

BLOCKCHAINS

ARCHITECTURE, DESIGN AND USE CASES

SANDIP CHAKRABORTY

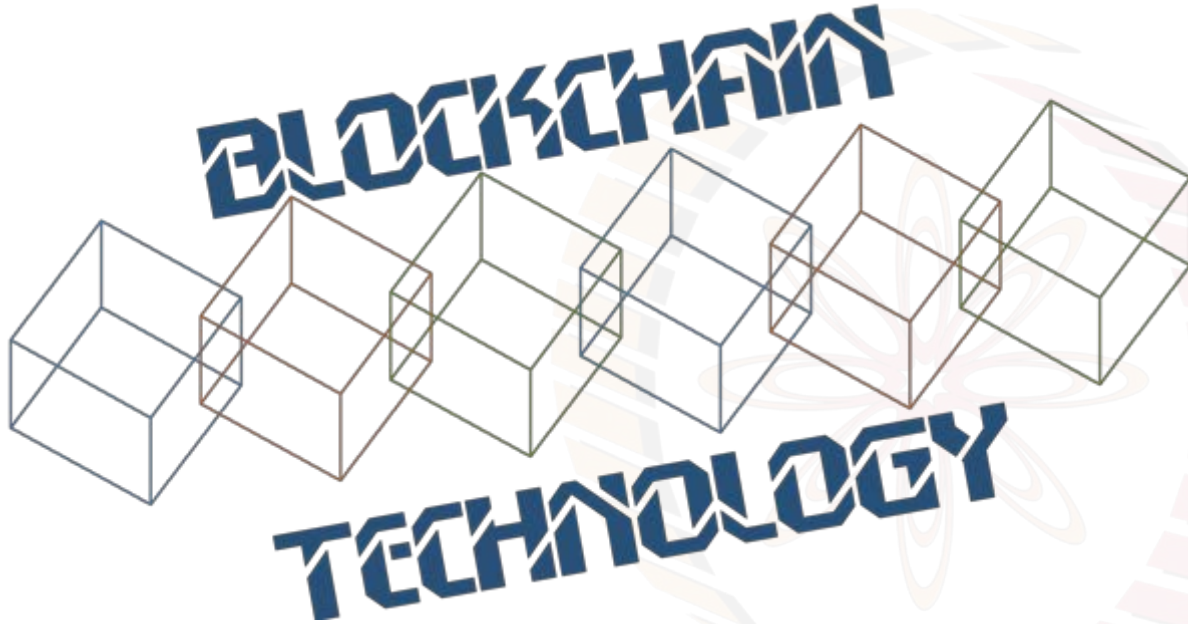
COMPUTER SCIENCE AND ENGINEERING,
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INDIA



**Image courtesy: <http://beetfusion.com/>*



BLOCKCHAIN FOR ENTERPRISE - OVERVIEW

Blockchain Defined

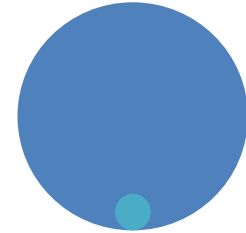


Blockchain is a design pattern made famous by its use in **Bitcoin**. But its uses go *far beyond*.



Blockchain can **reimagine** the world's most fundamental business interactions and open the door to invent new styles of digital interactions.

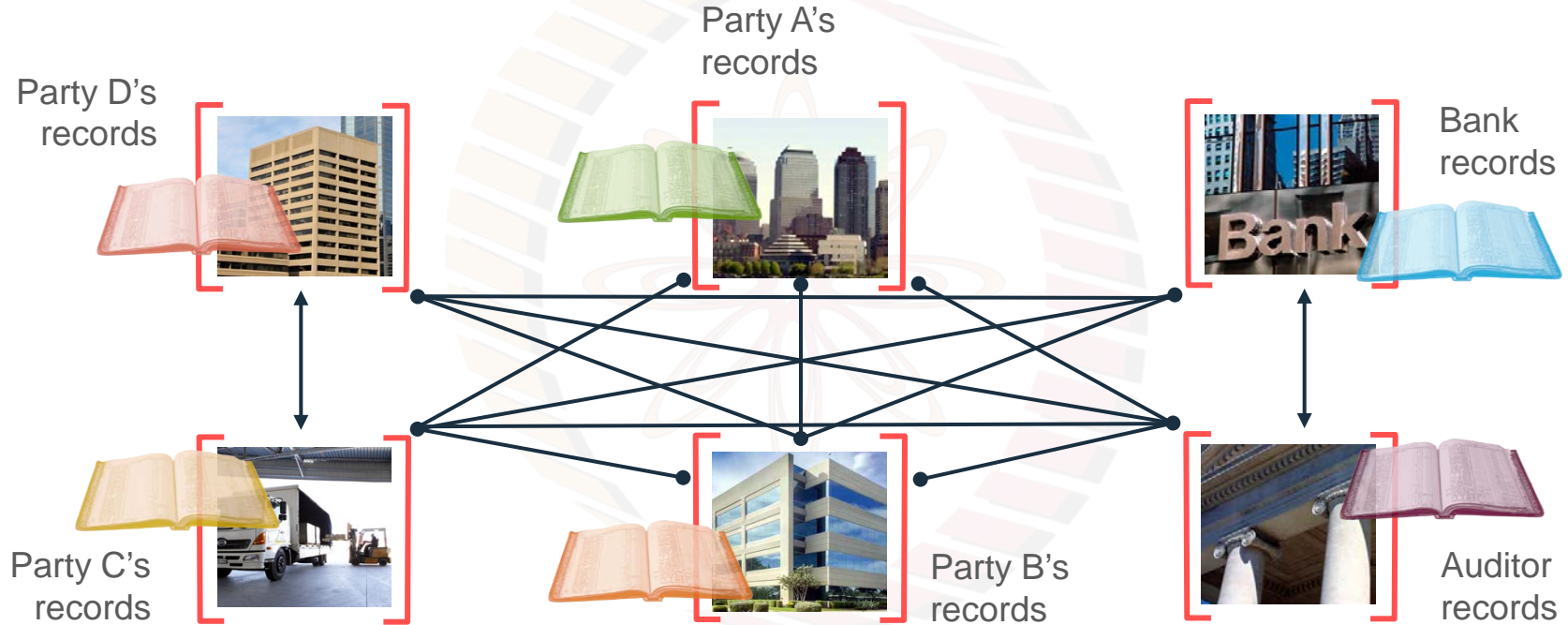
Total Blockchain Opportunity



Total Bitcoin Opportunity

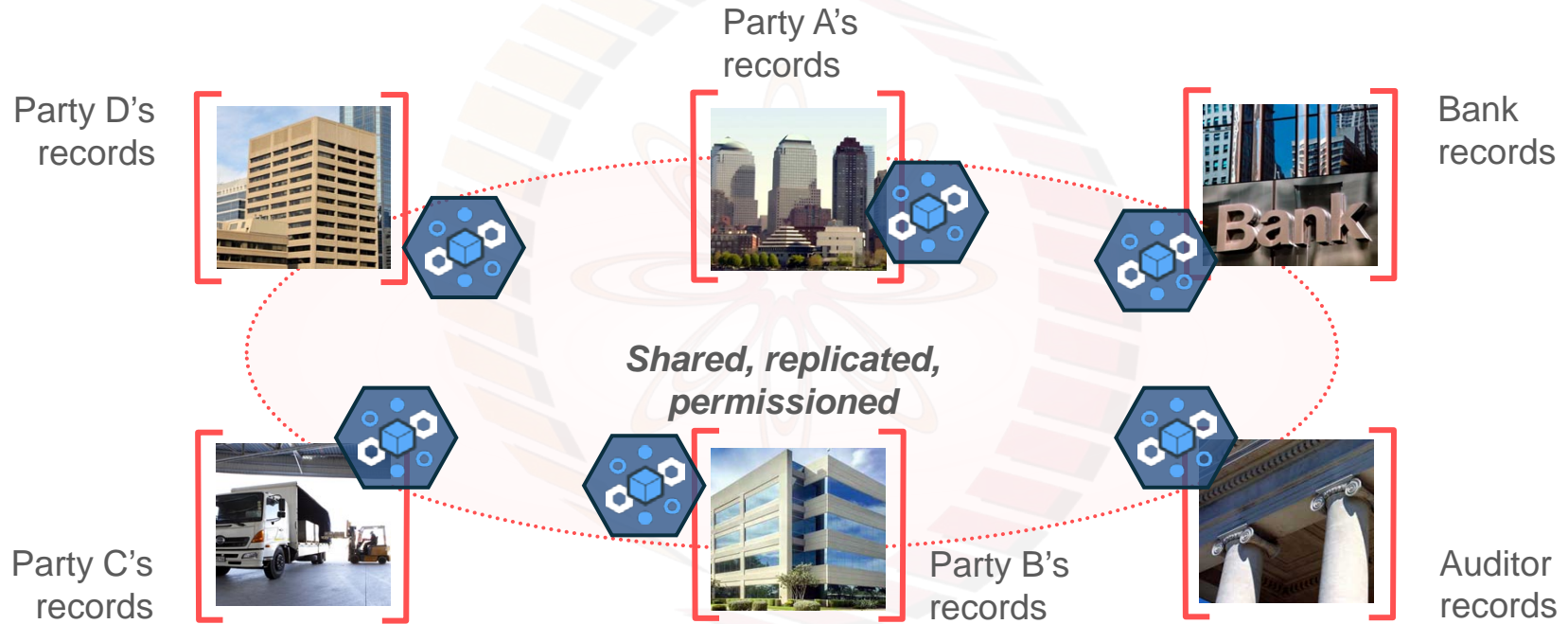
Enterprises are adopting Blockchain to a very **broad range** of business applications

Problem: Difficult to Track Asset Transfers in a Business Network



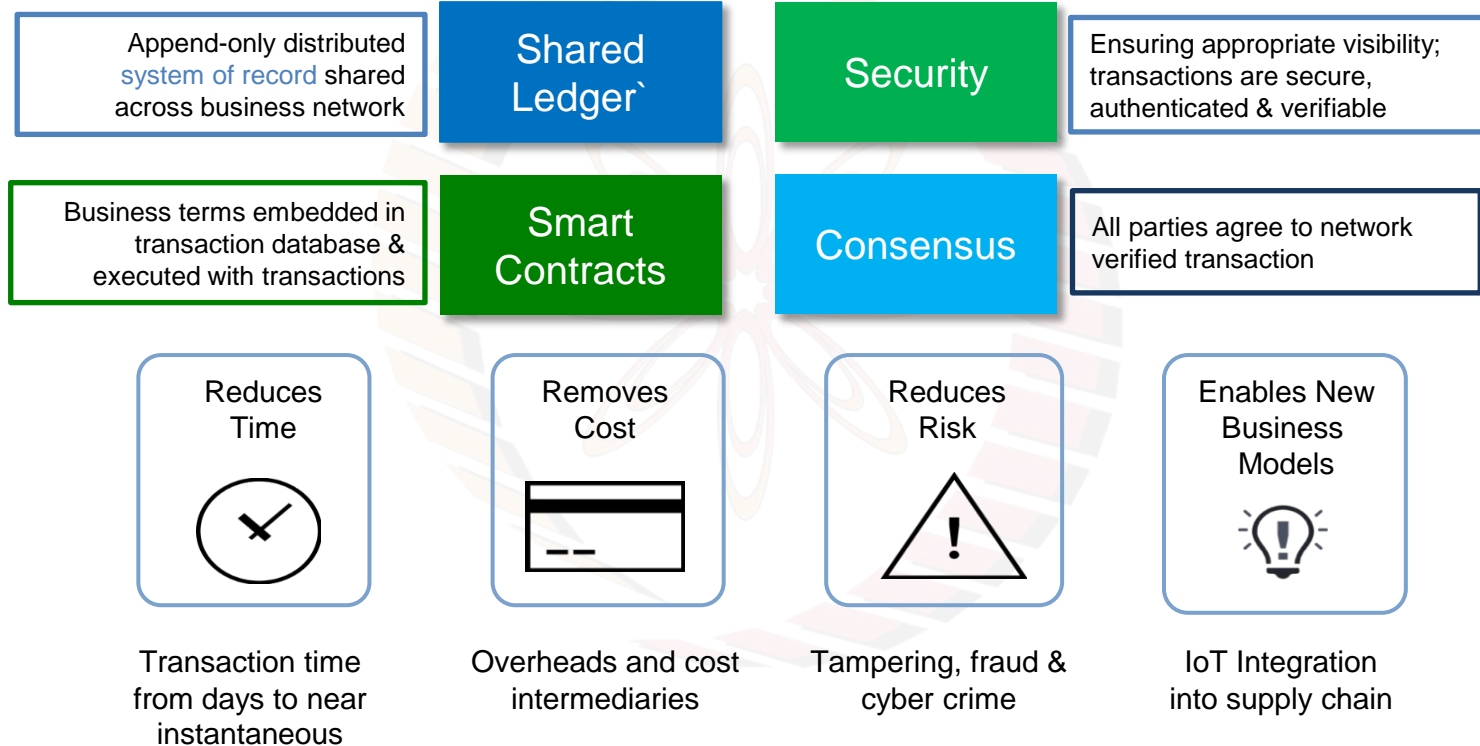
... Inefficient, expensive, vulnerable

Solution... Shared, Replicated, Permissioned Ledger



... Consensus, provenance, immutability, finality

Key Concepts and Benefits of Blockchain for Business



Degree of Centralization

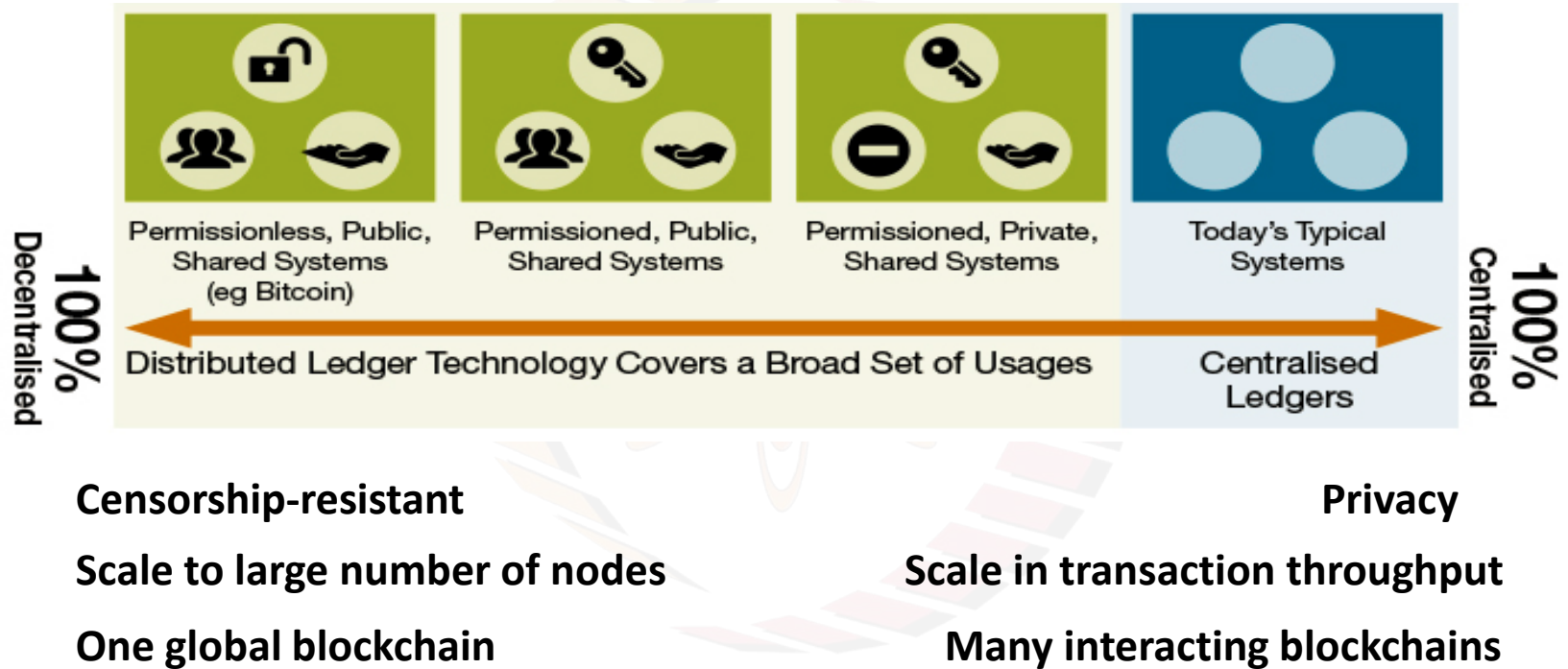


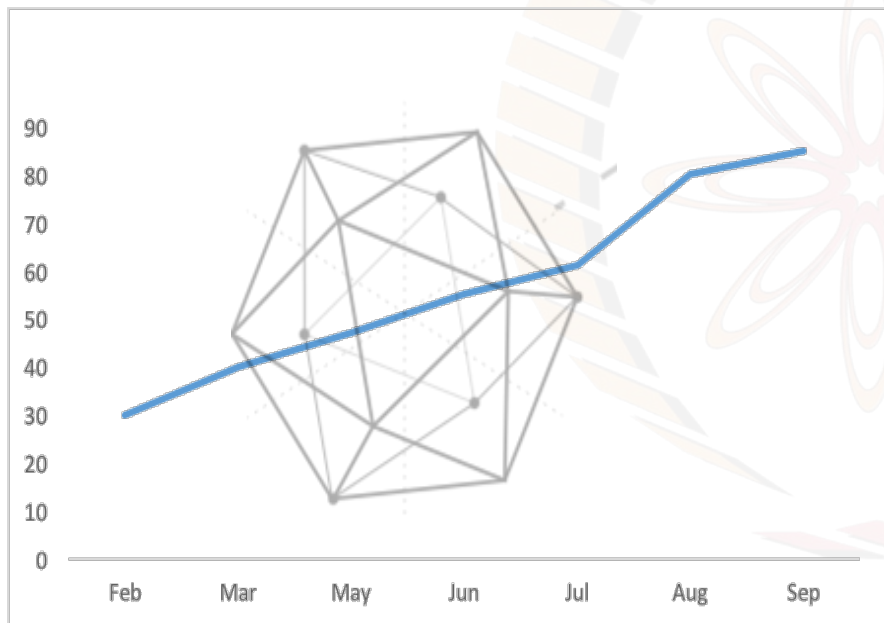
Figure source: "Distributed Ledger Technology: Beyond Blockchain", A report by UK Govt Chief Scientific Adviser

Permission-less vs Permissioned Blockchains

	Permission-less	Permissioned
Access	Open read/write access to database	Permissioned read/write access to database
Scale	Scale to a large number of nodes, but not in transaction throughput	Scale in terms of transaction throughput, but not to a large number of nodes
Consensus	Proof of work/ proof of stake	Closed membership consensus algorithms
Identity	Anonymous/pseudonymous	Identities of nodes are known, but transaction identities can be private/anonymous/pseudonymous
Asset	Native assets	Any asset/data/state

The Linux Foundation Hyperledger Project

A collaborative effort created to advance blockchain technology by identifying and addressing important features for a cross-industry open standard for distributed ledgers that can transform the way business transactions are conducted globally.



www.hyperledger.org

220+ Members, 260%
Growth in 11 months;
10 projects

Hyperledger Members

Source: <https://www.hyperledger.org/members>
Updated: 1 March 2018

Premier



Associate



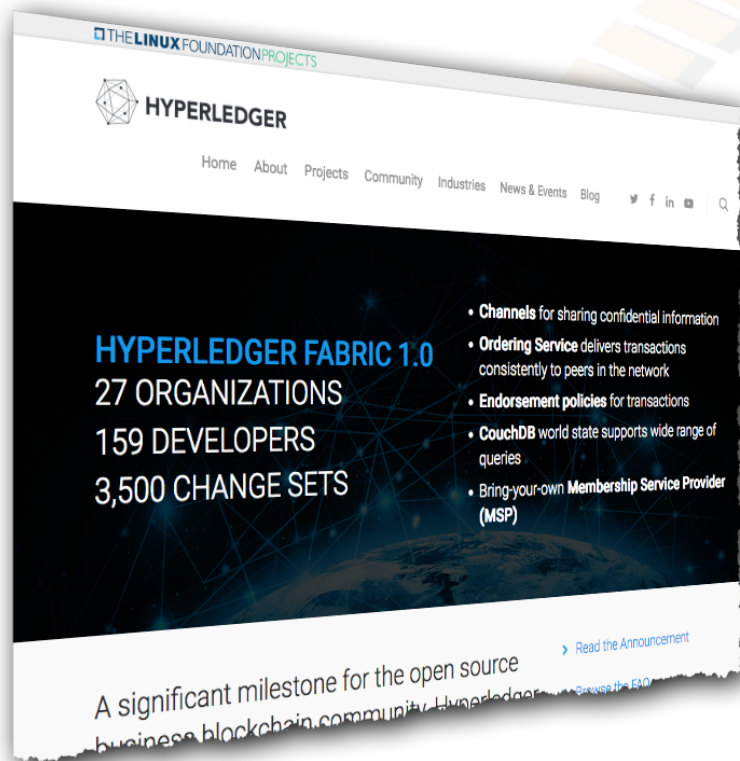
General



Associate (Academia)



Hyperledger Fabric: Distributed ledger platform



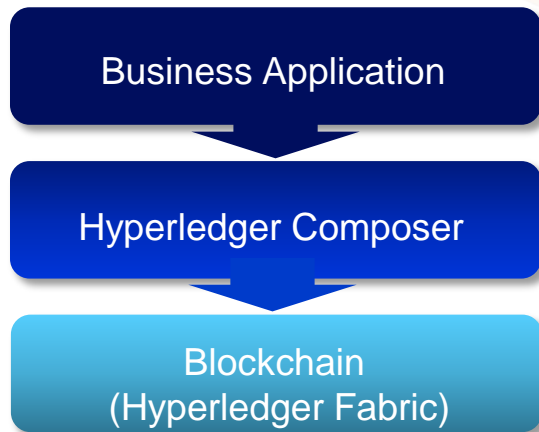
- An implementation of blockchain technology that is a foundation for developing blockchain applications
- Emphasis on ledger, smart contracts, consensus, confidentiality, resiliency and scalability.
- V1.0 released July 2017
 - 159 developers from 27 organizations
 - IBM is one contributor of code, IP and development effort to Hyperledger Fabric

<http://hyperledger-fabric.readthedocs.io/>

Hyperledger Composer: Accelerating Time to Value

<https://hyperledger.github.io/composer>

- 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
- Try it in your web browser now:
<http://composer-playground.mybluemix.net/>

Fun Reading

- What is the difference between Bitcoin and Blockchain (3 mins): <https://www.youtube.com/watch?v=MKwa-BqnJDg>
- Smart contracts, 1994 article by Nick Szabo: <http://www.fon.hum.uva.nl/rob/Courses/InformationInSpeech/CDROM/Literature/LOTwinterschool2006/szabo.best.vwh.net/smart.contracts.html>
- Hyperledger resources page: <https://www.hyperledger.org/resources>
- Hyperledger publications: <https://www.hyperledger.org/resources/publications>
- Keynote talk by Brian Behlendorf, Executive Director of Hyperledger Project at LinuxCon 2017 (21 mins): <https://www.youtube.com/watch?v=pr4Hb0jb0lo>



thank you!