DISTRIBUTED LEDGER TECHNOLOGY (DLT) AND BLOCKCHAIN

Blockchain and its applications

INTRODUCTION

Ishmeet Singh, Blockchain Consultant

I have built technology products for Fortune 500 companies like MasterCard, MetLife and Adobe. I have also built and scaled data-driven, intelligent technology platforms for hedge funds, finance, e-commerce, travel and healthcare companies.

I consult for and advise multi-million-dollar companies and startups on the application of artificial intelligence, machine learning, big data and Blockchain to solve real world problems.

SESSION DETAILS

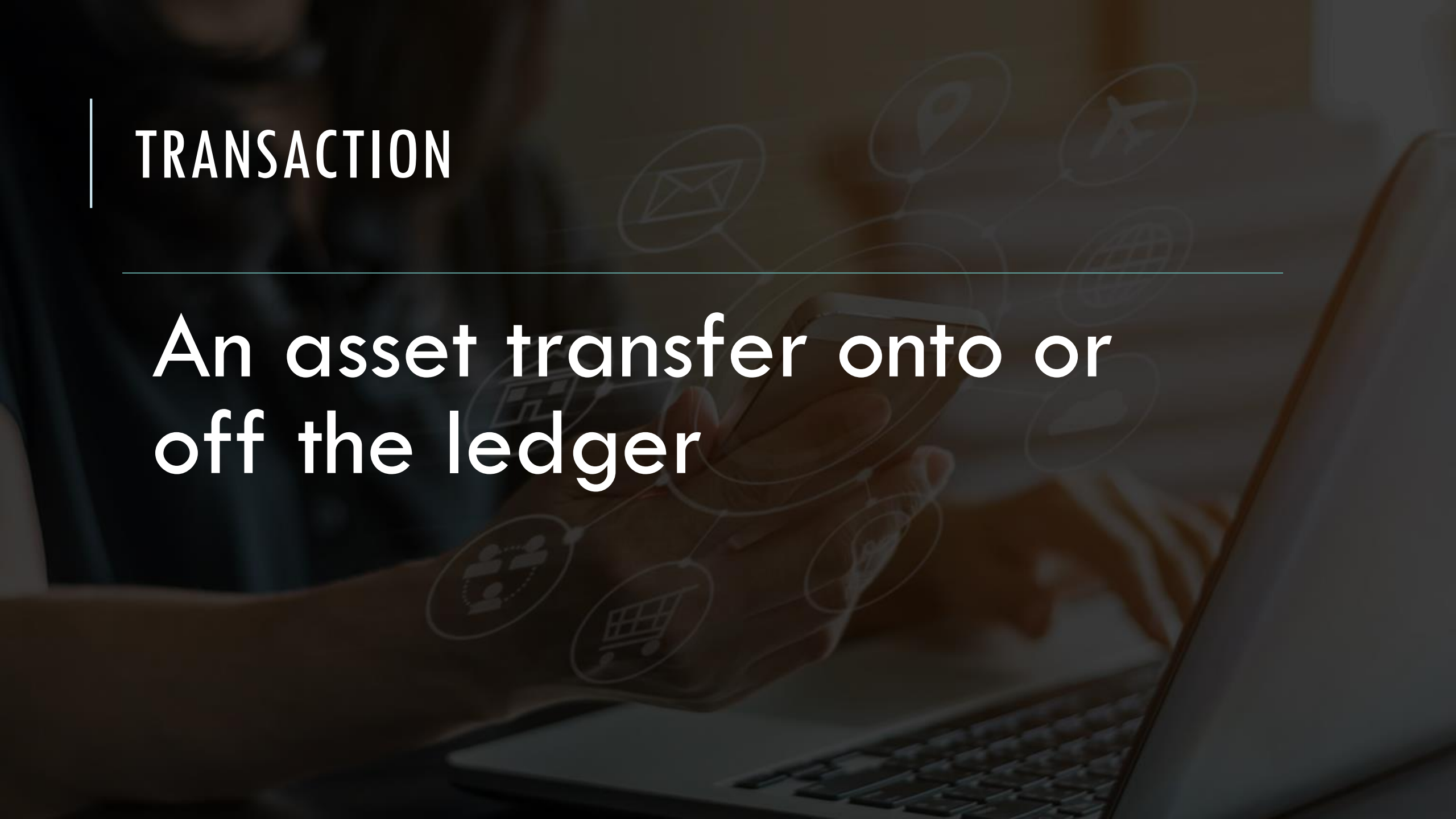
- Fundamental Concepts
- What is DLT?
- What is Blockchain Technology?
- Types of Blockchains
- How does Blockchain work?
- Examples

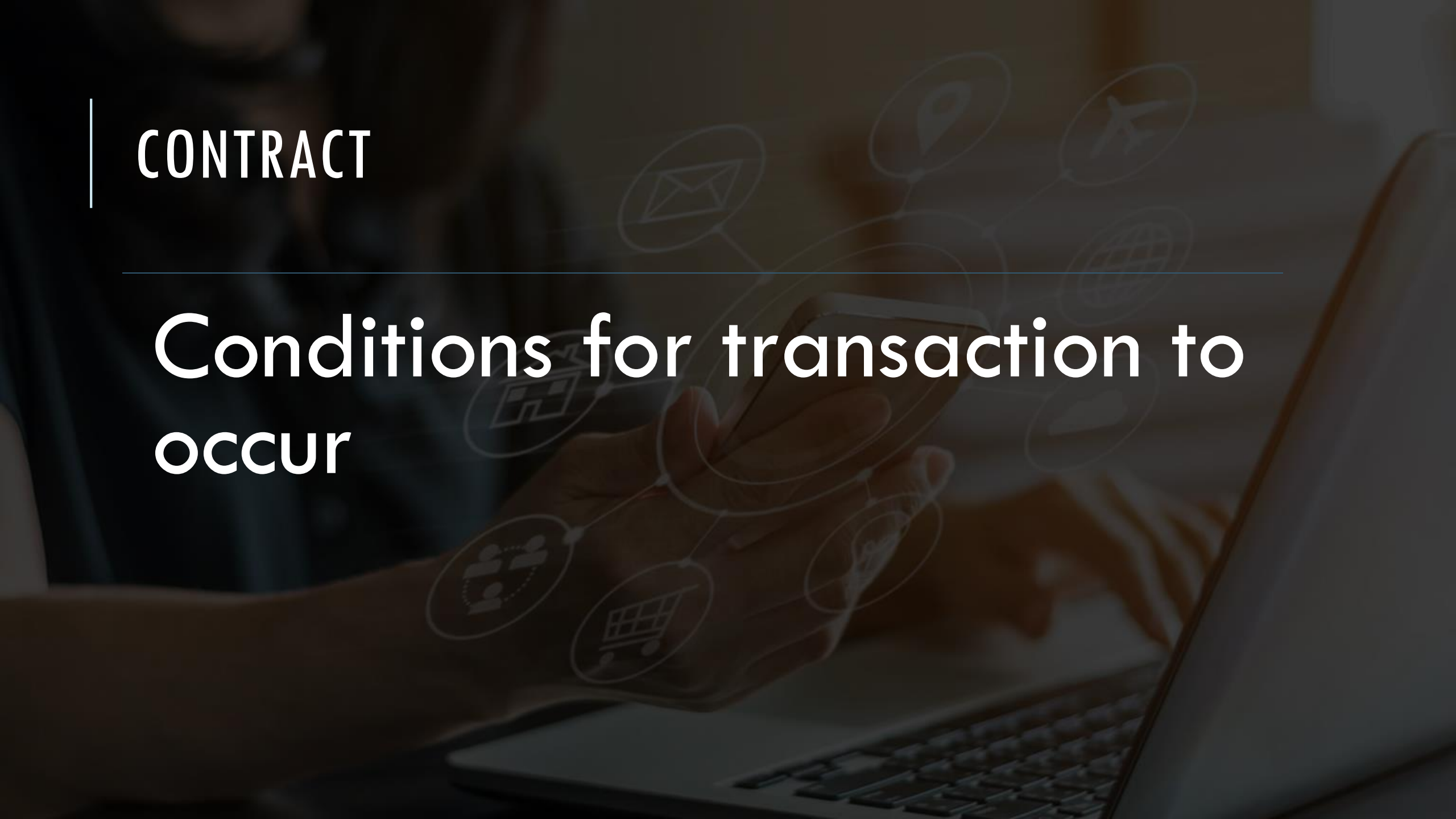
LEDGER

A collection of transactions or data

TRANSACTION

An asset transfer onto or off the ledger





CONTRACT

Conditions for transaction to occur

NODES

Network participants in a distributed ledger network

PEER-TO-PEER (P2P) NETWORK

A decentralized/distributed network of nodes that stores, updates, and maintains a distributed ledger

CENTRALIZED LEDGER

Centralized Ledger

All parties reconcile their local databases with a centralized electronic ledger that is maintained and controlled by a trusted central party.

DISTRIBUTED LEDGER

A consensus of replicated, shared, and synchronized digital data geographically spread across multiple nodes

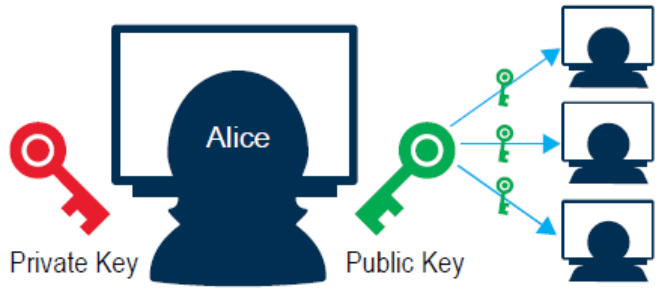
PUBLIC KEY CRYPTOGRAPHY

An asymmetric encryption scheme that uses two sets of keys: a public key that is widely disseminated and a private key that is only known to the owner

PUBLIC KEY CRYPTOGRAPHY FOR DIGITAL SIGNATURES

Alice has two keys: a public key which she shares with the entire network and a private key which is only known to Alice.

1.

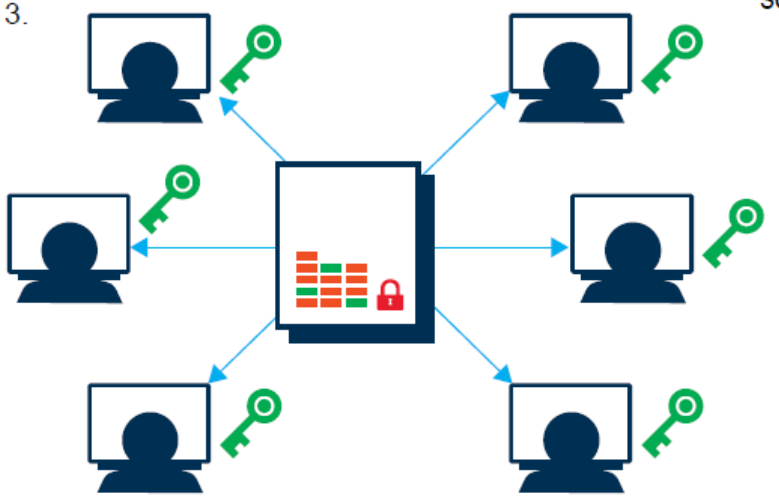


Alice uses her private key to encrypt a "hash" of the digital message which is then propagated to the entire network. The encrypted hash is called the "digital signature".

2.

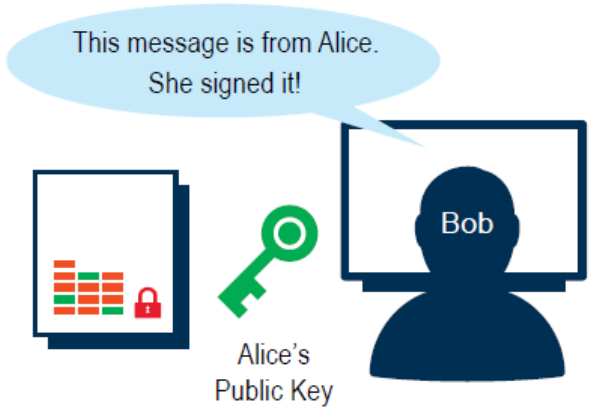
Network participants receive the digital message with a digital signature.

3.



Bob can then use Alice's public key (which she has shared with him) to validate that the digital message was encrypted with Alice's private key and that Alice is the sender of the message.

4.

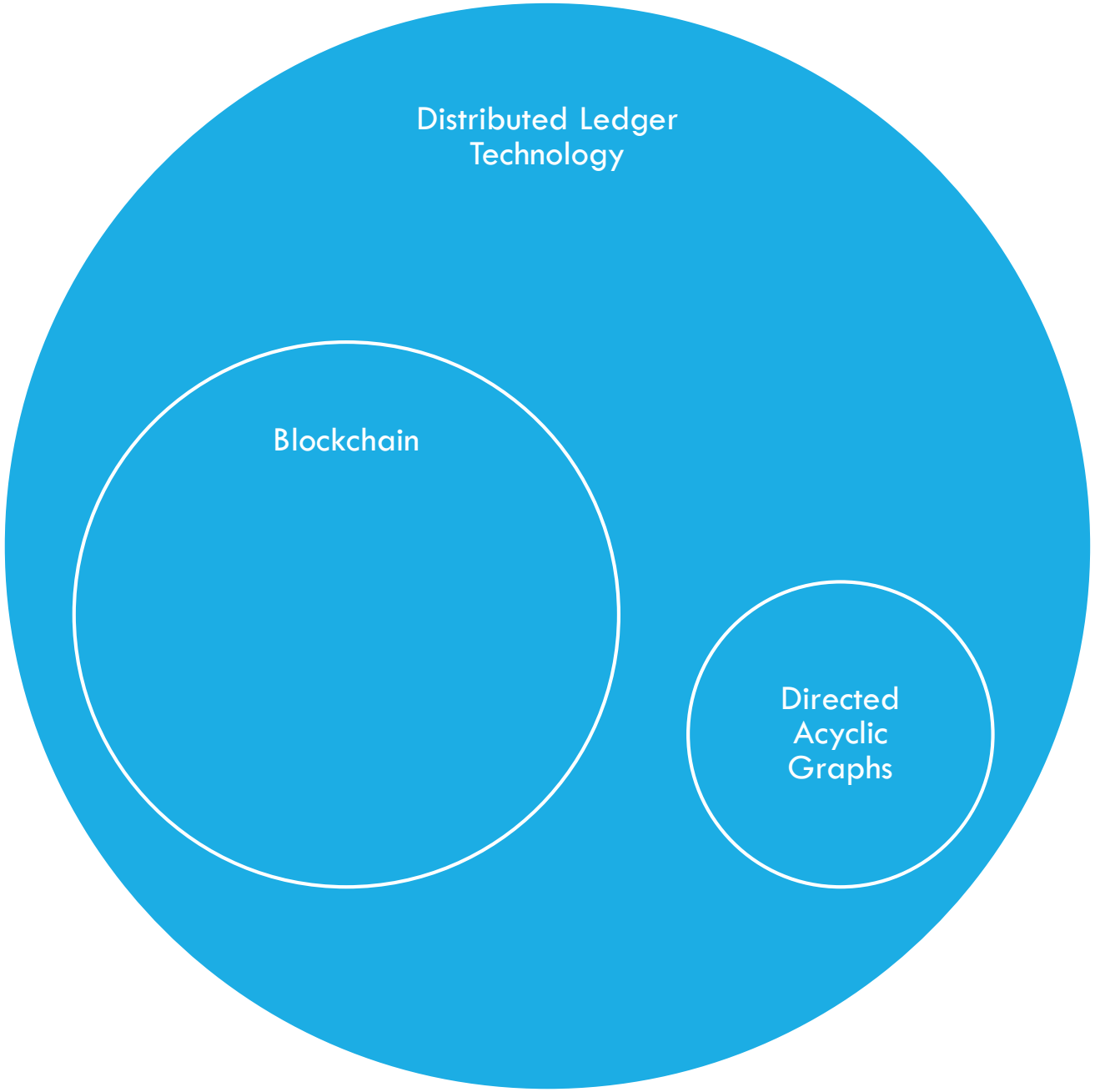


CONSENSUS ALGORITHM

A consensus algorithm is a process in computer science used to achieve agreement on a single data value among distributed processes or systems.

SMART CONTRACT

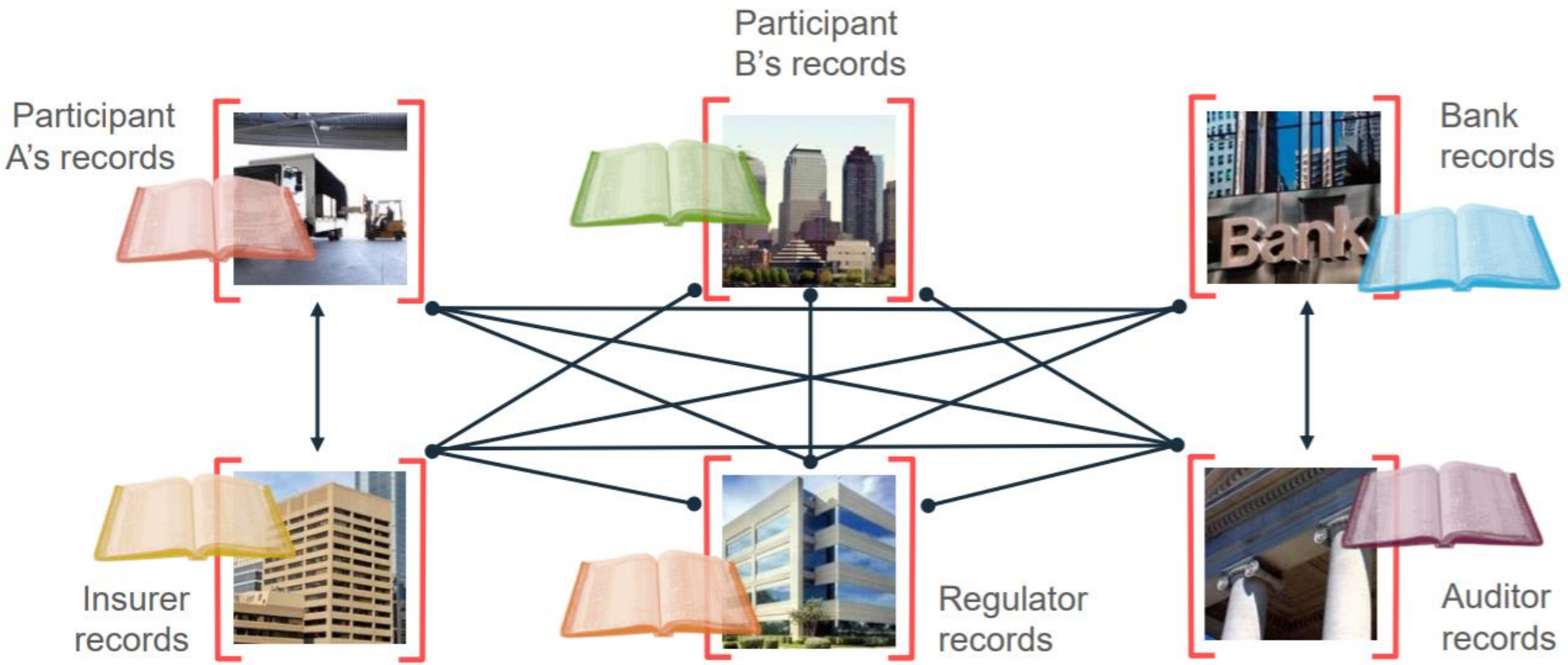
A permanent and immutable collection of code that runs on the blockchain



DLT AND BLOCKCHAIN

WHAT IS DISTRIBUTED LEDGER TECHNOLOGY (DLT)?

A technology that allows for transactions and data to be recorded, shared, and synchronized across a distributed network of nodes using cryptographic tools and a distributed consensus process in an immutable manner



PROBLEM STATEMENT

Business networks are inefficient, expensive and vulnerable

WHAT IS A BLOCKCHAIN?

A decentralized, distributed and public/private digital ledger

A type of data structure that stores and transmits data in packages called ‘blocks’ that are connected to each other in a digital ‘chain’

Blockchains employ cryptographic and algorithmic methods to record and synchronize data across the network in an immutable manner

Data records are added to the blockchain when multiple distributed parties come to consensus based on pre-agreed rules

TYPES OF BLOCKCHAINS

Public

Private, Permissioned

PUBLIC BLOCKCHAIN

A public blockchain network is completely open and anyone can join and participate in the network. The network typically has an incentivizing mechanism to encourage more participants to join the network

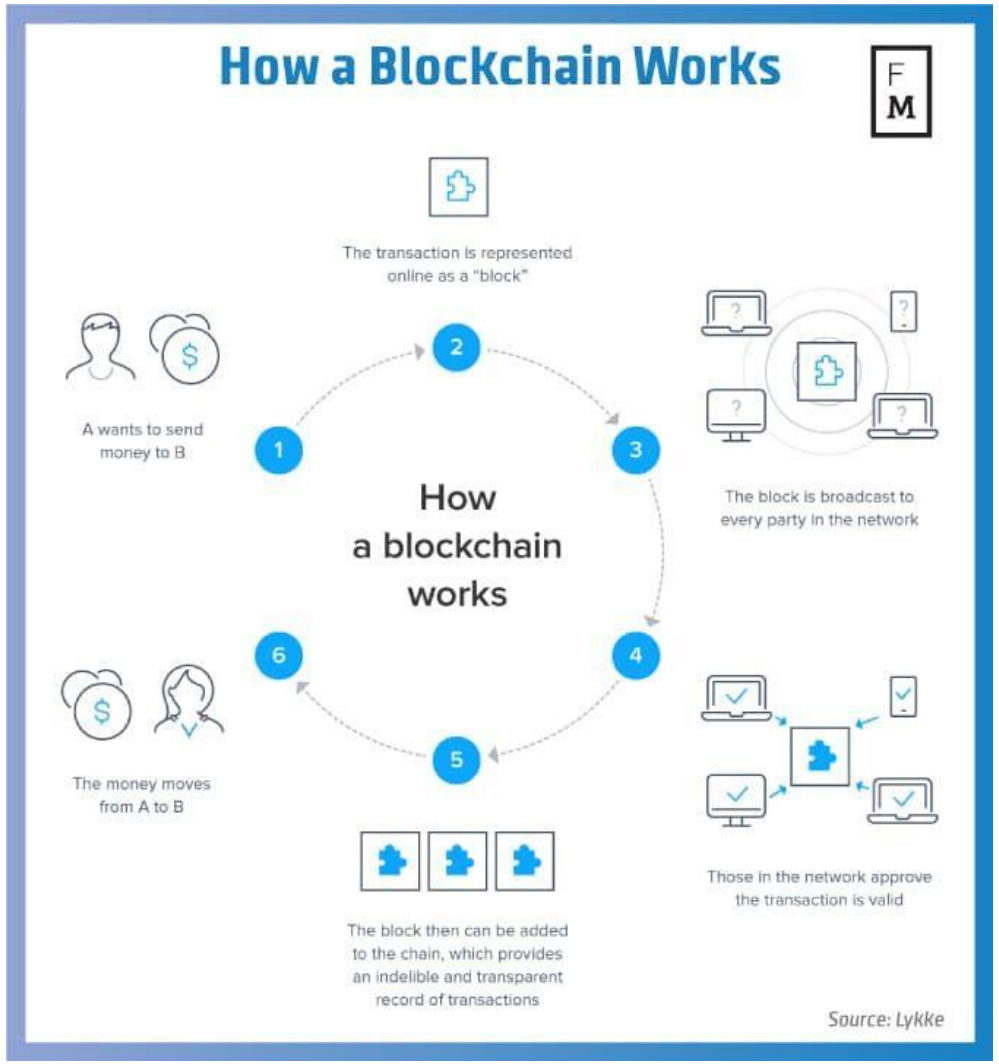
Eg. Bitcoin, Ethereum

PRIVATE, PERMISSIONED BLOCKCHAIN

A private blockchain network requires an invitation and must be validated by either the network starter or by a set of rules put in place by the network starter. A permissioned network places restrictions on who is allowed to participate in the network, and only in certain transactions.

Eg. Hyperledger

HOW DOES BLOCKCHAIN WORK?



Gains in speed and efficiency

Reduces Risk

Cost reductions

Easier auditability

Increases Trust

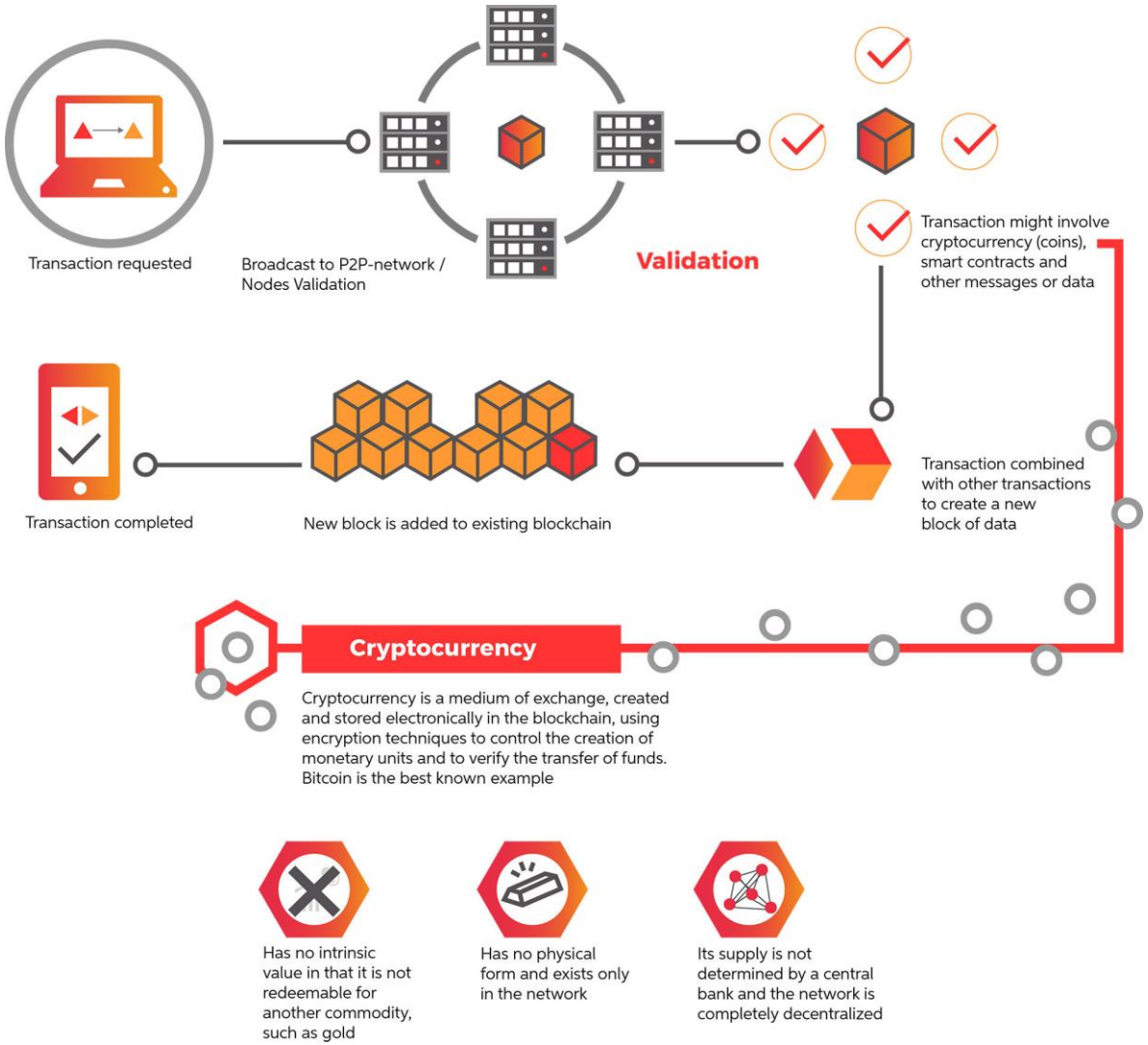
Automation and programmability

WHAT ARE THE KEY BENEFITS OF BLOCKCHAIN TECHNOLOGY TO BUSINESSES?

BLOCKCHAIN APPLICATIONS

Financial	Public Sector	Retail	Insurance	Manufacturing
Trade Finance	Asset Registration	Supply chain	Claims processing	Supply chain
Cross currency payments	Citizen Identity	Loyalty programs	Risk provenance	Product parts
Mortgages	Medical records	Information sharing (supplier – retailer)	Asset usage history	Maintenance tracking
	Medicine supply chain		Claims file	

EXAMPLE 1: BITCOIN & CRYPTOCURRENCIES



EXAMPLE 2: AUDIT AND COMPLIANCE

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 tamperproof qualities create high confidence financial audit trail
- Privacy features to 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

EXAMPLE 3: SUPPLY CHAIN

What

- Provenance of each component part in complex system 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, no authority "owns" provenance
2. Improvement in system utilization
3. Recalls "specific" rather than cross fleet

THANK YOU!

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