Release

Open source is one of the most successful enablers of global innovation in history

Linux Foundation: More Than Linux

› **1500+** Members From 40+ Countries

› **100%** of Fortune100 Tech & Telecom

› **30000+** Developers Contributing Code

› **200+** Open Source Projects

› **$16B+** Shared Value

Security	Let's Encrypt	CORE INFRASTRUCTURE INITIATIVE	
Networking	LF NETWORKING	ONAP	OPEN DAYLIGHT
Cloud	kubernetes	CLOUD FOUNDRY	CLOUD NATIVE COMPUTING FOUNDATION
Automotive	AUTOMOTIVE GRADE LINUX		
Blockchain	HYPERLEDGER		
Edge/IoT	LF EDGE	yocto PROJECT	Zephyr
Web	node JS	JS Foundation	GraphQL
AI	LF AI		
Film	ASWF ACADEMY SOFTWARE FOUNDATION		
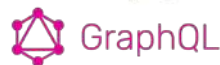
THE **LINUX** FOUNDATION

Linux has grown into the most important software platform in the world

100%	82%	2nd	90%	90%	62%	#1
Supercomputer Market	Smartphone Market Share	To Windows in Enterprise	Mainframe Customers	Public Cloud Workload	Embedded Systems Market	Internet Client
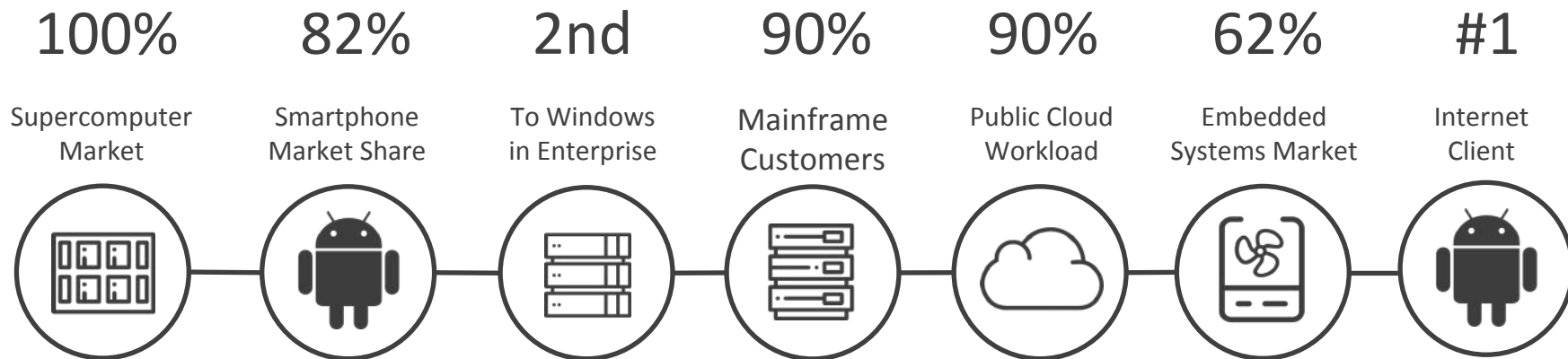
Linux eventually dominates every market it enters

The Linux Foundation is a critical part of the tech ecosystem

1320+
Members From
41 Countries

100%
of Fortune 100
Tech & Telecom

30,000+
Developers
Contributing Code

150+
Open Source
Projects

$16B+
Shared
Value

A new member joins the Linux Foundation every day

Today the Linux Foundation is much more than Linux

Security
We are helping global privacy and security through a program to encrypt the entire internet.

Networking
We are creating ecosystems around networking to improve agility in the evolving software-defined datacenter.

Cloud
We are creating a portability layer for the cloud, driving de facto standards and developing the orchestration layer for all clouds.

Automotive
We are creating the platform for infotainment in the auto industry that can be expanded into instrument clusters and telematics systems.

Blockchain
We are creating a permanent, secure distributed ledger that makes it easier to create cost-efficient, decentralized business networks.

Web
We are providing the application development framework for next generation web, mobile, serverless, and IoT applications.

We are regularly adding projects; for the most up-to-date listing of all projects visit tlfprojects.org

THE LINUX FOUNDATION

So what Is Hyperledger?

Open source
collaborative effort
to advance cross-
industry **blockchain
technologies**

Hosted by
The Linux Foundation

Global collaboration
spanning developers
and employers in
finance, technology,
supply chain,
healthcare and more

HYPERLEDGER
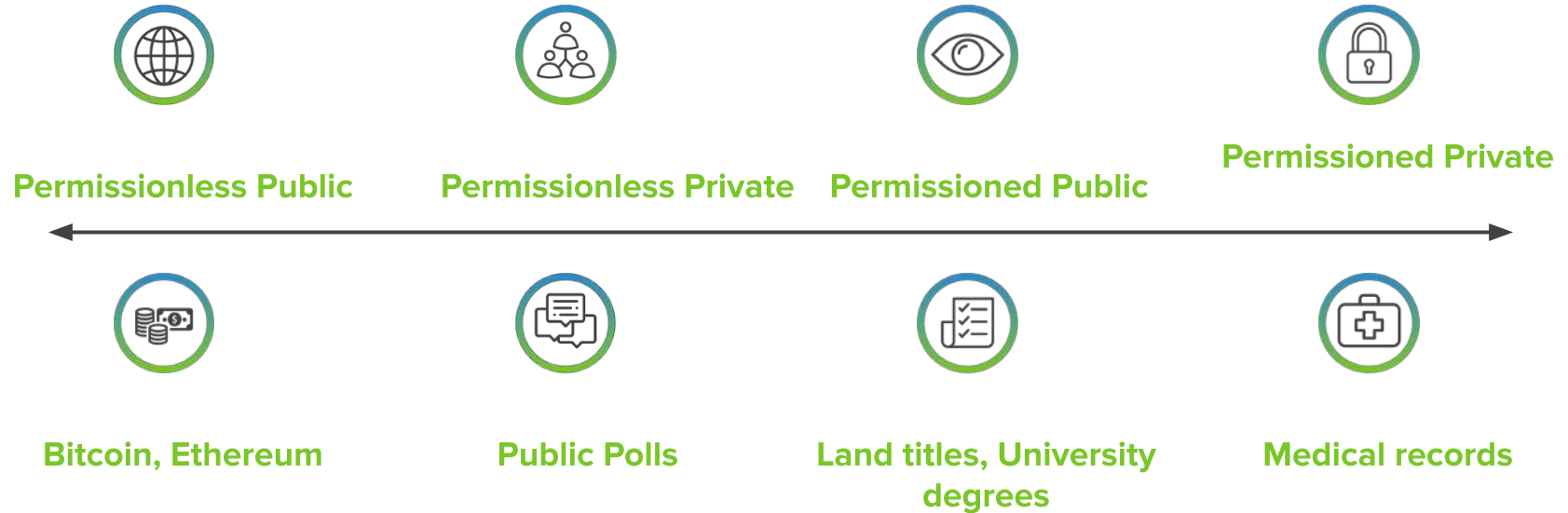BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

Everyone wants their own DLT

Worldwide spending on blockchain solutions is forecast to be nearly $2.9 billion in 2019, before surging to $12.4 billion in 2022.

Report by WEF 2019

White Paper

Building Value with Blockchain Technology:
How to Evaluate Blockchain's Benefits

In collaboration with Accenture

July 2019

WORLD ECONOMIC FORUM

COMMITTED TO IMPROVING THE STATE OF THE WORLD

HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

Spectrum of Blockchains

Permissioned vs. Permissionless: Who can write to a Blockchain (i.e., accessibility)
Public vs. Private: Who can read from a Blockchain (i.e., visibility)

Permissionless Public

Permissionless Private

Permissioned Public

Permissioned Private

Bitcoin, Ethereum

Public Polls

Land titles, University degrees

Medical records

HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

A Network of Ledgers - Networks of Networks

Financial Services

Bank wires. Equity trading. Mortgage underwriting. KYC/AML. P2P Lending. Collateral trades. Insurance and reinsurance.

Supply Chain

Provenance tracking. Trade Finance. Cutting bureaucracy at ports and customs. IoT to detect poor shipping conditions. Title tracking for high value goods.
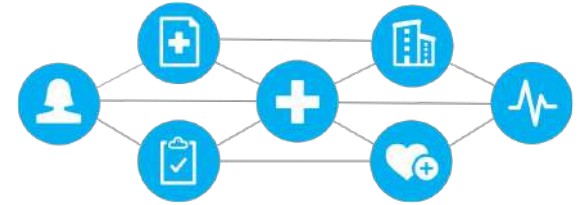
Healthcare

Provider directories and certification. Patient-driven health record sharing. Insurance claims processes. Pharma supply chain.

Trust networks need open source

Hyperledger Momentum

3.5
Years since launch

5
Libraries

4
Tools

6
Distributed Ledgers

3
1.0+ Production Releases

280+
Members
(50+ in China)

15
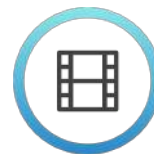Active Community Working Groups & Special Interest Groups

175+
Meetups Worldwide
(75+ countries)

62K+
Meetup Participants

2,000+
Media Clips Per Month

HYPERLEDGER
BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

Open Source Collaboration

The Hyperledger technical community is 100% open.

It is never pay-to-play at Hyperledger. Anyone can participate whether your company is a member or not. Our collaborative software development approach ensures the transparency of the process, and a market focus required to bring blockchain technology forward to commercial adoption.

Hyperledger is led by a diverse group of technical contributors.

Governed by technical merit and a principle of "do-ocracy", Hyperledger projects see contributions from many different developers and the companies who employ them. Contributions undergo a rigorous peer review process, but are welcome from anyone. Participation is global.

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Architecture of Hyperledger Projects

Available Tools

- Common software license: Apache v2
- Common IP framework: the Developer Certificate of Origin
- Collaboration tools (Gerrit, Jira, Chat, email)
- Promotion and branding
- Security processes and practices for bugs

A Team of Developer Volunteers

- Build code in the open
- Manage individual roadmaps and release schedules
- Responsible for following Hyperledger policies and requirements
- Align modular code with other projects

Infrastructure from The Linux Foundation

- Executive Director
- Business Operations
- Technical Staff for Security, Ecosystem and Community Development
- Communications Staff for Marketing, PR and Events
- Legal Counsel
- Membership Sales

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Hyperledger has a modular approach to hosting software projects. Think of Hyperledger as a **greenhouse** for developing business blockchain projects from initial experiment in Labs (seed) to stable code ready for production (fruition).

The Hyperledger Greenhouse
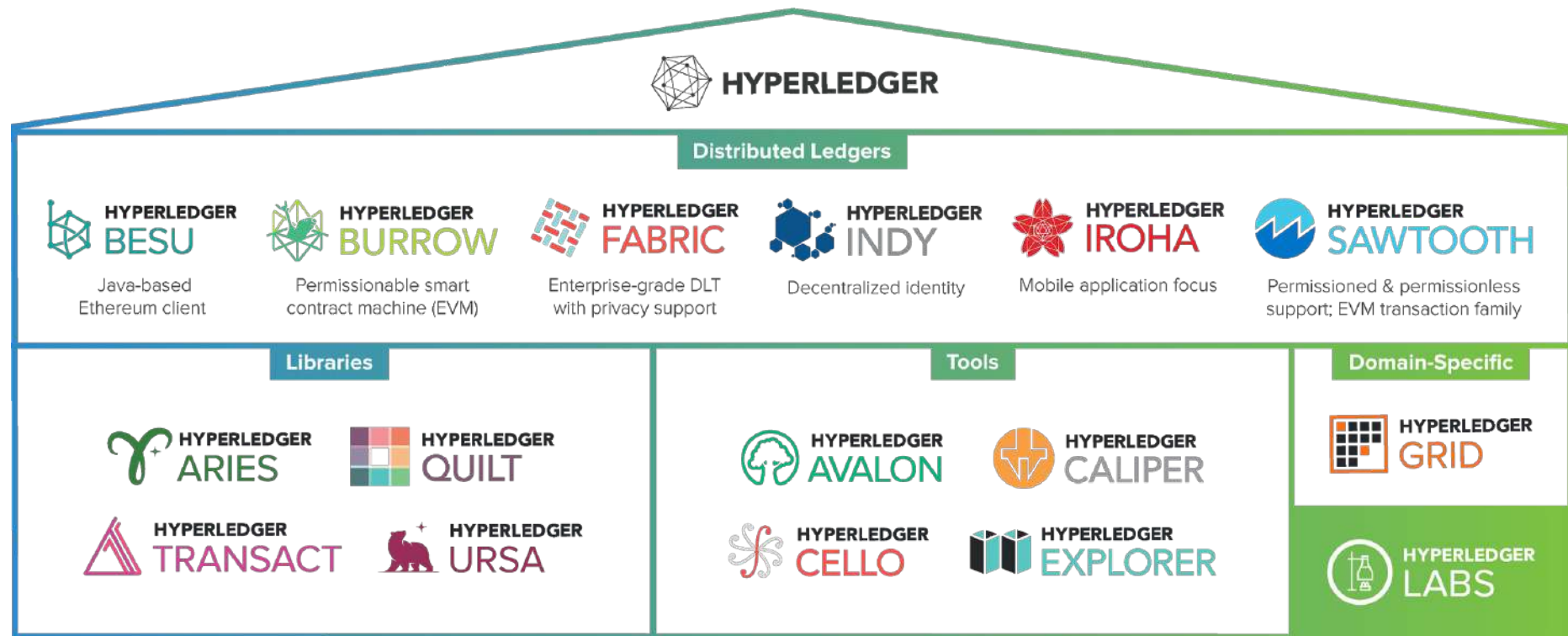
Distributed Ledgers

Frameworks that are basis for products and solutions. Differ in programming and smart contract languages, consensus and governance mode

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BLOCKCHAIN TECHNOLOGIES FOR BUSINESS
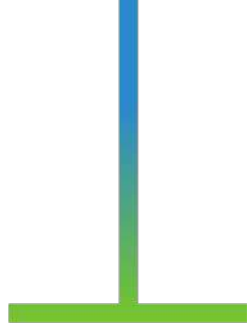
Project	HYPERLEDGER FABRIC
Status	ACTIVE
CII Badge	cii best practices passing
Description	Distributed ledger in Golang

Platform for developing blockchain networks with a modular architecture for consensus and membership services.
Fabric 1.4.1 and 2.0-alpha released in April.
200+ devs across 100+ companies contributing.
~Hundreds of pilot and production networks deployed.
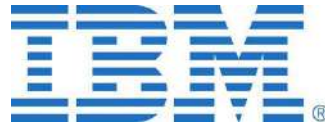
Hyperledger Fabric: Now Across All Major Clouds

Project	HYPERLEDGER SAWTOOTH
Status	ACTIVE
CII Badge	cii best practices passing
Description	Distributed ledger with Multi-Language Support

A modular platform for building, deploying, and running distributed ledgers. Hyperledger Sawtooth includes a novel consensus algorithm, Proof of Elapsed Time (PoET), which targets large distributed validator populations with minimal resource consumption. Hyperledger's second project, released as 1.0 in January 2018 and 1.1 in Dec 2018. Supports Solidity/EVM smart contracts by linking with HL Burrow.

Project	HYPERLEDGER INDY
Status	ACTIVE
CII Badge	cii best practices passing
Description	Distributed ledger purpose-built for decentralized identity

Tools, libraries, and reusable components for providing digital identities rooted on blockchains or other distributed ledgers so that they are interoperable across administrative domains, applications, and any other silo. Utilizes zero-knowledge proofs to provide verifiable claims which can be used to prove something about the identity without providing access to the underlying data

Project	HYPERLEDGER BURROW
Status	INCUBATION
CII Badge	cii best practices in progress 82%
Description	Permissioned Ethereum smart-contract blockchain

Burrow provides a modular blockchain client with a permissioned smart contract interpreter built in part to the specification of the Ethereum Virtual Machine (EVM). Uses Tendermint as its default consensus mechanism, but has also been ported to Fabric and Sawtooth.

Project	**HYPERLEDGER IROHA**
Status	ACTIVE
CII Badge	cii best practices passing
Description	Distributed ledger in C++

A business blockchain framework designed to be simple and easy to incorporate into infrastructural projects requiring distributed ledger technology. Written in C++ incorporating unique chain-based Byzantine Fault Tolerant consensus. Mobile SDKs. Multisig support for transactions.

Project	HYPERLEDGER BESU
Status	INCUBATION
CII Badge	cii best practices not started
Description	Besu is an Ethereum client that runs on the Ethereum public network, private networks, and test networks such as Rinkeby, Ropsten, and Görli.

Open source Ethereum client written in Java. It can be run on the Ethereum public network or on private permissioned networks, as well as test networks such as Rinkeby, Ropsten, and Görli. Hyperledger Besu includes several consensus algorithms including PoW, PoA, and IBFT, and has comprehensive permissioning schemes designed specifically for uses in a consortium environment.

Libraries

Code basis reusable
across different projects,
not restricted to Hyperledger only.

Hyperledger: Libraries

HYPERLEDGER ARIES

HYPERLEDGER TRANSACT

HYPERLEDGER URSA

HYPERLEDGER QUILT

Aries
Infrastructure for blockchain-rooted, peer-to-peer interactions. It provides a shared, reusable, interoperable tool kit designed for initiatives and solutions focused on creating, transmitting and storing verifiable digital credentials.

Transact
transaction execution platform designed to be used as a library or component when implementing distributed ledgers, including blockchains.

Ursa
A shared cryptographic library that would enable people (and projects) to avoid duplicating other cryptographic work and hopefully increase security in the process.

Quilt
An interoperability solution for blockchains, DLTs and other types of ledgers

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Our Newest Project- Launched Today

Hyperledger Avalon is a ledger independent implementation of the Trusted Compute Specifications published by the Enterprise Ethereum Alliance. Hyperledger Avalon will realize have different Worker types and include TEE (Trusted Execution Environments like Intel® SGX), MPC (multi-party compute), and ZK (zero-knowledge proofs).

Tools

Application level projects

without business logic

Hyperledger: Tools

Caliper
Blockchain benchmark framework which allows users to measure the performance of a specific blockchain implementation with a set of predefined use cases.

Cello
Deploy, manage and operate blockchains. Support various infrastructures like baremetal, vm platform, and container cloud (e.g., Swarm, Kubernetes).
Support advanced operational analytics for the system status and ledger behaviors

Explorer
User friendly web application to view/query blocks, transactions and associated data, network information (name, status, list of nodes), chain codes/transaction families (view/invoke/deploy/query) and any other relevant information stored in the ledger.
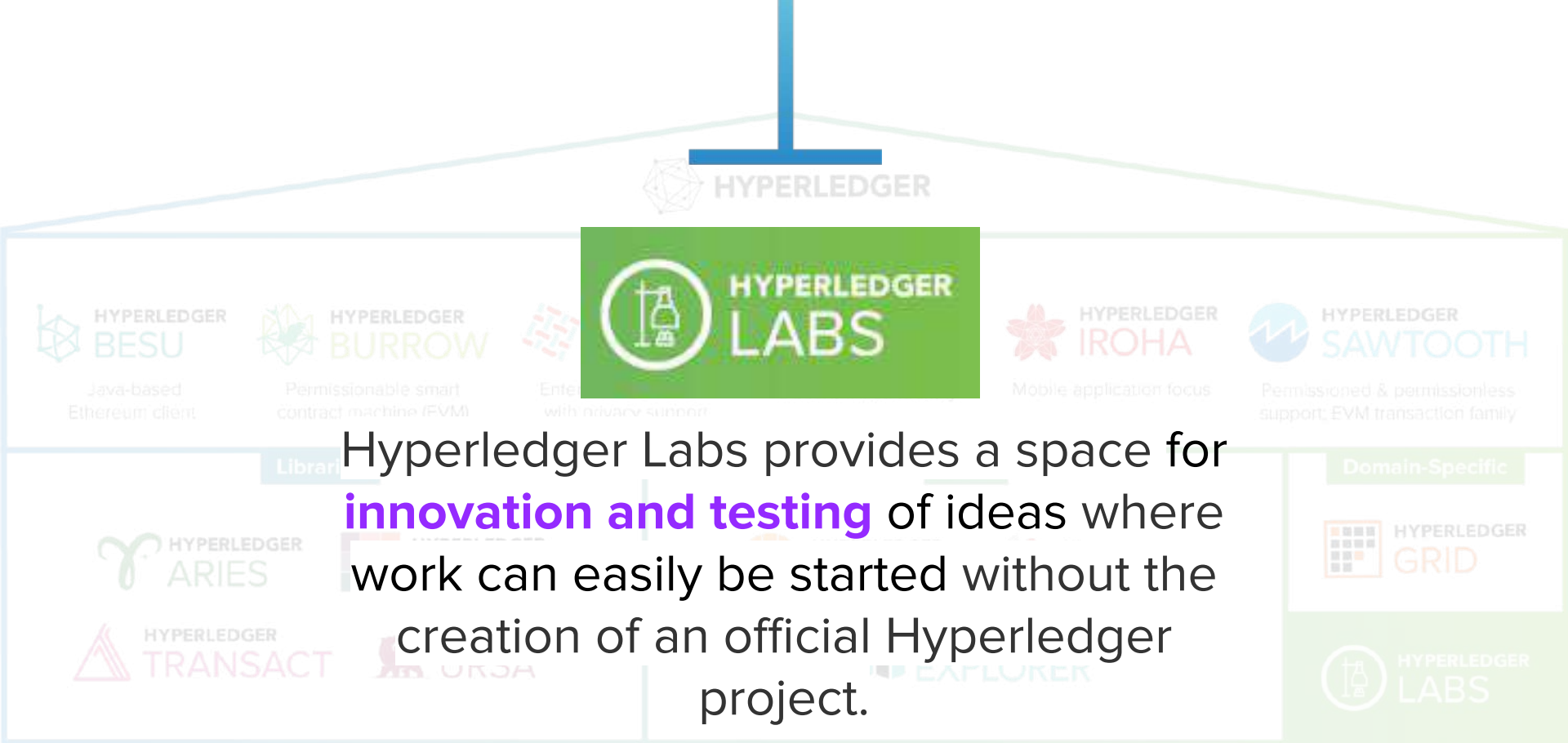
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Hyperledger: Domain Specific

A platform for building supply chain solutions that include distributed ledger components. It includes a set of libraries, data models, and SDK to accelerate development for supply chain smart contracts and client interfaces. This project will accelerate the development of blockchain-based solutions to cross-industry supply chain problems

Hyperledger Labs provides a space for **innovation and testing** of ideas where work can easily be started without the creation of an official Hyperledger project.

Hyperledger Goals

Where open source teams build diverse approaches for business blockchain

Create enterprise grade software

open source, distributed ledger frameworks & code bases
to support business transactions
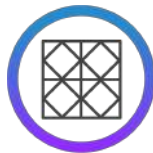
Provide community-driven infrastructures

that are open, neutral and supported by technical and business governance

Build technical communities

to develop blockchain and shared ledger POCs, use cases, field trials and deployments

Educate the public

about the market opportunity for blockchain technology

Build the commercial ecosystem

to help ISVs, cloud providers, SIs, and end user organizations all realize commercial benefit from participation in the project, and demonstrate the economic power of this domain

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Building the Commercial Ecosystem

85+

Global
Vendors across
multiple service
types, products
and industries

So who's using what?

Of the Forbes Blockchain 50:
- 23 HL Fabric
    - +5 IBM Blockchain
    - +2 DTCC & Google
    - +1 Oracle Blockchain
    - +1 Samsung Nexledger
- 21 (Public?) Ethereum (how many Besu?)
- 13 Corda
- 12 Quorum
- 3 HL Indy
- 3 HL Sawtooth

Hyperledger in Action
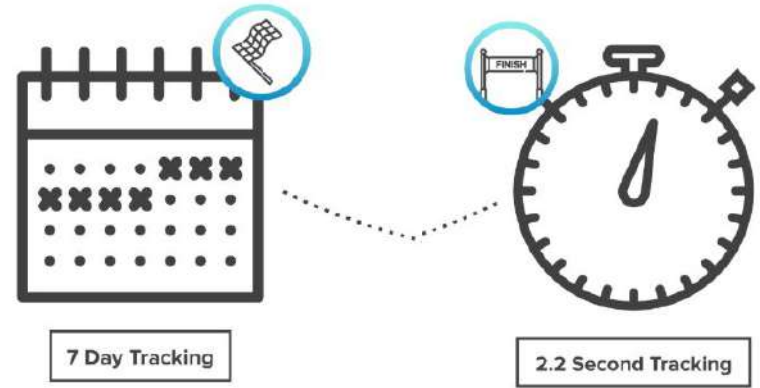
Diamond Supply Tracking

In 2003, the Kimberley Process Certification Scheme was established to prevent conflict diamonds from entering the market. However, the current process is complex and there is a history of fraud and "missing paperwork". Moving to a blockchain, all shipments are recorded and trackable with high integrity.

Diamond Mine → Rough Trader or Rough Aggregator → Diamond Cutter → Diamond Trader

Consumer ← Jewelry Retailer ← Jewelry Wholesaler ← Jewelry Manufacturer

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https://www.youtube.com/watch?v=AnLUVKIW9qo&feature=youtu.be

This system can empower whistleblowers, governments, mining companies, retailers, journalists, and human rights organizations to get specific on tracking where conflict diamonds are entering the supply chain and preventing them from entering the market.

everledger   IBM   SAP

FoodTrust - transparency to the food supply chain

- When an outbreak of a food-borne disease happens, it can take days, if not weeks, to find its source. **Better traceability could help save lives by allowing companies to act faster and protect the livelihoods of farmers** by only discarding produce from the affected farms.
- Walmart, and a group of retailers and food companies such as Unilever, Nestlé and Dole, have teamed up with IBM to explore how to apply blockchain technology like Hyperledger Fabric to their food supply chain.
- By making a **shared ledger accessible to each party in the supply chain, all food processing steps can be recorded and stored on the blockchain**, including digital compliance documentation, test results and audit certificates to improve transparency and efficiency across the food network.

7 Day Tracking

2.2 Second Tracking

Walmart

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https://www.hyperledger.org/resources/publications/walmart-case-study

Trade Finance: we.trade

- we.trade is a blockchain-based international trading system for a consortium of major world banks including: **HSBC, Deutsche Bank, KBC, Natixis, Rabobank, Société Générale, Santander, UniCredit and Nordea**
- SMEs generate 85% of employment growth in Europe, but only ~50% of them have access to formal credit.
- Went into production July 2018 conducting **seven live trade transactions by ten companies via four partner banks**
- Enables accurate trading position information, order to settlement control, risk coverage, track and trace options
- **Near-real time exchange of information** on a **secure** platform that digitizes transactional financing
- Continual business and **compliance readiness** in any relevant regulatory environment
- **Scalability** that allows for rapid international expansion as business, regulatory, and security opportunities converge

we.trade
more trust. more trade.

Source: BoAML, HSBC, IDA

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https://we-trade.com/

Digital Identity: The OrgBook

- The OrgBook serves as a **trusted digital network of verifiable data** about organizations which is globally connected, **interoperable, secure, and easy to join**
- Why? So business/government can quickly access evidence of that a potential partner is legally incorporated
- The new enrollment experience is **more convenient** and use an open global blockchain registry
- Reduced single point of failure for database, **reduced fraud** from counterfeit IDs, reduces bottlenecks, and **improves privacy** which a complex verification system can expose
- As more businesses establish their Self-Sovereign Identity, more Services will become Self-Sovereign Identity-aware
- **Live**, public, **globally accessible network** using the Sovrin Provisional Network built on Hyperledger Indy.

# Kiva: Implementing SSI and a privacy-first credit bureau for Sierra Leone

Challenge:
1. There is no effective digital identity system or credit bureau for SL's 7.5M citizens
2. As a result, Kiva's lending rates are 30%, much higher than in other countries and a blocker to financial participation.

Solution:
1. 2019-Q2 NCRA (SL government ID agency) will issue credentials on a Hyperledger-Indy based network.
2. 2019-Q4 BSL (central bank) will use Hyperledger Fabric for a shared, decentralized credit reporting bureau.

In April, the National Civil Registration Authority (the gov't identity agency in Sierra Leone) issued 5.2M DIDs using Indy, which are being used to bring broad financial inclusion in the country.

Building the credit bureau of the future
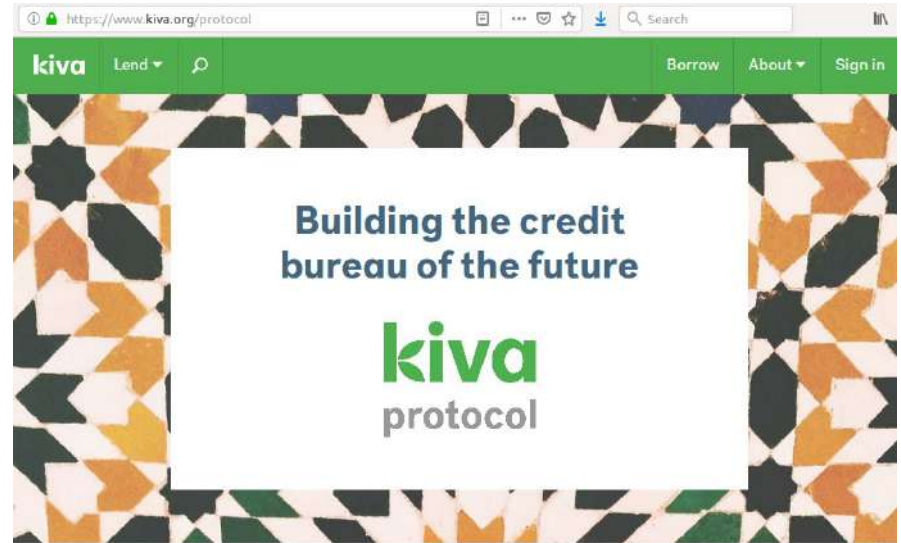
kiva protocol

Introducing Kiva Protocol, an exciting new initiative to give unbanked people digital identity and secure control over their own credit information.

Kiva, Sierra Leone and U.N. agencies announced the first implementation of the Kiva Protocol on Sept. 27, 2018, at the U.N. General Assembly. The Kiva Protocol will be used to create a nationwide digital identification system designed to help the country's 7 million citizens access the financial services they need to improve their lives.

Government Procurement: GSA

- Today's procurement processes take upto 35 days even when the requirements are very clear.
- The General Services Administration designed a FASt Lane process for IT Schedule 70 contracts.
- Blockchain-based software layer over the agency's existing infrastructure that aims to make the GSA Schedules **review process transparent and automate financial reviews and processes, creating savings in fixed costs.**
- Vendors' financial information is analyzed through a "smart contract" that compares their financial ratios to the average of companies with the same NAICS code.
- Agency estimates that the blockchain pilot will save a financial analyst 10 to 15 days when it comes to reviewing each proposal. Lowering the OpEx costs by 80-90%.

GSA

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BLOCKCHAIN TECHNOLOGIES FOR BUSINESS
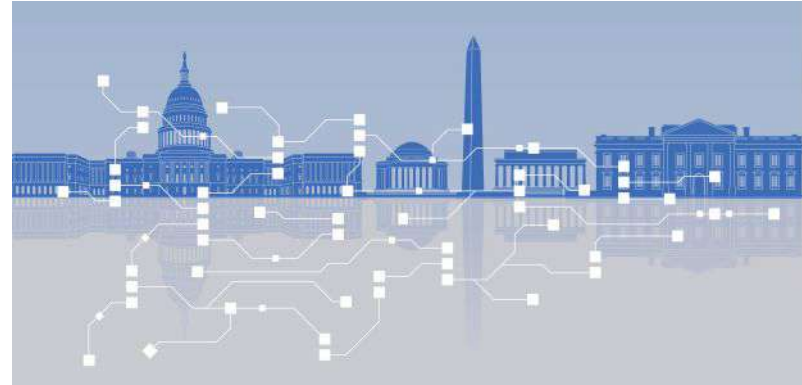
Letters of Credit

- China Minsheng Bank and China CITIC Bank jointly developed an open, standard and regulatory compliant domestic L/C transmission platform using blockchain
- Banks involved include **China Minsheng Bank, China CITIC Bank, Bank of China and Suning Bank**
- **Completed 100 million RMB letter of credit transaction**
- Removes need for SWIFT in China domestic L/C settlement and enables creation of an independent and domestic-controlled L/C exchange system
- **Improved user experience**, supporting a Chinese UI tailored to domestic business requirements
- Incorporated the whole L/C process, **shortening delivery time**, with improved efficiency and security
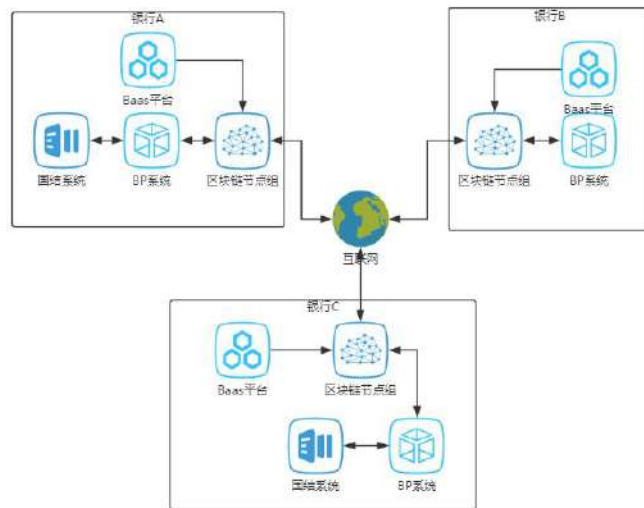
BBVA: Corporate Loan Deals

- A EUR 75 million corporate loan deal--**using Hyperledger Fabric and ETH**--with Indra, performing the complete process from negotiation to the signing of the loan over a mix of different public and private blockchain-based platforms
- **Reduction of time** taken to complete the deal from days to hours by recording and tracking interactions, reviews and iterations on Hyperledger Fabric.
- Once finalized the **contract's hash or unique ID is recorded to the Ethereum network**, ensuring an immutable record of the loan deal

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Join us!
It's a wild adventure

A Few Ways to Participate & Tools

Subscribe to Hyperledger Mailing Lists

Attend Hyperledger bootcamps and upcoming events

Get the latest **development updates** from the wiki

Engage in the discussion on **Chat**

Search for Open Bugs, or Report a New One, in **Our Bug Database**

Start or join a local Hyperledger **Meetup**

Participate in the Working Group meetings

Check out all the Hyperledger business blockchain technologies and **download our codebases**

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On-demand Webinar: Get Involved! How to get started with Hyperledger

Learn
Build
Participate

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BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

Visit www.hyperledger.org and www.wiki.hyperledger.org

Community Working Groups (WGs)

Technical Working Groups are open to the public

Technical Steering Committee

Architecture Working Group

Identity Working Group

Performance and Scalability Working Group

Smart Contracts Working Group

Technical Working Group China

Learning & Materials Development Working Group

Diversity, Civility and Inclusion Working Group (DCI)

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Visit: **https://wiki.hyperledger.org/display/HYP/Working+Groups**

Community Special Interest Groups (SIGs)

Sector Groups are open to the public

HYPERLEDGER
Healthcare
SPECIAL INTEREST GROUP

HYPERLEDGER
Public Sector
SPECIAL INTEREST GROUP

HYPERLEDGER
Telecom
SPECIAL INTEREST GROUP

HYPERLEDGER
Social Impact
SPECIAL INTEREST GROUP

HYPERLEDGER
Trade Finance
SPECIAL INTEREST GROUP

HYPERLEDGER
Supply Chain
SPECIAL INTEREST GROUP

HYPERLEDGER
Capital Markets
SPECIAL INTEREST GROUP

HYPERLEDGER
Education Architecture
SPECIAL INTEREST GROUP

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Visit: **https://wiki.hyperledger.org/display/HYP/Special+Interest+Groups**

Training and Certifications

Technical training courses and professional certifications to get up-to-speed on Hyperledger Fabric or Sawtooth. (more projects to follow)

- Blockchain: Understanding Its Uses and Implications
- Introduction to Hyperledger Technologies
- Hyperledger Fabric Fundamentals
- Hyperledger Sawtooth Administration
- Hyperledger Fabric Administration
- Hyperledger Fabric Developer (Q1)

Professional Certifications
- **Certified Hyperledger Sawtooth Administrator (CHSA)**
- **Certified Hyperledger Fabric Administrator (CHFA)**
- **Certified Hyperledger Fabric Developer (Q1 2020)**

Visit: https://www.hyperledger.org/resources/training

HYPERLEDGER
GLOBAL ✈ FORUM

Save the Date!

PHOENIX, AZ
MARCH 3-6, 2020

CFP
Deadline
OCT 4th

https://events.linuxfoundation.org/events/hyperledger-global-forum-2020/

Thank you!

Daniela Barbosa
VP World Wide Alliances
dbarbosa@linuxfoundation.org

Join us!

www.hyperledger.org

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