



Making Blockchain Real for Business

Explained



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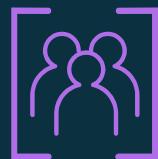
Contents



What is Blockchain?



Why is it relevant
for our business?



How can IBM help
us apply Blockchain?



Business networks, wealth & 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
- **Markets** are central to this process:
 - Public (fruit market, car auction), or
 - Private (supply chain financing, bonds)





What

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



What

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)





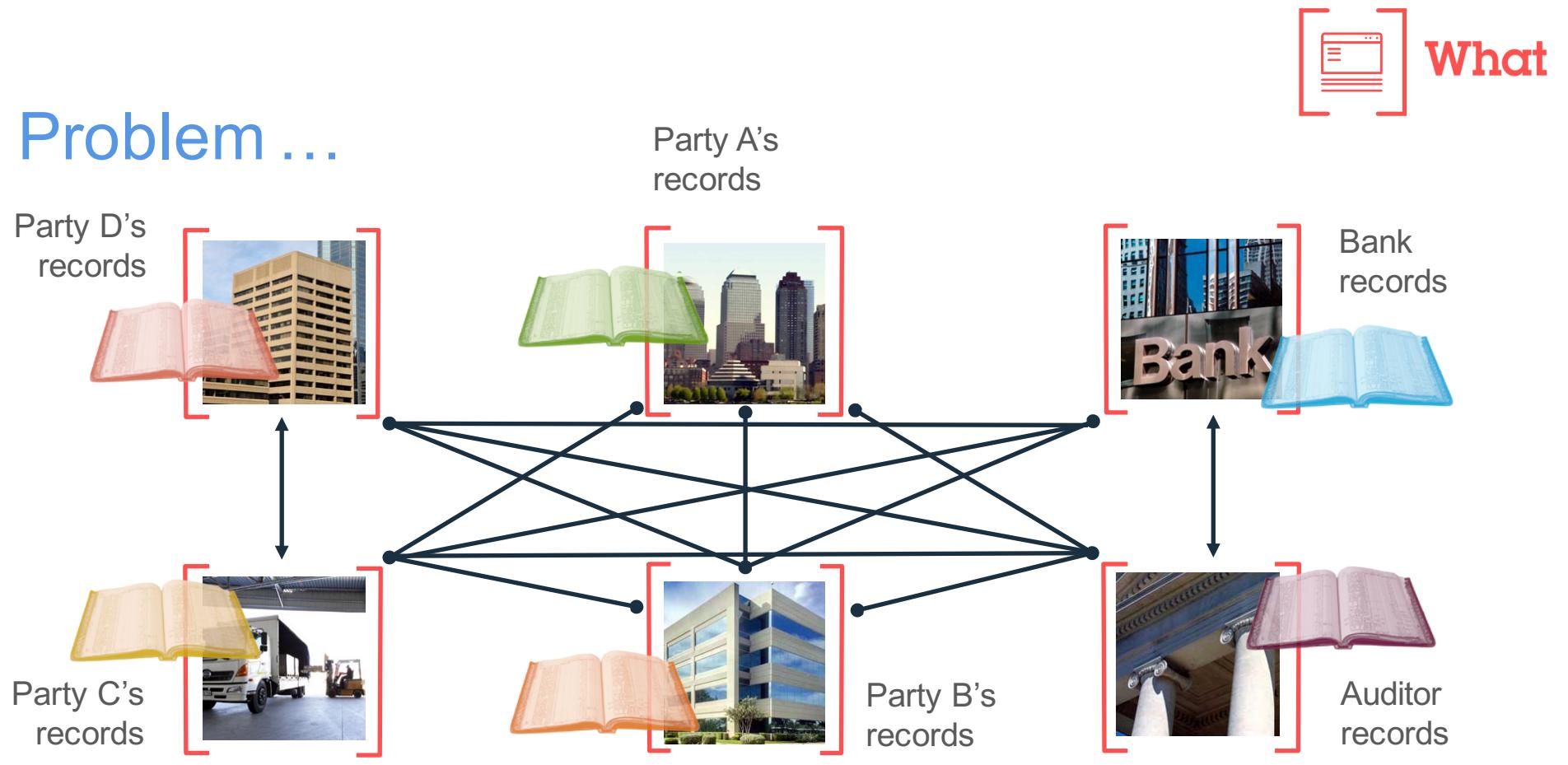
What

Introducing Blockchain

A shared ledger technology allowing any participant in the business network to see THE system of record (ledger)



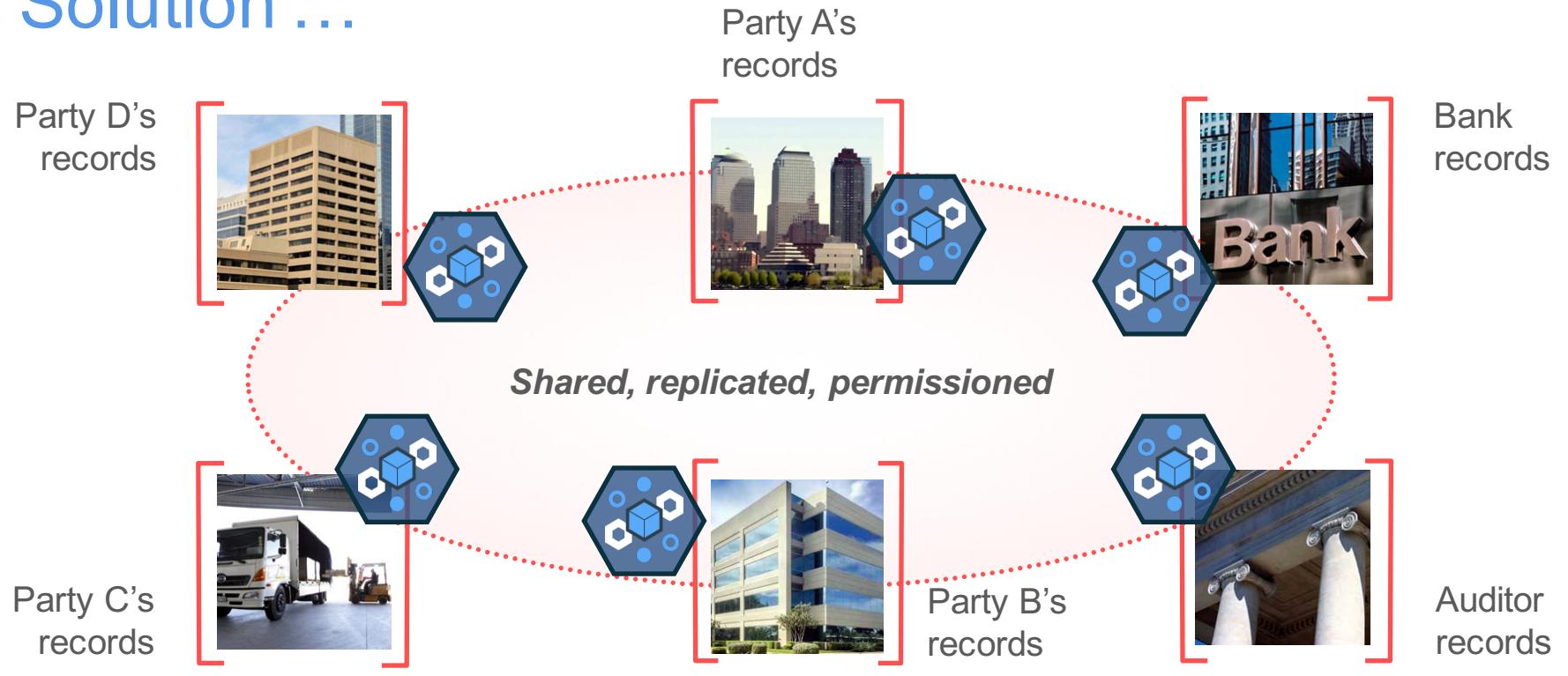
Problem ...



... Inefficient, expensive, vulnerable



Solution ...



... Consensus, provenance, immutability, finality

Blockchain underpins Bitcoin ...

- Unregulated, censorship-resistant shadow currency
- First Blockchain application
 - Pioneer of Blockchain technology

 **bitcoin**



What

BUT
BLOCKCHAIN
is not *bitcoin*

... Digital currencies different from cryptocurrency



What

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



Consensus

All parties agree to network verified transaction

... Broader participation, lower cost, increased efficiency

Shared ledger



Records all transactions across business network

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

Smart contract



Business rules implied by the contract ... embedded in the Blockchain
and executed with the transaction

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



Privacy

Ledger is shared, but participants require privacy

- Participants need:
 - Transactions to be private
 - Identity not linked to a transaction
- Transactions need to be authenticated
- Cryptography central to these processes

Consensus



... the process by which transactions are verified

- When participants are anonymous
 - Commitment is expensive
 - *Bitcoin cryptographic mining* provides verification for anonymous participants but at significant compute cost (proof of work)
- When participants are known & trusted
 - Commitment possible at low cost
- Multiple alternatives
 - proof of stake where fraudulent transactions cost validators (e.g. transaction bond)
 - multi-signature (e.g. 3 out of 5 participants agree)
 - PBFT (cross checked secure message exchange)
- Industrial Blockchain needs “pluggable” consensus

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[?] Why

Blockchain benefits



Saves time

Transaction time from days to near instantaneous



Removes cost

Overheads and cost intermediaries



Reduces risk

Tampering, fraud & cyber crime



Increases trust

Through shared processes and recordkeeping



Consensus use case – Shared routing codes

What

- Competitors/collaborators in a business network need to share reference data, e.g. bank routing codes
- Each member maintains their own codes, and forwards changes to a central authority for collection and distribution
- An information subset can be owned by organizations

How

- Each participant maintains their own codes within a Blockchain network
- Blockchain creates single view of entire dataset

Benefits

1. Consolidated, consistent dataset reduces errors
2. Near-real-time of reference data
3. Naturally supports code editing and routing code transfers between participants



Provenance use case – Vehicle maintenance

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



Immutability use case – Financial ledger

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

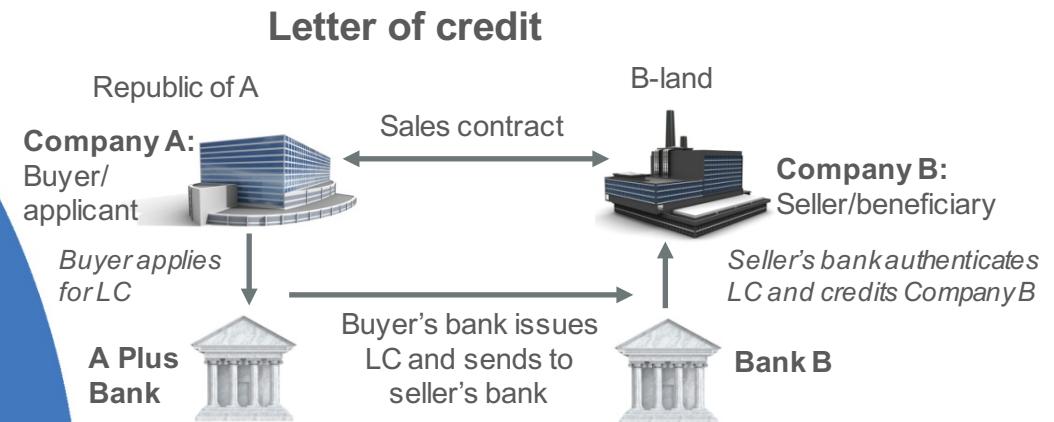
How

- 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

Finality use case – Letter of credit



What

- Bank handling letters of credit (LOC) wants to offer them to a wider range of clients including startups
- Currently constrained by costs & the time to execute

How

- Blockchain provides common ledger for letters of credit
- Allows all counter-parties to have the same validated record of transaction and fulfillment

Benefits

1. Increase speed of execution (less than 1 day)
2. Vastly reduced cost
3. Reduced risk, e.g. currency fluctuations
4. Value added services, e.g. incremental payment

Other potential use cases



– **Securities**

- Post-trade settlement
- Derivative contracts

– **Trade Finance**

- Bill of Lading
- Cross-currency payment

– **Syndicated Loans**

– **Supply Chain**

– **Retail Banking**

- Cross border remittances
- Mortgage verification & contracts

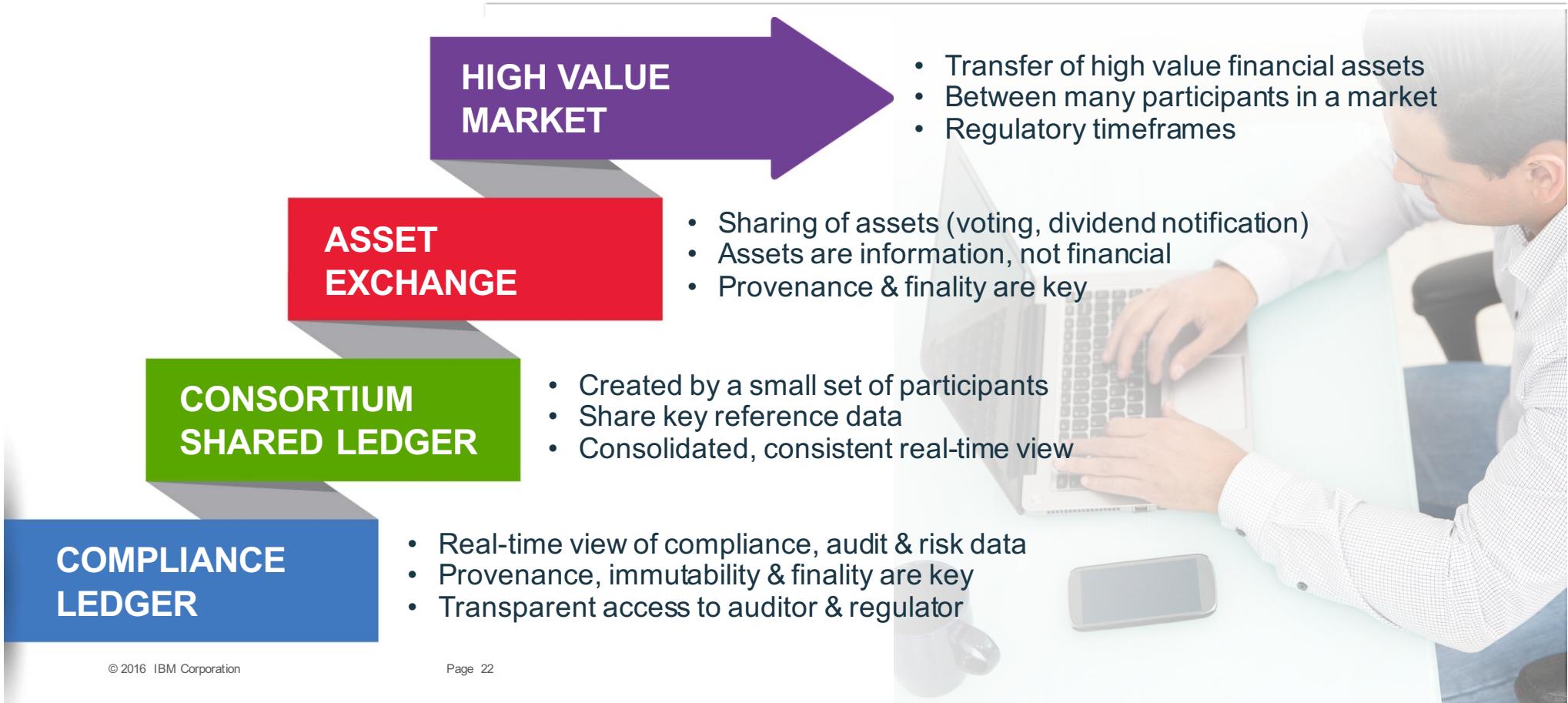
– **Public Records**

- Real estate records
- Vehicle registrations
- Citizen Identity

– **Digital Property Management**

[?] Why

Patterns for customer adoption



[?] Why

Key players for Blockchain adoption



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

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Blockchain for Business – Our Point of View



Community + Code

Linux Hyperledger Project

Open Source Code: Blockchain for business;

**Consensus | Provenance
Immutability | Finality**

Open Governance – 40 member cross industry board



Cloud

IBM Blockchain

Blockchain managed service on IBM Cloud and z Systems;

**Identity | Consensus | System Integration |
Hardware-assist for Performance & Security**

IBM Blockchain on Bluemix



Clients

Blockchain Solutions
Blockchain Garage

Making Blockchain real for business

Blockchain Garage;
New York | London | Singapore | Tokyo

Blockchain Services Practice



Linux Foundation's Hyperledger Project

- Linux Foundation project announced December 17, 2015 with **17** founders, now **40** members
- The Hyperledger Project is a collaborative effort 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
- Open source and open standards-based

Enable adoption of shared ledger technology at a pace and depth not achievable by any one company or industry

QUICK FACTS	
Chairman	Blythe Masters/DAH
Executive Director	Brian Behlendorf
Technical Chair	Chris Ferris/IBM
Contribution	44,000 lines of code in February 2016
Sprint to one codebase with unified thinking	Target 3Q release

www.Hyperledger.org

PREMIER



GENERAL





Engagement model overview



1. Discuss Blockchain technology
2. Explore customer business model
3. Show Blockchain Application demo



1. Understand Blockchain concepts & elements
2. Hands on with Blockchain on Bluemix
3. Standard demo customization



1. Design Thinking workshop to define business challenge
2. Agile iterations incrementally build project functionality
3. Enterprise integration



1. Scale up pilot or Scale out to new projects
2. Business Process Re-engineering
3. Systems Integration

Remote or face to face	Remote or face to face	Face to face	Face to face
Free of charge	Free of charge	For fee	For fee

Summary



Blockchain ...

- is a shared, replicated, permissioned ledger technology
- can open up business networks by taking out cost, improving efficiencies and increase accessibility
- addresses an exciting and topical set of business challenges, which cross every industry

IBM ...

- supports the Linux Foundation Hyperledger open standard, open source, open governance Blockchain
- has an easy to access, proven and incremental engagement model giving customers the confidence to get started NOW



Thank you!

