Create your first Blockchain

Hands-on lab to create your first Blockchain Business Network

Chris Tyler, Darrel Pyle

Technical Evangelists

Agenda

1. What is Blockchain
2. Why should you use Blockchain
3. What Blockchain isn't
4. What is Blockchain for Business
5. What is IBM Blockchain
6. Hyperledger Composer
7. Hands-on lab
8. Conclusion

What is Blockchain

An introduction to the Blockchain concepts

Blockchain Concepts

BUSINESS NETWORKS ARE THE REASONS FOR BLOCKCHAINS

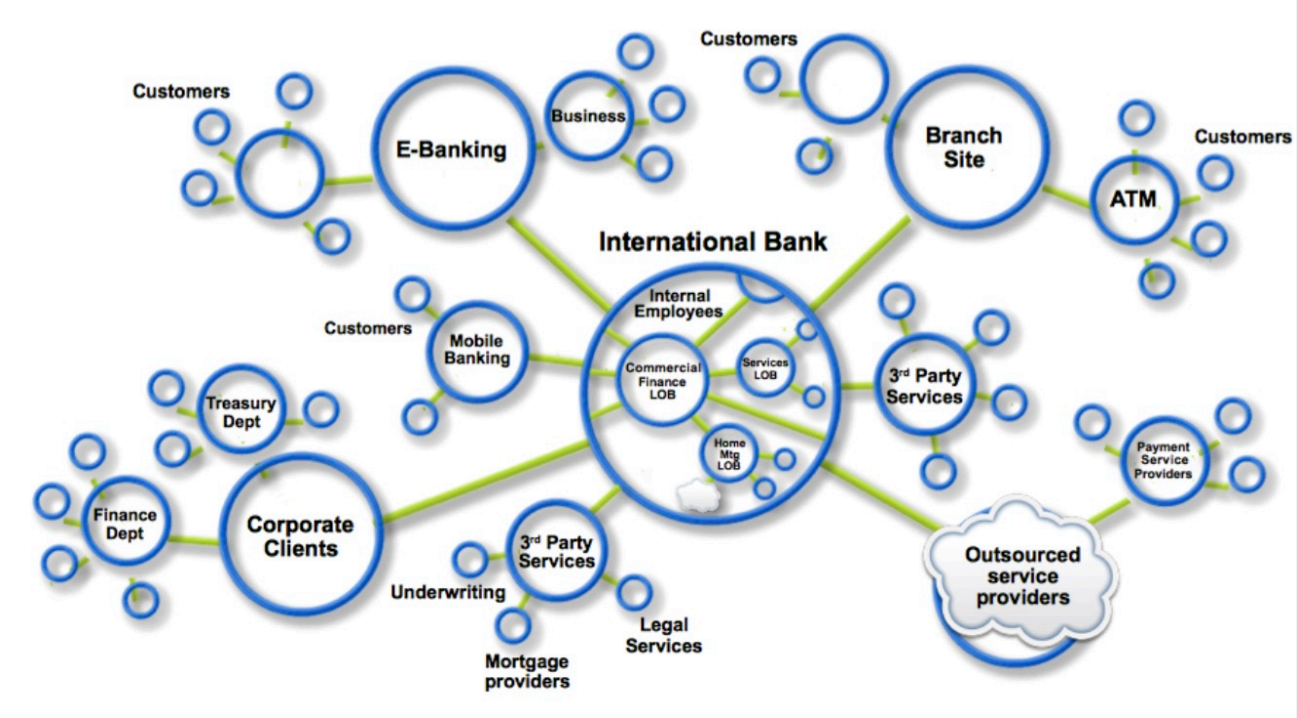
Business Networks benefit from connectivity

- Participants are customers, suppliers, banks, partners
- Cross geography and regulatory boundary

Wealth is generated by the flow of goods and services across business network in transactions and contracts

Markets are central to this process:

- Public (fruit market, car auction), or
- Private (supply chain financing, bonds)



Blockchain Concepts

ASSETS ARE MEANT TO BE TRADED

Anything that is capable of being owned or controlled to produce value, is an asset

Two fundamental types of asset

- Tangible, e.g. a house
- Intangible, e.g. a mortgage

Intangible assets subdivide

- Financial, e.g. bond
- Intellectual, e.g. patents
- Digital, e.g. music

Cash is also an asset

- Has property of anonymity

Blockchain Concepts

LEDGERS ARE KEY TO THE SUCCESS OF A NETWORK

Ledgers are THE system of record for a business.

- Businesses will have multiple ledgers for the multiple business networks in which they participate.

Transaction: an asset transfer onto or off the ledger

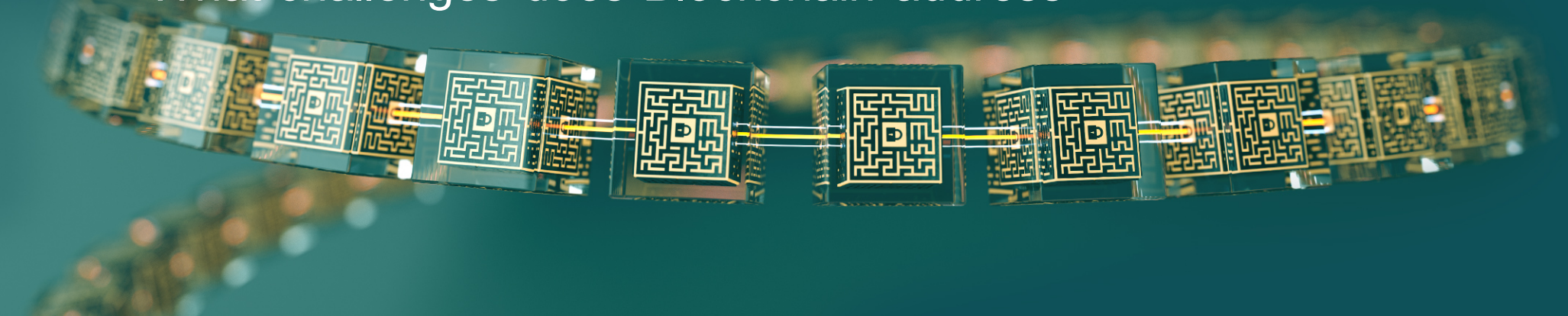
- John gives a car to Anthony (simple)

Contract: the conditions for a transaction to occur

- If Anthony pays John money, then car passes from John to Anthony (simple)
- If car won't start, funds do not pass to John (as decided by third party arbitrator) (more complex)

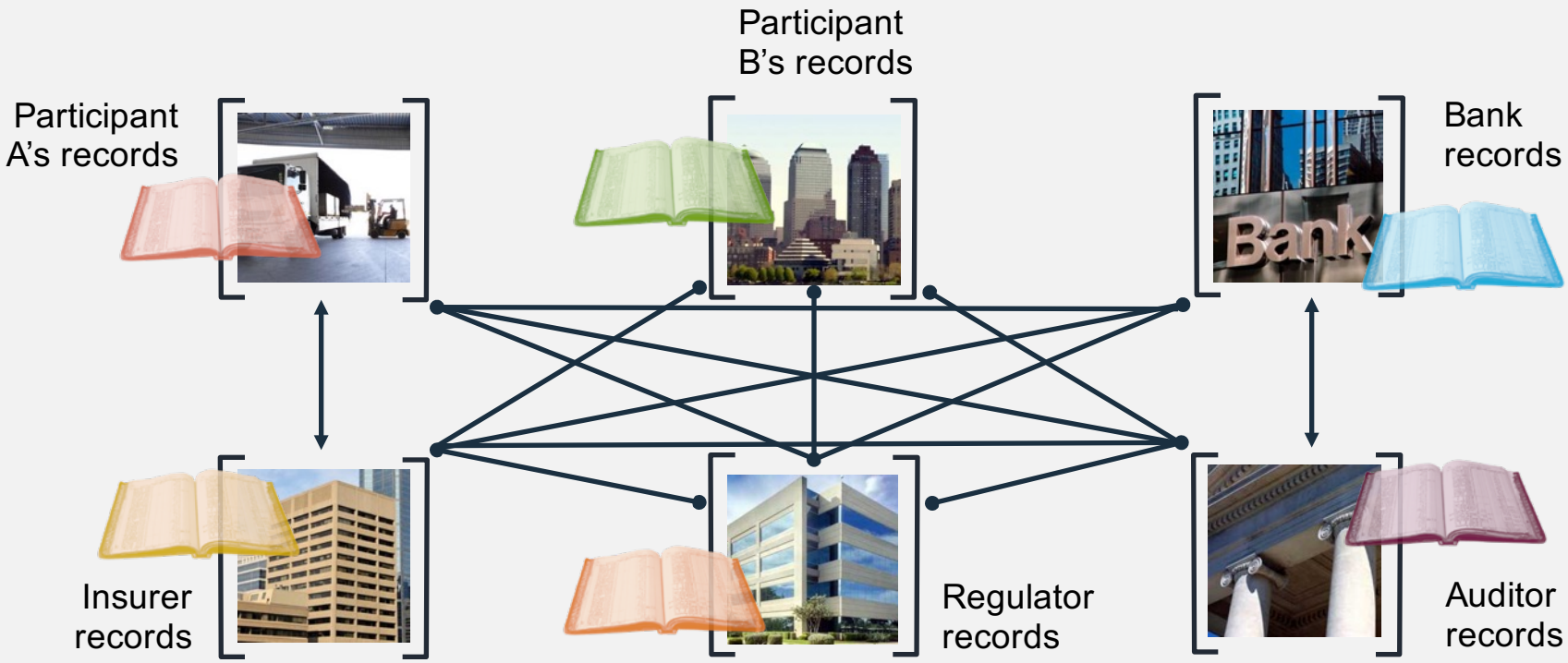
Why use Blockchain

What challenges does Blockchain address



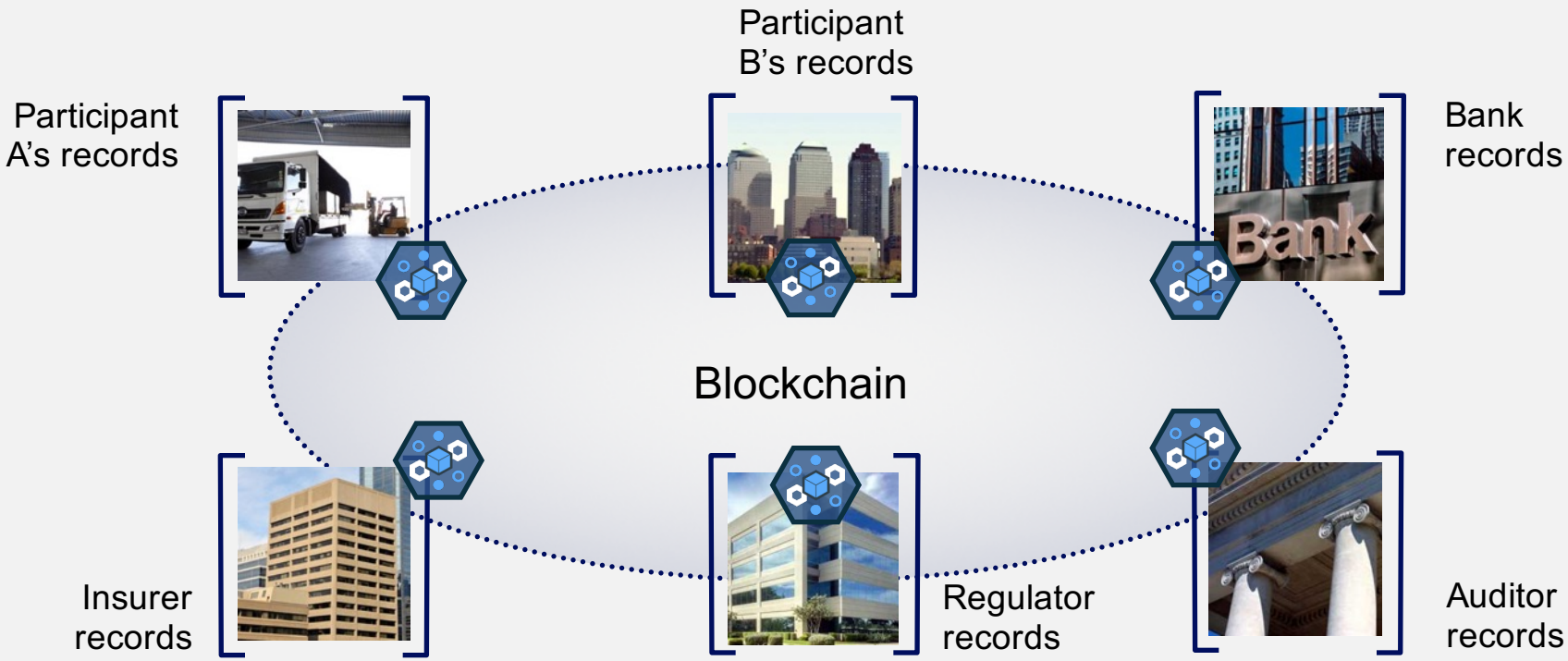
The Problem

BUSINESS TRANSACTIONS ARE INEFFICIENT, EXPENSIVE AND VULNERABLE



The Solution

A SHARED, REPLICATED, PERMISSIONED LEDGER



… with consensus, provenance, immutability and finality

Example

SUPPLY CHAIN

Benefits

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

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

Example

INSURANCE

Benefits

1. Creates a new level of trust in the underwriting process
2. Provides more efficiency with complexities in underwriting
3. Reduces fraud and errors

What

- Records and tracks multi-national payments specific to the terms of the policies
- Requires consensus among parties associated with the policies

How

- Provides a single source for the policy transactions
- Visibility is controlled by access permissions

Example

MORE EXAMPLES

Financial

- Trade Finance
- Cross currency payments
- Mortgages

Public Sector

- Asset Registration
- Citizen Identity
- Medical records
- Medicine supply chain

Retail

- Supply chain
- Loyalty programs
- Information sharing (supplier – retailer)

Insurance

- Claims processing
- Risk provenance
- Asset usage history
- Claims file

Manufacturing

- Supply chain
- Product parts
- Maintenance tracking

Key players for Blockchain adoption

YOU NEED ONE TO START

Regulator

- An organization who enforces the rules of play
- Regulators are keen to support Blockchain based innovations
- Concern is systemic risk – new technology, distributed data, security

Industry Group

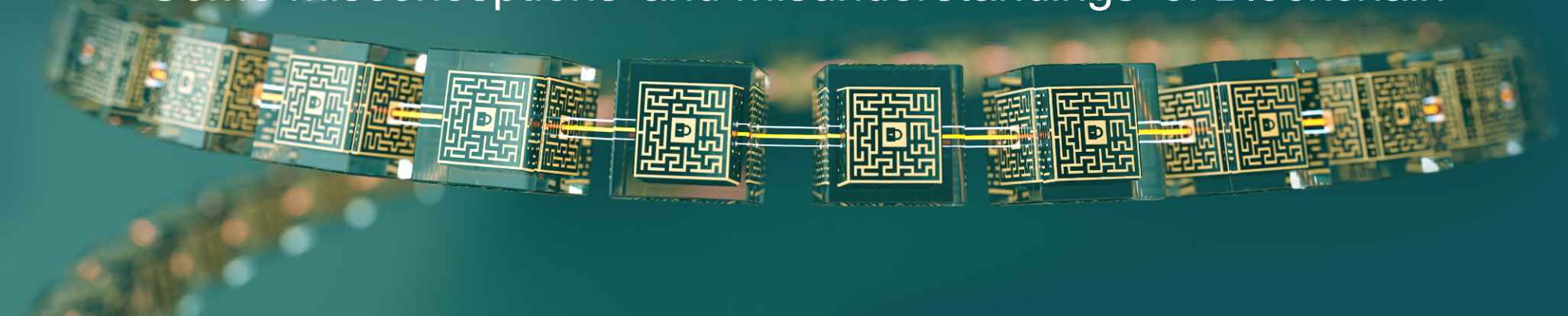
- Often funded by members of a business network
- Provide technical advice on industry trends
- Encourages best practice by making recommendations to members

Market Maker

- In financial markets, takes buy-side and sell-side to provide liquidity
- More generally, the organization who innovates
  - Creates a new good or service, and business process (likely)
  - Creates a new business process for an existing good or service

What Blockchain Isn’t

Some misconceptions and misunderstandings of Blockchain



What Blockchain Isn't

BLOCKCHAIN IS NOT…

1. Bitcoin
2. (totally) mature
3. a product
4. needed when there is no network
5. a transaction processing system replacement
6. a distributed database replacement
7. a secure messaging replacement
8. just about cryptocurrency
9. usually suited for high-volume, low-value transactions
10. (necessarily) anonymous

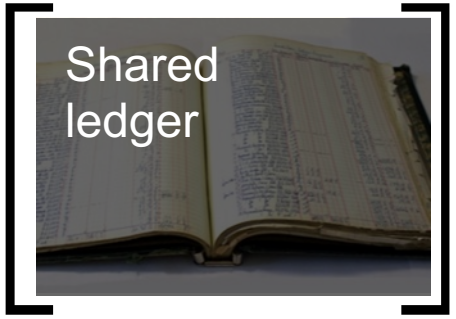
Blockchain for Business

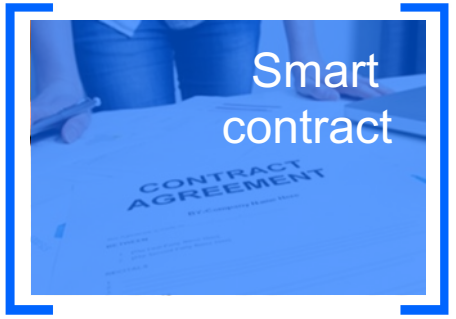
Using Blockchain to build trust

Blockchain for Business

REQUIRES TRUST

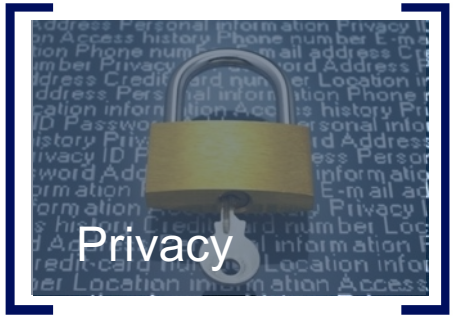
Append-only distributed system of record shared across business network

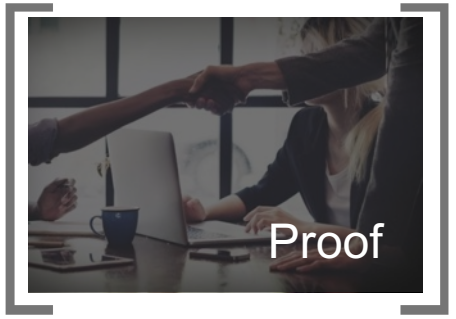




Business terms executed with transactions

Transactions are secure with appropriate visibility



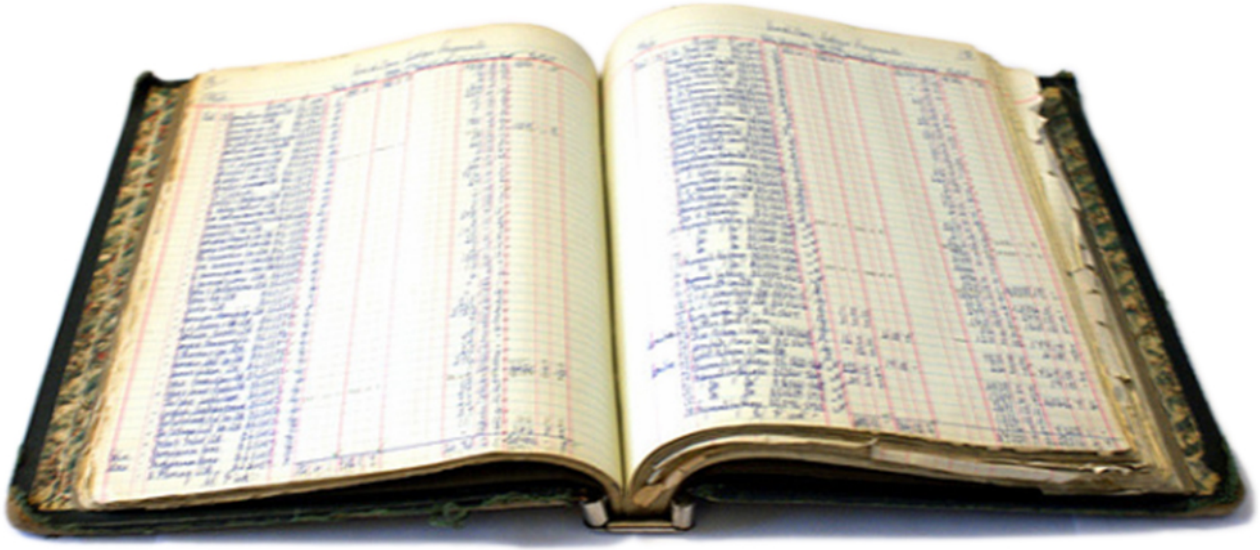


Transactions are provably endorsed by relevant participants

Shared Ledgers

RECORD OF ALL TRANSACTIONS ACROSS THE NETWORK

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



Smart Contracts

BUSINESS RULES ASSOCIATED WITH THE TRANSACTION

- Verifiable, signed
- Encoded in programming language
- Example:
  - Defines contractual conditions under which a bond transfer occurs

Privacy

PARTICIPANTS REQUIRE PRIVACY AND CONFIDENTIALITY

- Participants need:
  - Appropriate **privacy** and **confidentiality** between subsets of participants
  - Identity not linked to a transaction
- Transactions need to be authenticated
- Cryptography is central to these processes

Proof

THE LEDGER IS THE TRUSTED SOURCE OF INFORMATION

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

IBM Blockchain

What is IBM Blockchain

IBM Blockchain

THE IBM BLOCKCHAIN PLATFORM

http://ibm.biz/Platform_Demo

IBM Blockchain Platform is a fully integrated enterprise-ready blockchain platform designed to accelerate the development, governance, and operation of a multi-institution business network

- Full lifecycle tooling to speed activation and management of your network
- Specialized compute for security, performance and resilience
- Delivered via the IBM Cloud on a global footprint with 24x7 Integrated Support
- Based on Hyperledger Fabric V1 runtime and using Hyperledger Composer development tools

IBM Blockchain

MAKING BLOCKCHAIN REAL FOR BUSINESSES

Trade Finance	Pre and Post Trade	Complex Risk Coverage
Digital Trade Chain, MIZUHO, NATIXIS, TRAFIGURA	DTCC, CLS Fundamental to FX, Bolsa Comercio Santiago, JPX	AIG, Standard Chartered
Identity/ Know your customer (KYC)	**Unlisted Securities/ Private Equity Funds**	**Loyalty Program**
SECURE KEY, Crédit Mutuel ARKEA, DIACC	NORTHERN TRUST, BORSA ITALIANA, SBI 証券	UnionPay 銀联
Medicated Health Data Exchange	**Fraud/ Compliance Registry**	**Distributed Energy/ Carbon Credit**
FDA	دبي الذكية SMART DUBAI	TenneT, Energy Blockchain Labs
Supply Chain	**Food Trust**	**Provenance/ Traceability**
MÆRSK, PSA The World's Port of Call	Walmart, Driscoll's, Tyson, McLane, Dole, Kroger, Nestlé, Unilever, gsf golden state foods	everledger

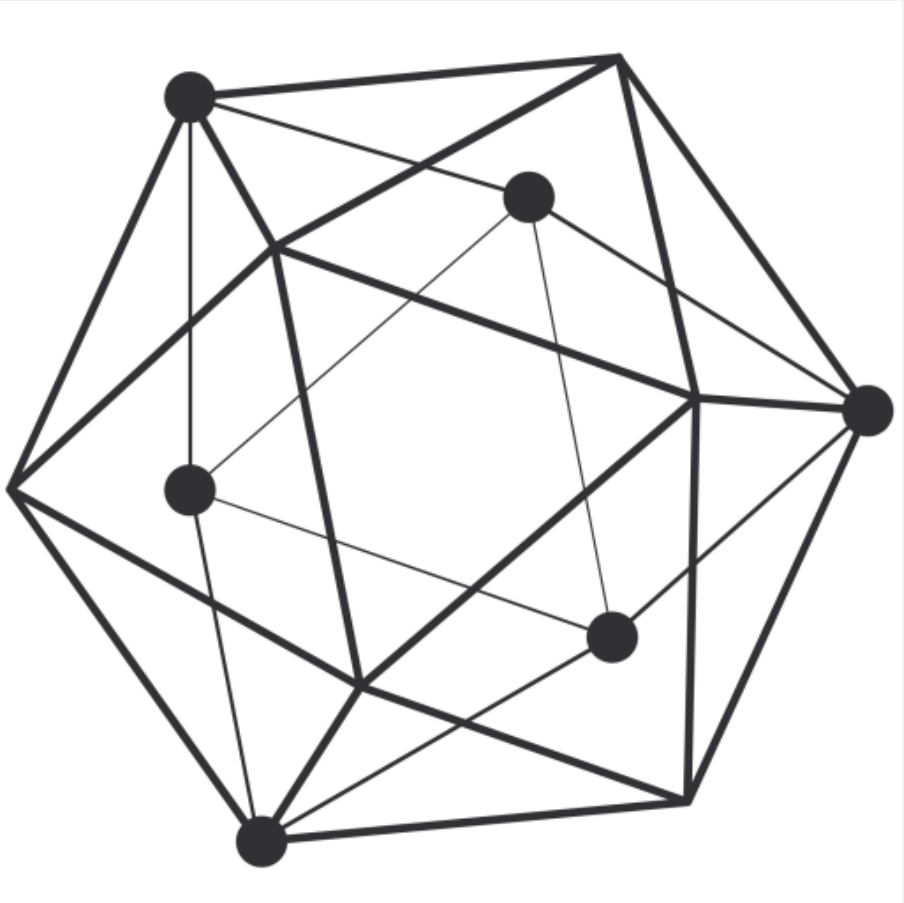
Hyperledger Fabric and Composer

The Open Source core to IBM Blockchain

Hyperledger

A LINUX FOUNDATION PROJECT

- A collaborative effort created to advance cross-industry blockchain technologies for business
- Founded February 2016; now more than 185 member organizations
- Open source, open standards, open governance
- Five frameworks and four tools projects
- IBM is a premier member of Hyperledger



Hyperledger Members

IBM IS A PREMIER MEMBER

Premier

General

General

Associate

Source: https://www.hyperledger.org/members
Updated: 26 January 2018

Hyperledger Fabric

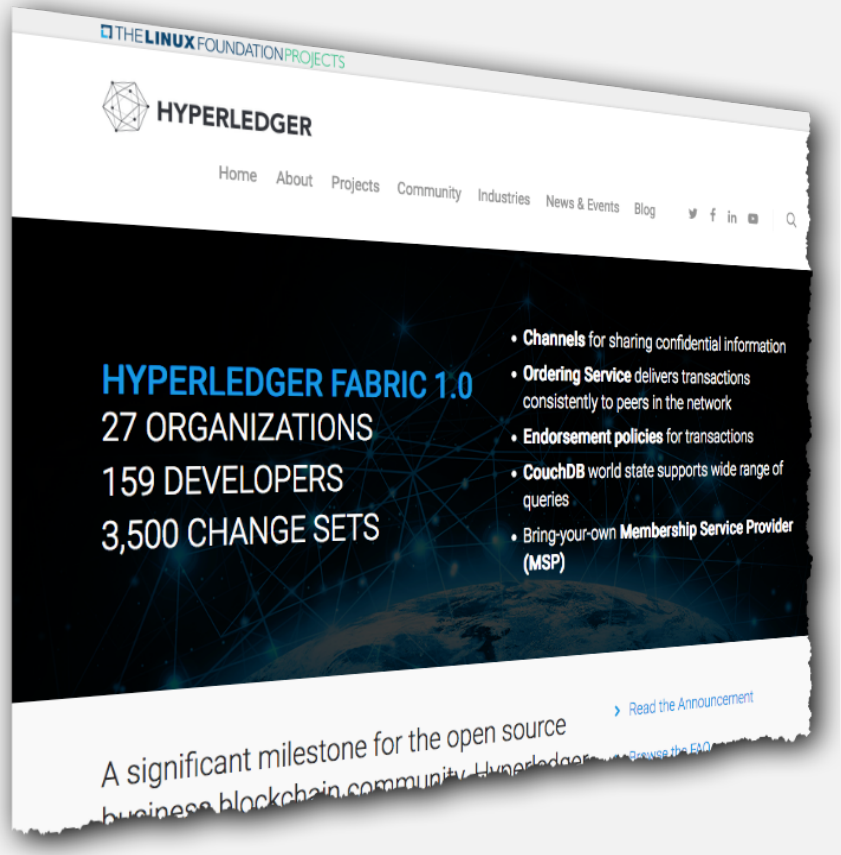
THE BLOCKCHAIN FOR BUSINESS PLATFORM

An implementation of blockchain technology that is a foundation for developing blockchain applications

Emphasis on ledger, smart contracts, consensus, confidentiality, resiliency and scalability.

V1.0 released July 2017

- 159 developers from 27 organizations
- IBM is one contributor of code, IP and development effort to Hyperledger Fabric



Hyperledger Composer

ACCELERATING TIME TO VALUE

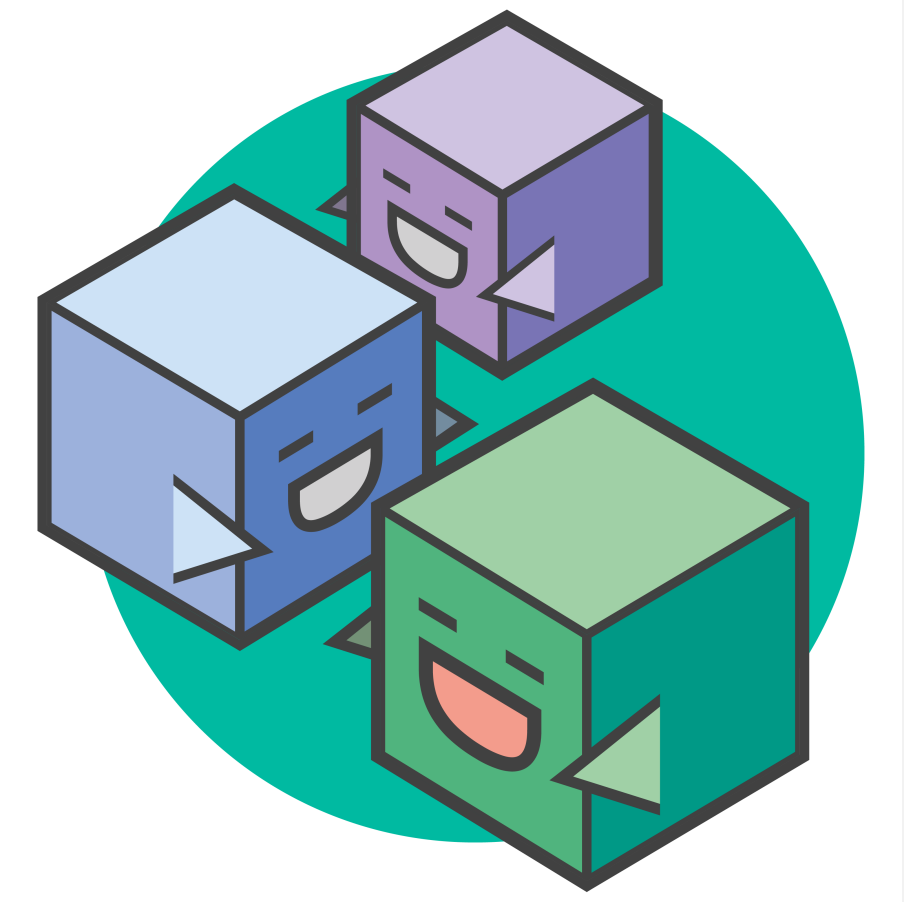
A suite of high level application abstractions for business networks

Emphasis on business-centric vocabulary for quick solution creation

Reduce risk, and increase understanding and flexibility

Features

- Model your business networks, test and expose via APIs
- Applications invoke transactions to interact with business network
- Integrate existing systems of record
- Fully open and part of Linux Foundation Hyperledger



Hands-on Lab

Building your first Blockchain Business Network

Lab Agenda

BUILDING YOUR FIRST BLOCKCHAIN BUSINESS NETWORK

1. Hyperledger Composer Concepts
2. Access the Composer Playground
3. Modeling Language Basics
4. Build the Network
5. Test the Network
6. Export the Network

Conclusion