

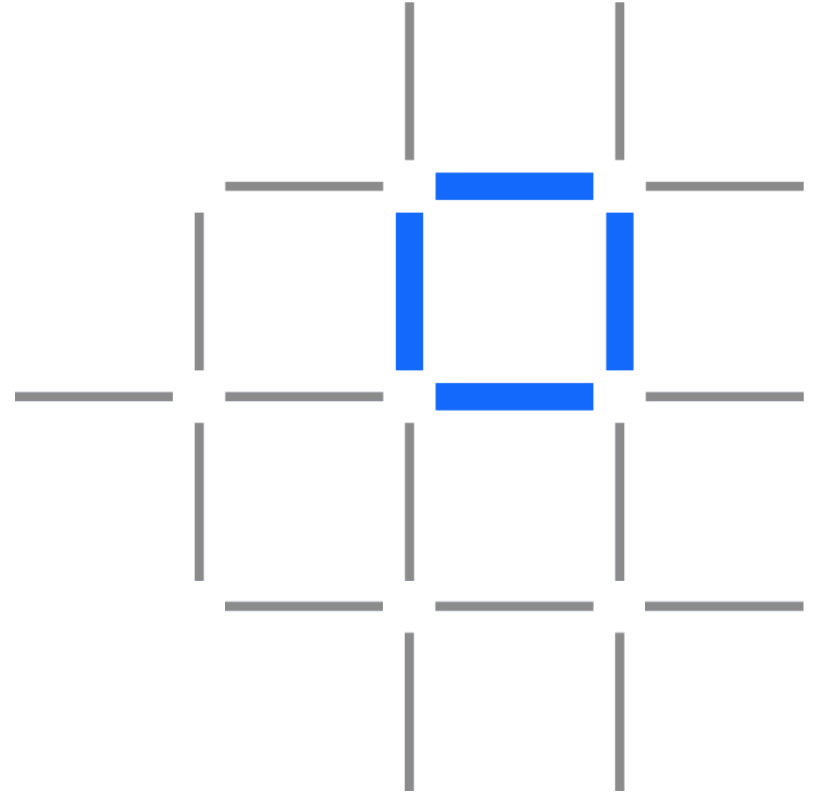
Blockchain, a disruptive technology for the enterprise

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Lecture Given at the Blockchain and Crypto-currencies
Revolution event organized by the Rhode Island-Israel
Collaborative and the Pell Center of Salve Regina University
November 29, 2017, Newport, RI USA



What's the Buzz?



Famous Quotes



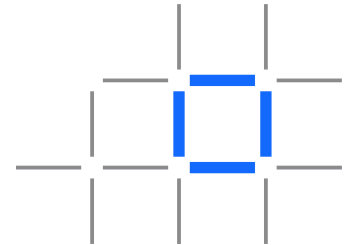
IBM Chief Executive Ginny Rometty.

"What the internet did for communications, I think Blockchain will do for trusted transactions."



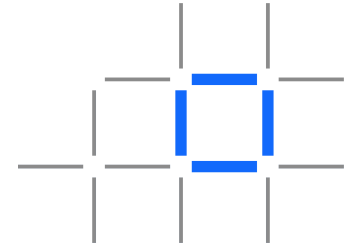
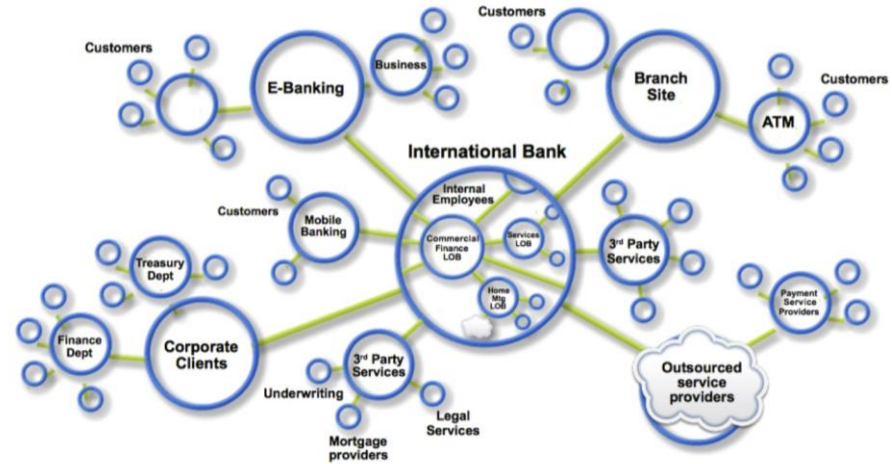
"I'm a big believer in the ability of Blockchain technology to effect fundamental change in the infrastructure of the financial service industry."

Bob Greifeld, CEO of NASDAQ



Business networks, wealth and markets

- **Business Networks** benefit from connectivity
 - Participants are customers, suppliers, banks, partners
 - Cross geography & regulatory boundary
- **Wealth** is generated by the flow of goods & 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)



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



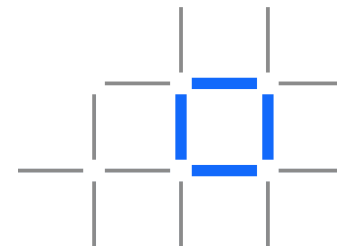
Intangible assets subdivide

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



Cash is also an asset

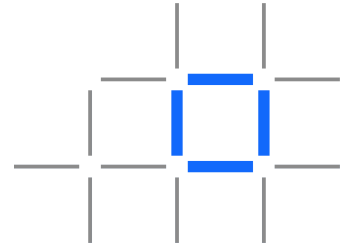
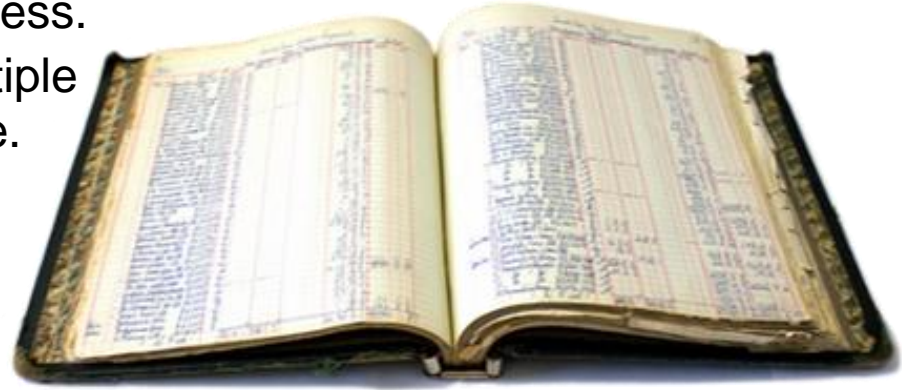
- Has property of anonymity



Ledgers are key

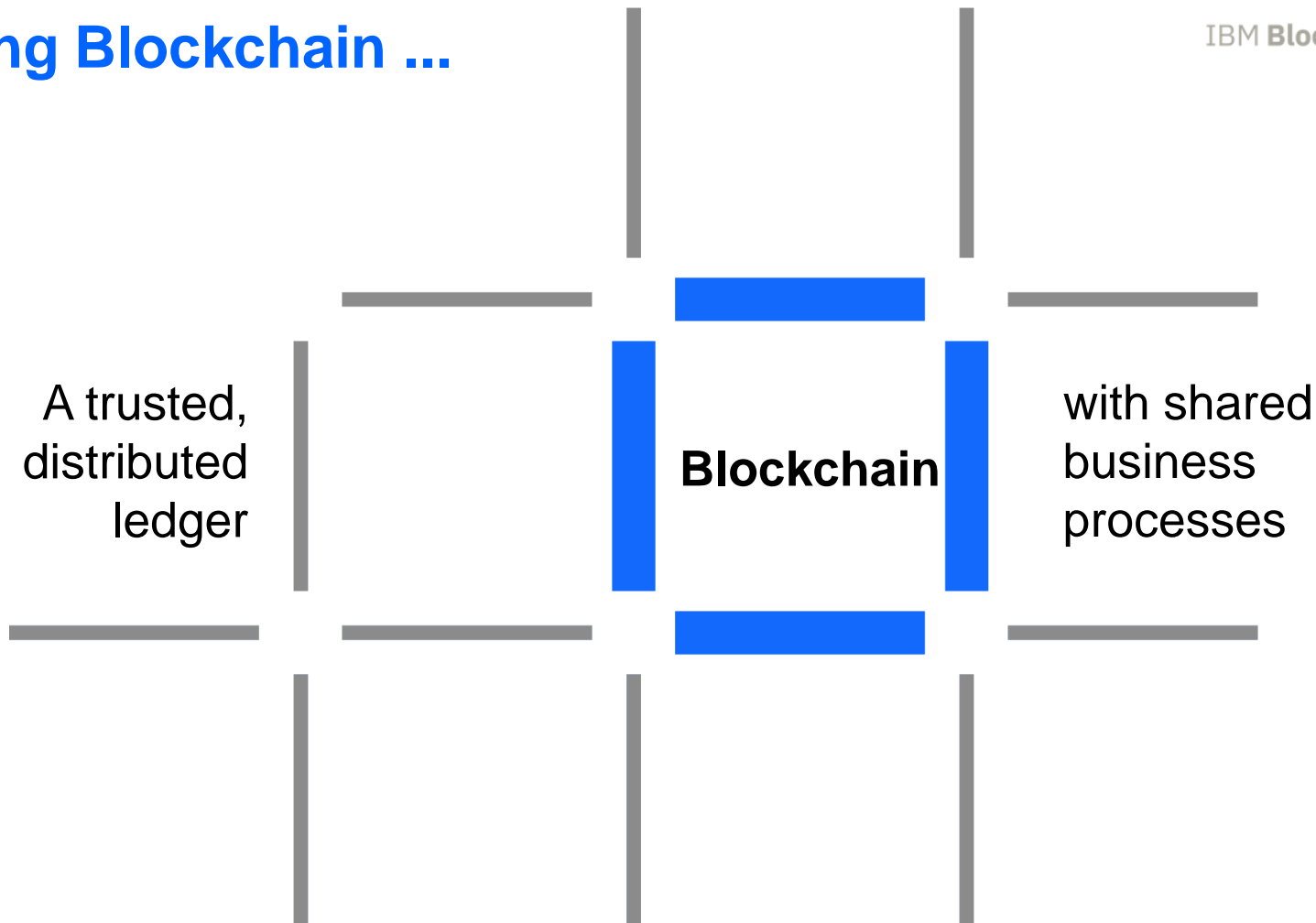
Ledger is THE system of record for a business. Business will have multiple ledgers for multiple business networks in which they participate.

- **Transaction** – an asset transfer onto or off the ledger
 - John gives a car to Anthony (simple)
- **Contract** – conditions for 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)

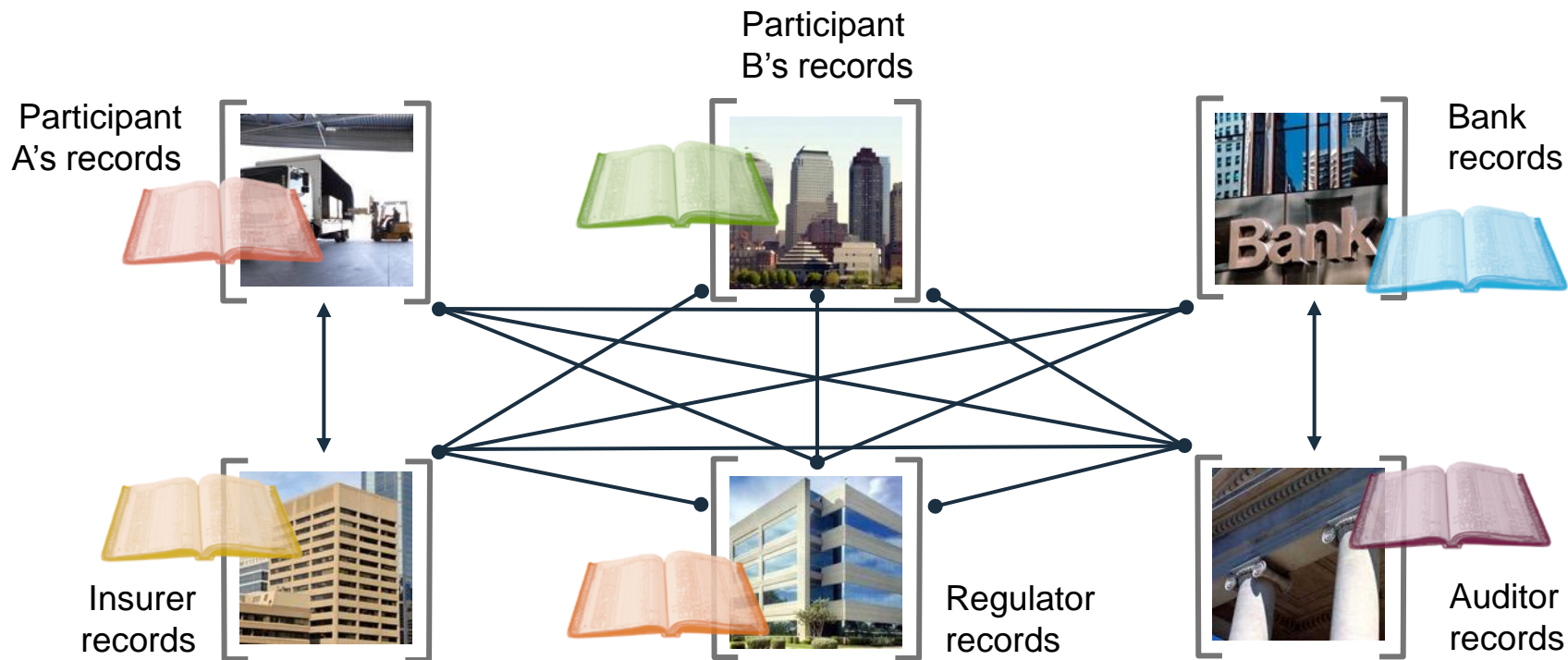


Introducing Blockchain ...

IBM Blockchain

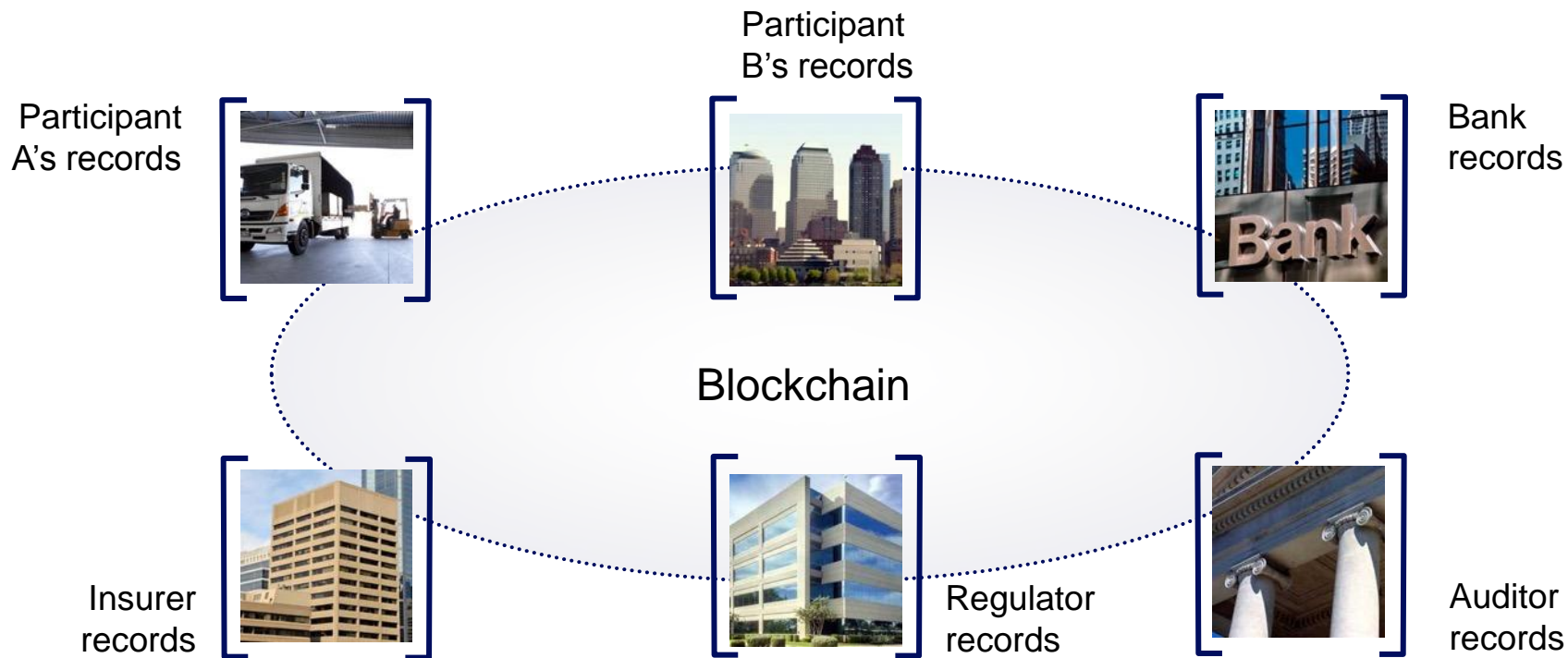


Problem ...



... inefficient, expensive, vulnerable

A shared, replicated, permissioned ledger ...

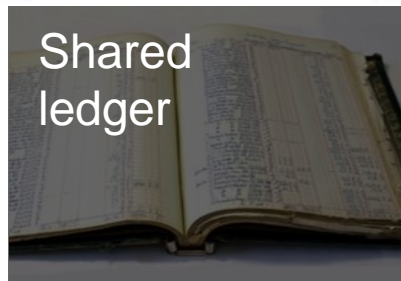


... with consensus, provenance, immutability and finality

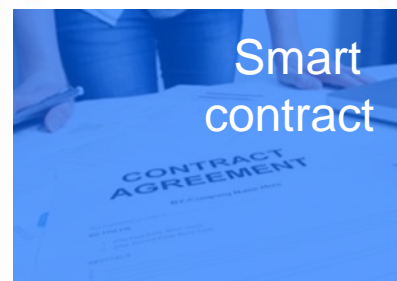
Requirements of blockchain for business

Append-only
distributed system of
record shared across
business network

Shared
ledger



Smart
contract



Business terms
embedded in
transaction
database
& executed with
transactions

Ensuring appropriate
visibility; transactions
are secure,
authenticated
& verifiable

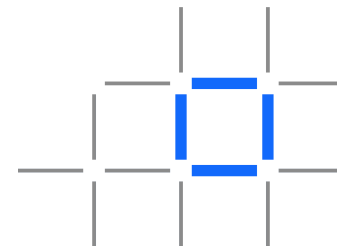
Privacy



Trust



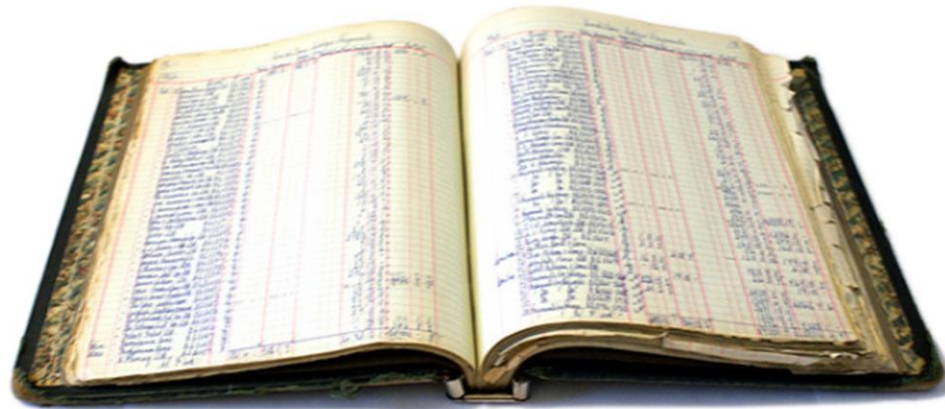
Transactions are
endorsed by
relevant
participants



Shared ledger

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

Records all transactions across business network



Smart contract

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

Business rules associated with the transaction



- The ledger is shared, but participants require privacy*

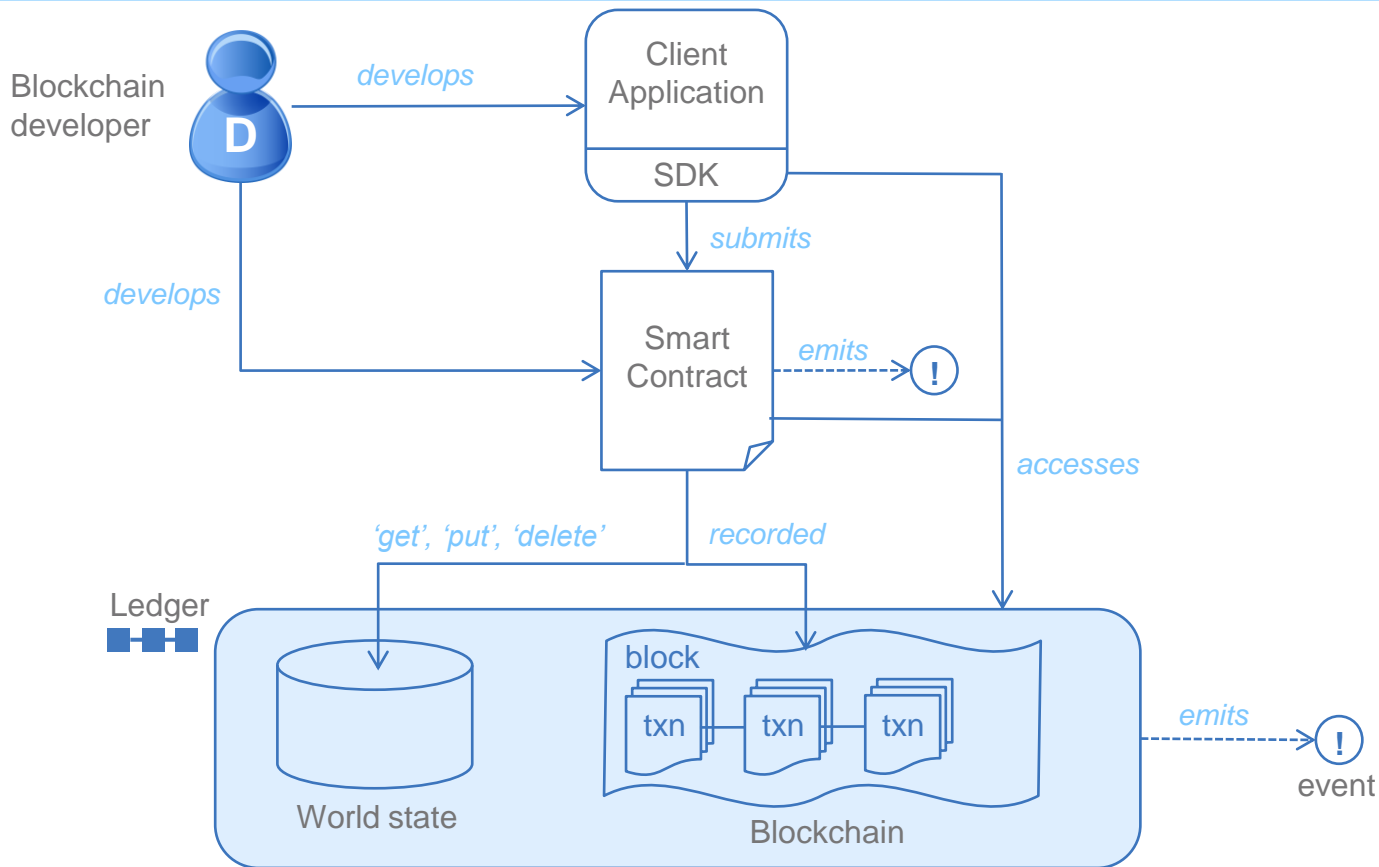


The ledger is a trusted source of information

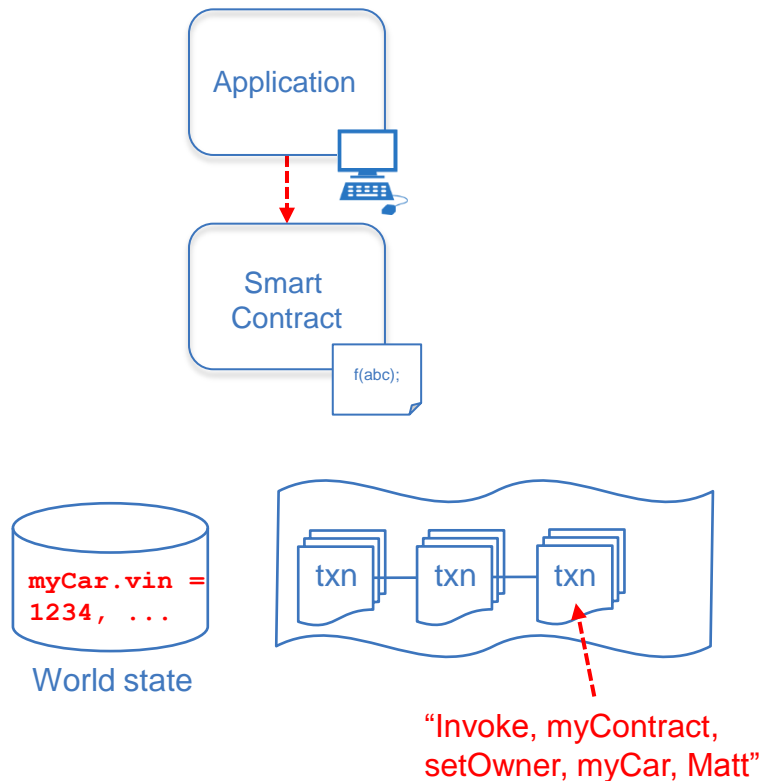
- Participants endorse transactions
 - Business network decides who will endorse transactions
 - Endorsed transactions are added to the ledger with appropriate confidentiality
- Assets have a verifiable audit trail
 - Transactions cannot be modified, inserted or deleted
- Achieved through consensus,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



How applications interact with the ledger



Working with the ledger: Example of a change of ownership transaction



Transaction input - sent from application

```
invoke(myContract, setOwner,  
       myCar, Matt)  
...
```

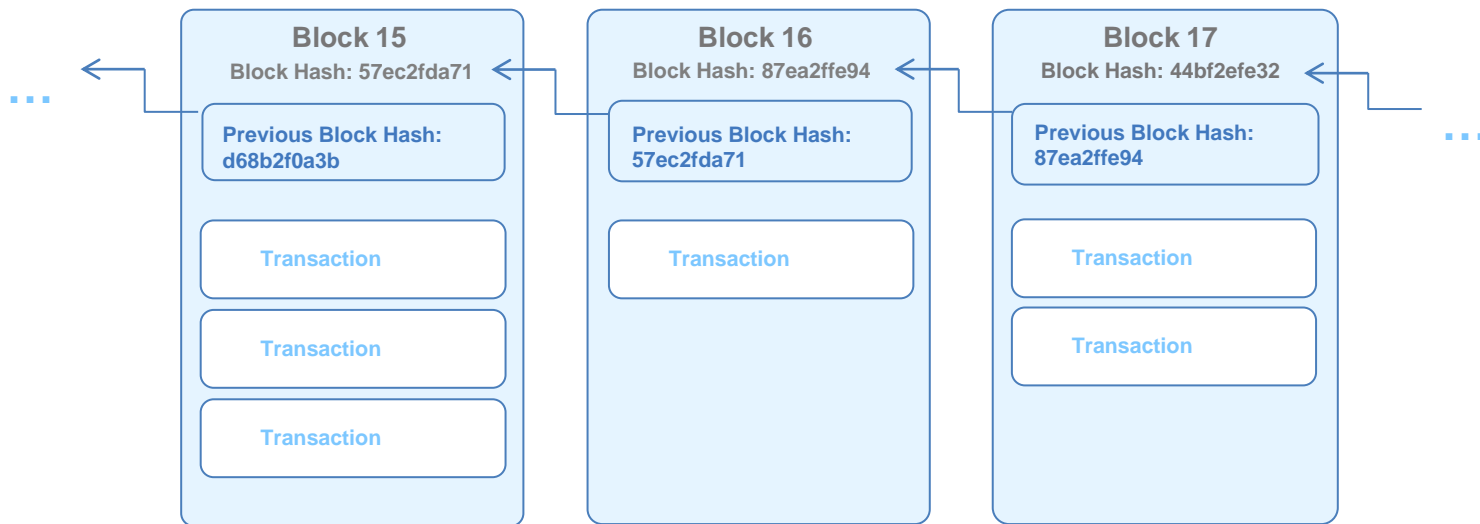
Smart contract implementation

```
setOwner(Car, newOwner) {  
    set Car.owner = newOwner  
}
```

World state: new contents

```
myCar.vin = 1234  
myCar.owner = Matt  
myCar.make = Audi  
...
```

Block detail



- A blockchain is made up of a series of blocks with new blocks always added to the end
- Each block contains zero or more transactions and some additional metadata
- Blocks achieve immutability by including the result of a hash function of the previous block
- The first block is known as the “genesis” block

Blockchain is creating extraordinary opportunities for businesses to come together in new ways

Create New Value

Exploit new business models and eliminate inefficiencies

Optimize Ecosystems

Streamline business processes and the exchange of value along your ecosystem

Reduce Risk

Replace uncertainty with transparency and a trusted decentralized ledger



Examples by industry



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



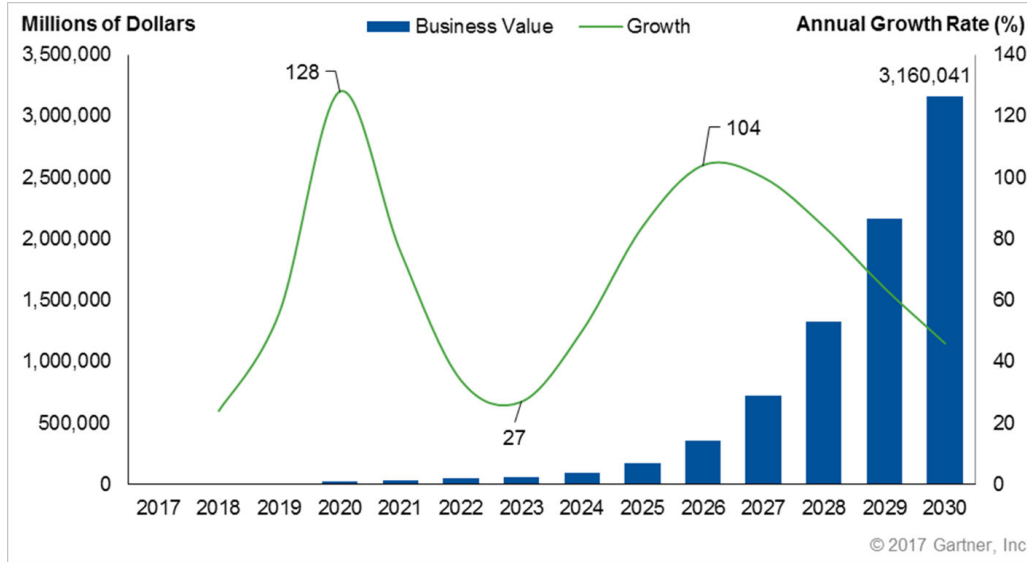
Blockchain

Buzz or Reality?



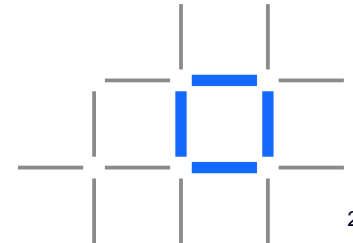
Practical Blockchain: A Gartner Trend Insight Report

Published: 3 March 2017 ID: G00325933



- Blockchain is evolving from a digital currency infrastructure into a platform for digital transformation.
- Forecasts operational risks in many Blockchain projects over the **next five to seven years.**

By 2025, five Blockchain / distributed ledger platforms will be "mainstream" commerce platform enablers.



400+



IBM Blockchain

DISRUPTION

Chemicals

Finance

Transportation

Government

Supply Chain

Energy & Utilities

Media

Healthcare



Food Safety Consortium built on IBM Blockchain Platform



News Announcements:



22 Aug 2017: Walmart and a group of leading companies across the global food supply chain announced a major Blockchain collaboration with IBM

19 Oct 2016 - Walmart opened its new **Walmart Food Safety Collaboration Center** in Beijing. **Walmart and Tsinghua University** announced a collaboration to improve the way food is tracked, transported and sold to consumers across China



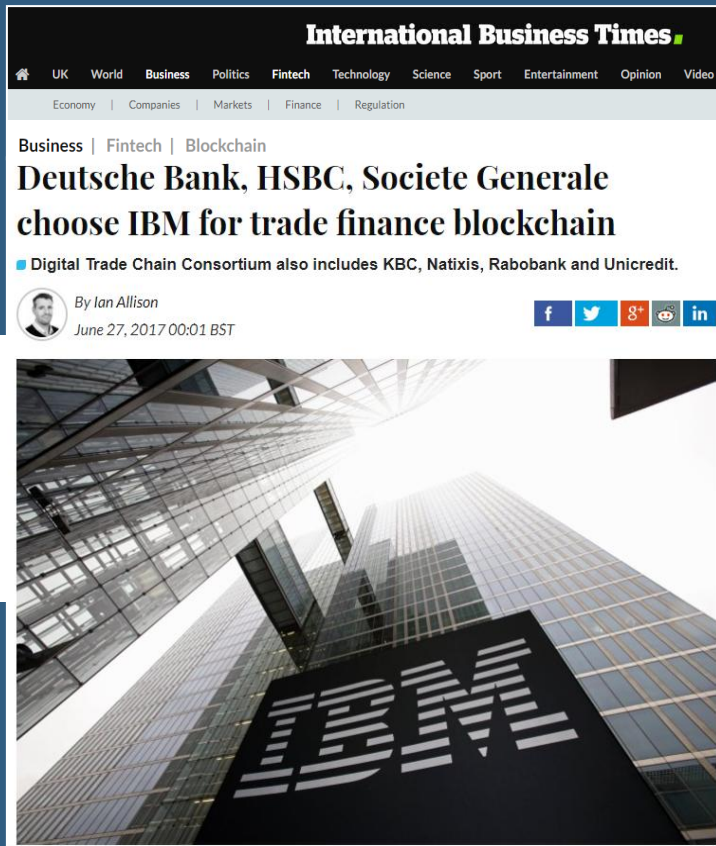
Business Values:

- Food traceability
- Food quality assurance
- Food fraud prevention
- Compliance with food, agriculture and labor regulations
- Paper-less Operational costs saving
- Market Potential – Billions of USD

IBM Technologies & Services:

- Blockchain Garage Services
- GBS Consulting
- IBM Blockchain
- Watson IoT
- IBM HSN (Highly Secured Blockchain Network)





HSBC

UniCredit

SOCIETE GENERALE

NATIXIS
BEYOND BANKING

KBC

Rabobank

Deutsche Bank

IBM Cloud

The Challenge of Trade Finance for SMBs

Trust



Time

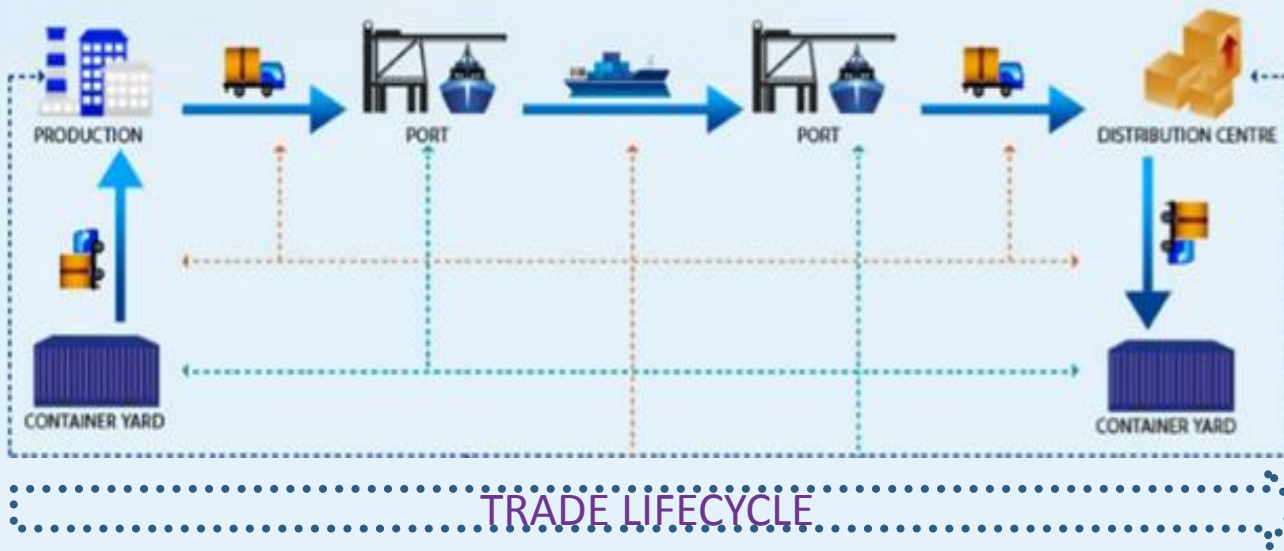


Finance



IBM Cloud

Today's International Trade: Inefficiencies and Risks



Risks



Blockchain-Enabled Future State



“ This project will mark one of the first
real-world use cases of Blockchain
technology in financial institutions ”

The New York Times

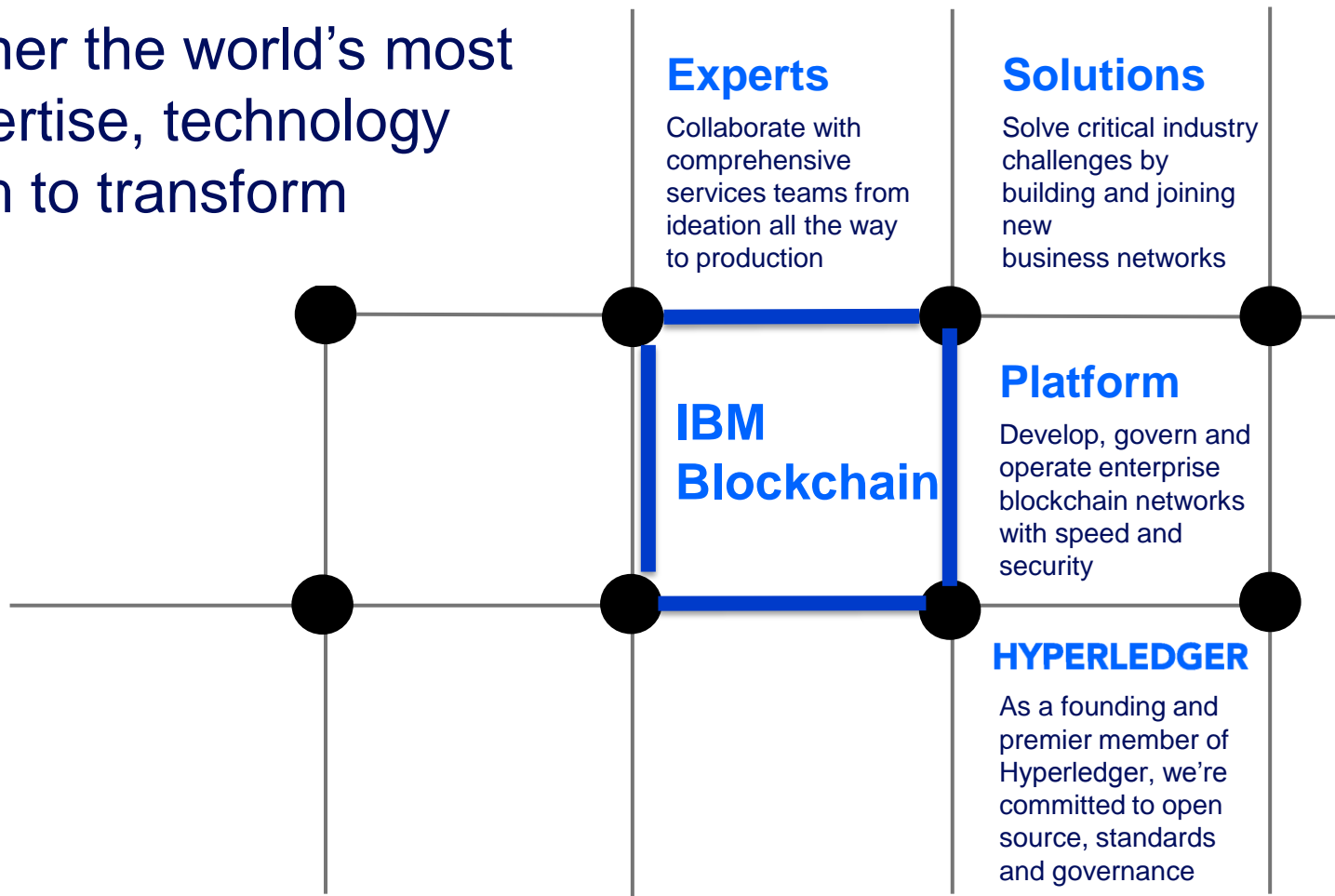


REUTERS

“ We are convinced that Blockchain will have
huge impact on banks in the future and that
trade finance is one of the biggest areas of
potential for the technology ”

Rudi Peeters, CIO @ 

Bringing together the world's most advanced expertise, technology and ecosystem to transform industries

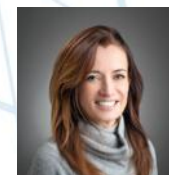


Hyperledger: A Linux Foundation project

- A collaborative effort created to advance cross-industry blockchain technologies for business
- Announced December 2015, now around 150 members
- Open source, open standards, open governance
- Five frameworks and three tools projects
- IBM is a premier member of Hyperledger



Brian Behlendorf
Executive Director



Blythe Masters
Board Chair



Chris Ferris
TSC Chair

www.hyperledger.org

Hyperledger members

Premier

General



Associat e

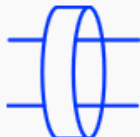
Source: <https://www.hyperledger.org/about/members>
Updated 21 August 2017

Benefits



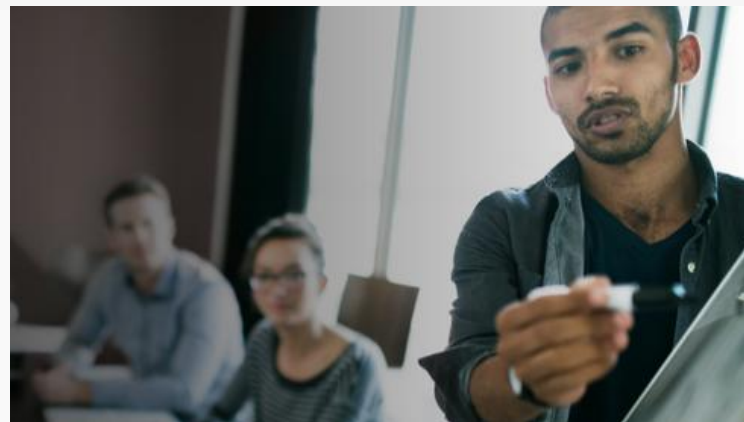
Insight

Gain a deeper understanding of the technology, use cases and key considerations for production



Direction

Accelerate the development and deployment of your blockchain use case



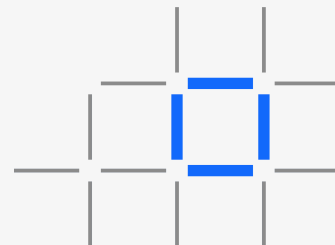
Skills development

Increase your team's skills through collaboration with blockchain technical experts



Speed

Create and deploy applications in an agile format with cloud technology



IBM Alpha Zone Accelerator

IBM Alpha Zone accelerator

Alpha Zone is the first IBM Accelerator in the world, founded in 2014. This has become the main program through which we are screening startups that will work with us, to integrate IBM technology and building long term partnerships with IBM world-wide.

Program Highlights:

- “Late Stage” Accelerator
- Post Seed & Round A startups
- 2 Main Goals:
 - Build Enterprise-Grade solutions
 - Long term partnership with IBM
- Dedicated IBM resources:
 - Technical training, guidance and support.
 - Global business development.
- 20 weeks program
- Office Space
- No equity / IP / board seats
- Support OCS (Israel Innovation Authority)
- Network of Mentors & VCs
- Investor Demo Day

Our Partners:



<https://youtu.be/Fqef6Hxt7Qw>

For more information: www.IBMAlphaZone.com



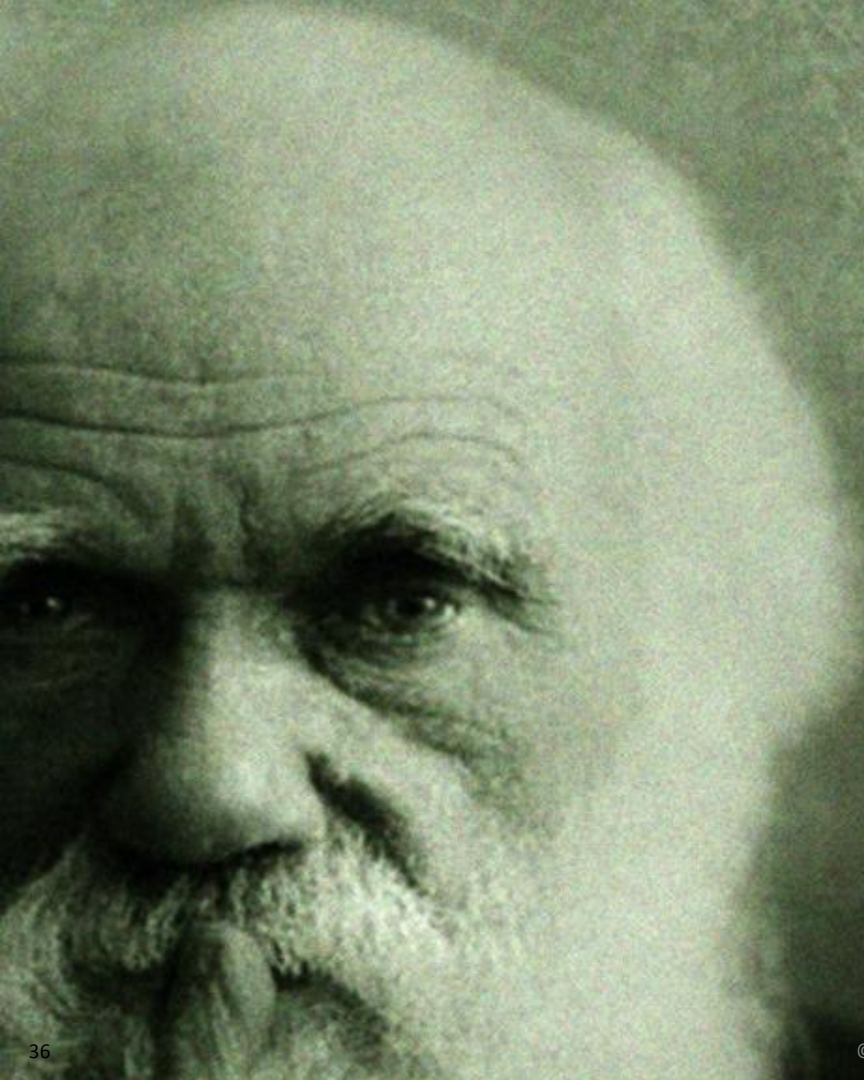
Blockchain

Buzz or Reality?



Blockchain is here to change the way we do business!





“It is not the
strongest of the
species that
survives, nor the
most intelligent,
but the one most
responsive to
change.”

~Charles Darwin, 1809

Ronen Siman- Tov

www.ibm.com/blockchain
developer.ibm.com/blockchain
www.hyperledger.org

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