under the assumption that no device is trusted, so “blocks” of data that are distributed through the network are anonymous and unalterable using blockchain's multiple ledger system.
- DApps are typically open sourced, decentralized, incentivized, and run on a standard protocol.

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# 5. Disruption in the Economy

# On the potential of blockchain

“Bitcoin gives us, for the first time, a way for one Internet user to transfer a unique piece of digital property to another Internet user, such that the transfer is guaranteed to be safe and secure, everyone knows that the transfer has taken place, and nobody can challenge the legitimacy of the transfer. The consequences of this breakthrough are hard to overstate.

What kinds of digital property might be transferred in this way? Think about digital signatures, digital contracts, digital keys (to physical locks, or to online lockers), digital ownership of physical assets such as cars and houses, digital stocks and bonds ... and digital money.”

*-Marc Andreessen, Founder of Netscape and famous venture capitalist, 2014*

# Disruption in the financial sector

- Trust in business, media, NGOs and government has fallen below 50% in two thirds of 28 countries surveyed (HBR.org, Jan. 2017)
- Who owns cryptocurrencies?  
17% of US millennials, 9% of GenX, 2% of Boomers (Finder.com Mar-18)
- The supply of cryptocurrencies is determined by algorithm, not by central banks
- Trust, efficiency and transparency are driving forces

# Use Cases

## Financial Services

- Currencies
- Private equities
- Public equities
- Bonds
- Derivatives
- Investor voting rights
- Commodities
- Trading records
- Recording mortgages / liens
- Servicing records
- Crowd-funding

## Public Sector Record Keeping

- Land titles
- Vehicle titles
- Business incorporation
- Regulatory records
- Passports
- Degrees and diplomas
- Birth certificates
- Death certificates
- Voting
- Health / Safety Inspections
- Building permits
- Gun permits
- Criminal records
- Forensic evidence tracking
- Court records
- Government accounting

# Block Transactions and Chain

Each block includes verified transactions, and the blockchain maintains a ledger with all prior transactions. The blockchain is duplicated by all the computers on a network.

Source: Matthew Leising & Ed Robinson, Bloomberg



**Gold** | Real Asset Co. in London permits gold bugs to record bullion on the blockchain and will soon enable them to trade the metal.

## Syndicated Loans

Digital Asset Holdings, Master's firm is creating a distributed ledger to handle the settlement of pooled corporate debt.

## Private Shares

Nasdaq is developing a blockchain system for trading shares in closely held companies.

## U.S. Treasury Repos

Digital Asset is developing a way to record and settle short term government bond tags on a distributed ledger.

## Airline Miles

Chain, a San Francisco firm, offers software tools for developers to build apps to transmit anything of value on the ledger, including loyalty points.

## Interbank Payments

London-based Earthport and Ripple Labs, a San Francisco startup, have launched a new international payments network on a private blockchain.

## Remittances

MeXBT in Mexico City provides a Web-based app that lets migrants send money via the blockchain to Mexico and withdraw cash from ATMs.

## Diamonds

London startup Everledger uses 40 unique characteristics to "fingerprint" large diamonds and record stones on the blockchain to track them from the mine to someone's finger.

## Property Titles / Land Records

Factom, based in Austin, Texas is building a land title registry in Honduras on the blockchain so citizens can defend their property in court from unlawful seizures.



The blockchain, the ledger that underlies bitcoin, enables institutions to transfer and record assets other than the digital currency without an intermediary. Here's how it's being put to use.

# Blockchain in the Public Sector

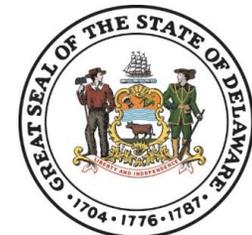
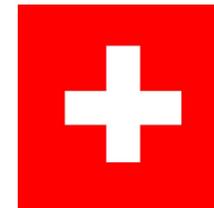
Current public sector Blockchain initiatives to improve efficiency in licenses, birth certificates, visas, payments, land titles, financial services and stock registries

Dubai's Blockchain Strategy predicts 50% of official documents by 2021;  
\$1.5 billion USD in annual document processing savings, 25 million hours of economic productivity saved, reduction of 114 million tons CO2 from travel avoided.

Innovate UK



Government  
of Bermuda



# 6. Regulating Blockchain

# Why regulate blockchain?

- Sector already provides high-tech jobs for young Canadians
- Regulatory Certainty = More Investment
- Competitive global environment
  - Canada is at risk of falling behind numerous other jurisdictions who have already announced blockchain regulations
  - Ex. Bermuda announced blockchain regulations in April, this week leading cryptocurrency exchange Binance said it will move there

# Tokens

- They are digital assets
- Can be securities
- Can be 'utility tokens'
  - Payments for a service or subscription
- Can represent hard assets
  - A museum might decide to sell shares in a famous painting to multiple investors using tokens

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# Issues

- What is a security?
- What is money?
- Who is responsible when there is no central operator?
- Taxation

# 7. Questions

# Thank You

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