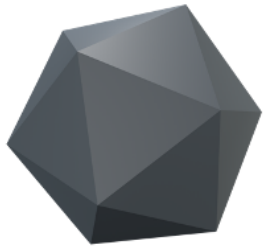


Blockchain.dcwebmakers.com

Blockchain for Entrepreneurship

By Matt Zand



DC WEB MAKERS

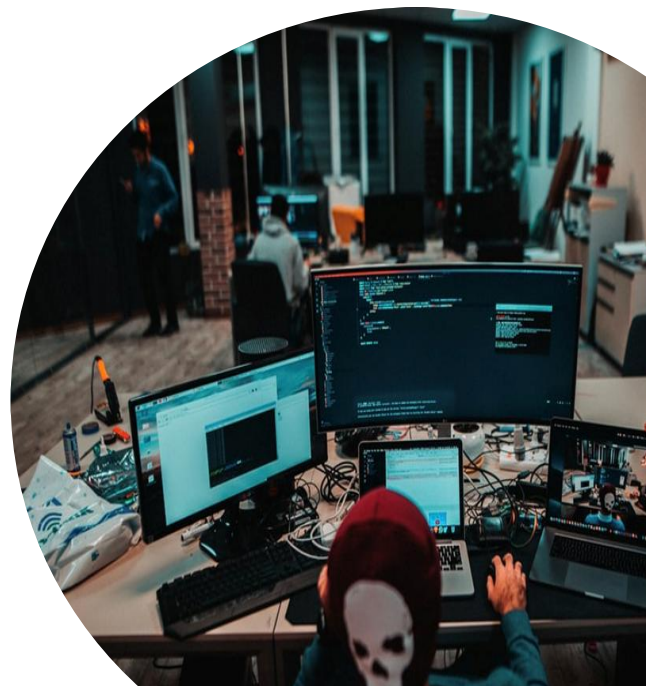
Introduction to Blockchain Technology

27 Use cases of blockchain

- **Matt** is a serial entrepreneur and the founder of 3 successful tech startups: [DC Web Makers](#), [Coding Bootcamps](#) and [High School Technology Services](#).
- He is a leading author of [Hands-on Smart Contract Development with Hyperledger Fabric](#) book by O'Reilly Media.
- He has written more than 100 technical articles and tutorials on blockchain development for Hyperledger, Ethereum and Corda platforms.
- He has a master's degree in business management from the University of Maryland.
- Prior to blockchain development and consulting, he worked as senior web and mobile App developer and consultant, angel investor, business advisor for a few startup companies.

Prerequisite

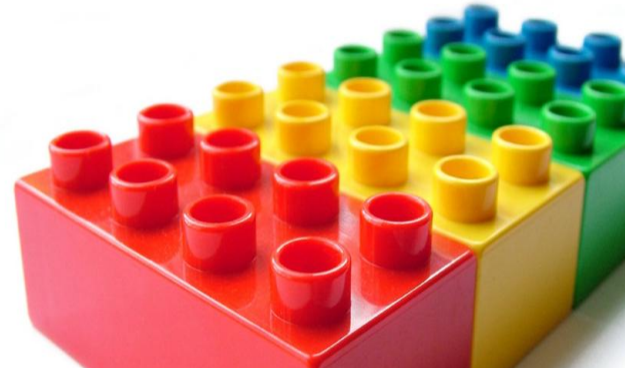
None



Topics

I- Overview of Blockchain

- Intro to Blockchain
- How Blockchain Works
- Blockchain Structure
- Smart Contracts
- Blockchain Roles
- Decentralized Applications
- Blockchain Challenges



Topics

II- Popular Blockchains

- **Ethereum**
- **Corda**
- **Hyperledger Fabric**
- **Hyperledger Family**
- **Other Popular Blockchains**

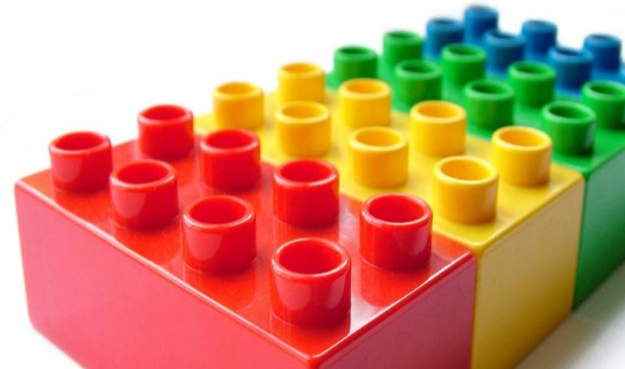


Topics...

III- Blockchain Use Cases

IV- Launch Startup Business

- Five Phases of Blockchain Product Development



I- Overview of Blockchain

What is blockchain and what are blockchain main components?

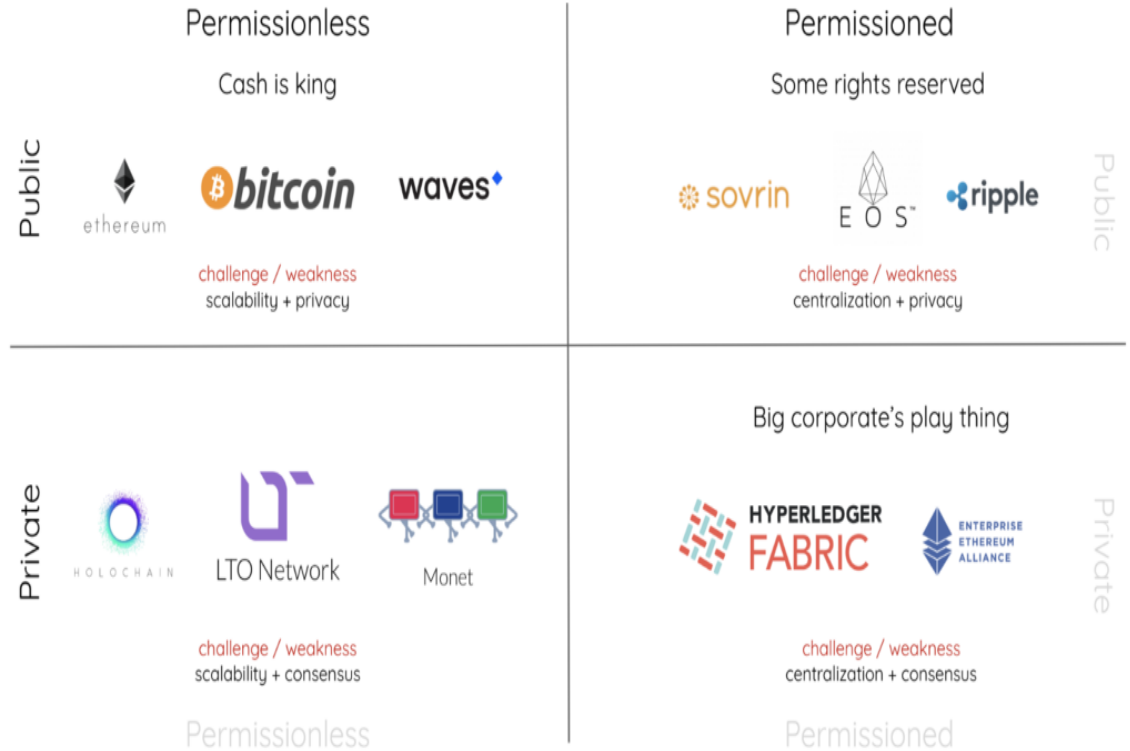
- Originally devised for the digital currency, Bitcoin, the tech community has now found other potential uses for the technology.
- Currently, blockchain is penetrating every single industry with potential use-cases coming up every week.
- According to hyperledger.org,

"A blockchain is a peer-to-peer **distributed** ledger forged by **consensus**, combined with a system for "**smart contracts**" and other assistive technologies."

- Blockchain is a specific form or subset of distributed ledger technologies, which constructs a chronological chain of blocks, hence the name 'block-chain'. A block refers to a set of transactions that are bundled together and added to the chain at the same time.
- Blockchain is a public record of transactions. It's also distributed, so instead of one person controlling everything, there are thousands of computers around the world connected to a network, and these thousands of computers together come to an agreement on which transactions are valid.

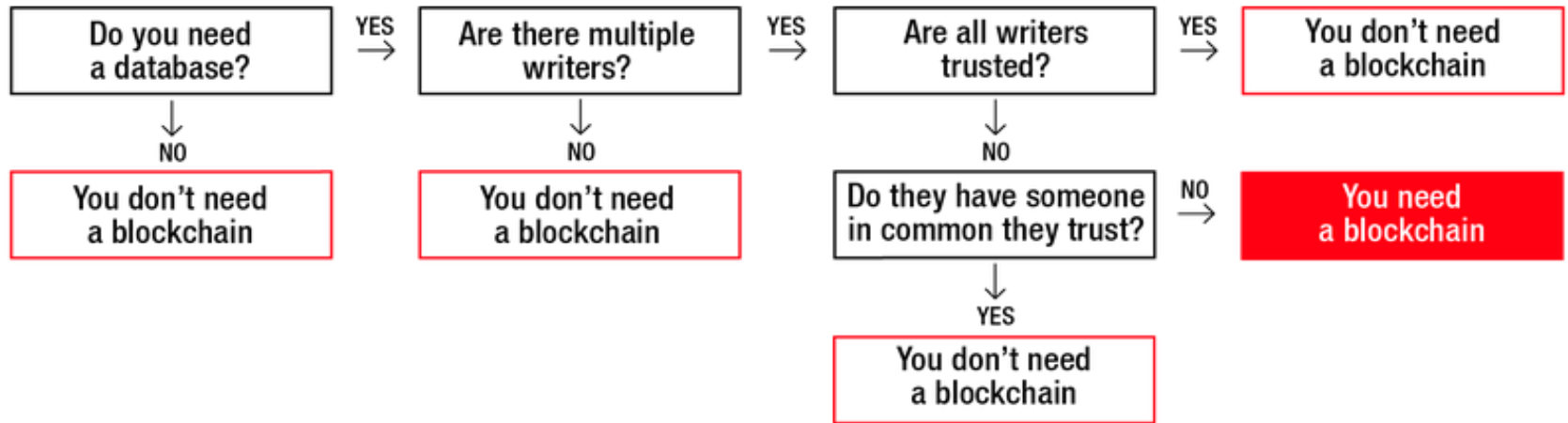
Types of Network:

- Public Blockchain Network
- Private Blockchain Network
- Permissioned / Consortium Blockchain Network



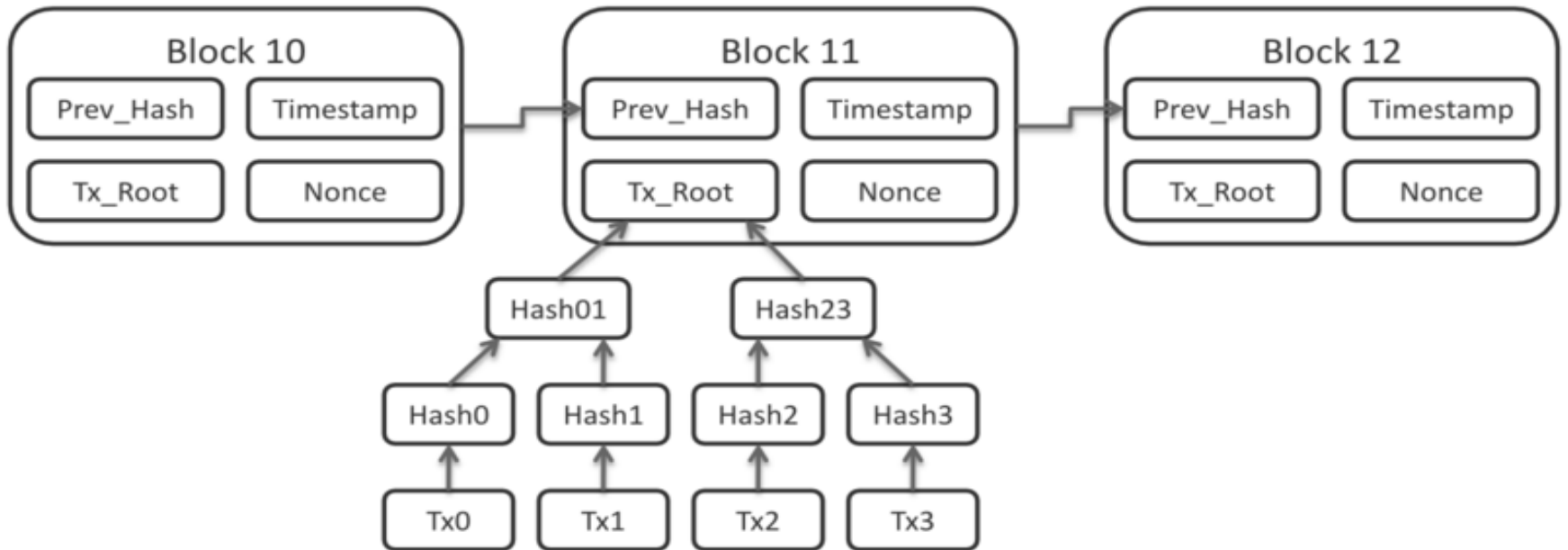
	Public Network	Private Network	Permissioned/Consortium Network
Network Type	Decentralized	Partially Decentralized	Partially Decentralized – hybrid between public and private networks
What is it?	Anyone anywhere in the world can read and write on the network. Data is validated by every participant “node”, thus making it secure.	Permission to read and write on the blockchain is controlled by the “owner” of the blockchain.	Permission to read and write on the blockchain is controlled by predetermined nodes.
Benefits	<ul style="list-style-type: none"> -Secure as the entire network verifies transaction. -Transparent as all transactions are made public with individual anonymity. 	<ul style="list-style-type: none"> -Efficient as verification is done by just owner of the blockchain. -Private as the owner can control who has read/write access. 	<ul style="list-style-type: none"> -Efficient as nearly lesser nodes verify transactions. -Private as read and write access can be controlled by predetermined nodes. -No consolidation of controlling power.
Challenges	Efficiency is lacking	Controlling power is consolidated to a single organisation.	

How to assess if the blockchain is a good fit



- Blockchain technology is an open distributed ledger that can record transactions of two parties securely and efficiently.
- As it is distributed, Blockchain is typically managed by a peer-to-peer network working simultaneously together to solve complex mathematical problems in order to validate new blocks.
- Once recorded, the data in any given block cannot be updated retroactively without changing all subsequent blocks, which requires the confirmation of the majority in the network.

Blockchain Structure



- A smart contract is a computer code running on top of a blockchain containing a set of rules under which the parties to that smart contract agree to interact with each other. If and when the pre-defined rules are met, the agreement is automatically enforced. The smart contract code facilitates, verifies, and enforces the negotiation or performance of an agreement or transaction. It is the simplest form of decentralized automation.
- It is a mechanism involving digital assets and two or more parties, where some or all of the parties deposit assets into the smart contract and the assets automatically get redistributed among those parties according to a formula based on certain data, which is not known at the time of contract initiation.



STEP 1

An option contract is written as code into a blockchain.



STEP 2

An event (delivery of goods, an expiration date, etc.) triggers the execution of the coded terms of the contract.



STEP 3

Assets are released to the necessary parties.



STEP 4

Regulators can study the immutable transaction record to understand all activity that has taken place.

- **Blockchain Architect:** Responsible for the architecture and design of the blockchain solution.
- **Blockchain Developer:** The developer of applications and smart contracts that interact with the Blockchain and are used by blockchain users.
- **Blockchain User:** The business user, operating in a business network. This role interacts with the blockchain using an application. They are not aware of the blockchain.
- **Blockchain Regulator:** The overall authority in a business network. Specifically, regulators may require broad access to the ledger's contents.

- **Blockchain Operator:** Manages and monitors the Blockchain network. Each business in the network has a blockchain Network operator.
- **Membership Services:** Manages the different types of certificates required to run a permissioned Blockchain.
- **Traditional Processing Platform:** An existing computer system which may be used by the blockchain to augment processing. This system may also need to initiate requests into the blockchain.
- **Traditional Data Sources:** An existing data system which may provide data to influence the behavior of smart contracts.

- **DApp** is an abbreviated form for Decentralized Application.
- A DApp has its backend code running on a decentralized peer-to-peer network. Contrast this with an App where the backend code is running on centralized servers.
- A DApp can have frontend code and user interfaces written in any language (just like an app) that can make calls to its backend.
- If an app=frontend+server, since smart contracts are code that runs on the global decentralized peer-to-peer network, then:
DApp = frontend + smart contracts

Blockchain is still a fairly young technology whose full potential has yet to emerge. Current challenges are:

- Performance speed and scalability
- Lack of standardization for interoperability
- Lack of innovation-supporting regulation

II- Popular Blockchains

Ethereum, Corda and
Hyperledger Fabric

- Ethereum is a second generation blockchain.
 - Ethereum was built by Bitcoin developers to provide a platform to build blockchain-based applications.
 - Like all blockchain applications, Ethereum applications are called distributed applications, or DApps.
 - Ethereum website: <https://www.ethereum.org>
 - Ethereum is a single ledger blockchain.
 - Ethereum has a virtual currency called the **Ether**.
 - The Ether currency is used on Ethereum to complete transactions, that can be later converted back to dollars.

- Corda
 - Corda is a Distributed Ledger Technology (DLT) product for business, <https://www.corda.net>.
 - Similar to Hyperledger, Corda is a permissioned blockchain solution.
 - Corda was developed to allow known transactors to directly update the Corda ledger on behalf of their organizations.
 - Corda has a rich API and smart contracts engine.
 - Corda applications are called CorDapps, and they are written in Java.

- Corda
 - Corda was initially developed for the financial services industry, and other regulated industries.
 - Corda manages financial instrument assets such as bonds, securities, and cash.
 - Corda does not have a native token.
 - Corda recently expanded to support all industries and any kind of asset.

- [Hyperledger Fabric](#)
 - A Distributed Ledger Technology (DLT) and smart contract Engine
 - Hyperledger Fabric is a Linux community based blockchain product, <https://www.hyperledger.org/projects/fabric>
 - Hyperledger Fabric is an enterprise-grade permissioned distributed ledger framework for developing solutions and applications.
 - Hyperledger Fabric offers a permissioned approach to consensus, and it preserves privacy.

- Hyperledger Fabric
 - Most Blockchain are single ledger.
 - As the name implies, Hyperledger Fabric is a multi-ledger Blockchain.
 - The multiple Hyperledger ledgers are called channels that allow two or more users to conduct transactions in private.
 - Hyperledger Fabric smart contracts are called Chaincode, and are usually written in JavaScript or Go.

- Hyperledger Fabric versus the Hyperledger family
 - Distributed Ledgers
 - Libraries
 - Tools
 - Domain-Specific projects

- Distributed Ledgers



- Libraries



- Tools



- Domain-Specific projects



- [Hyperledger Fabric V2](#) book highlights
 - Overview of blockchain, Hyperledger family and Fabric components
 - Develop, test, debug and deploy smart contracts
 - Deploy Fabric on cloud platforms like Azure, AWS, Oracle and IBM
 - Survey of Fabric V2 features and hands-on guides for migration to V2
 - Build end-to-end Pharma supply chain with Fabric V2
 - Work with Hyperledger Aries, Avalon, Besu, and Grid

- Private Business grade blockchains need:
 - Distributed Ledger
 - Data seen only by those who need to see it.
 - Permissioned roles
 - Can manage any type of asset or data
 - The ledger is only available to those who need to see it
 - Immutable
 - Known users
 - Visibility based on role
 - Few nodes with known users
 - Smart contracts

- Other Popular Blockchain Products
 - EOS: <https://eos.io>
 - Stellar: <https://www.stellar.org>
 - Hyperledger Sawtooth:
<https://www.hyperledger.org/projects/sawtooth>
 - OpenChain: <https://www.openchain.org>
 - Neo: <https://neo.org>
 - Ripple: <https://ripple.com>

III- Blockchain Use Cases

Review of 27 practical use cases of blockchain

1- Financial Services

- Many financial services firms and Central Banks are working with blockchain projects.
 - Blockchain projects have launched for interbank settlements.
 - There are also several projects for securities settlements.
 - Providing banking services to “Unbanked” populations

2- Cyber and Network Security

- Blockchains immutability and resiliency makes it a great cyber security solution.
- Blockchain's distributed network make it less vulnerable to attack.

3- Entertainment

- Blockchain is great environment for managing information assets such as music files or images.
 - Use smart-encoded, blockchain-powered file formats to ensure that artists and others, are receiving their fair compensation.
 - Ensures that all parties are credited and/or paid
 - Ethereum based file format supports metadata to be preserved and cross-checked for consistency at all stages.

4- Energy

- Energy has had hundreds of blockchain projects.
 - Decentralizing Energy Retail.
 - Tracking unused energy that can be used by other customers. The blockchain would also exchange payments for the use of excess energy.

4- Energy...

- The main benefits of blockchain in the energy sector are:
 - Reduced costs
 - Environmental sustainability
 - Increased transparency for stakeholders while not compromising privacy

5- Supply Chain

- Blockchain is a natural use case for supply chain.
 - Supply chains are made of independent vendors with a common customer.
 - The vendors only share some of their data.
 - All participators in the supply chain can input required data including locations, lot numbers, deliveries etc.
 - The transparency of the blockchain make this readily reportable and traceable.

6- Law Enforcement

- Law Enforcement also is running many blockchain projects.
 - The immutability of the blockchain makes it ideal for evidence tracking.
 - Blockchain can also provide immutable diaries or notes of the steps taken during investigations.
 - The transparency of the blockchain also provides advantages to the legal system.

7- Identity Management

- When it comes to identity management, there are many solutions offered by the blockchain.
 - Identity meta-data and attributes can be hashed and stored on a blockchain.
 - Identity Information could be available when and when needed and only shared with those who need it

8- Elections and Voting

- Blockchain can be a fair, inexpensive, secure, and transparent voting system.
 - Each elector would have 1 vote token per office up for election.
 - When ready to vote, the elector would send ownership of his/her vote token to the supported candidate.
 - The blockchain would tally the votes in real time, and the votes can be reported at any time.

9- Fund Raising

- The ERC-20 is a standard for smart contracts on the Ethereum blockchain for implementing tokens.
- The ERC-20 tokens represent cryptocurrencies or other business assets.
- These assets can be sold in a “crowd sale” model.
- This approach is called an Initial Coin Offering (ICO).
- ICOs are unclearly regulated, and firms are cautioned to consult an expert in ICO regulation before offering ERC-20 tokens.

10- Personal Data and Attention

- The Brave web browser is a Blockchain based and uses tokenization.
 - The Ethereum ERC-20 token is called Basic Attention Token (BAT).
 - Brave creates links between the user, advertisers and content creators, allowing interactions by token
 - Brave prevents all advertising, then allows users to view only the advertisements they want to view.
 - Users receive payment in BAT for their attention to their advertising and advertisers receive key data..

11- Record keeping

- Ownership assets can be permanently and immutably stored in the blockchain.
 - This use case can also greatly serve the developing world where documented registration often does not occur.
 - The ownership assets such as:
 - Deeds
 - Licenses
 - Birth and death certificates
 - Certificates of insurance
 - More ...

12- Loyalty Programs

- Loyalty points can also be tokenized.
- Blockchain loyalty applications provide:
 - More Flexibility
 - Fraud Reduction
 - Reduce Program Costs
 - Increased Availability
- Another advantage involves making loyalty tokens redeemable not only from the issuer, but also, anonymously, from other participating merchants.
- This allows issuers to understand where their customers are using the tokens.

13- Healthcare

- Healthcare is also another natural use case for blockchain.
- Patient data can be secured on Ethereum and only made available as needed to:
 - Physicians and other health care providers
 - Hospitals
 - Insurance companies



14- Smart Cities

- Blockchain applications can enable smart cities with more security.
- Distributed application have greater availability.

15- Settling Disputes

- Blockchain applications: can validate ownership, are secure, support digital signatures and are transparent and timestamped.
- Blockchain applications can greatly aid settling disputes.
 - Advantages include saving the public and individual money and time.

16- Internet-of-Things (IoT)

- The current state of the IoT is that it is greatly insecure. Users log into Internet connected devices; therefore, the devices are vulnerable.
- Blockchain applications provide a way to secure IoT devices.
- Users are able to store user information on Ethereum and using public and private keys in order to access to IoT devices.

17- Human Resource Management

Here are 9 areas in which HR professionals can use blockchain:

- Payroll automation through smart contracts
- Tax and cross-border payment automation via smart contract
- Digital record management
- Employment contract automation via smart contract

17- Human Resource Management...

- Cybersecurity protection for personal and financial data
- Expense reimbursement automation via smart contracts
- Promotion and performance assessment automation via smart contract
- Subcontractor management via blockchain
- Using digital ID for verifying credentials of job candidates

18- Real Estate Trading and Rental Markets

- In the US, realtors charge a broker fee, typically 5 to 6% of the selling price, for bringing a seller and a buyer together to make a real estate transaction. Lawyers also charge for providing legal services to a buyer or seller.
- A real estate blockchain network matches untrusted buyers/sellers or tenants/landlords for a deal. The scripted legal document, a smart contract, replaces most legal services provided by a real estate lawyer.
- No escrowing accounts are required since blockchain combines transaction and settlement into one action.

19- Retail Fashion and Luxury

Fashion and luxury retail can use blockchain in the following ways:

- Support of sustainable practices
 - Redefinition of customer experience
 - Brand authenticity
 - Enhancement of consumer trust
 - Improved data management
 - Reduced costs and settlement time
-
- Click [here](#) to read more.

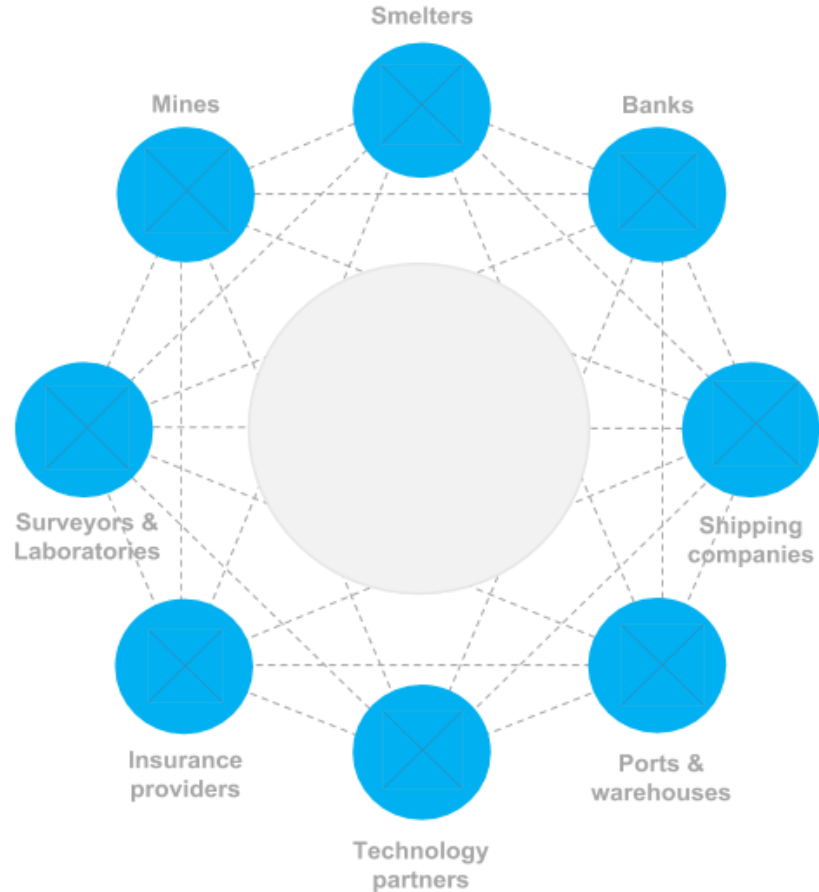
20- Sports and Esports

Here are 4 areas in which sports/esports can use the blockchain:

- Enhancing fan interaction and experiences by incentivizing engagement
- Providing new revenue models through tokenized teams and enhanced loyalty programs
- Creating new markets for sports betting and collectibles trading
- Enabling athletes to crowdfund their performance using income share agreements or loyalty rewards

21- The Mining Industry

There are many parties involved in a typical mining supply chain



21- The Mining Industry...

Blockchain can be used in the mining industry in the following ways:

- Developing comprehensive end-to-end tracking of ores and minerals.
- Engineering, construction and handover of the mine sites
- Compliance and mining lease management
- Mineral provenance
- Mining equipment OEM

22- The Publishing Industry

- Intellectual property/copyright management
- Revenue models (making money) and revenue distribution (sharing the money)
- More efficient production and collaboration processes- print supply chain and piracy tracking
- E-book ownership transfer
- Crowd-funding for authors to finance their new books

22- The Publishing Industry...

Note that the use cases such as IP commercialization, protection and management via blockchain are applied to other digital assets such as music/video contents or patents.

23- The Aviation Industry

- Maintenance and operation in aviation industry
- Airline industry
 - 1- Ticketing
 - 2- Loyalty
 - 3- Security and identity
 - 4- Improve ground operations and on-time departures
 - 5- Reduce dependence on intermediaries and reallocate industry value.
 - 6- Simplify revenue accounting and payment reconciliation.

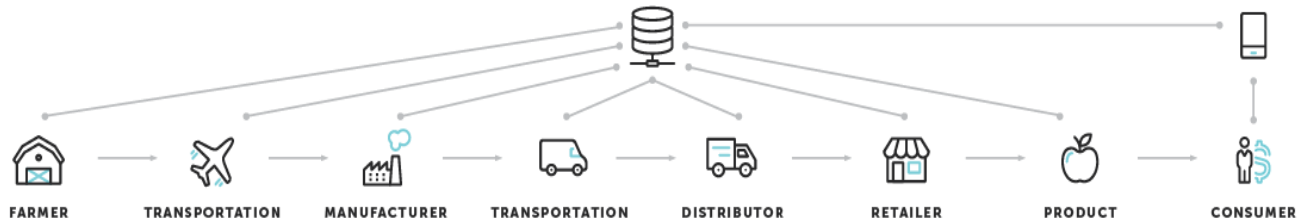
23- The Aviation Industry...

- Aircraft finance
 - 1- Building value in the secondary market.
 - 2- Transforming leasing.
- Workforce management

24- The Agriculture Industry

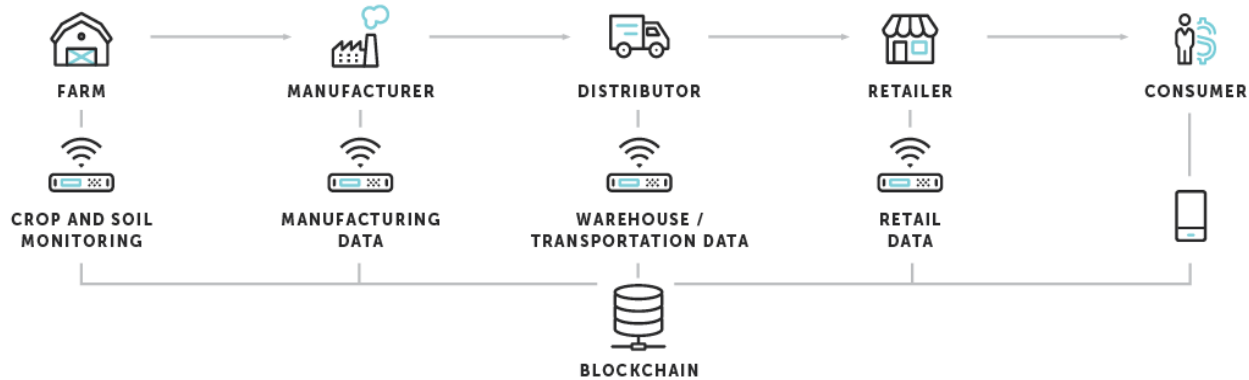
Use Case 1: Traceability from Seed to Shelf

From seed to shelf, a blockchain-based supply chain solution tracks goods with unique identifiers (QR codes) that are scanned at each location to create a digitally traceable end-to-end journey.



24- The Agriculture Industry...

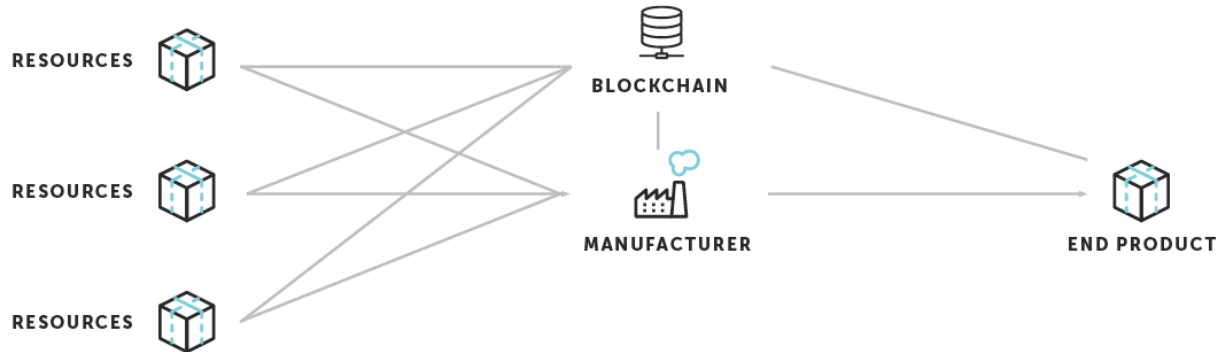
Use Case 2: Compliance & Quality Control



24- The Agriculture Industry...

Use Case 3: Inventory Management

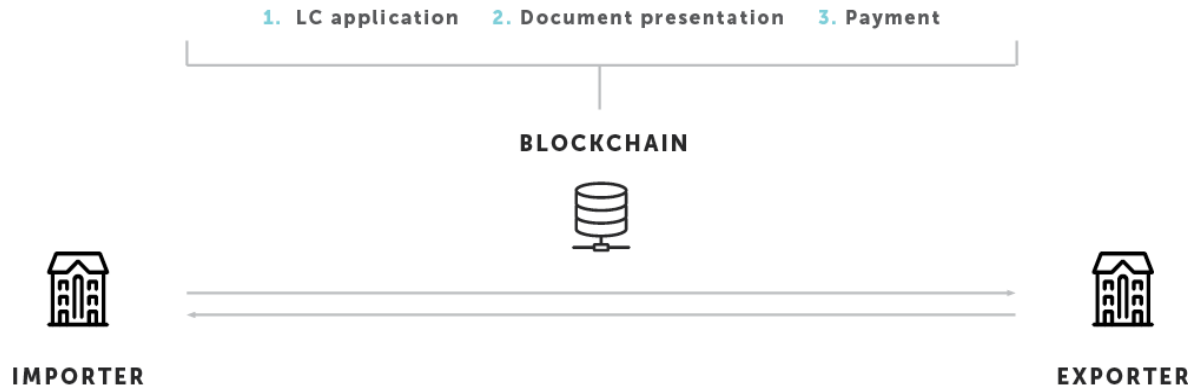
Scanning unique identifiers (QR codes) on each batch/product triggers transparent updates to the blockchain-based inventory system, where data is stored securely on a distributed ledger.



24- The Agriculture Industry...

Use Case 4: Trade Finance

Managing all communications and exchanges on the blockchain provides transparency for all parties involved. Smart contracts provide improved cash flow with automatically triggered payments once terms are met.



25- The Insurance Industry

- Registries of high-value items and warranties
- Know-your-customer (KYC) and anti-money laundering (AML) procedures
- Parametric (index-based) products
- Reinsurance practices
- Claims handling
- Distribution methods
- Peer-to-peer (P2P) models

Click [here](#) to read more...

26- Higher Education

- Verified credentials
- Paper-based certificates
- Track and protect intellectual property infringement
- Fair allocation of financial grants and admission process

27- Data Science

- Ensuring Trust (Data Integrity)
- Preventing Malicious Activities
- Making Predictions (Predictive Analysis)
- Real-Time Data Analysis
- Manage Data Sharing

IV- Launch Start-up Business

How to start a new business
that uses blockchain
technology?

Five Phases of Blockchain Product Development

Research	Prototype Design	Proof of Concept Development	Minimum Viable Product Development	Production Integration & Support
Conduct use case research, do the feasibility study and pick a blockchain platform	Design prototypes to evaluate business ideas and assess applicability in existing business processes	Build Distributed Ledger Technologies (e.g. security tokens) based on business prototype model	Develop, test and deploy a Minimum Viable Product based on Proof of Concept	Develop your fully-functional blockchain application and commercialize it

How we can help new entrepreneurs interested in launching blockchain-based product:

- Business idea incubations
Should you offer your idea as a service or product?
- Product and market research for choosing the right blockchain development platform
- Technical assistance in building product prototype
- Proof of Concept and Minimum Viable Product development
- Launching, securing and scaling up the blockchain application while monitoring its performance.

Take Away

What you learned in this
webinar?

Resources

- [Security Tokens versus Initial Coin Offerings](#)
- [Comprehensive overview and analysis of blockchain use cases in many industries](#)
- [History and Evolution of Blockchain Technology from Bitcoin](#)
- [Overview of Blockchain evolution and phases from Ethereum to Hyperledger](#)

Resources...

- [Blockchain Management with Hyperledger for System Admins](#)
- [Hyperledger Fabric and Composer for Developers](#)
- [Intro to Blockchain Cybersecurity](#)

Resources...

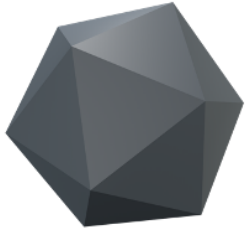
- [Learn Solidity Programming by Examples](#)
- [Introduction to Ethereum Blockchain Development](#)
- [Learn Blockchain Dev with Corda R3](#)

Contact

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