IBM Blockchain Platform Explained

An Introduction to the IBM Blockchain Platform

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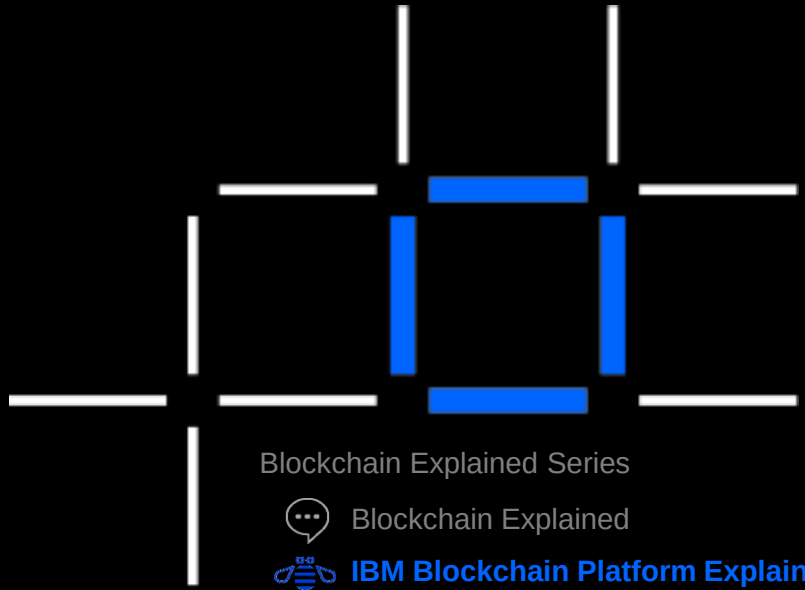


Blockchain Explained Series

- Blockchain Explained
- **IBM Blockchain Platform Explained**
- Solutions Explained
- Garage Explained
- Next Steps

V1.10, 23 May 2018

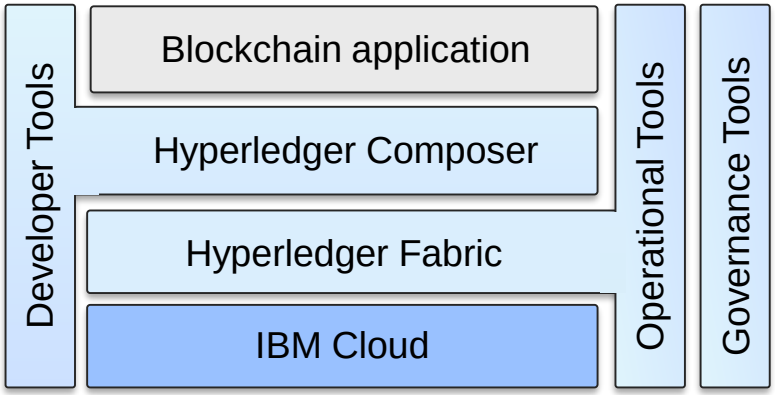
IBM **Blockchain**

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

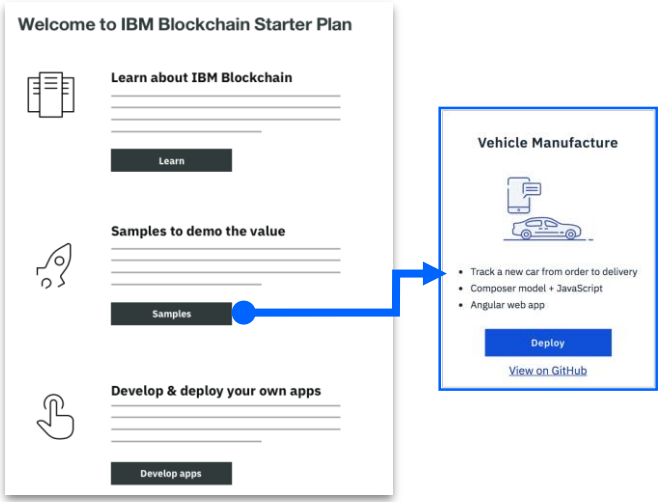
Plan	Key Features	Deployment
Starter	Easy on-ramp for blockchain-as-a-service	IBM Cloud
Enterprise	Production plan for industries comfortable with cloud	IBM Cloud
Enterprise +	Production plan for regulated industries, multi-region HA/DR and highest performance	IBM Cloud
Support-only	Supported instances 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**
  - Configured for two organizations with one peer each, sample applications and informational tutorials
  - Environment enables iterative development prior to production deployment
  - Same experience as Enterprise
    - Uses SOLO ordering for simplified configuration, development and testing

- Currently in beta, and free until generally available
  - After that time, sign up for 30 day free trial



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

Support-only Plans

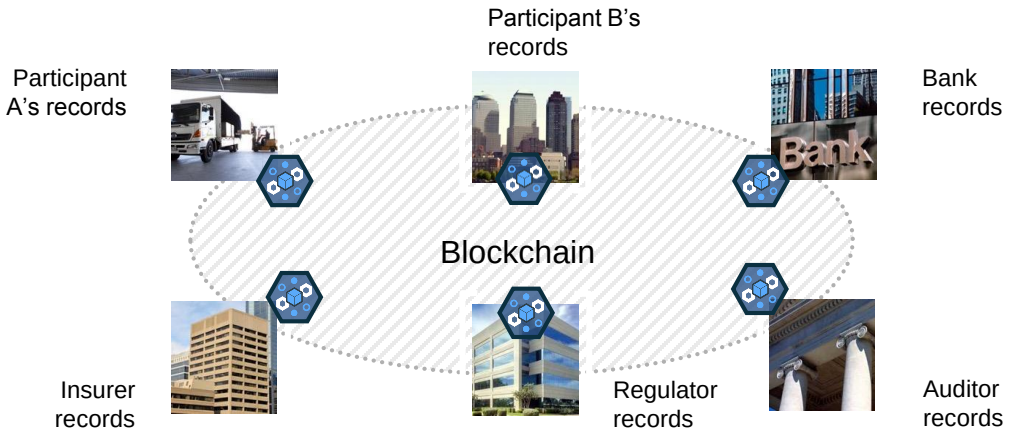
- Looking for **IBM support on Hyperledger Fabric or Composer**?
  - IBM produces signed Hyperledger Fabric images which can be supported for production usage outside of IBM Cloud
  - Hyperledger Composer supported within same plan
  - Available for LinuxONE (IBM Z), Power and x86 architectures
  - Subscription term one year

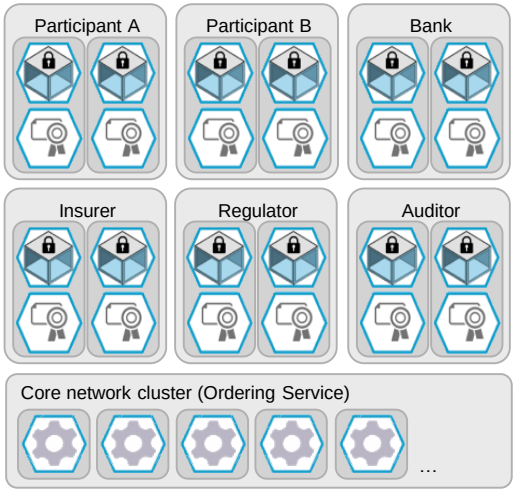
- **Elite tier** (5737-E89/DV13ALL)
  - Supported 24x7x365; response target within 2 business hours
  - Multiple technical contacts and developer assistance
  - Yearly cost $24,000 per peer

- **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

Example Network

- Consider an in-production blockchain business network comprising multiple organizations running Enterprise Plan on IBM Cloud
  - Each organization has two peers and two certificate authorities
  - Blockchain cost per organization (two peers + membership fee) = US$3000 per month
  - Support for IBM Cloud services @10% = US$300
  - Cost for one year per organization = 12 x US$3300 = US$39600





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

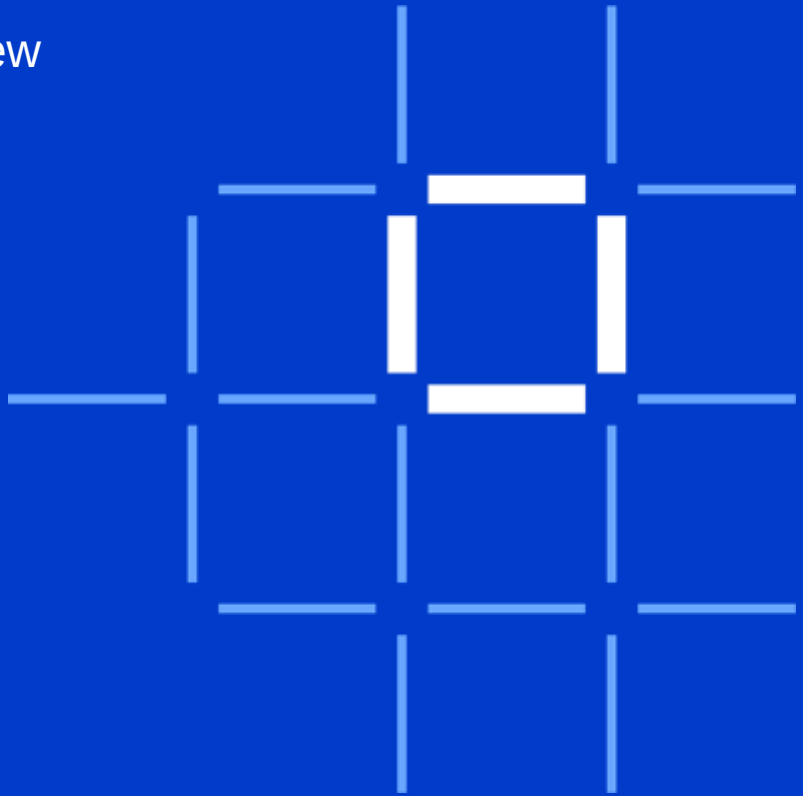
What you need to know

Getting Started - DEMO

The tools to make your blockchain real

Roadmap

IBM's blockchain strategy and where the platform is going



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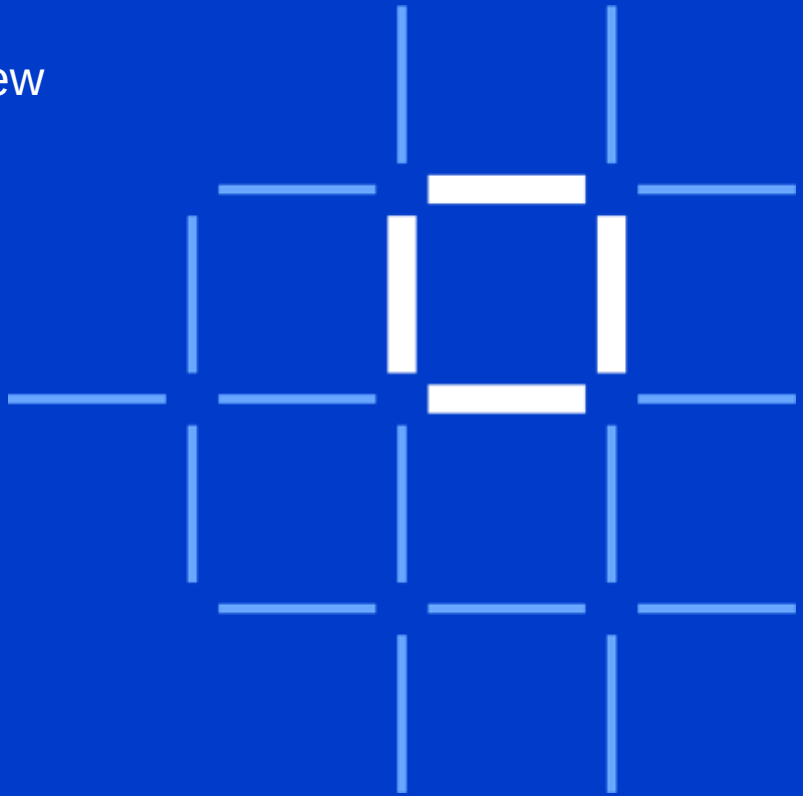
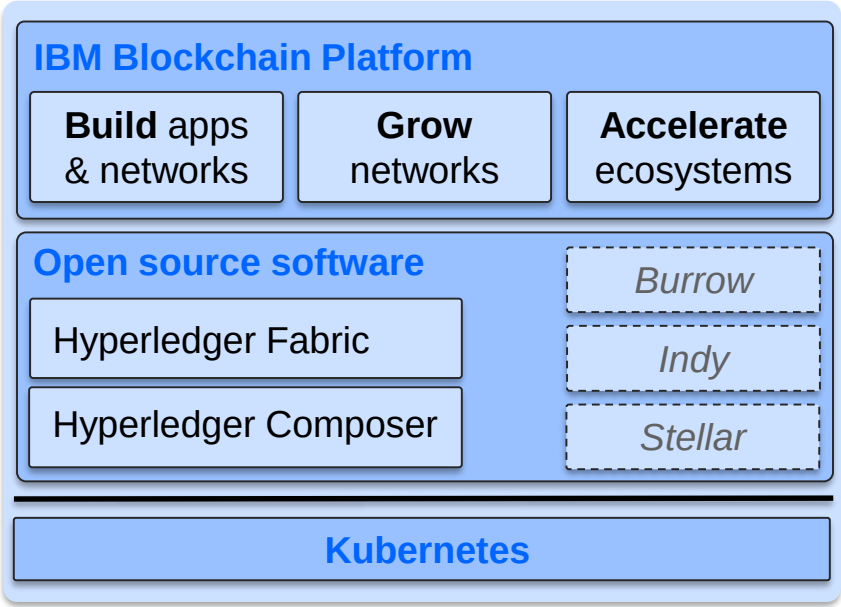


IBM Blockchain Platform – 2018 Strategy

IBM Blockchain Platform is the catalyst that enables true blockchain innovators to disrupt industries:

- **Best in market tools** to quickly build, launch, run enterprise applications on blockchain networks
- **Accelerated progression** path from POC to production by making it easy to create & join networks, integrate existing applications, and grow the ecosystem
- **Flexible deployment options** on Kubernetes architecture



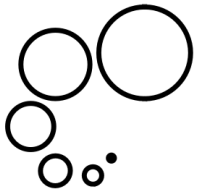
Under consideration

Core Capabilities for 2018

The IBM Blockchain Platform will give users the ability to…

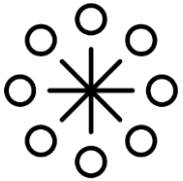
Build Apps & Networks

- **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

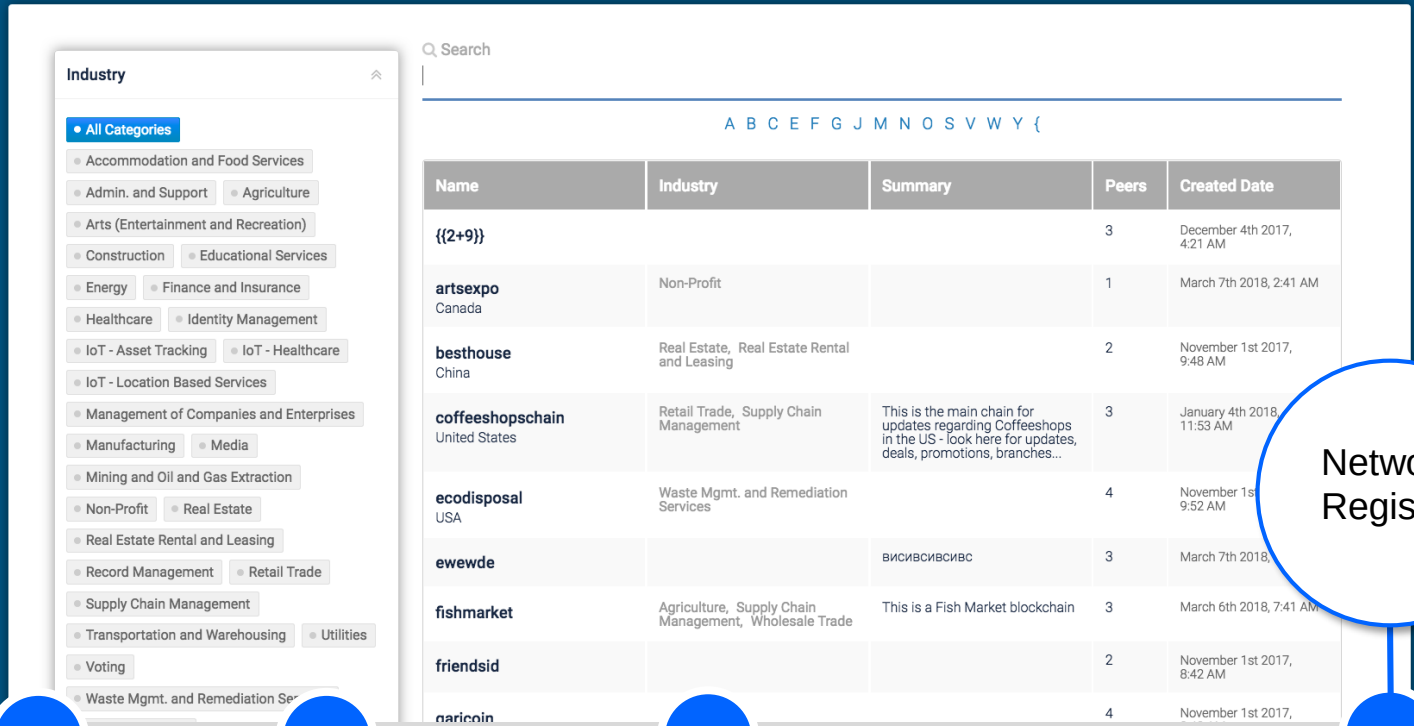


Accelerate Ecosystems

- **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



Network Registry

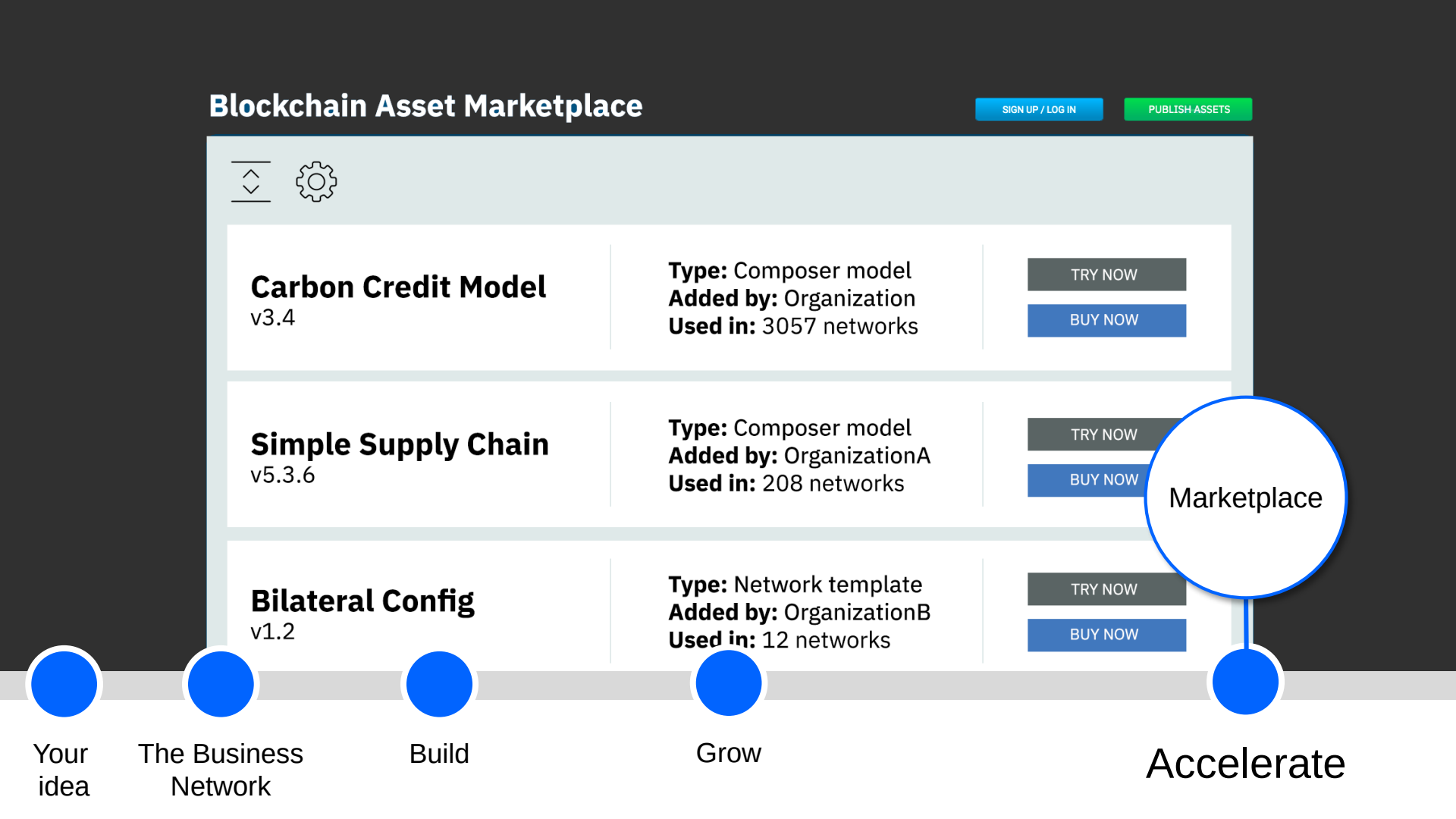
Your idea

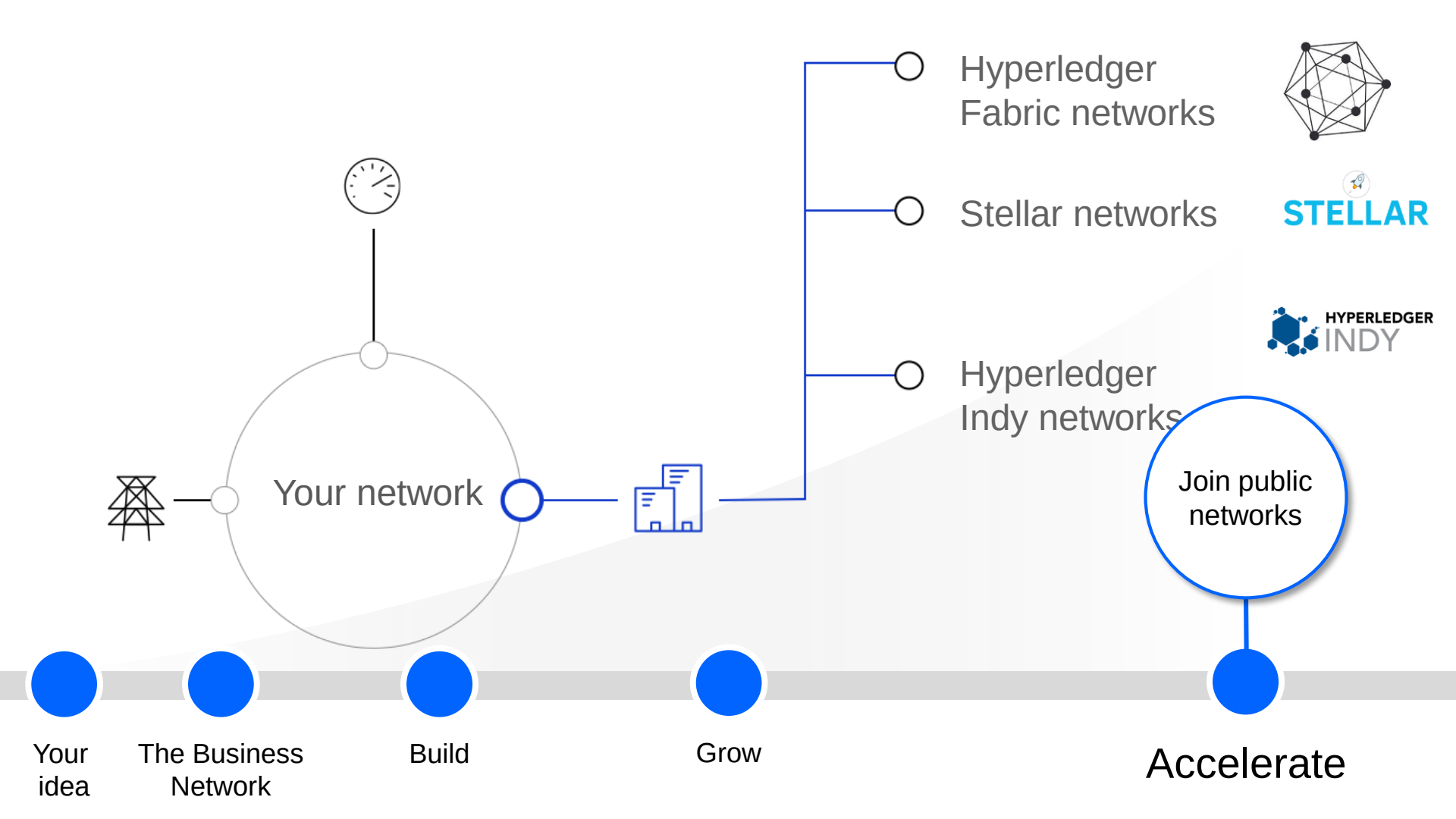
The Business Network

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


Hyperledger
Fabric networks
Stellar networks
STELLAR
HYPERLEDGER
INDY
Hyperledger
Indy networks
Your network
Join public
networks
Your
idea
The Business
Network
Build
Grow
Accelerate

IBP capabilities available in flexible deployments

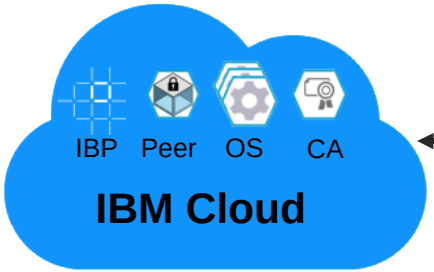
Simplicity ← → Flexibility

SaaS

Available now: $

- **Use:** Dev/ Test and Production
- **Infrastructure:** Pre-defined by IBM Cloud
- **Configuration**: Default with optionality
- **Software lifecycle:** IBM
- **Geo Location:** Defined by IBM
- **Business continuity:** Basic
- **Compatibility:** All

Pricing/ Packaging/ RFP: Andy Whalen

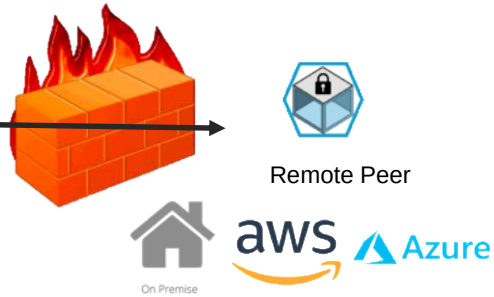


Hybrid PaaS

Available Q2/Q3: $$

- **Use:** Dev/test and production
- **Infrastructure:** OSS: On-prem, AWS, MSFT, Google
  IBP: IBM Cloud with customizable options
- **Configuration**: Default with optionality
- **Software lifecycle:** IBM manages IBP; Client OSS
- **Geo Location:** IBP choice of geo, region, zone
- **Business continuity:** DR option
- **Compatibility:** All

Pricing/ Packaging/ RFP: Lukas Staniszewski

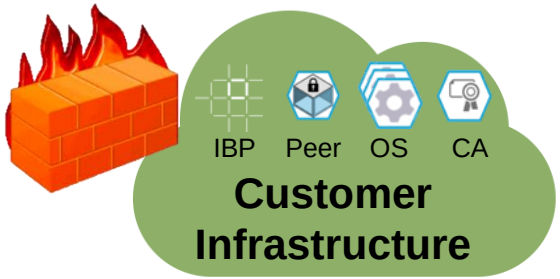


License (On-

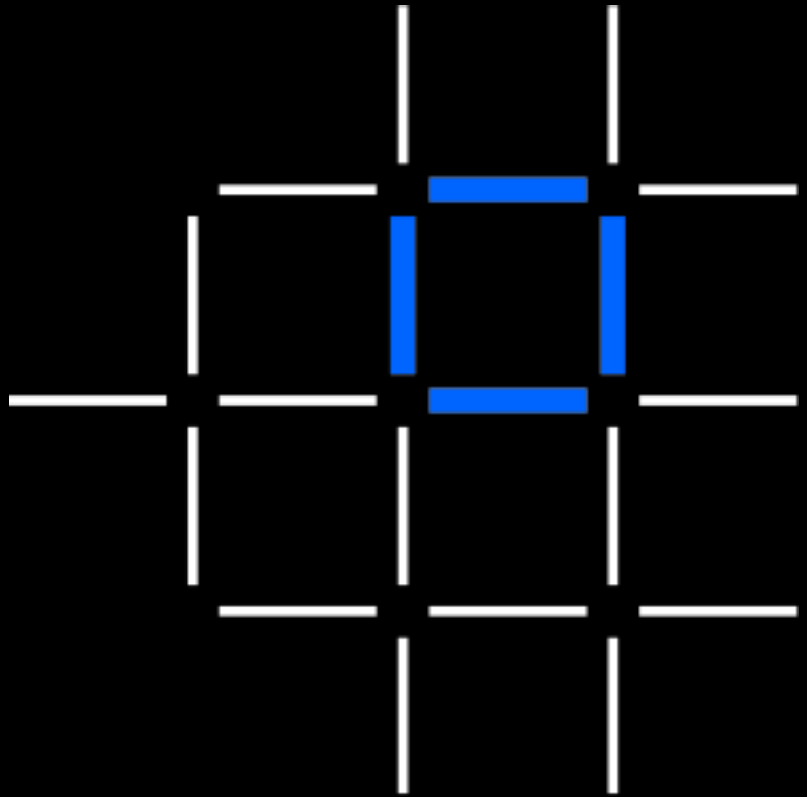
Available Q3/Q4: $$$

- **Use:** Dev/ test and production
  Infrastructure: Client owned & managed
- **Configuration**: Client managed
- **Software lifecycle:** Client managed (compatibility guidelines apply)
  Geo Location: Client managed
- **Business continuity:** Client managed
- **Compatibility:** All

Pricing/ Packaging/ RFP: Lukas Staniszewski



Thank you



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

@IBMBlockchain

IBM Blockchain

IBM Blockchain

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

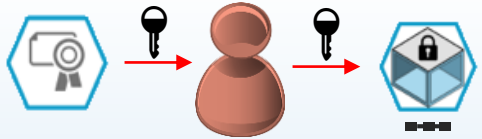
Technical Details

The architecture behind IBM Blockchain Platform

Blockchain 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



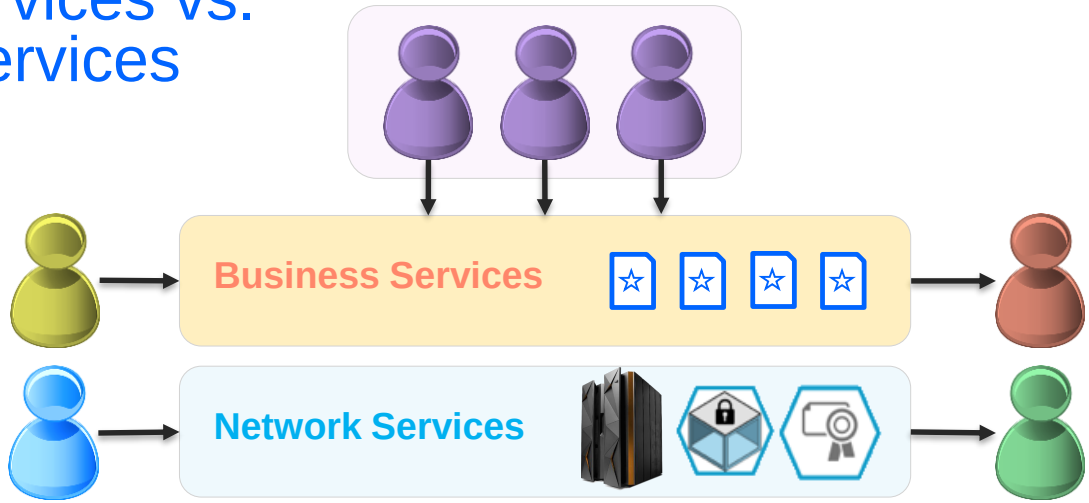
Certificate authorities provide identity services to participants on the network

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



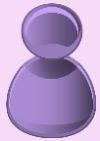
- A good enterprise architecture consists of Network Services and Business Services
  - Network Services provide a technical computing foundation
  - Business Services are an abstraction that provide meaningful business context

- 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

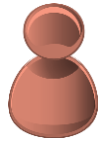
- Depending on their role, blockchain stakeholders each **provide** or **consume** these services…

Blockchain Participant Roles

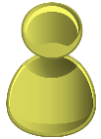
(A single organization may play multiple roles!)



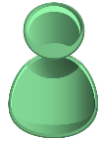
End-user **runs** presentation logic
(e.g. on mobile device or dashboard)



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



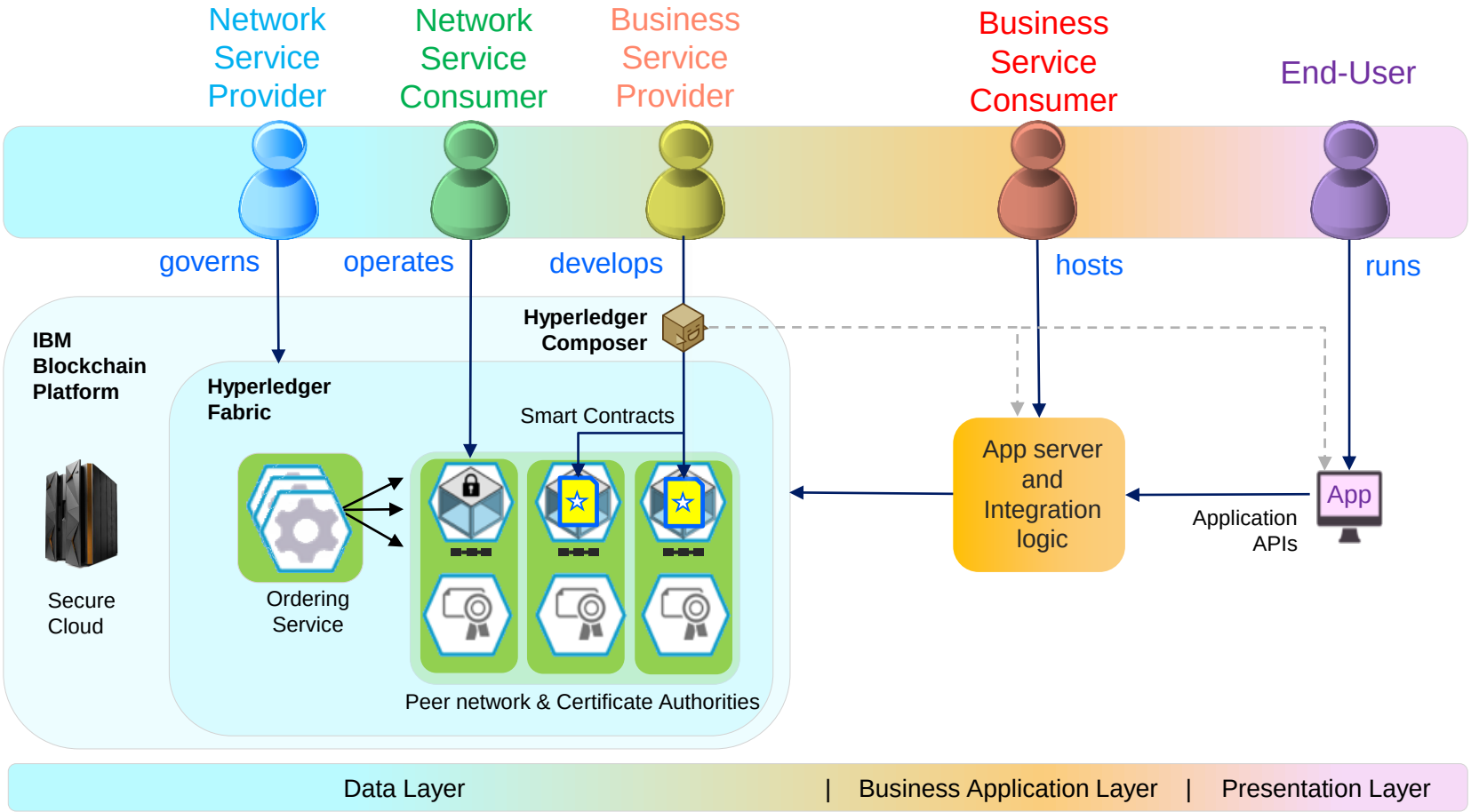
Business Service Provider **develops** blockchain business applications, including transaction, app server, integration and presentation logic



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

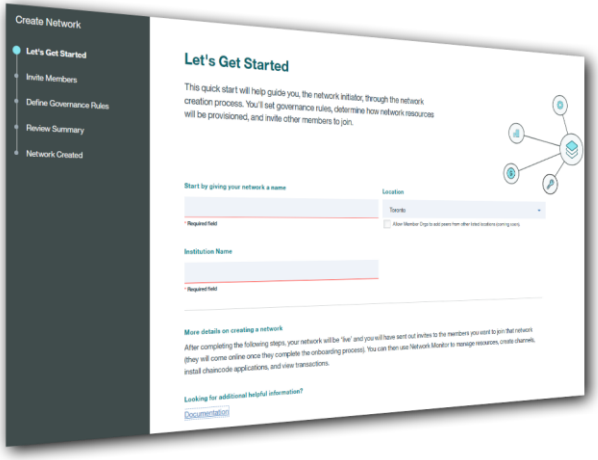
Network Service Provider **governs** changes to the network;
a consortium of network members or designated authority

Network Architecture and Participant Roles

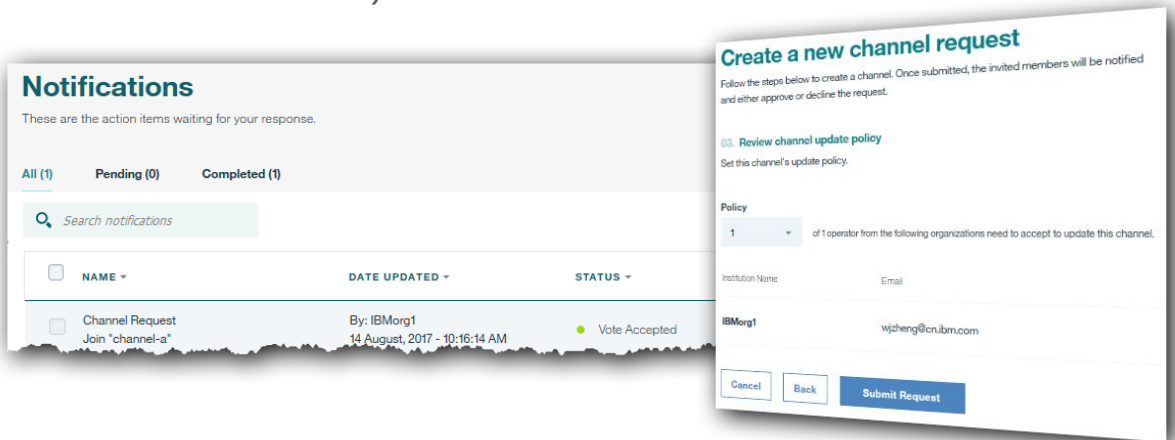


IBM Blockchain Platform for Network Service Providers

Governance of changes to the blockchain network

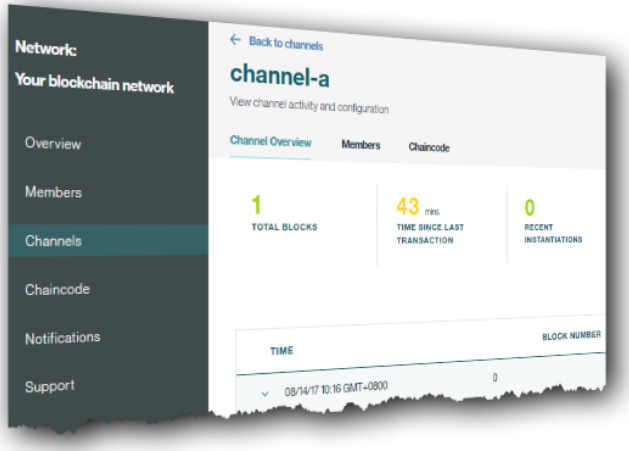


- Network Service Providers play a vital role in a blockchain network
  - Initiating the network
  - Creating membership, channel and smart contract policies
- Typically covers **changes to the network**; common recurring tasks (e.g. certificate management) are managed by Network Service Consumers
- Either centralized (e.g. industry regulator) or decentralized (e.g. members of a consortium)
- Democratic voting policies handled through Notifications UI
  - Accept/Reject proposals
  - Review completed items

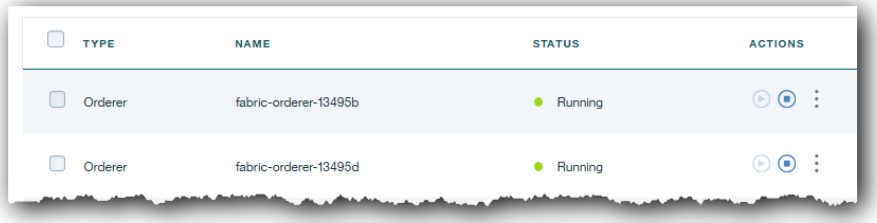


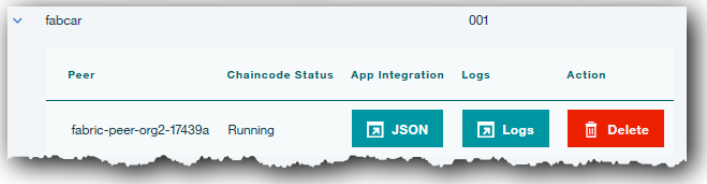
IBM Blockchain Platform for Network Service Consumers

Operate a subset of peers in a blockchain network



- Network Service Consumers operate an organization's peers and certificate authorities
  - Installing and instantiating smart contracts
  - Managing certificates for Business Service Consumers in their organization
  - Monitoring network resources
  - Creating channels (in accordance with defined policies)

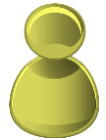




- All administrative tasks accessible through web UI
  - Covers members, channels, smart contracts…
  - Full access to APIs and logs for transparent problem determination

IBM Blockchain Platform for Business Service Providers

Develop blockchain applications



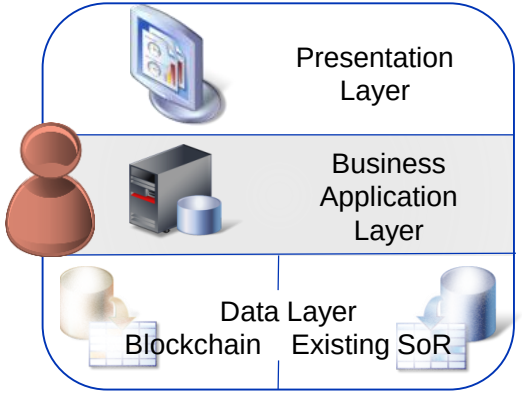
- A blockchain application consists of three components:
  - **Smart contracts**: transaction logic run on the distributed peer network (e.g. Composer BNA file)
  - **Business logic**: business applications and integration services that invoke smart contracts
  - **Presentation logic**: client applications run by end-users of the system

- The role of Business Service Providers is to develop these components
  - Separation of concerns between business logic and blockchain network (the what and the where)

  - **Hyperledger Composer** comprises a set of tools for rapid blockchain application development
    - Smart contracts: deployed to the IBM Blockchain Platform as chaincode
    - Business logic: deployed to application server/integration tier
    - Presentation logic: made available to end-users

The role of Business Service Consumers

Host applications and integration services that invoke smart contracts



- Business Service Consumers are typically responsible for two things:
  - Hosting business logic that invokes smart contracts running on IBM Blockchain Platform
  - Managing End-User identity
- Business logic is **hosted on an application server**
  - Either off-premises (e.g. IBM Cloud) or on-premises
  - Typically connect via integration middleware (e.g. IBM Integration Bus)
- Invokes appropriate APIs to invoke smart contracts in the usual way
  - End-users authenticate and cause blockchain transactions to be invoked using a proxy identity provided by the Network Service Consumer's certificate authority
  - Multiple applications can interact with the same blockchain
- Consider implementing a **shadow chain** and running existing systems of record in parallel
  - Allows for staged onboarding of new members and mitigation of risk

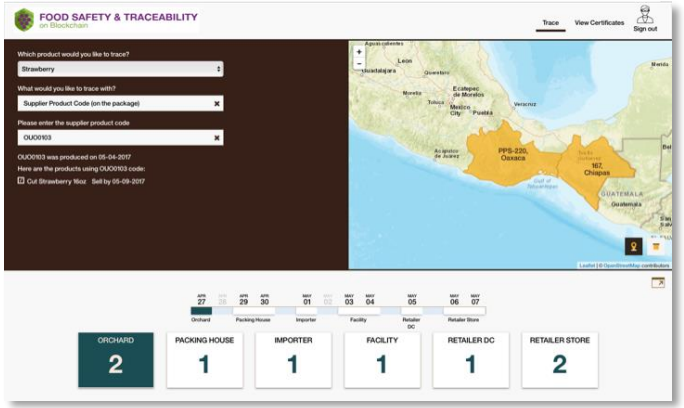
How End-Users interact with the blockchain

Exchange trustworthy information

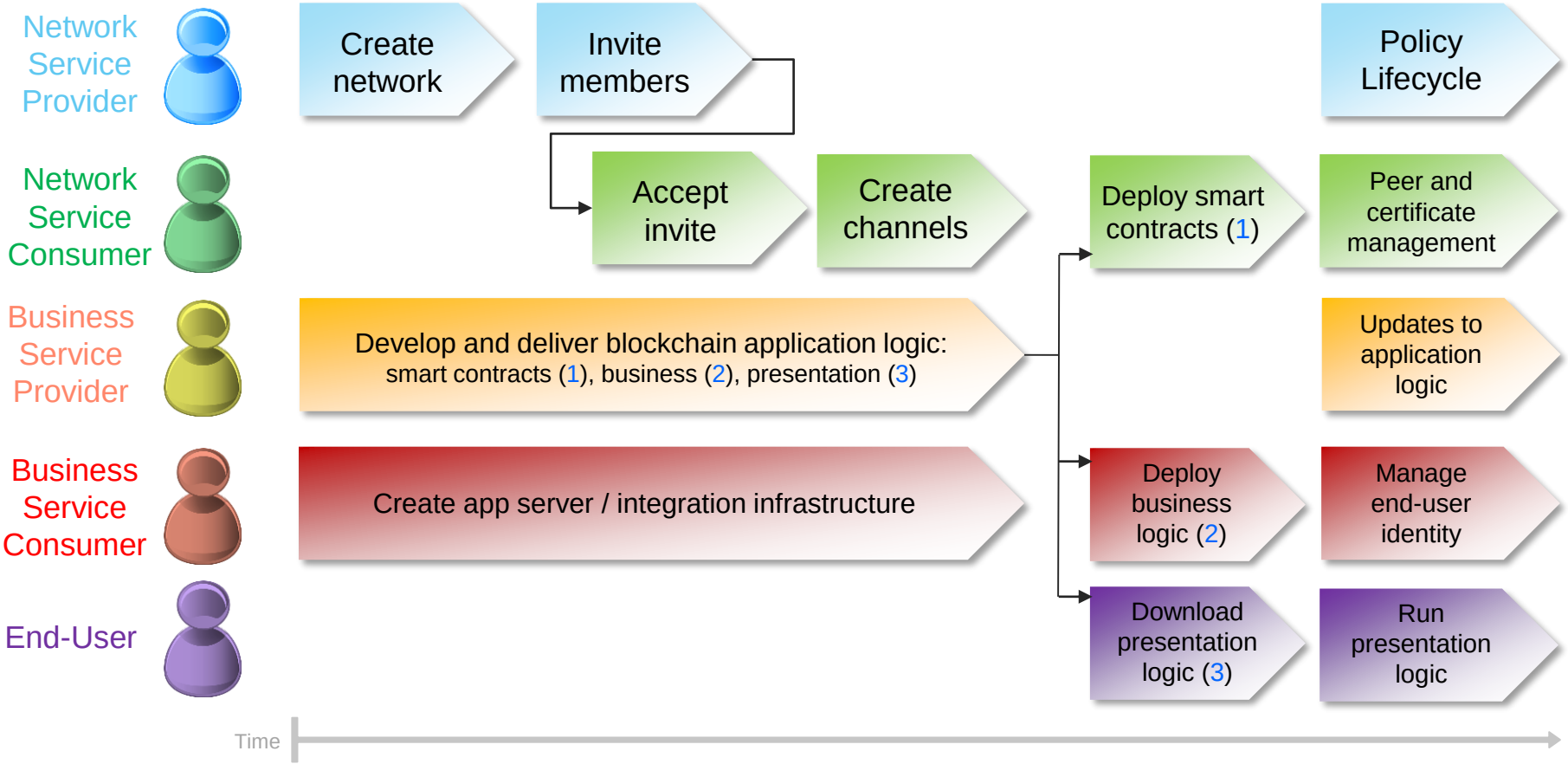
- End-users run presentation logic on an appropriate device
  - For example, mobile application or desktop dashboard
  - There may be multiple end-user applications (often one per organization or user role)

- 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

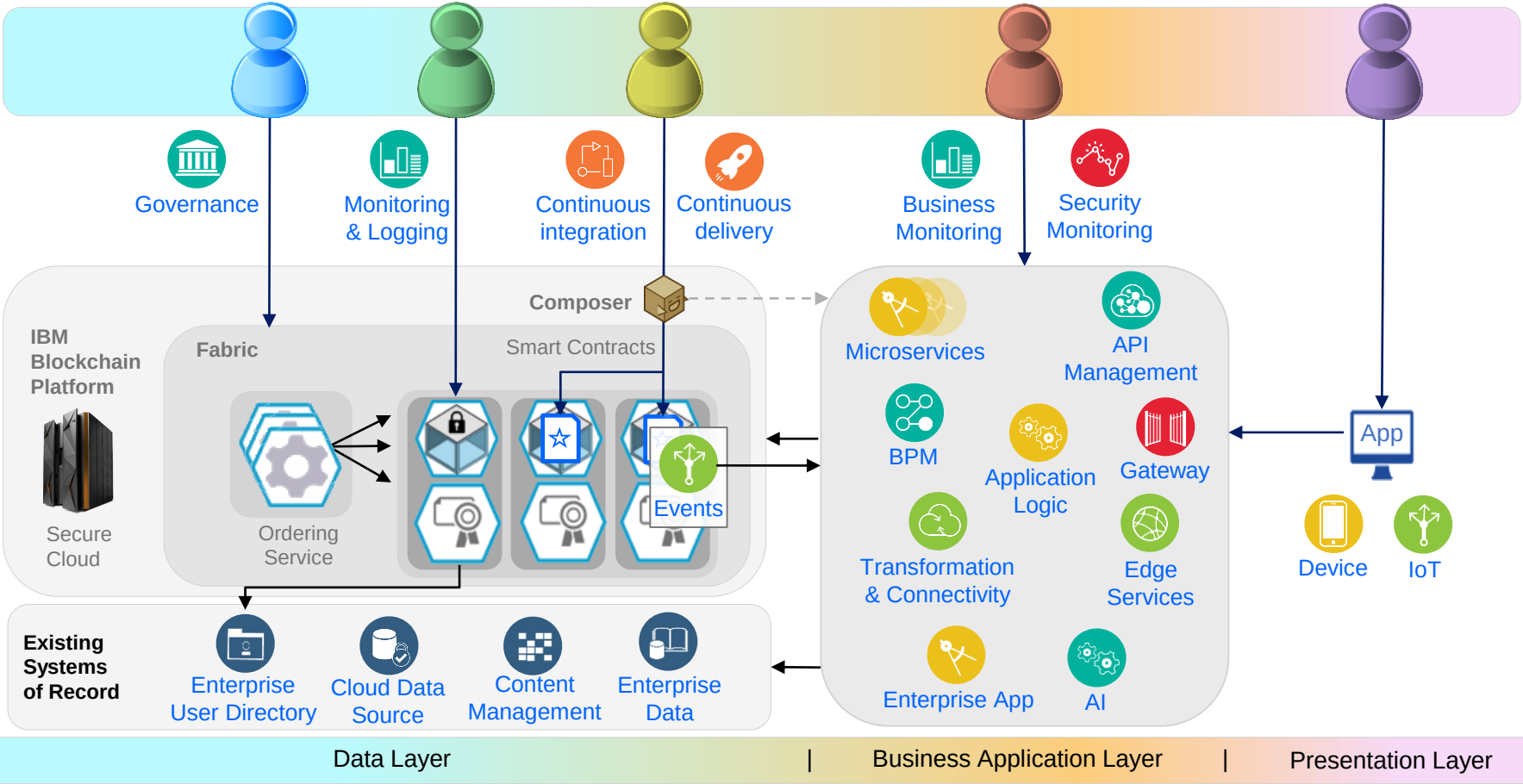
- Many options for presentation logic implementation
  - IBM Blockchain Platform can use Hyperledger Composer to generate skeleton Angular or command-line applications
  - Application usually interacts with the business logic layer via REST



Workflow for Network Formation



How the architecture fits with enterprise services and processes



Security is implemented at each layer of the architecture

Secure Hardware

Hardware Security Module

Encrypted Storage

Secure Services Containers

Membership Services

Secure Comms

Consensus

Hyperledger Fabric

Security is implemented at each layer of the architecture

- Hyperledger Fabric
  - Membership Services: Organizations are invited to join and authenticated using an Enrollment Certificate
  - Transaction Consensus: Each transaction is endorsed and validated by multiple peers before committing to the ledger
  - Controlled Ledger Access: Channels restrict transactions to a set of organizations that are shared on the ledger
  - Secure Communications: Between the end-user application and smart contract is secure
  - Extensive security scans and audits performed by IBM, and independently by IBM and Linux Foundation sponsored 3rd-party penetration testing and code audits

- Secure Service Containers
  - Secure appliance framework providing infrastructure services encapsulating the Hyperledger Fabric
  - No root access: Access system and software only through API's; even trusted administrators
  - Impervious to the injection of malware: Installed from encrypted, signed boot image
  - Data Privacy: Encryption of data in flight and at rest on the ledger

- Secure Performant Hardware
  - Hardware Security Module (HSM) is certified to FIPS 140-2 level 4
  - Fastest cryptographic acceleration: used by block hashing and digital signatures

Continuing your blockchain journey…

Business Stakeholder

- Request a business value assessment from IBM
- Prove out technology with a first project

Blockchain BVA

Solution Architect

- Learn about blockchain use-cases and references
- Understand blockchain solution best practices

Blockchain Solutions

Developer

- Play with IBM Blockchain Developer Tools
- Learn about Hyperledger Composer

Blockchain Composed

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
- ISO Certification
  - https://www-935.ibm.com/services/multimedia/saas_27k.pdf
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