

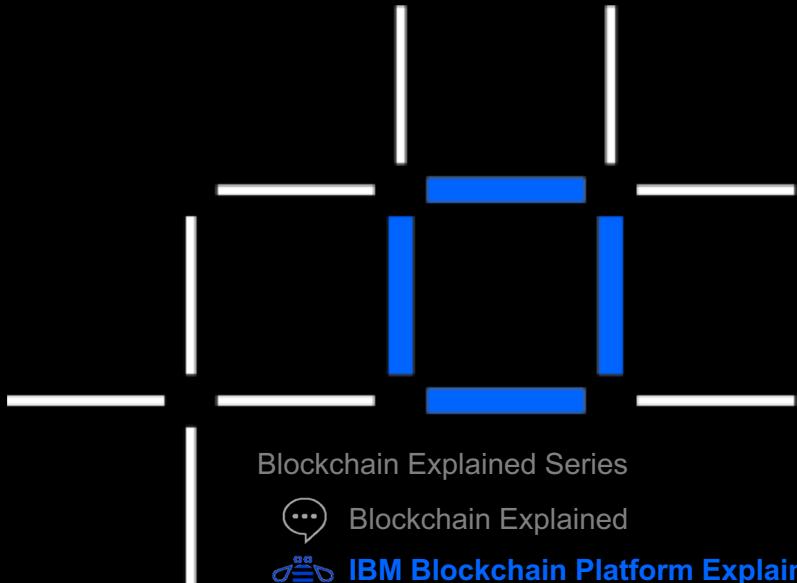
IBM Blockchain Platform Explained

An Introduction to the IBM Blockchain Platform

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<https://www.linkedin.com/in/titogarrido/>



Blockchain Explained Series

… Blockchain Explained

IBM Blockchain Platform Explained

✓ Solutions Explained

House Garage Explained

→ Next Steps



IBM Blockchain Platform Overview

What you need to know



Getting Started

The tools to make your blockchain real



Roadmap

IBM's blockchain strategy and where the platform is going



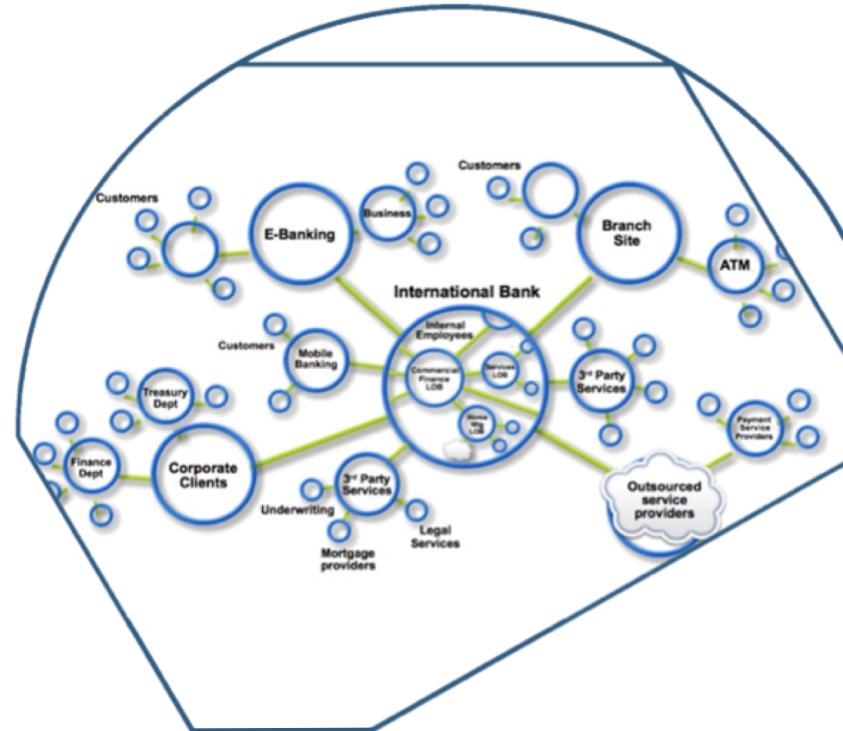
Technical Details

The architecture behind IBM Blockchain Platform

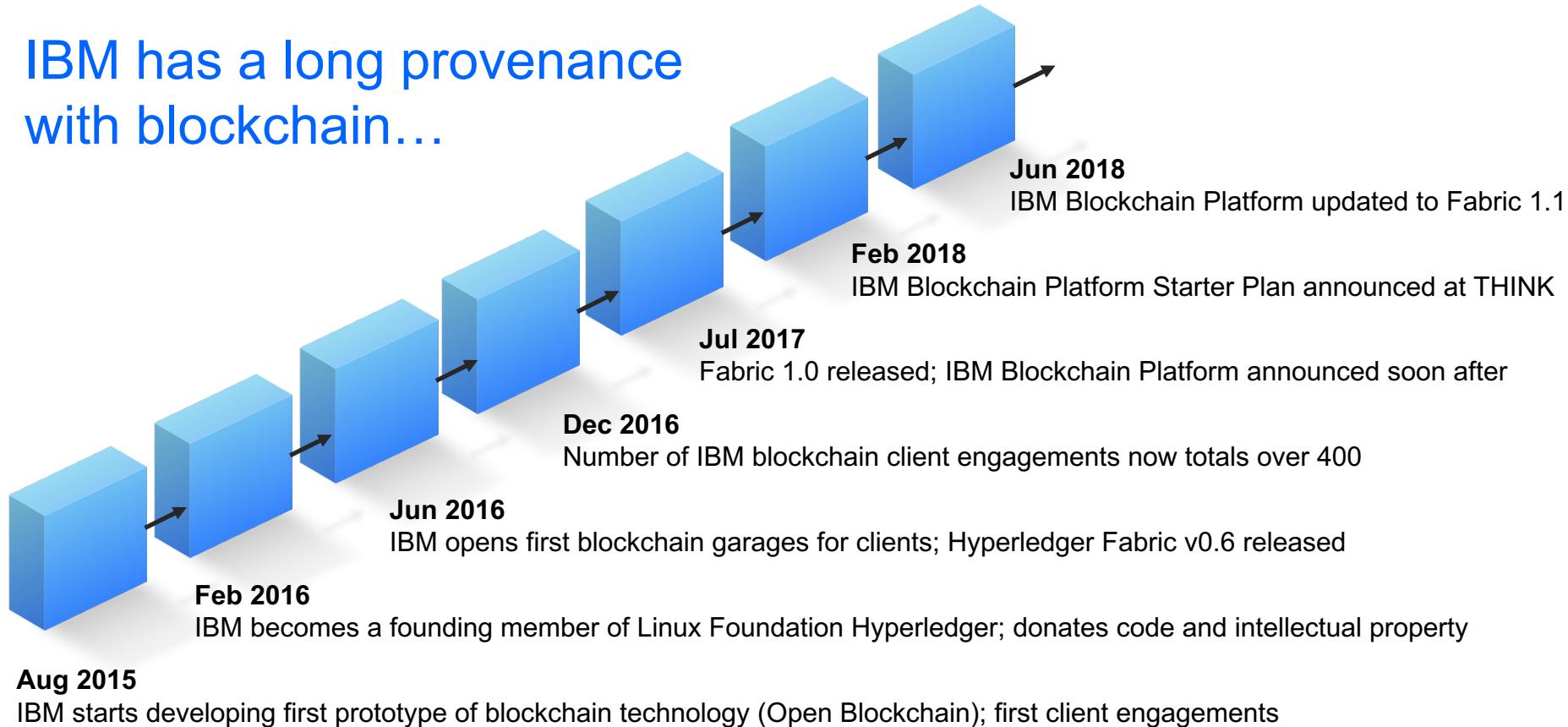


Blockchain Recap

- Blockchain is a shared, replicated ledger
 - Permissioned blockchains bring trust to business networks through consensus, provenance, immutability and finality
- Linux Foundation Hyperledger is a collaborative effort created to advance cross-industry blockchain technologies for business
 - Hyperledger Fabric is a blockchain providing implementation of a ledger, smart contracts, privacy and consensus
 - Hyperledger Composer is a suite of tools that make it easy to develop blockchain applications



IBM has a long provenance with blockchain...

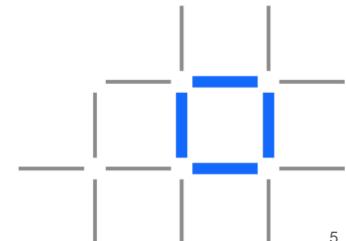
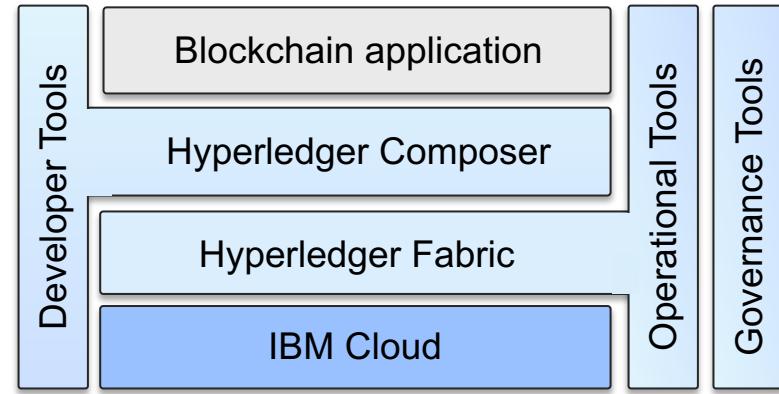


Introducing the IBM Blockchain Platform

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

- **Developer tools** that make use of Hyperledger Composer to quickly build your blockchain application
- Hyperledger Fabric provides the ledger, which is managed through a set of intuitive **operational tools**
- **Governance tools** for democratic management of the business network
- Flexible deployment options, including a highly secure and performant **IBM Cloud** environment



End-to-end lifecycle coverage



Develop

- Accelerated creation of blockchain applications
- No-charge development and test tools hosted on IBM Cloud
- Based on popular Hyperledger Composer toolset

Govern

- Activate, customize and change complete blockchain business networks
- Secure democratic governance across organizations
- Implement rules for authorizing network updates

Operate

- Connect, deploy and manage blockchain peers with flexible deployment options
- Production ready, secure and scalable
- Based on Linux Foundation Hyperledger Fabric V1

Platform Value: *Simplicity in the face of overwhelming complexity*

	IBM Blockchain Platform	Community Code Deployment
Inviting members	5 seconds	20 minutes per instance
Installing and instantiating smart contracts	Single click installation	10 minutes per smart contract per peer
Deployment	Specify network parameters and automatically launch ordering service	Not available
Network alterations and additions	Add new members, channels and smart contracts through single clicks, text box or drop down via the UI	CLI driven, and more advanced skills required
Support	Complete support from the HW stack through the blockchain code base included	IBM support options available
Security	Secure container and highest level of security provided	Custom
Migration	Rolling migration and 99.999% availability provided under the covers	Not available

"IBM provides us with the easiest way to develop prototype blockchain applications for our clients. Thank you!"

-- Global consulting firm

"IBM has enabled our team to develop our blockchain demo with minimal hassle and gives us a clear path to scale with the tools to manage it"

-- Series backed start-up

Flexible pricing plans

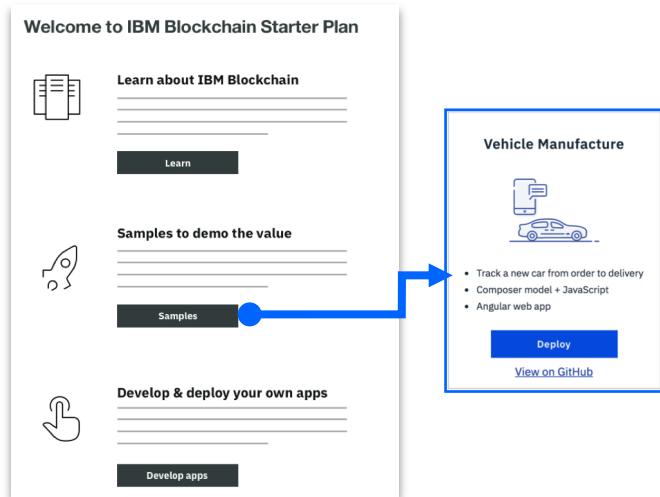
Plan	Key Features	Deployment
Starter	Easy on-ramp for blockchain-as-a-service	IBM Cloud
Enterprise	Production plan for industries comfortable with cloud	IBM Cloud
Enterprise +	Production plan for regulated industries, multi-region HA/DR and highest performance	IBM Cloud
Support-only	Supported instances of Hyperledger Fabric and Composer running outside IBM Cloud Platform	Docker

Starter Plan

Sign up at

www.ibm.com/blockchain

- Get started with IBM Blockchain Platform with **one-click setup and a fully functional network**
 - One-click network configuration, code samples and support for Hyperledger Fabric 1.1
 - Environment enables iterative development prior to production deployment
 - Same experience as Enterprise
 - Uses SOLO ordering for simplified configuration, development and testing
- **Monthly charge of \$500** for two peers
 - \$250 membership fee per month, plus \$125 per peer
 - Receive \$500 in IBM Cloud credits on sign-up



Enterprise Plan

- Everything in Starter, plus everything you need for a **full production** environment:
 - Fault-tolerant ordering service, added layers of security and premium support
 - Compliance certification: ISO27001, GDPR (coming soon), SOC 2 Type 2 (coming soon)
 - Single-zone HA/DR
- Monthly cost starts at **US\$3000 per organization per network**
 - Assumes two peers for high availability (\$1000 per peer plus \$1000 membership fee)
 - Includes basic blockchain support only; support for services on IBM Cloud is an additional 10%
 - Certificate authorities and access to the ordering service is not chargeable



Enterprise+ Plan

- Enterprise+ Plan is also intended for **production or near-production** scenarios
- Everything in Enterprise, plus:
 - Data isolation
 - Customized compute for scaling performance
 - Multi-zone HA/DR (coming soon)
 - Virtual circuits: VPN access from your data center
- Currently limited availability
 - Contact IBM for pricing information



IBM Blockchain Platform Membership Plans	Starter	Enterprise	Enterprise Plus
Suitability	MVP		
Features			
Deploy and run Composer apps			
Hyperledger Fabric features and capabilities			
Multiple org simulation			
Rolling migrations with no network outages			
Low-code interface			
Ability to scale			
Support options			
Fault tolerant ordering service			
Cryptographic Acceleration			
HSM Available		Coming soon	Coming soon
Advanced Secure container technology			
Isolated Compute Environment			
Multi-Geo/Site DR			

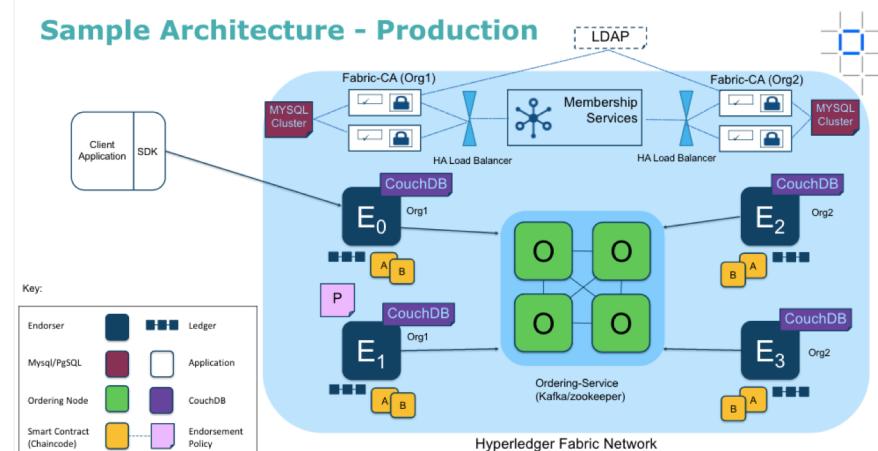
Support-only Plans

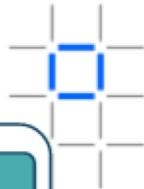
- Looking for **IBM support on Hyperledger Fabric or Composer?**
 - IBM produces signed Hyperledger Fabric images which can be supported for production usage outside of IBM Cloud
 - Hyperledger Composer supported within same plan
 - Available for LinuxONE (IBM Z), Power and x86 architectures
 - Subscription term one year
- **Elite tier (5737-E89/DV13ALL)**
 - Supported 24x7x365; response target within 2 business hours
 - Multiple technical contacts and developer assistance
 - Yearly cost \$24,000 per peer
- **Entry tier (5737-E90/DV13BLL)**
 - Support hours Monday – Friday 8am-5pm local time; response target within 8 business hours
 - Single technical contact
 - Yearly cost \$6,000 per peer



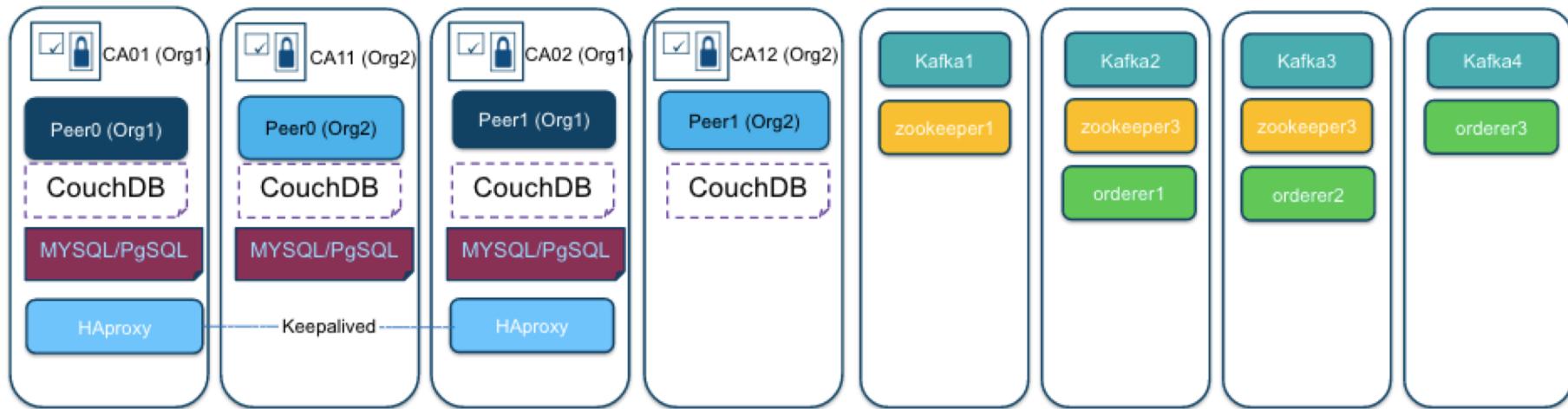
On Premise Implementation

- Lab Service is able to deploy an "on premise" Fabric if the customer prefers
 - It will use IBM signed Hyperledger Fabric images
 - Available for LinuxONE (IBM Z), Power and x86 architectures
 - The images are deployed following High Availability practices
- Elite tier support is highly recommended for production customers





Sample Deployment - Production



- In this sample, related nodes are distributed to 8 different host systems
- If considering automated container relocation, the number of host systems can be reduced
- Peer nodes are running separately with Ordering services nodes
- At least 2 CA Per Organization, Mysql or PgSQL cluster as CA Database, HAproxy/Nginx or other load balancer is needed
- At least two Peers Per Organization
- Default LevelDB or CouchDB as WorldState Database
- Ordering-Service – 4 Kafka, 3 zookeeper, 3 Orderer
- Optional. Fabric-CA can be integrated with LDAP server

IBM Blockchain Platform Sites



- IBM Blockchain Platform Enterprise plan is hosted in multiple sites to help you satisfy data residency requirements

- More platform locations planned

- ↑ Complemented by a set of IBM Blockchain Garages to help you get started with IBM Blockchain Platform

Learn more at
www.ibm.com/blockchain



IBM Blockchain Platform Overview

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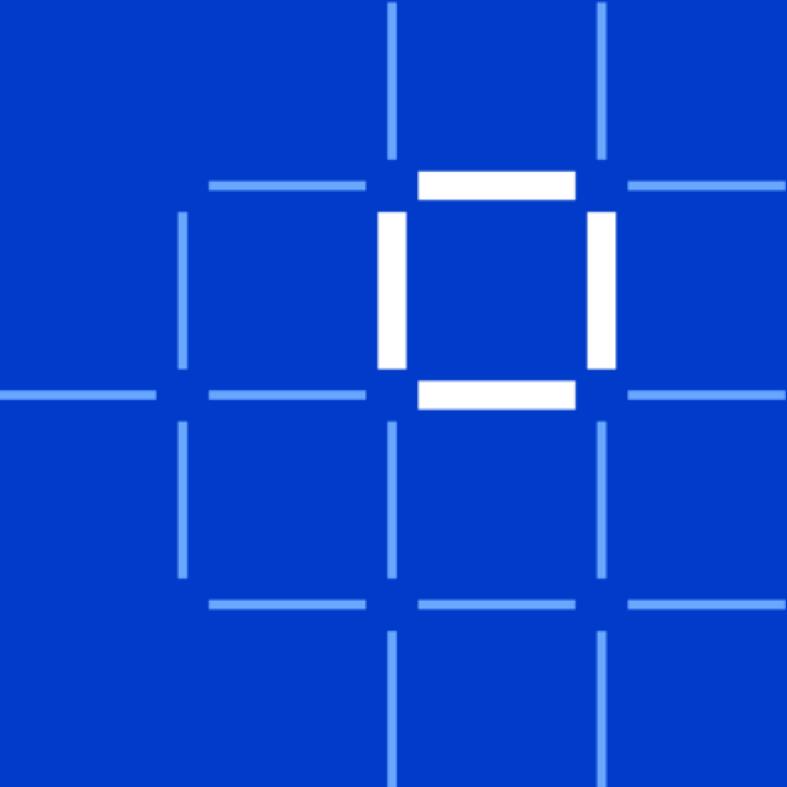
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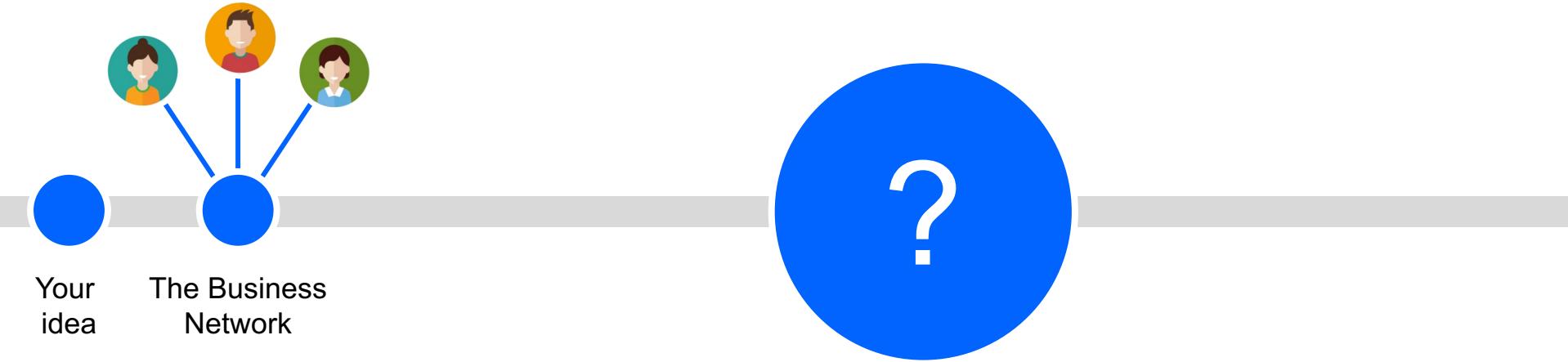
IBM's blockchain strategy and where the platform is going



Technical Details

The architecture behind IBM Blockchain Platform





Web energy-network

Define Test

admin

▼

FILES

About

README.md

Model File

models/energy-model.cto

Script File

lib/business-logic.js

Access Control

permissions.acl

+ Add a file...

Model, Build
and Code33
34 };Your
ideaThe Business
Network

Build

Script File lib/business-logic.js



```
16  * Records the energy usage reading for a given household
17  * @param {com.energy.RecordEnergyReadingTX} tx the energy transaction instance
18  * @transaction
19  */
20  function recordEnergyReading(tx) {
21
22      // Get the asset registry for the energy readings.
23      return getAssetRegistry('com.energy.EnergyReading')
24          .then(function (assetRegistry) {
25              // Put the energy reading in the asset registry
26              return assetRegistry.add(tx.energyReading);
27          })
28          .then(function () {
29              // Emit an event when the ledger is updated
30              var event = getFactory().newEvent('com.energy', 'NewReadingEvent');
31              event.energyReading = tx.energyReading;
32              emit(event);
33
34      });
35  }
```



Overview

Members

Channels

Notifications

APIs

MY CODE

Write code

Install code

Try samples



Your idea

The Business Network

Build

Lets get started!

Choose an option to begin your blockchain journey.



Learn about the platform

Read tutorials and break down blockchain terminology to build your knowledge.

[Learn more](#)

Deploy sample apps

Explore sample applications and learn how blockchain code is running on the platform.



Get started
with tips

[View samples](#)[Get started](#)

Install the developer tools, use them to create your own apps, and then deploy them to the platform.

[Develop apps](#)

x

Connection Profile

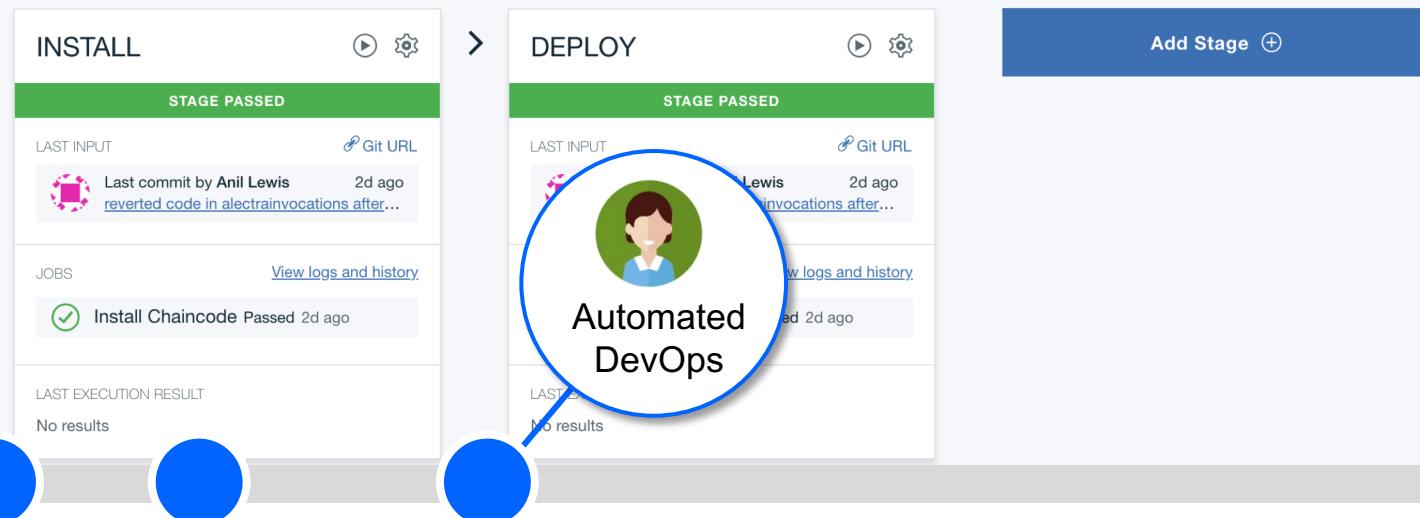
[+ Add Peers](#)

ACTIONS



Toolchains / energy-bc-toolchain... / energy-bc-chaincode-build-20180306150859885

energy-bc-chaincode-build-20180306150859885 | Delivery Pipeline



Your idea

The Business Network

Build

TLS networks LTD. ▾

MY NETWORK

Overview

Members

Channels

Notifications

APIs

MY CODE

Write code

Install code

Try samples



Your idea

The Business Network

Build

Grow

Members

View and manage
the organizations
that you own by

Members

MEMBERS (?)

Company A
mdgallo@us.iCompany B
mdgallo@us.iKayla
kdwhite@us.iKayla
kdwhite@us.iRick
rlarose@us.i

Invite member



Organizations in addition to the two organizations
you're currently managing.

Select a member for your network

Invite a member

Invite other organizations to join your network. Invited members will receive an email invitation with instructions to join your network and set up their own peers.

Add a member

Add a new organization to simulate multi-organization scenarios on your own. You can switch between your organizations to operate the network in the Network Monitor.

Organization Name

Enter (member)



Add new members

Operator Email

Enter email

Add a note

Write a message to

+ Invite Members

ACTION

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ed

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ding

Request a new channel

Complete the steps to request a new channel. After the request is submitted, the invited members will be notified and vote for the request.

02. Select members and set roles

Select the appropriate network members to participate in the channel. You must assign at least one operator for the channel.

Member Name:

All Available Members Have Been Added

Add Member

Member

Permissions

Action

Company A
dave_gorman@uk.ibm.com

Operator Writer Reader

Company B
dave_gorman@uk.ibm.com

Operator Writer Reader

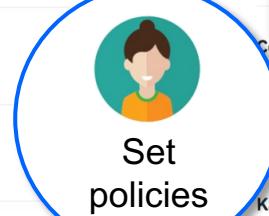
* Assign at least one operator for the channel and give at least one role for each member.

Reset

Cancel

Back

Next



Request a new channel

Complete the steps to request a new channel. After the request is submitted, the invited members will be notified and vote for the request.

03. Review channel update policy

Define the policy to update the channel.

Policy

How many operators need to accept the request to update the channel?

Select

- 1 (Any)
- 2 (Majority)

Company A

Company B

Kayla Co

Email

kdwhite@us.ibm.com

kdwhite@us.ibm.com

kdwhite@us.ibm.com

Cancel

Back

Submit Request



Your idea



The Business Network



Build



Grow

Network created!

Your Starter Plan network has two organizations, each with its own peer.

With this network you can test chaincode, deploy samples, and invite other members to collaborate.

Launch



Your
idea



The Business
Network



Build



Grow



IBM Blockchain Platform Overview

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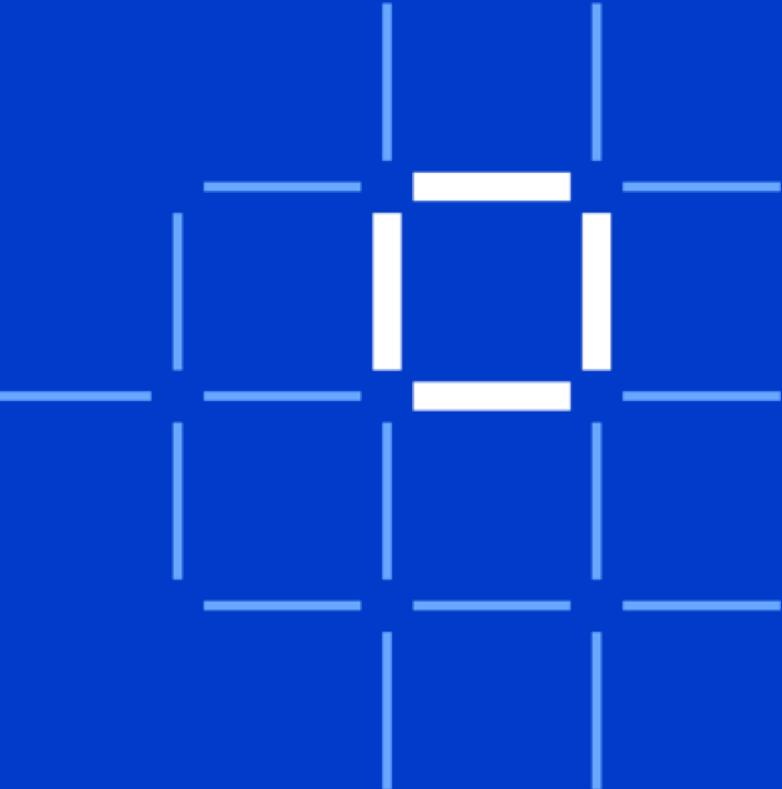
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IBM's blockchain strategy and where the platform is going



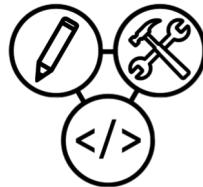
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The architecture behind IBM Blockchain Platform



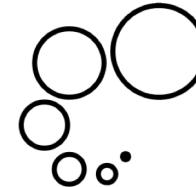
Core Capabilities for 2018

The IBM Blockchain Platform will give users the ability to...



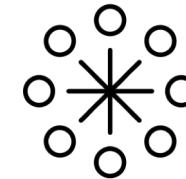
Build Apps & Networks

- **Development tools** to create applications which leverage blockchain networks
- **API endpoints and SDKs** for building and monetizing blockchain apps
- **Model for founders** to create business models enabled by blockchain



Grow Networks

- **Operational tools** to test, manage, monitor, troubleshoot, deploy, migrate and upgrade blockchain networks
- **Governance tools** to create and manage governance policies on permissioned networks



Accelerate Ecosystems

- **Network registry** to discover and join existing blockchain networks
- **Marketplace** to discover and use APIs, service components and applications
- **Public networks** to accelerate blockchain ecosystems

Blockchain Network Finder

[SIGN UP / LOG IN](#)[RESERVE NETWORK](#)

Industry

All Categories

- Accommodation and Food Services
- Admin. and Support
- Agriculture
- Arts (Entertainment and Recreation)
- Construction
- Educational Services
- Energy
- Finance and Insurance
- Healthcare
- Identity Management
- IoT - Asset Tracking
- IoT - Healthcare
- IoT - Location Based Services
- Management of Companies and Enterprises
- Manufacturing
- Media
- Mining and Oil and Gas Extraction
- Non-Profit
- Real Estate
- Real Estate Rental and Leasing
- Record Management
- Retail Trade
- Supply Chain Management
- Transportation and Warehousing
- Utilities
- Voting
- Waste Mgmt. and Remediation Services

Search

A B C E F G J M N O S V W Y {

Name	Industry	Summary	Peers	Created Date
{{2+9}}			3	December 4th 2017, 4:21 AM
artsexpo Canada	Non-Profit		1	March 7th 2018, 2:41 AM
besthouse China	Real Estate, Real Estate Rental and Leasing		2	November 1st 2017, 9:48 AM
coffeeshopschain United States	Retail Trade, Supply Chain Management	This is the main chain for updates regarding Coffeeshops in the US - look here for updates, deals, promotions, branches...	3	
ecodisposal USA	Waste Mgmt. and Remediation Services		4	
ewewde		ВИСИВСИВС	3	
fishmarket	Agriculture, Supply Chain Management, Wholesale Trade	This is a Fish Market blockchain	3	March 1st 2018, 12:00 AM
friendsid			2	November 1st 2017, 8:42 AM
garcoin			4	November 1st 2017, 8:42 AM

Network Registry



Your idea



The Business Network



Build



Grow



Accelerate

Blockchain Asset Marketplace

[SIGN UP / LOG IN](#)[PUBLISH ASSETS](#)

Carbon Credit Model

v3.4

Type: Composer model

Added by: Organization

Used in: 3057 networks

[TRY NOW](#)[BUY NOW](#)

Simple Supply Chain

v5.3.6

Type: Composer model

Added by: OrganizationA

Used in: 208 networks

[TRY NOW](#)[BUY NOW](#)

Bilateral Config

v1.2

Type: Network template

Added by: OrganizationB

Used in: 12 networks

[TRY NOW](#)[BUY NOW](#)

Marketplace



Your idea



The Business Network



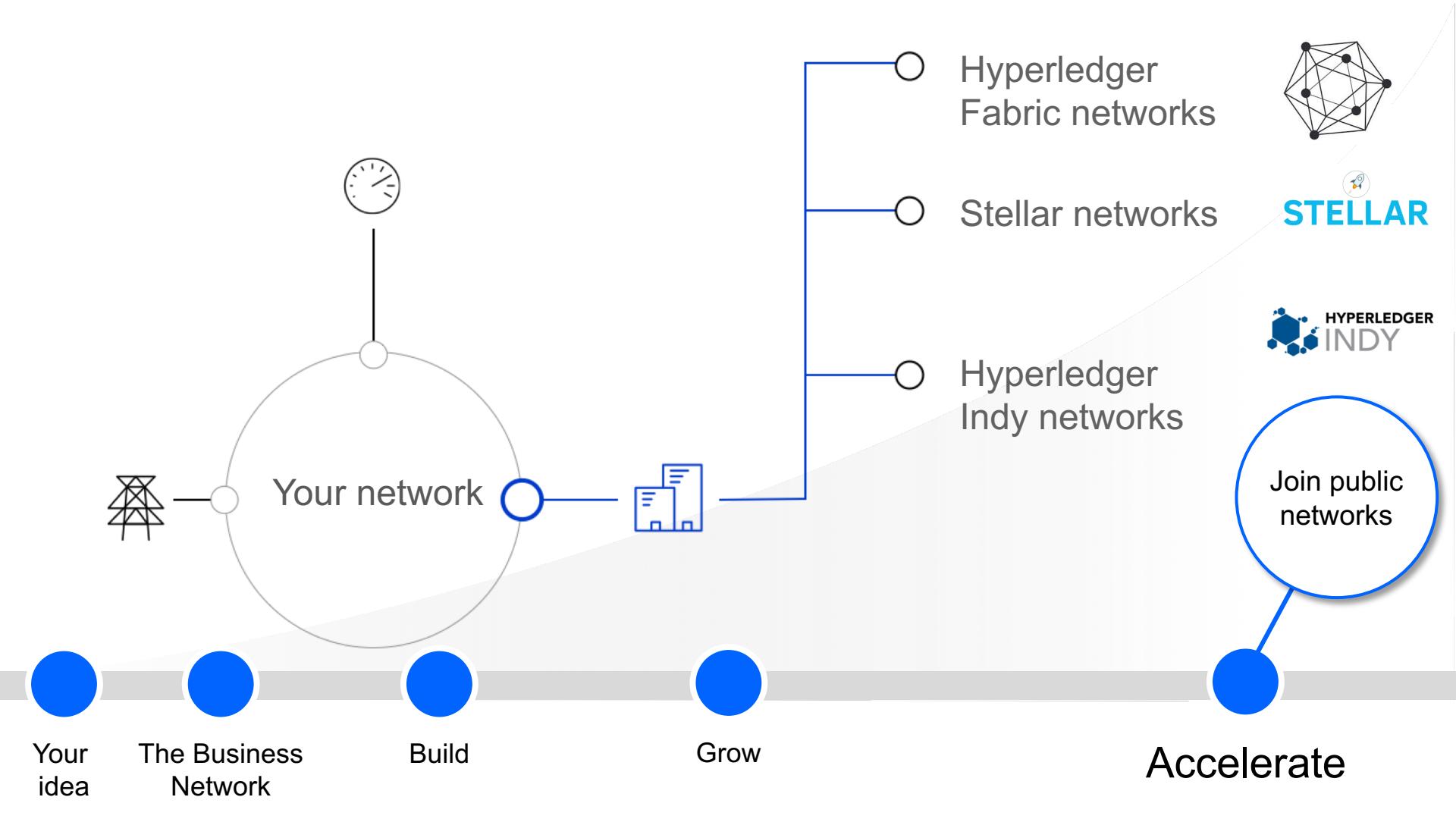
Build



Grow



Accelerate





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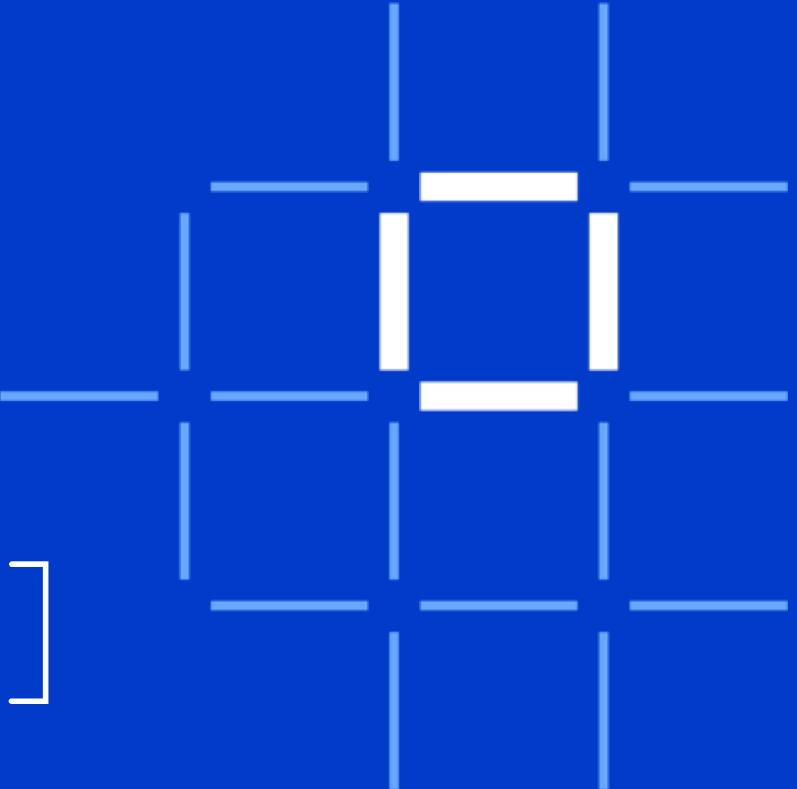
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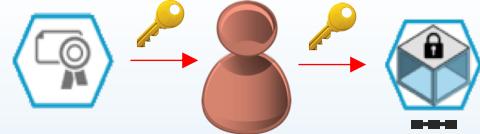
Blockchain Technical Concepts



Peers are the networked services that maintain ledger state and run smart contracts



Channels are defined subsets of the peer network that share a single ledger



Certificate authorities provide identity services to participants on the network



Smart contracts constitute the transaction logic whose output is agreed by the peer network

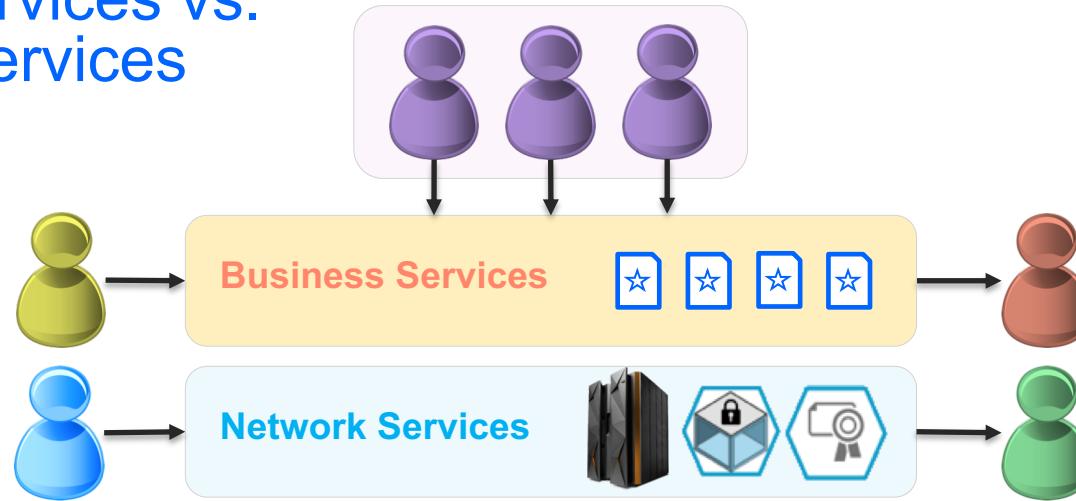


Consensus is the process by which agreement is obtained on the peer network



The **Ordering Service** agrees transaction sequence and distributes blocks to peers

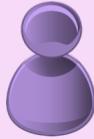
Network Services vs. Business Services



- A good enterprise architecture consists of **Network Services** and **Business Services**
 - Network Services provide a technical computing foundation
 - Business Services are an abstraction that provide meaningful business context
- A blockchain network also consists of Network Services and Business Services
 - Peers, Channels, Ordering Service, etc. are Network Services
 - Smart Contracts and the APIs that invoke them are Business Services
- Depending on their role, blockchain stakeholders each **provide** or **consume** these services...

Blockchain Participant Roles

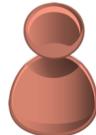
(A single organization may play multiple roles!)



End-user **runs** presentation logic
(e.g. on mobile device or dashboard)



Business Service Consumer **hosts** application and integration logic which invoke blockchain transactions



Business Service Provider **develops** blockchain business applications, including transaction, app server, integration and presentation logic

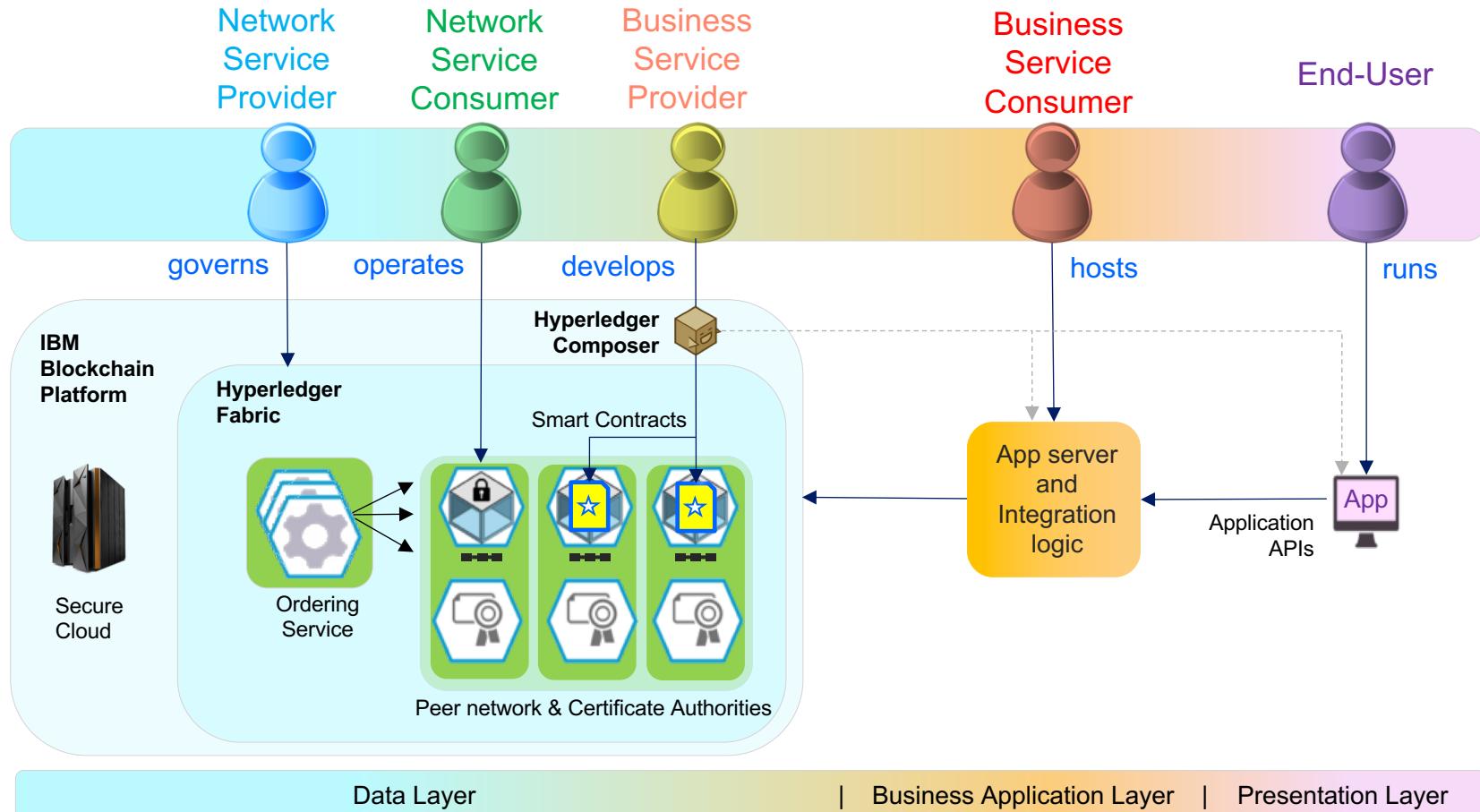


Network Service Consumer **operates** a set of peers and certificate authorities on the network; represents an organization on the business network



Network Service Provider **governs** changes to the network; a consortium of network members or designated authority

Network Architecture and Participant Roles



How End-Users interact with the blockchain

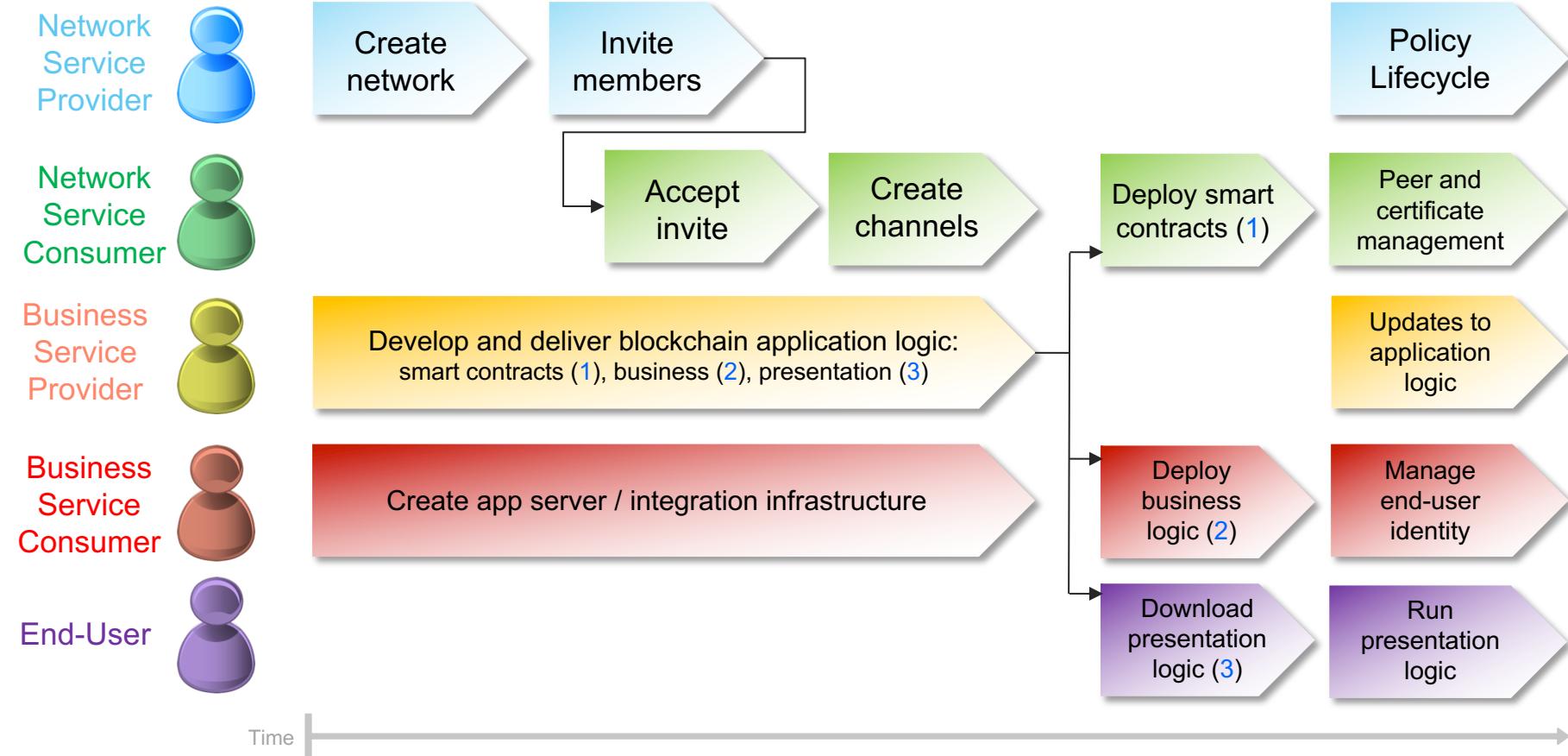
Exchange trustworthy information



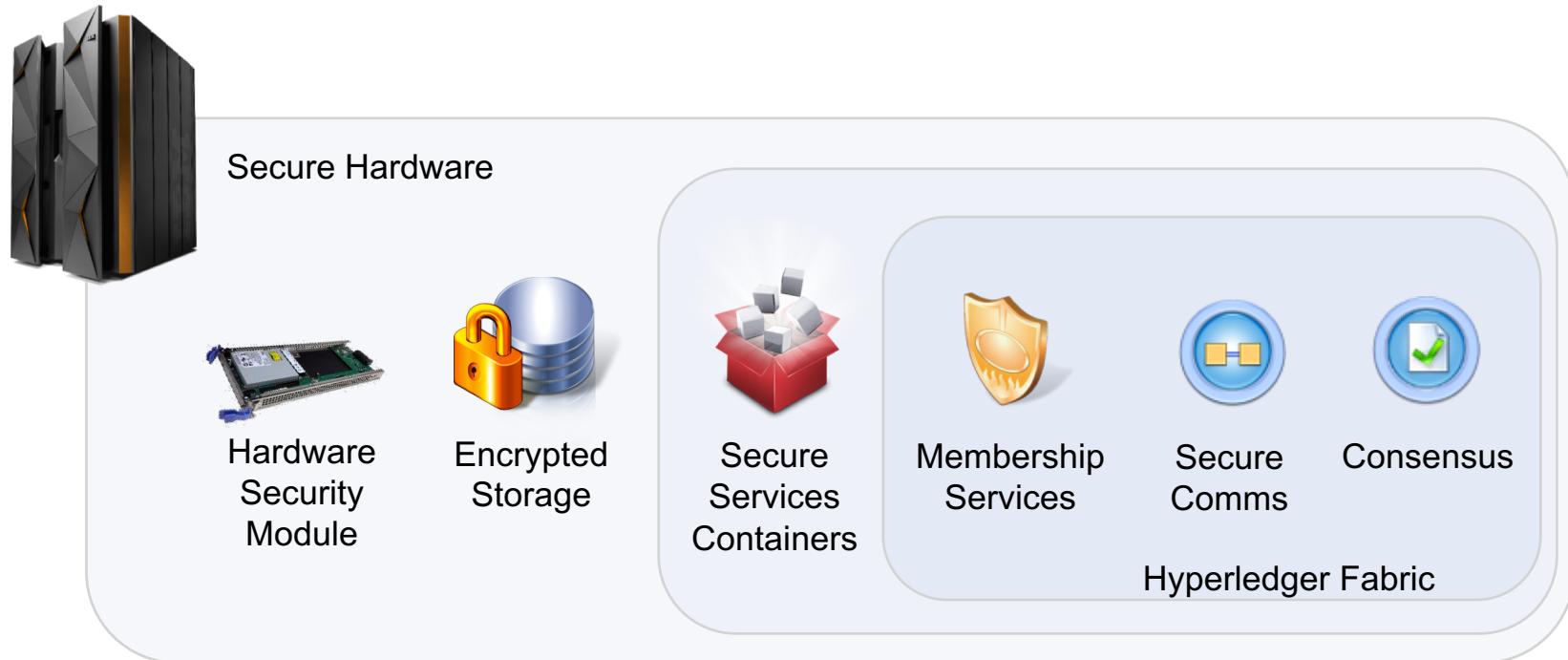
- End-users run presentation logic on an appropriate device
 - For example, mobile application or desktop dashboard
 - There may be multiple end-user applications (often one per organization or user role)
- The value proposition to end-users is that the information they see is **trustworthy**
 - Will probably be unaware of blockchain back-end
 - Uses an identity managed by the business application layer
- Many options for presentation logic implementation
 - IBM Blockchain Platform can use Hyperledger Composer to generate skeleton Angular or command-line applications
 - Application usually interacts with the business logic layer via REST

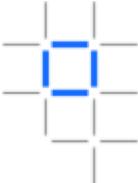
The screenshot displays a web-based application titled "FOOD SAFETY & TRACEABILITY on Blockchain". On the left, there's a search interface with fields for "Which product would you like to trace?", "Supplier Product Code (on the package)", and "Please enter the supplier product code". Below these fields, it shows "OQU0903 was produced on 05-04-2017" and "Here are the products using OQU0903 code: Cut Strawberry Mix Sell by 05-09-2017". To the right of the search interface is a map of Mexico and Guatemala, highlighting specific regions: PHS-220, Oaxaca and 167, Chiapas. At the bottom, a timeline shows the flow from "Orchard" (2 units) through "Packing House" (1 unit), "Importer" (1 unit), "Facility" (1 unit), "Retailer DC" (1 unit), and "Retailer Store" (2 units).

Workflow for Network Formation



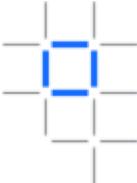
Security is implemented at each layer of the architecture





Further information

- Platform Information
 - <https://www.ibm.com/blockchain/platform/>
- Technical Overview
 - https://www-01.ibm.com/marketing/iwm/dre/signup?source=urx-20950&S_PKG=ov61731
- Platform Service
 - <https://console.bluemix.net/catalog/services/blockchain>
- Platform Service Level Agreement
 - [http://www-03.ibm.com/software/sla/sladb.nsf/pdf/6605-12/\\$file/i126-6605-12_11-2017_en_US.pdf](http://www-03.ibm.com/software/sla/sladb.nsf/pdf/6605-12/$file/i126-6605-12_11-2017_en_US.pdf)
- ISO Certification
 - https://www-935.ibm.com/services/multimedia/saas_27k.pdf
 - https://www-935.ibm.com/services/us/en/it-services/pdf/ibmcloud_27017.pdf
 - https://www-935.ibm.com/services/multimedia/ibmcloud_27018.pdf



Further information

- Hyperledger Fabric Official Docs
 - <https://hyperledger-fabric.readthedocs.io/en/release-1.1/>
- Hyperledger Composer Docs
 - <https://hyperledger.github.io/composer/latest/>
- Certifications
 - <https://developer.ibm.com/courses/all/category/blockchain/>



Thank you

Tito Garrido Ogando

titog@br.ibm.com

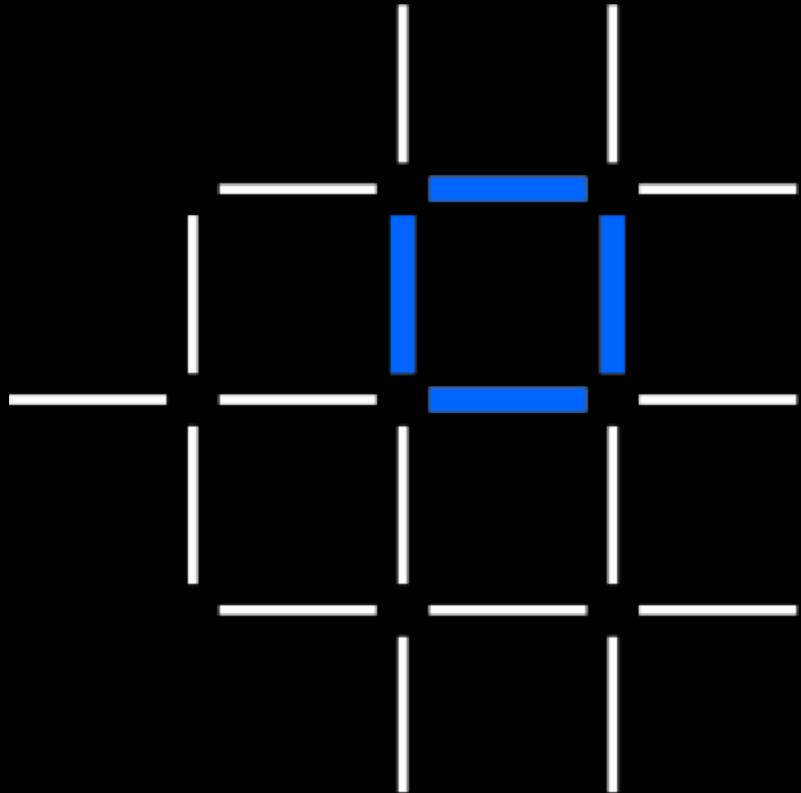
<https://www.linkedin.com/in/titogarrido/>

*Questions? Tweet us or
go to ibm.com/blockchain*

 @IBMBlockchain

 IBM Blockchain

 IBM Blockchain





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