Going Public

EY Global Blockchain Summit 2020

Paul R. Brody
Keynote presentation

EY
Building a better working world

Agenda/contents slide

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The year of solid progress

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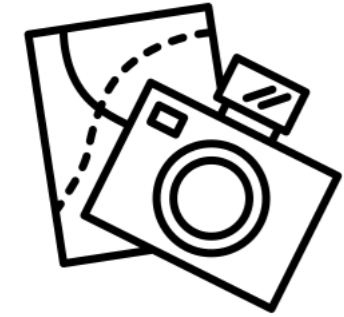Blockchain industry transformation

3

Going Public

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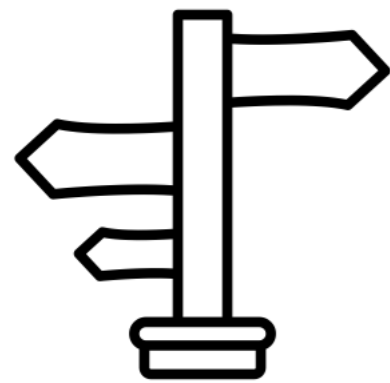Now, next and beyond

EY

The year of solid progress

EY

For blockchains and cryptocurrencies, the last 12 months have been challenging

End of blockchain tourism by large enterprises

High volatility and poor returns on crypto assets

Regulatory uncertainty for future offerings

Going Public: EY 2020 Global Blockchain Summit

EY

Enterprises blockchain applications (ours included) have suffered from their own significant challenges

Too complicated to explain the ROI

Too complicated to use and deploy

Not secure enough to trust

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CC0 Photo by Benjamin Suter on Unsplash

EY

In facing up to these challenges, we have managed to continue to grow our business, if not at the blistering pace of 2018 and early 2019

Blockchain project volume is growing, though not at the high rate of FY2019:

Development

Advisory services

Assurance and analytics

Tax services

■ **Projects**

EY
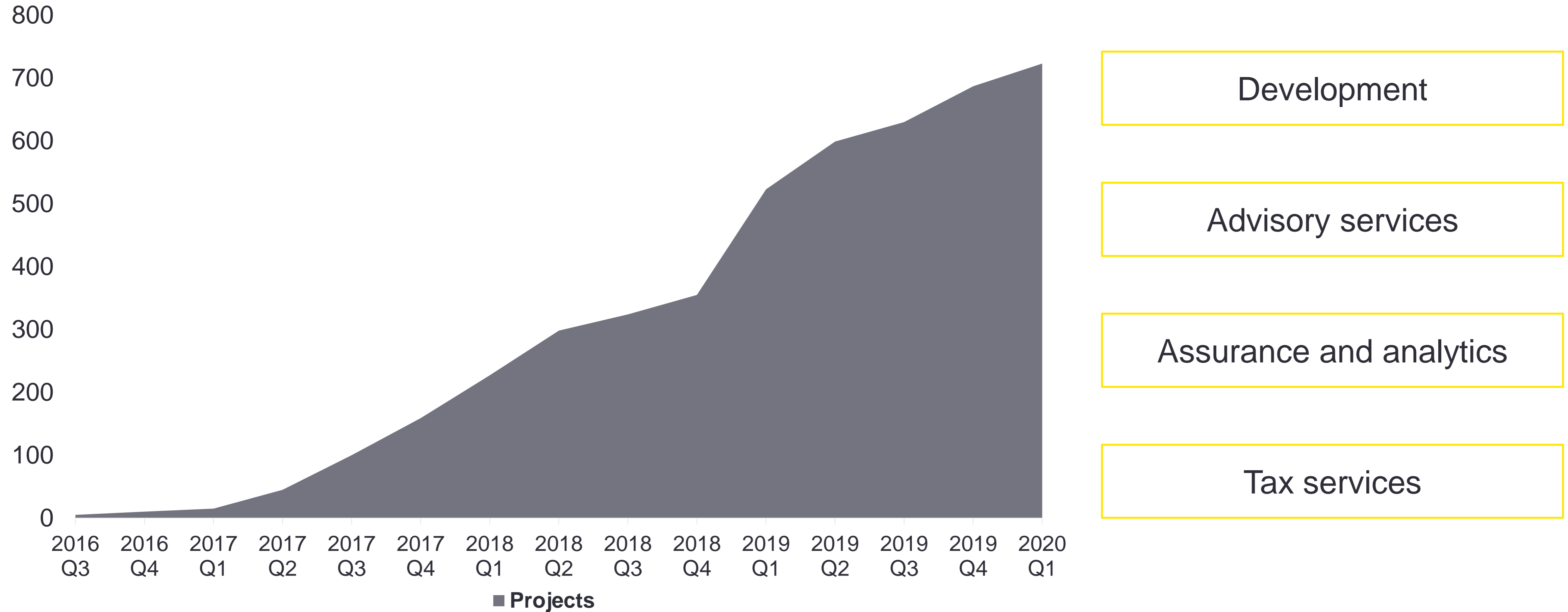
Our flagship EY OpsChain solution continues to gain new installations and users around the world, with a series of major go-lives

Food and beverage traceability

Carrefour

The House of Roosevelt

Japan Craft Sake Company

Spinosa

Drug and medical supply chain

Canadian Blood Services

H-Source

Merck Animal Health

Shipping and logistics

BVL

DB Schenker

Editel

GS1 Austria

LKW Walter

Wirtschafts Universität Wien
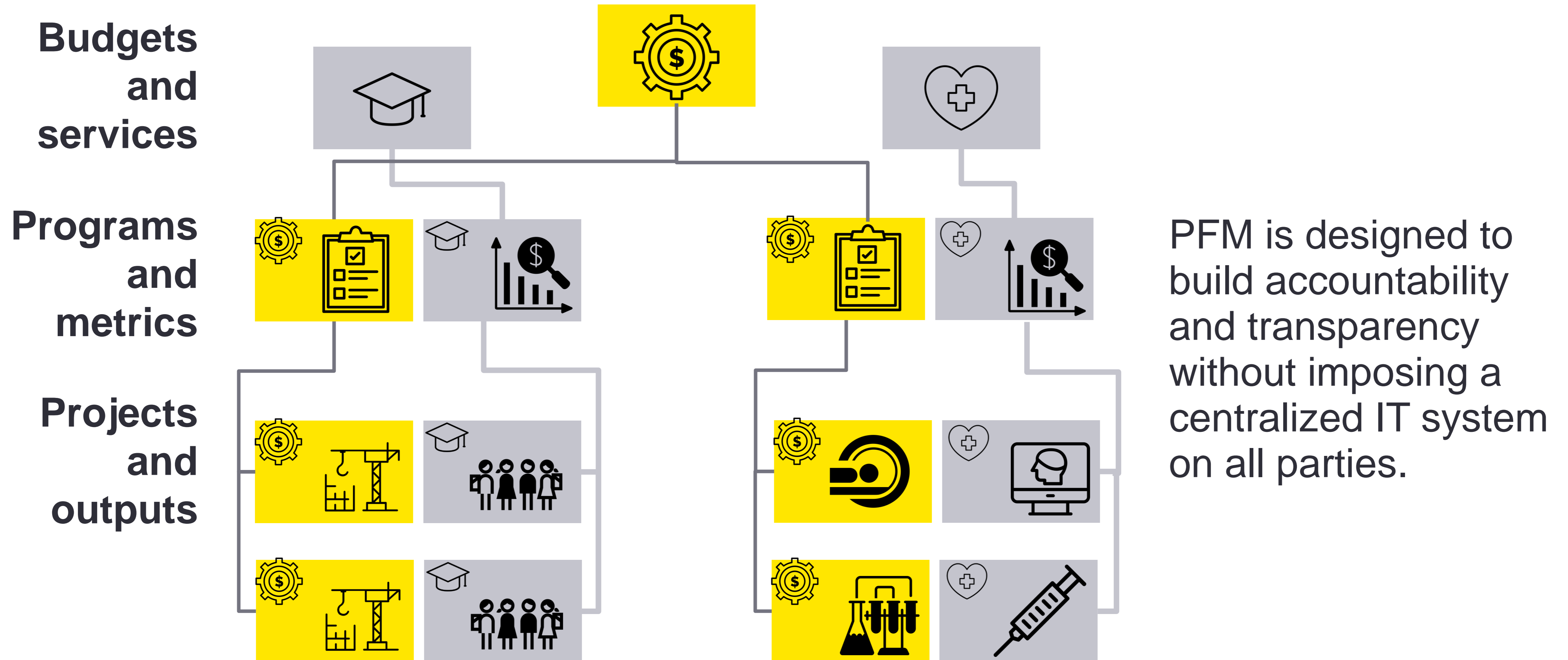
Funds management and financial transactions

Nacha

Toronto

Labor management

Block 2

EY

Our newest application, EY OpsChain Public Finance Manager (PFM), is making headway with clients like the City of Toronto

Budgets and services

Programs and metrics

Projects and outputs

PFM is designed to build accountability and transparency without imposing a centralized IT system on all parties.

EY

We launched our first, true software-as-a-service (SaaS) application at blockchain.ey.com with smart contract review

Functionality

Security

Quality

Efficiency
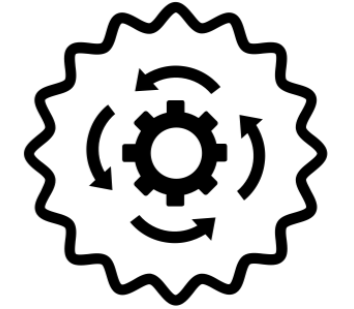
87 ▶ ERC-20 tests

58 ▶ General tests

+

Coming soon

▶ User-defined tests

▶ Mainnet simulation

▶ ERC-721

We now have over 130 blockchain assurance clients with many now using EY Blockchain Analyzer as well

► Available across a selection of more than **130+ EY Assurance clients** that hold or trade cryptocurrencies or operate in the blockchain ecosystem

► Available for EY Assurance teams in **95 countries**

Current version

Litecoin

Bitcoin

Bitcoin Cash

Ethereum

Ethereum Classic

In development

Ripple

Tether

Bitcoin SV

ERC20

Stellar

Dash

EOS

Dogecoin
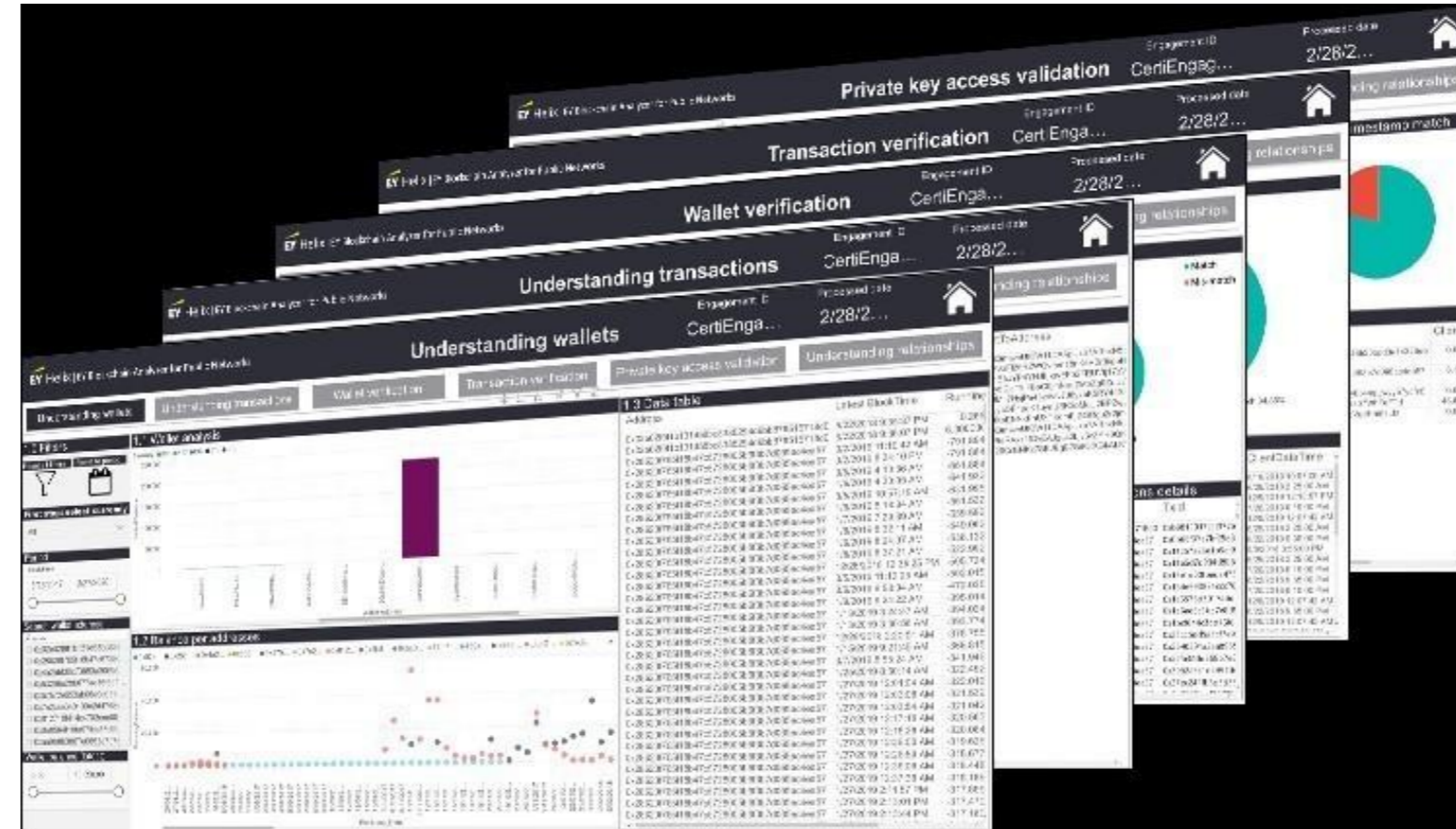
► Full copy of the ledger

► Analyze 100% of client records

► Support Global Audit guidance

Our mission has not changed

Blockchains will do for networks of enterprises and business ecosystems what ERP did for the single company.

EY

Nor has our vision of how this world will evolve and where we should end up: with tokenized transactions, denominated in fiat currency on public networks

Notarization

Crypto

Separated

Private

Tokenization

Fiat

Integrated

Public

Going Public: EY 2020 Global Blockchain Summit

EY
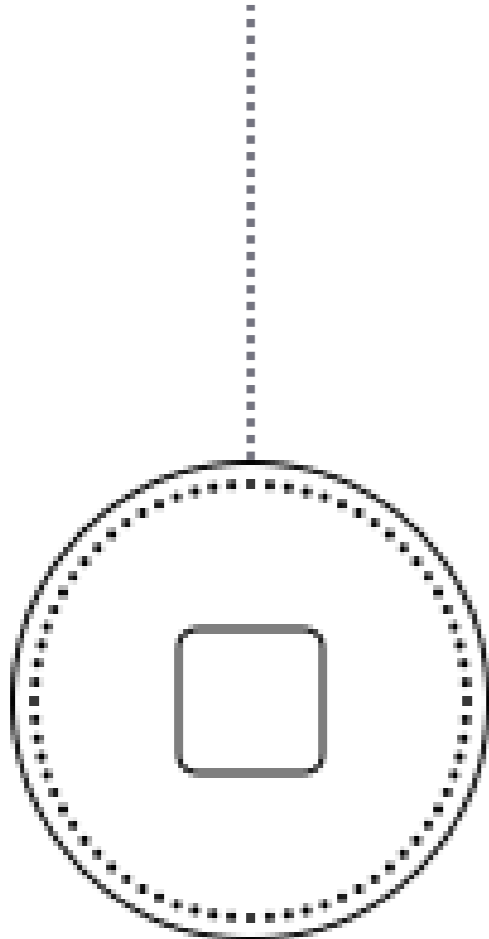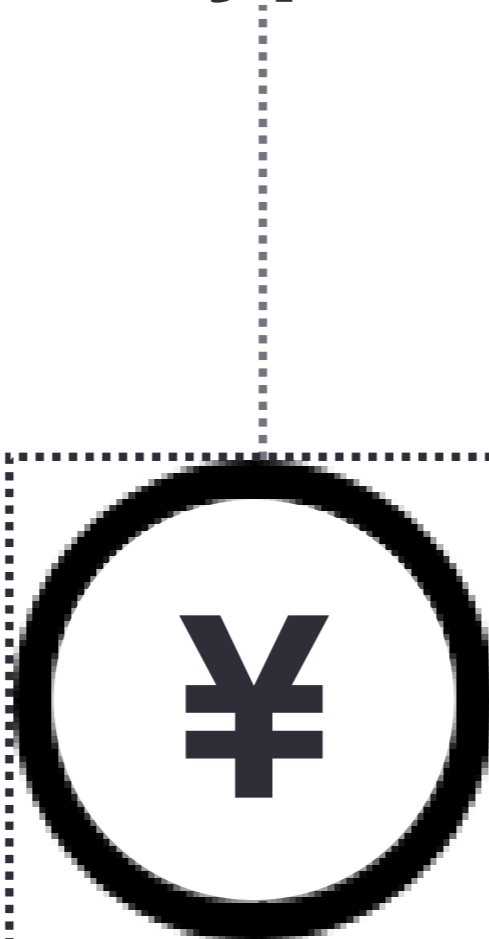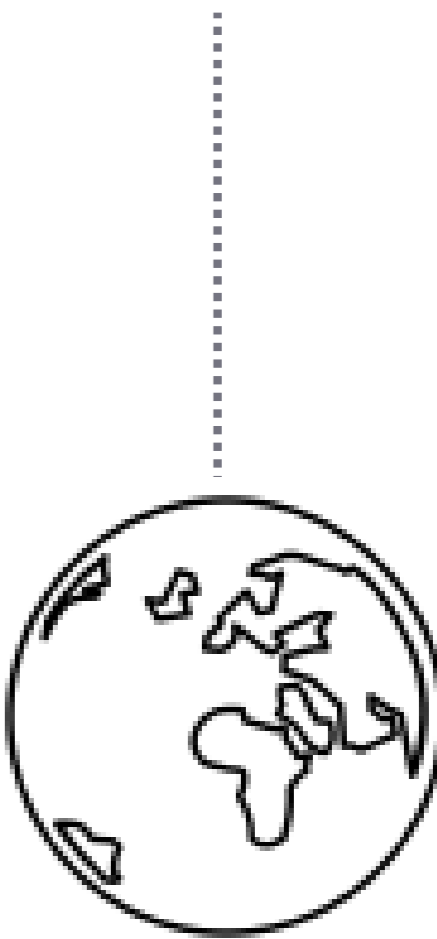
We believe the future of B2B transactions are private, secure and regulatory compliant smart contracts denominated in fiat currencies on public blockchains.

EY

Blockchain industry changes in progress

EY

Four big shifts in the blockchain ecosystem in the last year

China as a blockchain super power
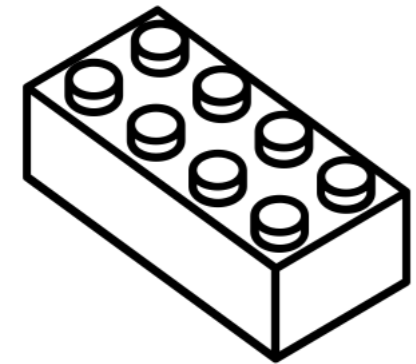
Development of decentralized finance (DeFi)

Acceptance of public blockchains

Industrialization of privacy technology

EY

The emergence of China as a blockchain superpower has been lost from view because of the global coronavirus pandemic, but it is hugely important

> We must take the blockchain as an important breakthrough for independent innovation of core technologies.
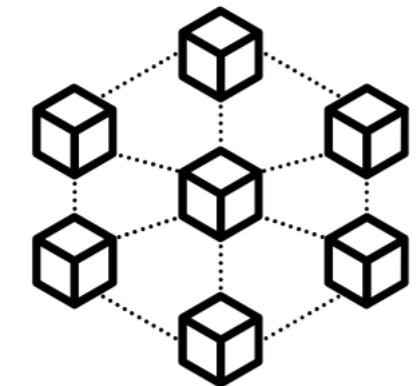
Xi told committee members

> [We must] clarify the main direction, increase investment, focus on a number of key core technologies, and accelerate the development of blockchain technology and industrial innovation.
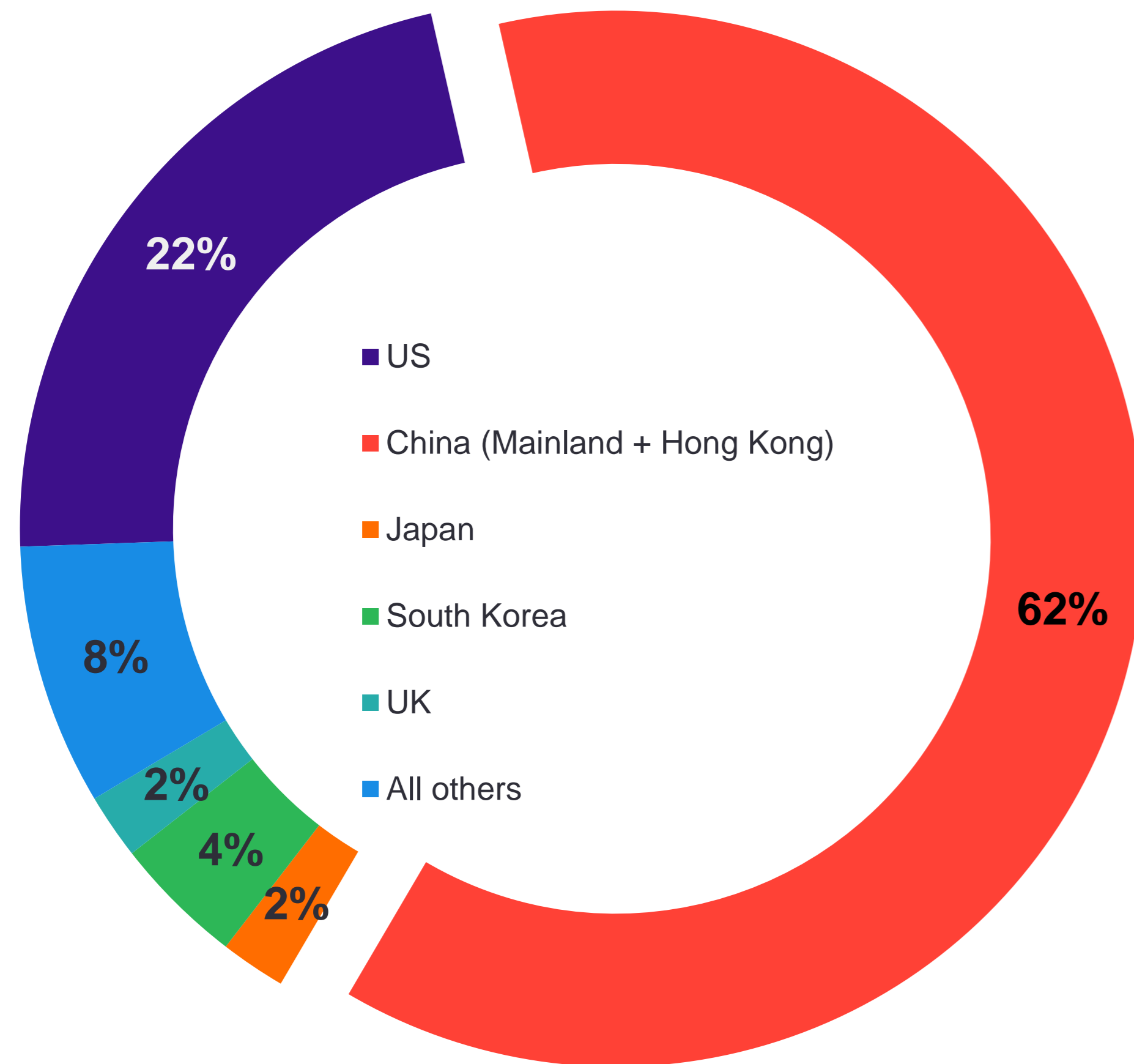
> Greater effort should be made to strengthen basic research and boost innovation capacity to help China gain an edge in the theoretical, innovative and industrial aspects of this emerging field.

Source: https://www.iam-media.com/patents/revealed-countries-leading-race-blockchain-patents

EY

China was already a global blockchain power before the decision to focus on this technology toward the end of 2019

Blockchain *patents* by country of origin

Legend:
- US
- China (Mainland + Hong Kong)
- Japan
- South Korea
- UK
- All others

Chart values: 22% (US), 62% (China), 8%, 2%, 4%, 2%

► While the quality of the patents may not be high, the sheer volume means that Chinese companies will have high freedom of operation in this business.

► Traditional western efforts to rein in Chinese competition by claiming intellectual property (IP) infringements will not work in this case, as there will be a strong legal record of original innovation.

► Chinese companies have often been technologically isolated within China, and even though they have grown large in total size, they have not been successful in global markets.

► Blockchain may mark a turning point in the global ambitions of Chinese tech companies.

Source: https://www.iam-media.com/patents/revealed-countries-leading-race-blockchain-patents

EY

Thanks to China's growing global trade and investment connections, their technology standards will have significant impact beyond their borders

Exports, imports and FDIs as a share of GDP/domestic investment

Legend:
- ■ Exports
- ■ Imports
- ■ Foreign direct investments (FDIs)

Country	Exports	Imports	FDIs
South Korea	11%	6%	1%
Malaysia	11%	11%	6%
Philippines	8%	14%	1%
Singapore	11%	18%	5%
Vietnam	11%	13%	1%
Australia	16%	7%	3%
South Africa	15%	6%	3%
Japan	5%	5%	1%
United Kingdom	2%	5%	2%
USA	2%	6%	1%
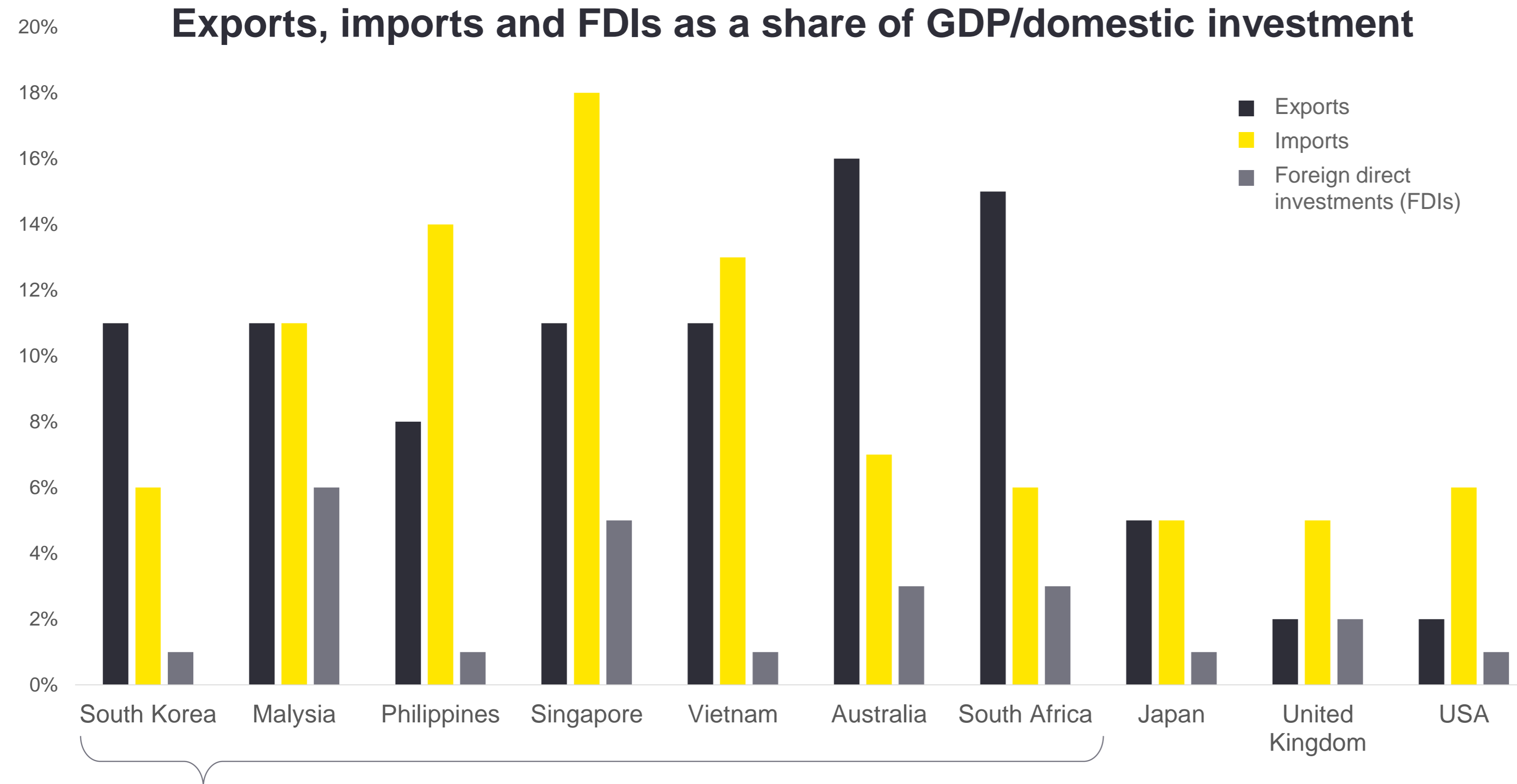
Expect very strong alignment with China's digital strategy over time. (bracket spanning South Korea through South Africa)

Source: McKinsey report on China's global economic integration, 2019

► Countries that export to or import from China will want to be digitally connected to enable product and service traceability.

► Blockchain-based digital financing will likely be linked to China's Digital Currency Electronic Payment (DCEP) program, not traditional western financial systems.

► Expect Chinese blockchain standards to be integrated into the "Belt and Road" Initiative.

EY

We foresee three major blockchain ecosystems emerging in the near term within China, though they may consolidate in time down to two major systems

Segment 1: DCEP RMB payment system (Phase 1)

Reserve Bank

Bank 1

Non-Bank Finance

Correspondent Bank

Investment Bank
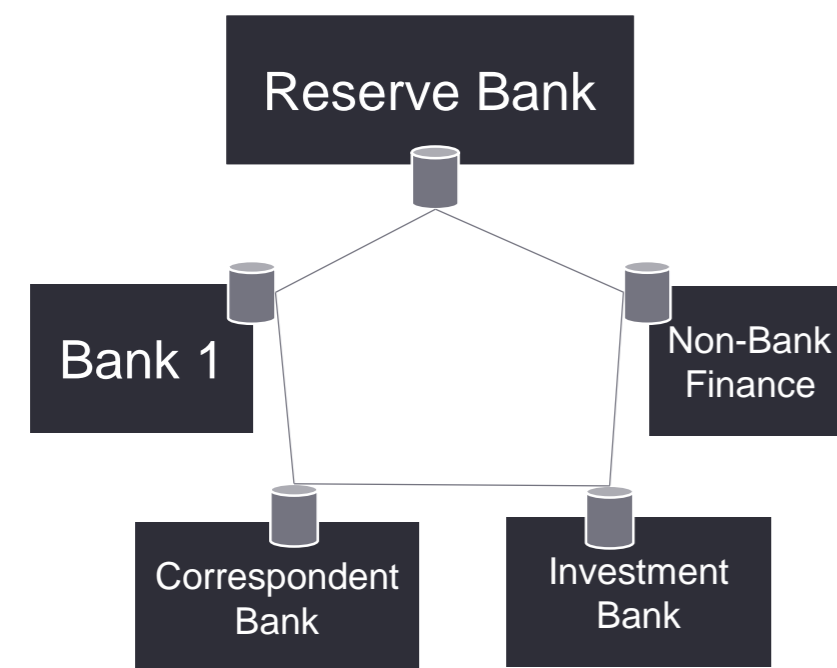
► Digital payments only

► Initially between banks and later directly available to individuals as a substitute for cash

Segment 2: private domestic blockchains

Suning	ThunderChain
KBaaS	Ant Financial
Z-BaaS	Tencent
Baidu	JD
Huawei	

► B2B transaction systems

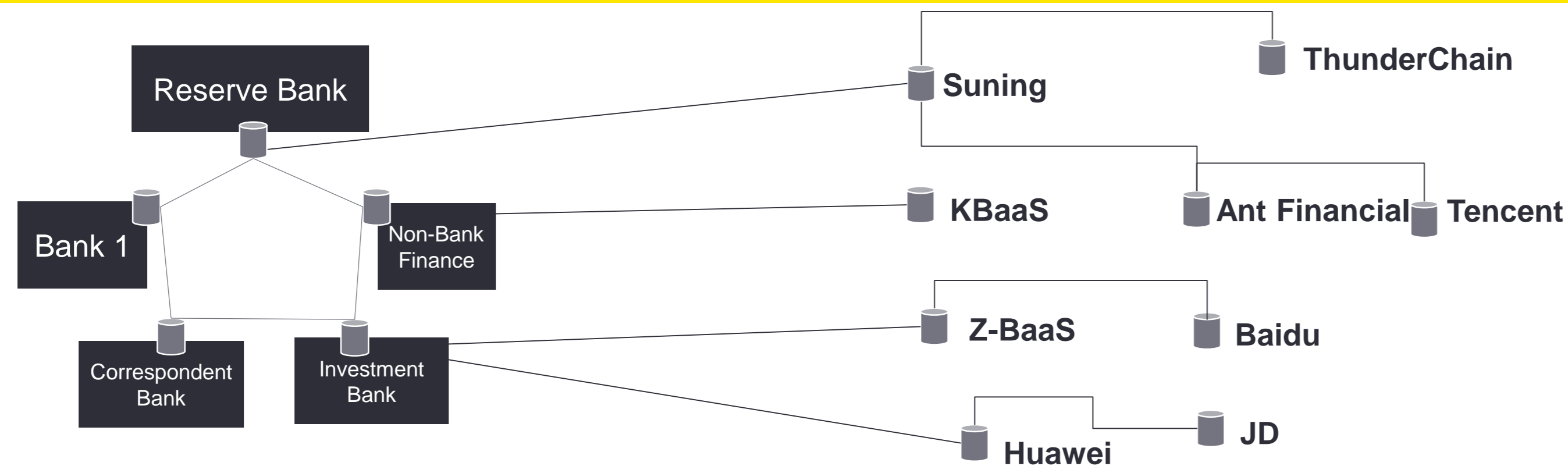► Gradual interconnection between private networks

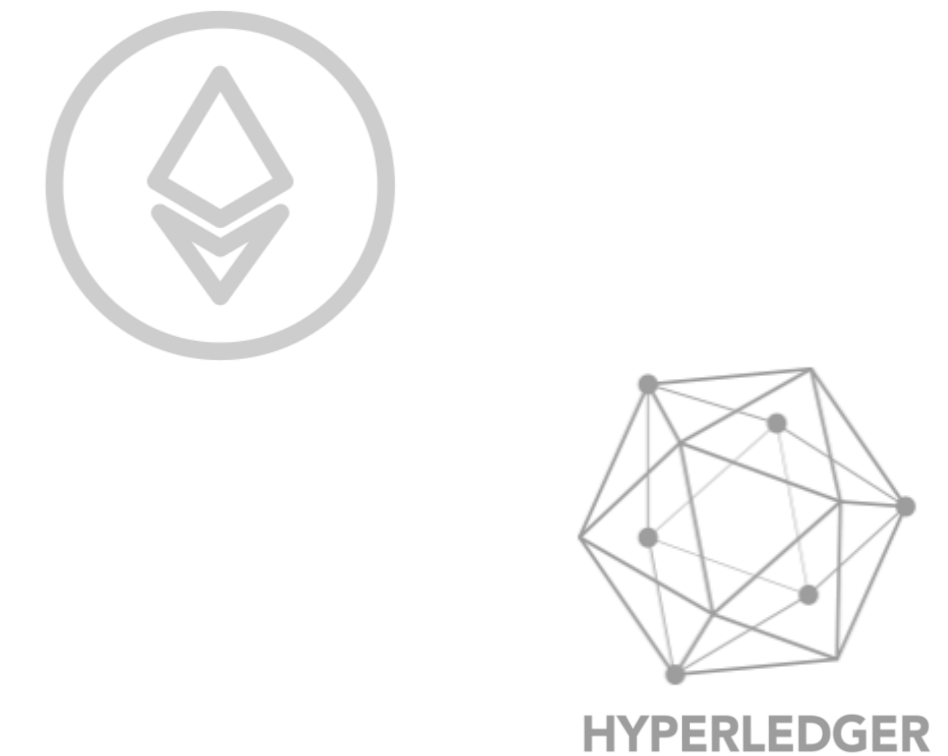## Segment 3: global trade connectivity

HYPERLEDGER

► B2B transactions and payments for international trade to/from China

EY

We foresee three major blockchain ecosystems emerging in the near term within China, though they may consolidate in time down to two major systems

Interconnection and gradual merge of DCEP and private enterprise blockchains for domestic business

Reserve Bank

Bank 1

Non-Bank Finance

Correspondent Bank

Investment Bank

Suning

ThunderChain

KBaaS

Ant Financial — Tencent

Z-BaaS

Baidu

Huawei

JD

Cross-Chain Connections
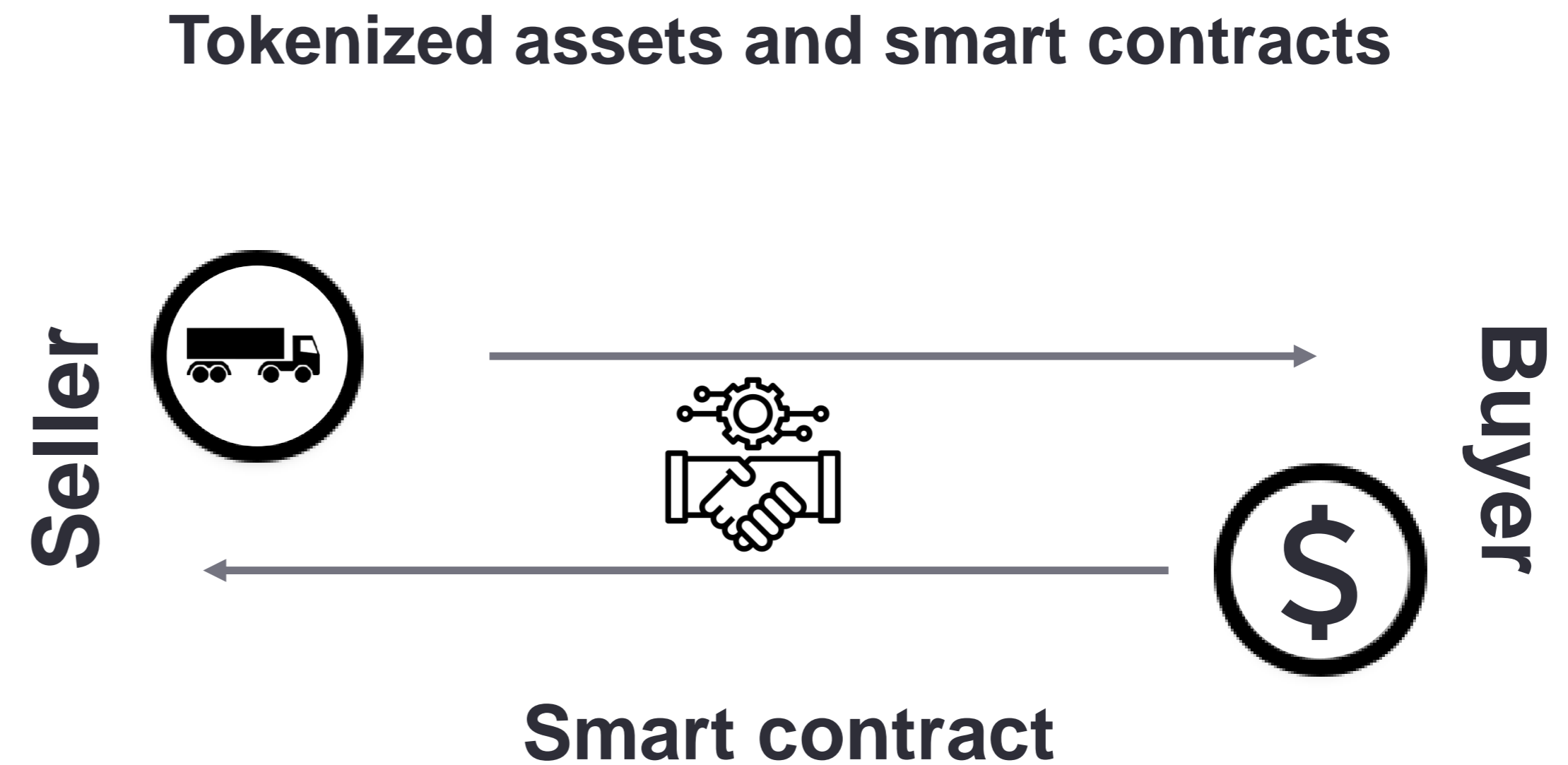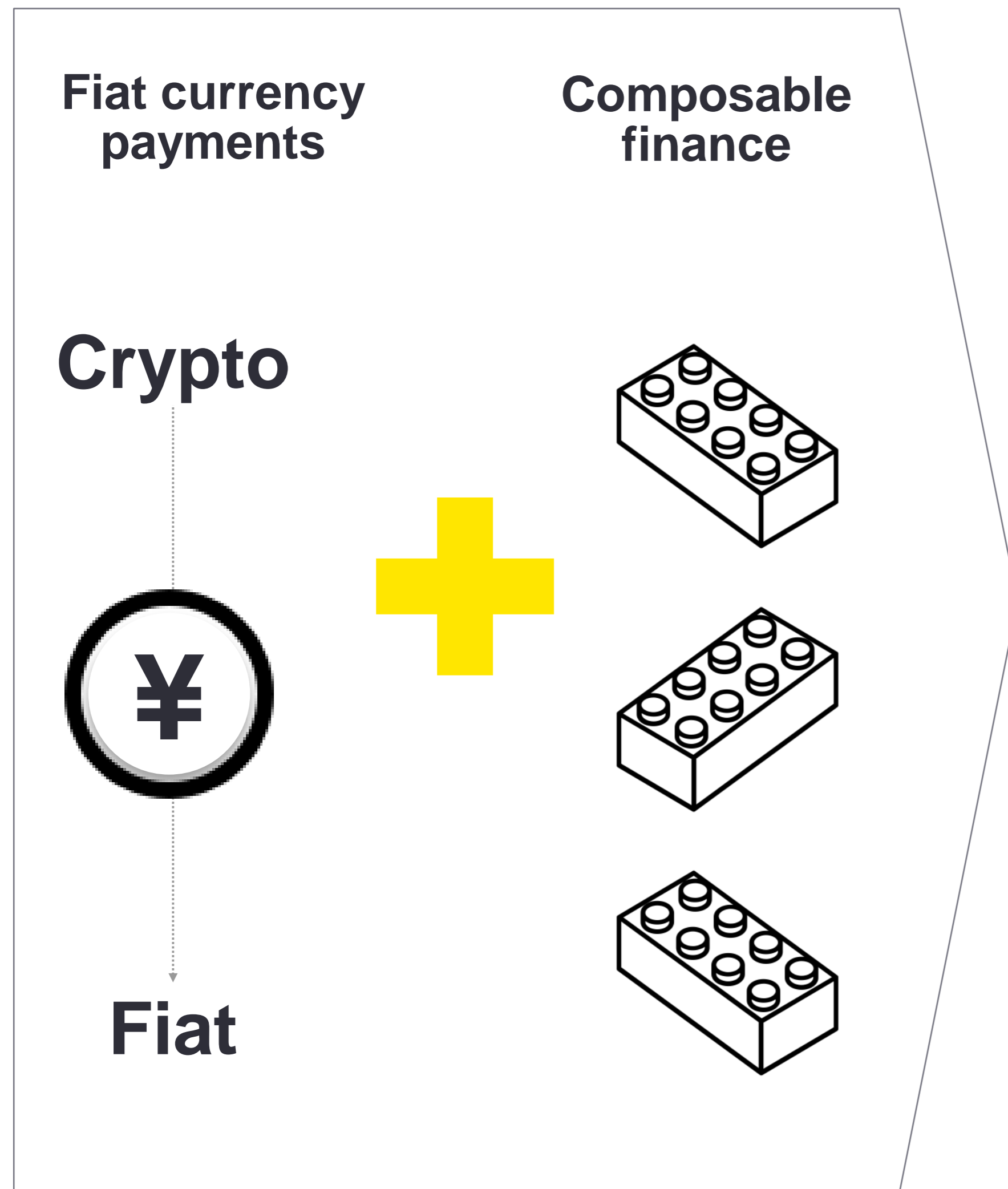
Global blockchain networks for international transactions

HYPERLEDGER

► Phase 2 of DCEP is expected to support smart contracts, which will allow central-bank authorized payments to be integrated into private B2B blockchains.

► Mandatory interconnection between networks will lead to convergence in systems, standards, and eventually consolidation toward far fewer blockchain offerings domestically.

► B2B transactions and payments for international trade to/from China

► Interconnection gateways to domestic transactions for end-to-end processing

Source: EY meeting with the Ministry of Communications blockchain standards team in Beijing, January 2020
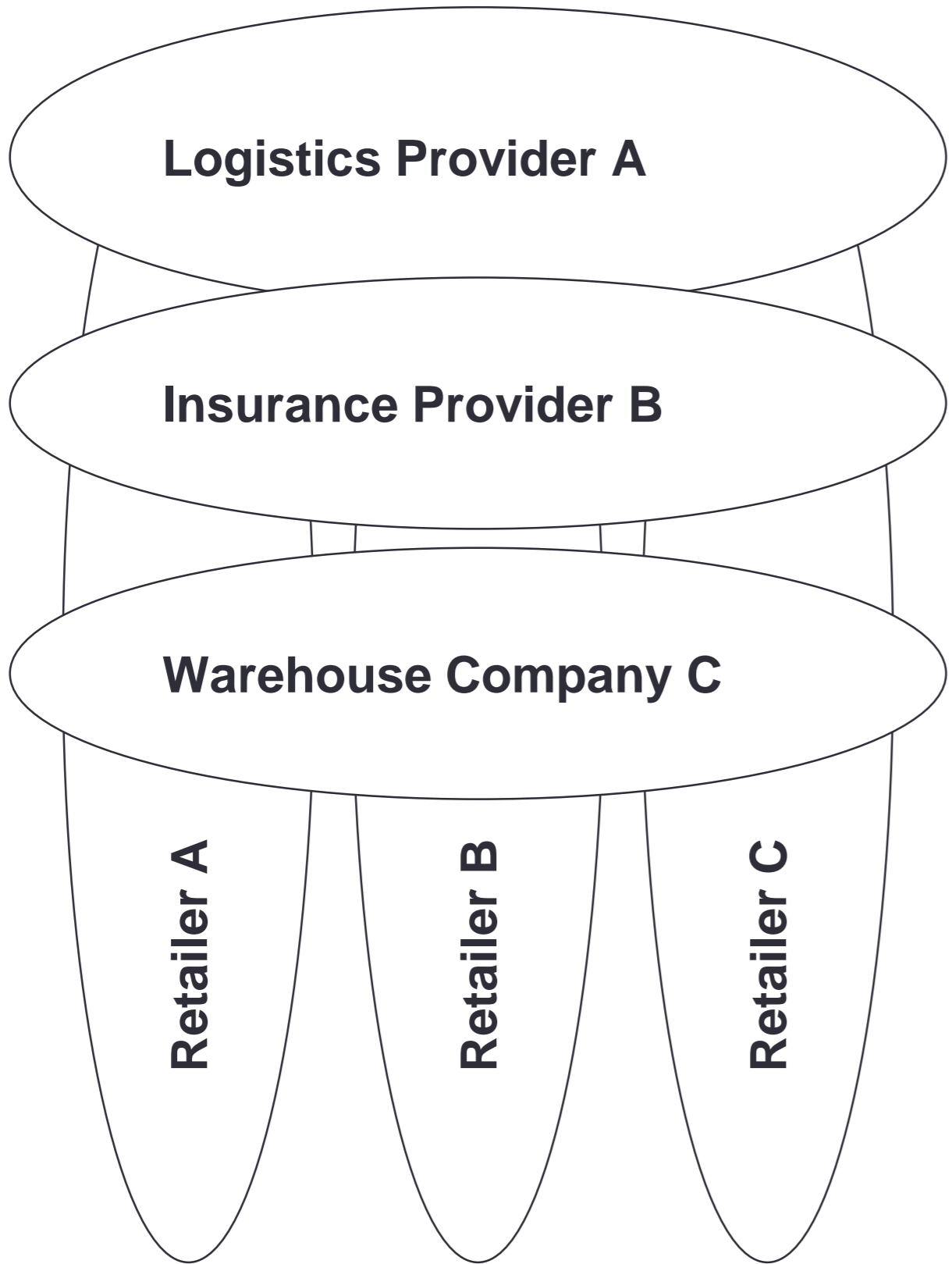
EY

The emergence of decentralized finance (DeFi) lays the groundwork for enterprises to embed financing directly in their business operations

Fiat currency payments

Composable finance

Crypto

Fiat

Tokenized assets and smart contracts
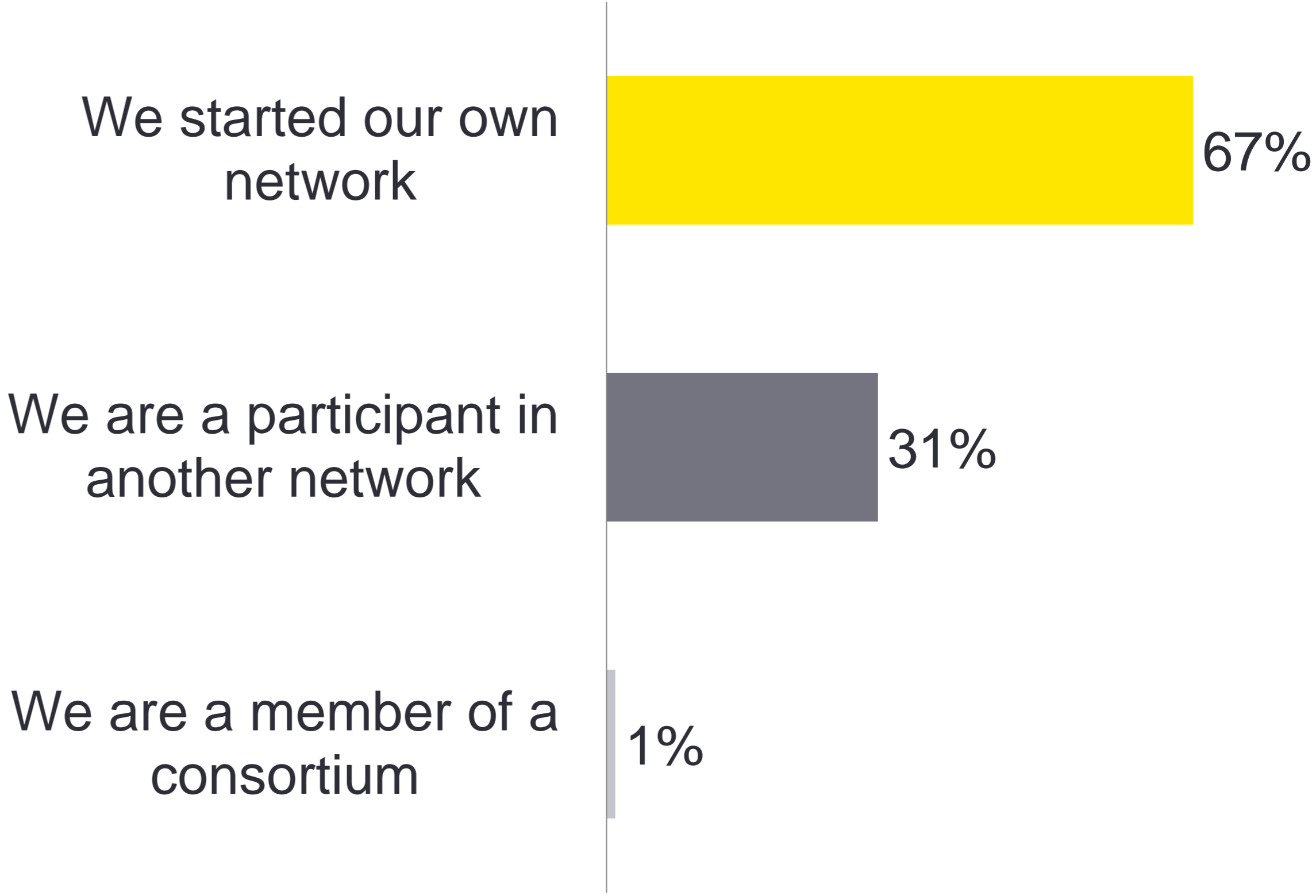
Seller

Buyer

Smart contract

▶ Directly insert financial services into business transactions

▶ Instant financing, insurance, receivables factoring and working capital all delivered in the context of a specific deal or project

EY

The most unexpected and hopeful trend from 2019 was the accelerated interest in and openness to public blockchains by enterprise users

**Current model of siloed and parallel private networks is unsustainable:**

Logistics Provider A

Insurance Provider B

Warehouse Company C

Retailer A

Retailer B

Retailer C

The average private blockchain has 0.5 participants, excluding the founding entity:

We started our own network — 67%

We are a participant in another network — 31%

We are a member of a consortium — 1%

EY

For enterprises that have experienced the challenges of building private blockchains, most now understand the power of public networks

How likely are you to use public blockchains in the future?
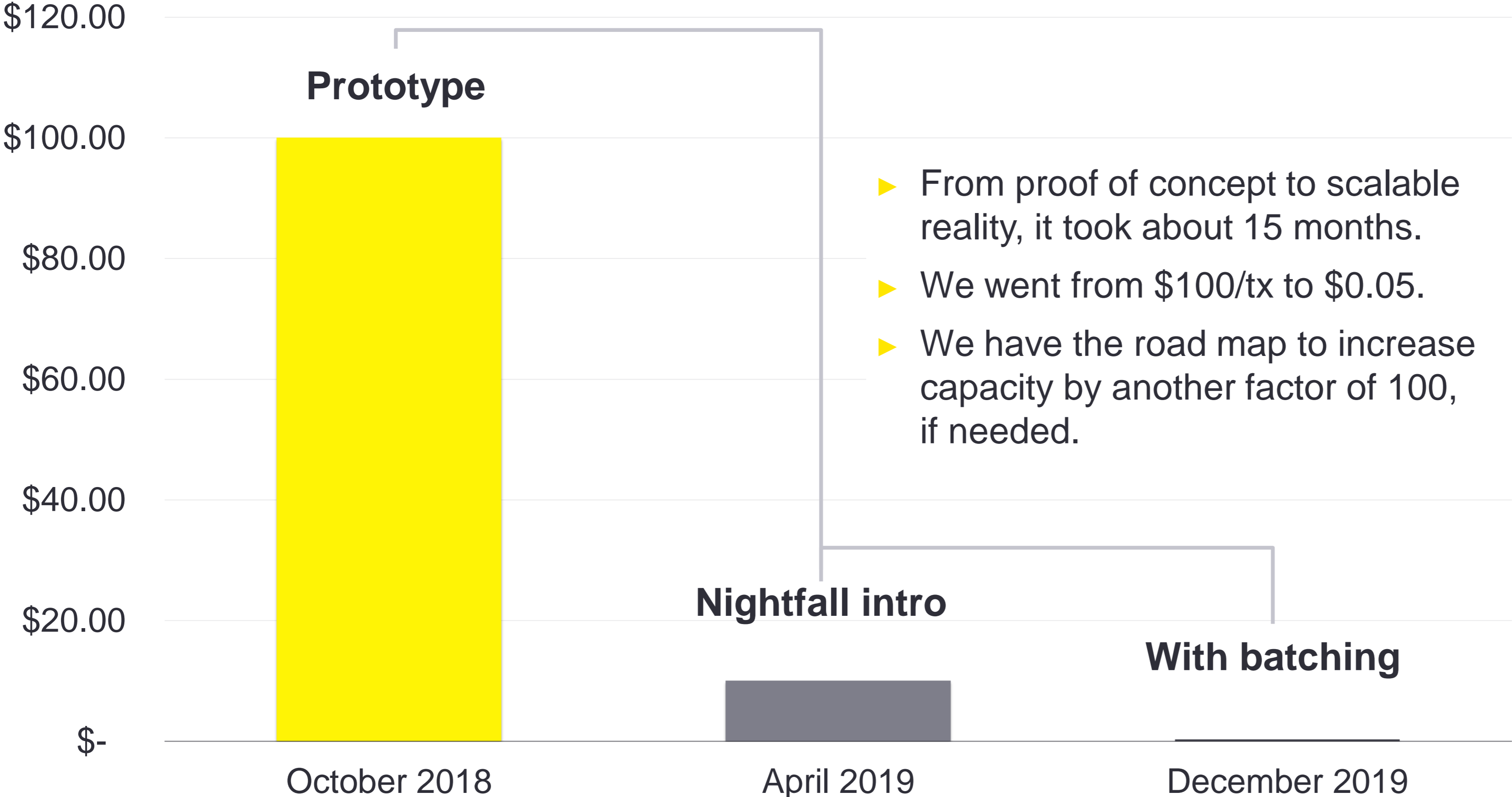233 enterprise executives with blockchain responsibilities

43%

32%

22%

3%

Not at all likely | Not likely | Somewhat likely | Very likely
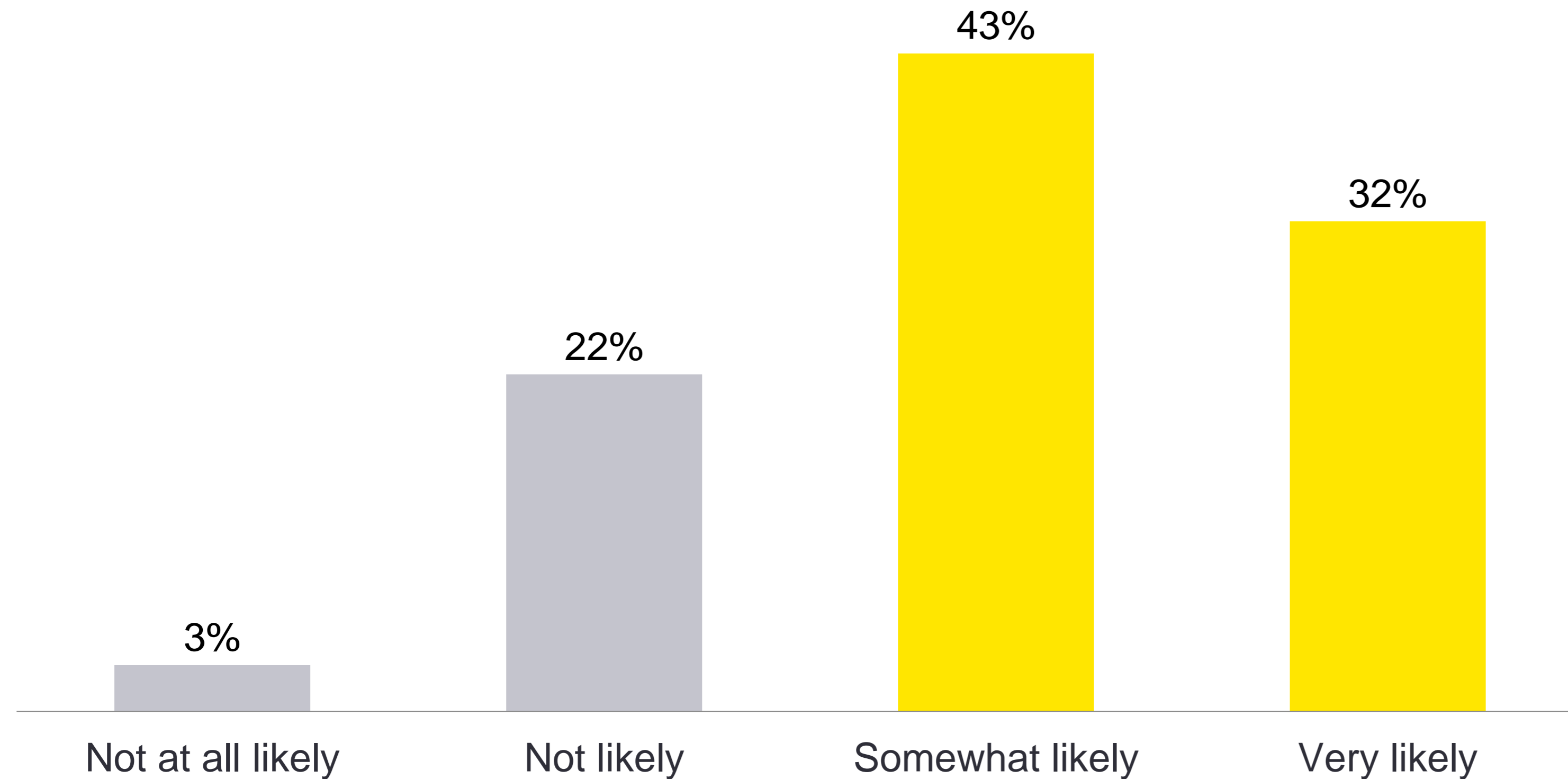
75%

Believe public blockchains are in their future.

EY

Finally, we made enormous technological progress in 2019 around enabling private transactions and business agreements on public blockchains
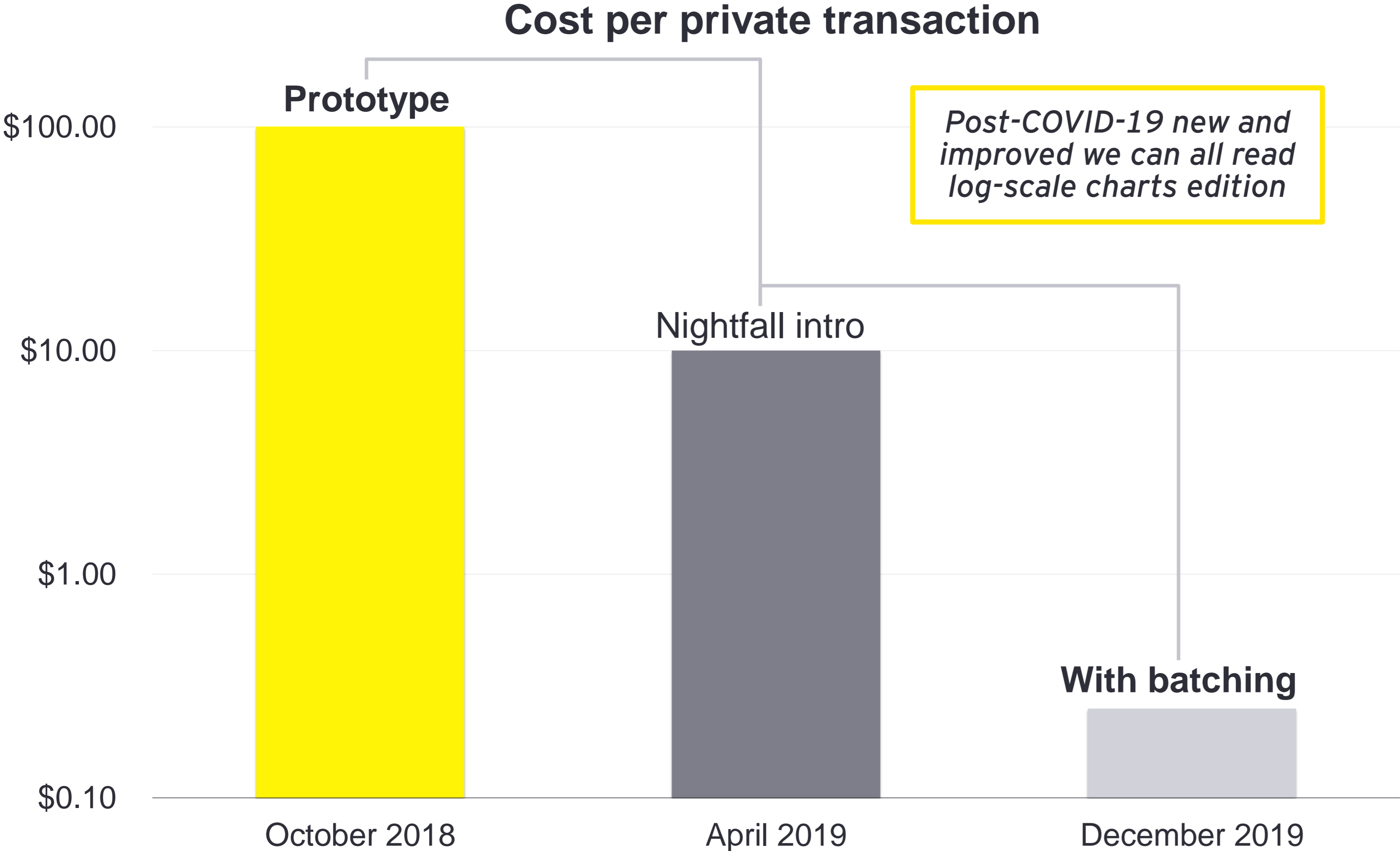
Cost per private transaction

- ► From proof of concept to scalable reality, it took about 15 months.
- ► We went from $100/tx to $0.05.
- ► We have the road map to increase capacity by another factor of 100, if needed.

Regulatory compliance

- ► White lists
- ► Black lists
- ► Audit functions

EY

Finally, we made enormous technological progress in 2019 around enabling private transactions and business agreements on public blockchains

Cost per private transaction

Prototype

$100.00

Post-COVID-19 new and improved we can all read log-scale charts edition

$10.00

Nightfall intro

$1.00

With batching

$0.10

October 2018   April 2019   December 2019

Regulatory compliance

► White lists

► Black lists

► Audit functions

EY

That doesn't mean there aren't challenges to making public blockchains usable and scalable for enterprises – we saw four big ones remaining
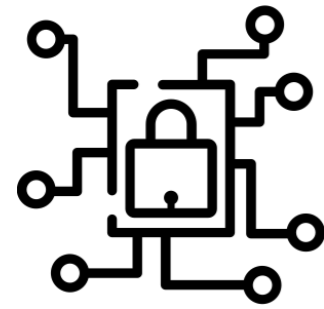
Private business logic

▶ Business logic that can be executed in a secure, compartmentalized manner without resorting to "trusted compute" modules or third parties
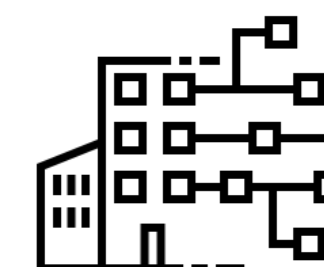
Business identity and discovery

▶ Searchable directories of enterprises with verified identifies

▶ Integration to emerging enterprise identity standards
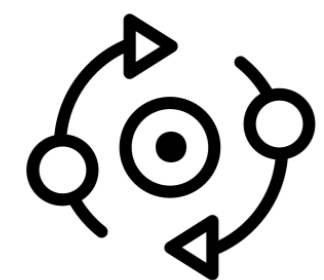
Process state sync and messaging

▶ Ability to manage and sync state in end-to-end processes

▶ Private messaging with guaranteed delivery

Enterprise process tokenization

▶ Standardized ways of tokenizing key outputs of enterprises processes like purchase orders, contracts and receivables

With our initial goal of cost effective private transactions on public networks in sight, we started thinking about everything else that needed to be done back in June of 2019

EY

Introducing The Baseline Protocol

Our goal is to allow enterprises to coordinate complex, multi-party business processes including payments and asset transfers with privacy and…

…without putting any sensitive enterprise information on the blockchain.

Going Public:
The EY blockchain product vision and road map

EY

Our vision hasn't changed

Blockchains will do for networks of enterprises and business ecosystems what ERP did for the single company.

EY

Blockchains will integrate information and processes within and across enterprise boundaries.

Tokens and smart contracts will be the standard way in which companies transact with each other.

EY

Our path to get there has become much clearer over the last year. Five key principles are governing our approach to the product development

1. Enterprises should be able to execute secure, private business transactions on the public Ethereum blockchain.

2. Users should be able to understand the risks and value of smart contracts before they enter into those agreements and without having to be software developers.

3. Transactions should be auditable and regulatory compliant.

4. User experiences and ERP integration should be simple and support existing industry standards.

5. The gold standard for security and reliability is to make core technologies public domain and open source, maintained and inspected by a diverse community of experts.

EY

For EY, everything is coming together under blockchain.ey.com, which will be a single point of integration across our different services around the world
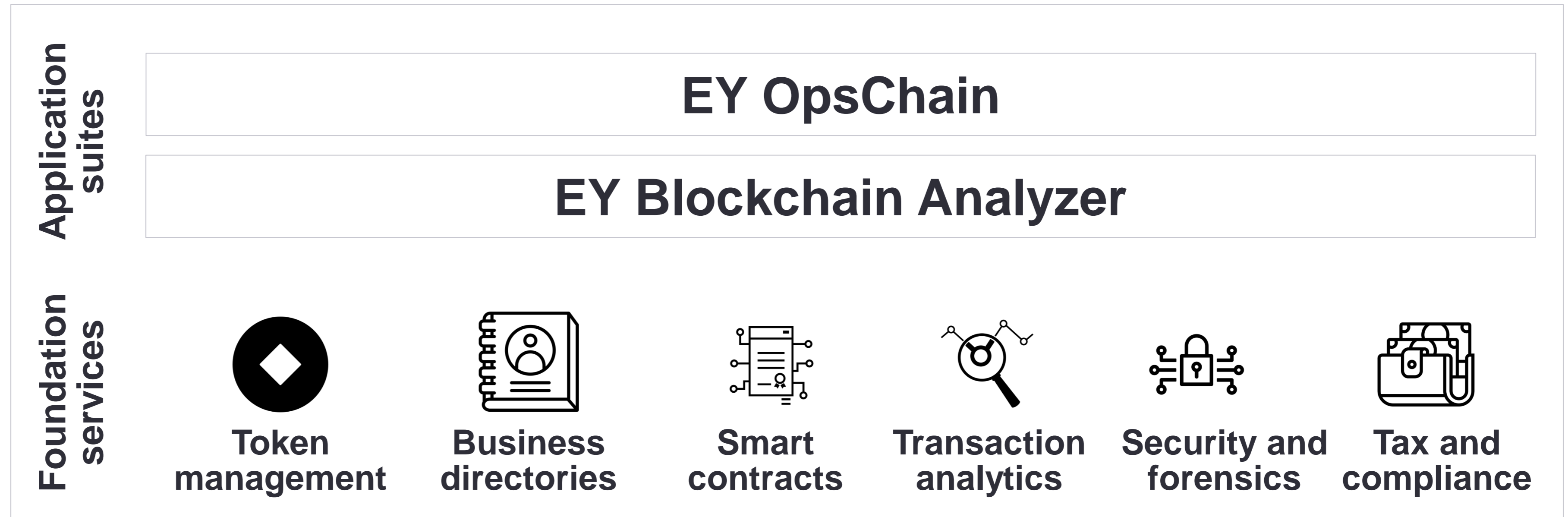
blockchain.ey.com
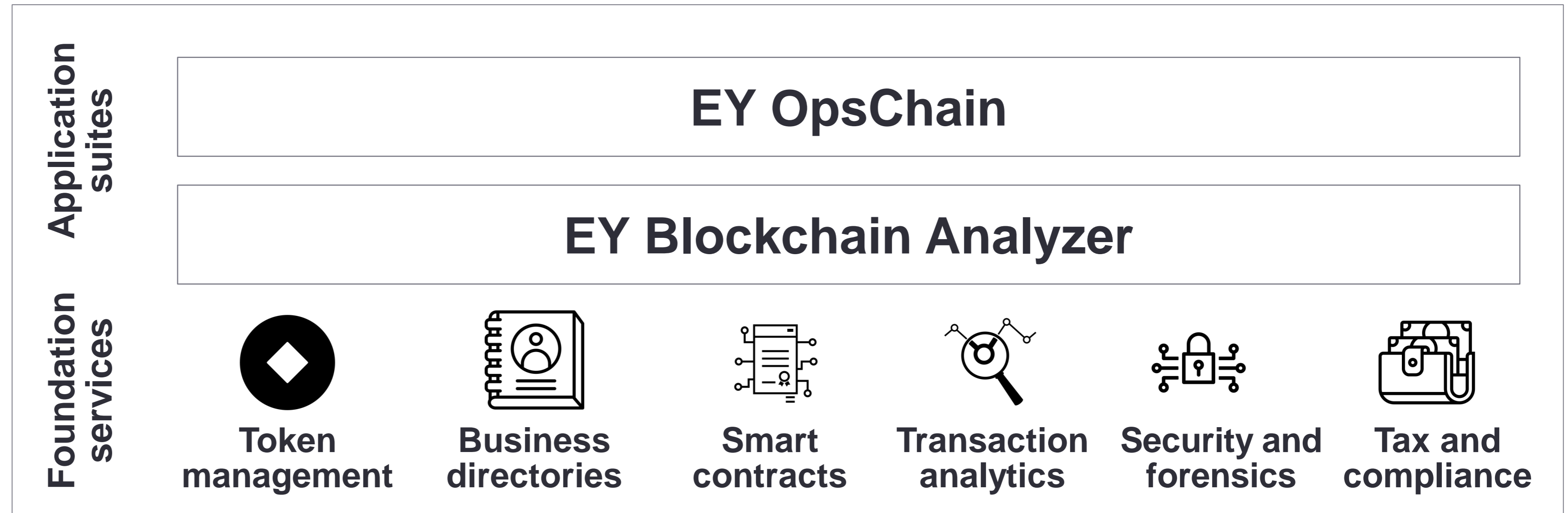
Application suites

EY OpsChain

EY Blockchain Analyzer

Foundation services

Token management	Business directories	Smart contracts	Transaction analytics	Security and forensics	Tax and compliance

Not all functions and interaction methods will be available immediately. Web and GraphQL will be in the first wave of deployment, others to follow. Analytics, security and tax to join with procurement in the early releases of blockchain.ey.com

EY

For enterprises, there will be a wide variety of ways to interact with blockchain.ey.com, including installing your own on-premises implementation
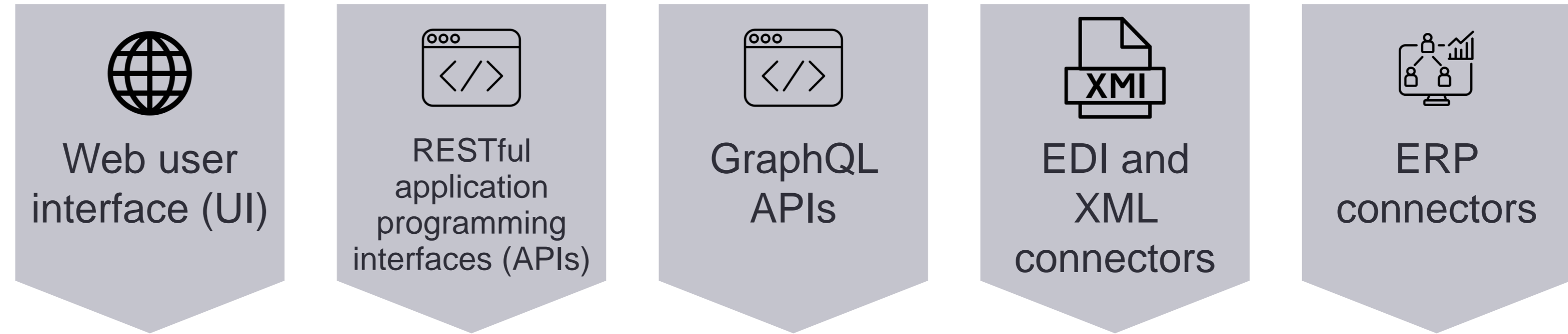
| Web user interface (UI) | RESTful application programming interfaces (APIs) | GraphQL APIs | EDI and XML connectors | ERP connectors |

blockchain.ey.com

Application suites

EY OpsChain

EY Blockchain Analyzer

Foundation services

| Token management | Business directories | Smart contracts | Transaction analytics | Security and forensics | Tax and compliance |

Not all functions and interaction methods will be available immediately. Web and GraphQL will be in the first wave of deployment, others to follow. Analytics, security and tax to join with procurement in the early releases of blockchain.ey.com

EY

blockchain.ey.com will interact with both public and private blockchains

blockchain.ey.com

Application suites

EY OpsChain

EY Blockchain Analyzer

Foundation services

| **Token management** | **Business directories** | **Smart contracts** | **Transaction analytics** | **Security and forensics** | **Tax and compliance** |

Business applications and analytics

Analytics

| **Public Ethereum** | **Private Ethereum** | **Quorum** | **Bitcoin** | **Hyperledger** |
| At launch | Future | Future | At launch | Future |

EY
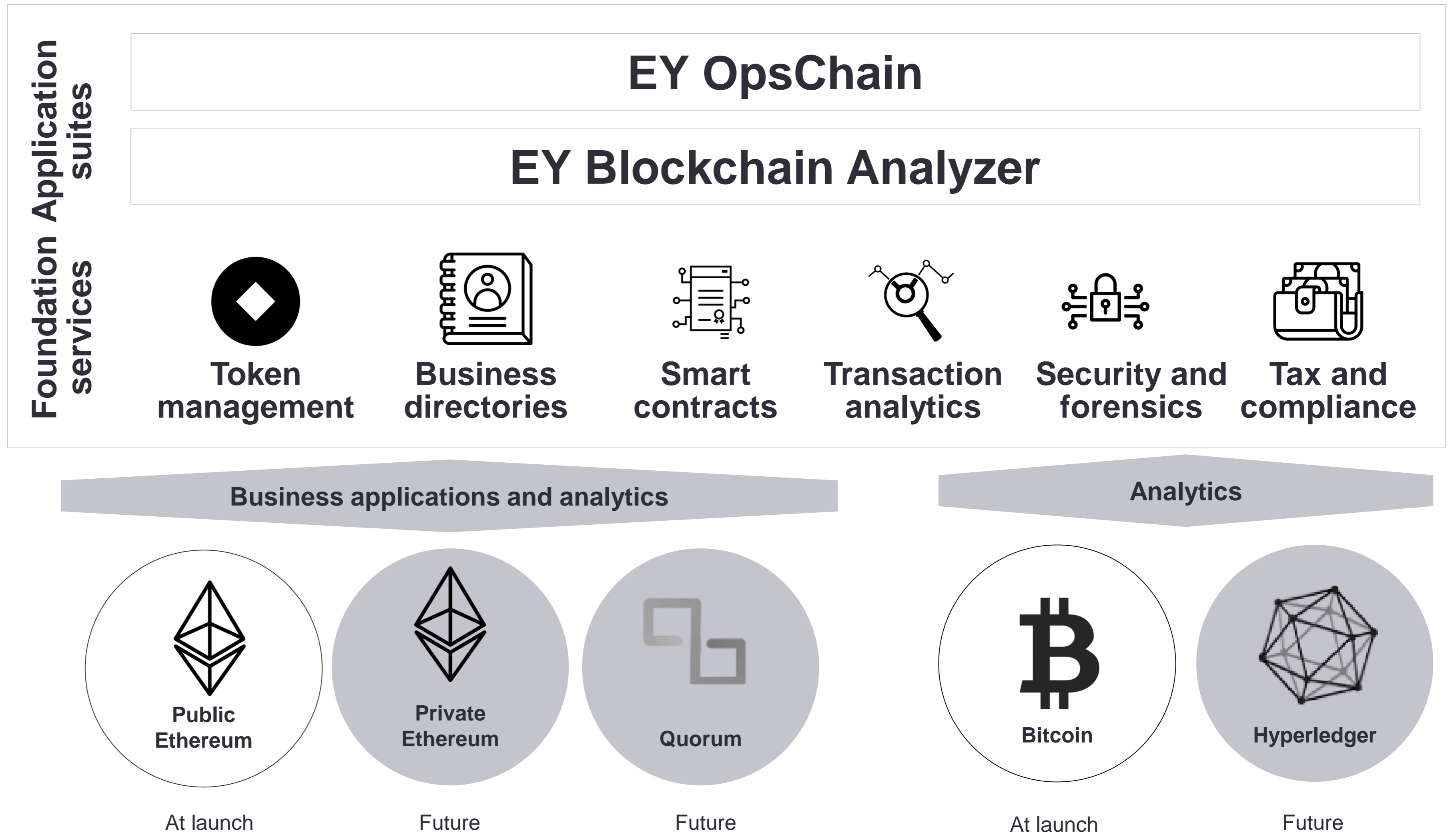
Today, we are announcing the deployment of three new applications into blockchain.ey.com to join our security testing service already available

blockchain.ey.com

Application suites

EY OpsChain

EY OpsChain Network Procurement

EY Blockchain Analyzer

Tax Calculator

Smart Contract Review

Visualization

Foundation services

Token management

Business directories

Smart contracts

Transaction analytics

Security and forensics

Tax and compliance

EY
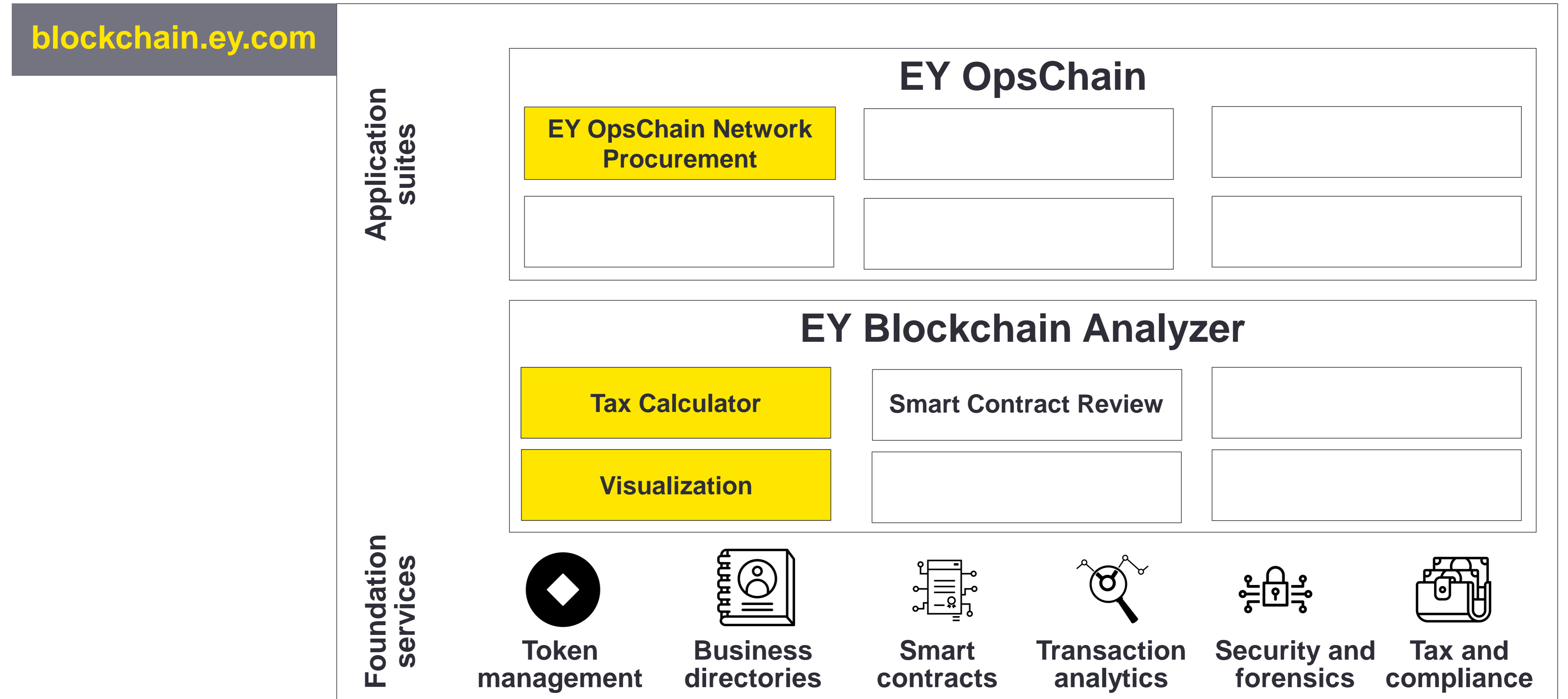
Preview: EY Blockchain Analyzer Tax Calculator

EY Internal - Available for our internal EY Teams for our client's Tax calculations

Enterprise Version – Designed to support enterprise volumes, details available on request

B2C Version - For consumer use, currently in development
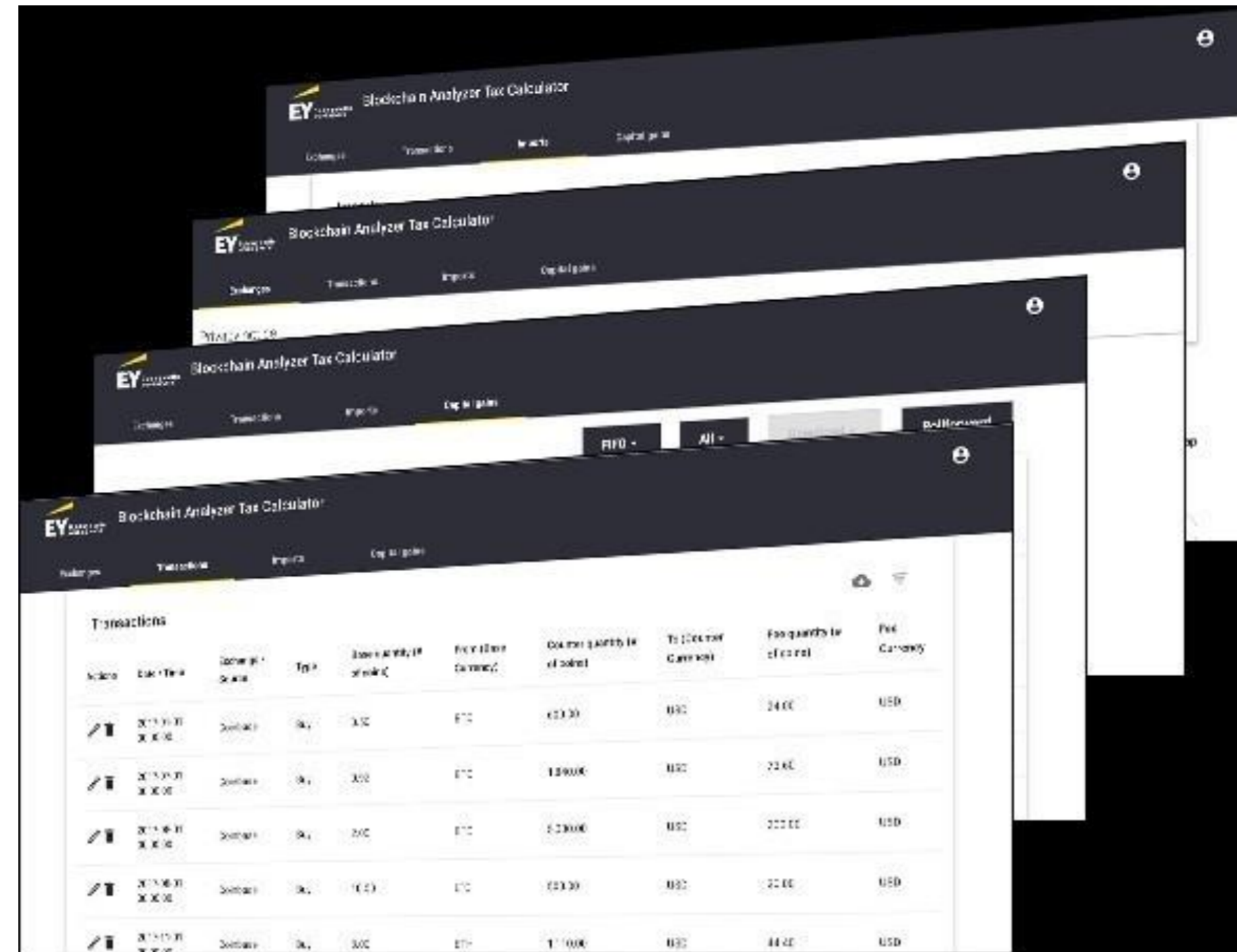
Key features

Capital gains & losses – automatically calculate the capital gains & losses
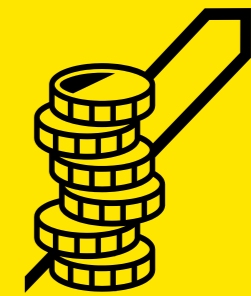
Download populated Form 8949 – PDF or CSV format
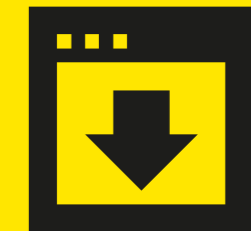
Tax Rollforward - Keep track of your cost basis for next tax year
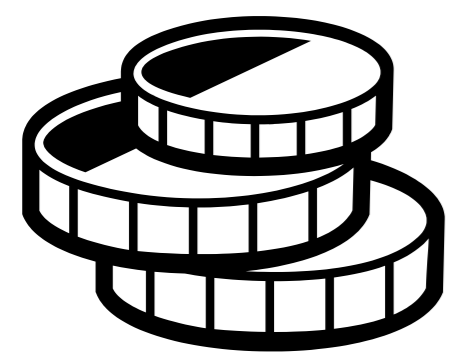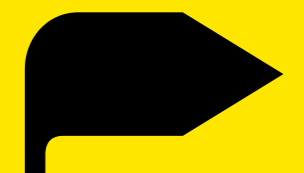
Supports data formats from multiple **cryptocurrency exchanges**

US IRS New schedule 1
"At any time during 2019, did you receive, sell, send, exchange or otherwise acquire any financial interest in any virtual currency?"

Global Tax
Currently supports US Tax rules. Support for more country Tax rules is in development.

EY

Our new visualization tool was designed by our audit and forensics teams to support global visibility across complex networks

Key features

Block explorer
► Search for specific transactions, addresses and blocks to receive related information

Data visualization
► Expand transaction inputs and outputs to identify related transactions, access the underlying transaction details and quickly determine patterns

Exportable data
► Download the underlying on-chain data and visualization; the data will be shareable across EY blockchain products, providing a unified experience regardless of objective

Current and future assets supported

EY

EY OpsChain 4.0 and our first module, Network Procurement, is our first solution to be deployed on the Baseline Protocol

A typical enterprise procurement process

Request for proposal → Proposal sent → Contract award → Contract signed → Purchase order (PO) → Product shipment → Product receipt → Invoice sent → Payment sent → Payment received
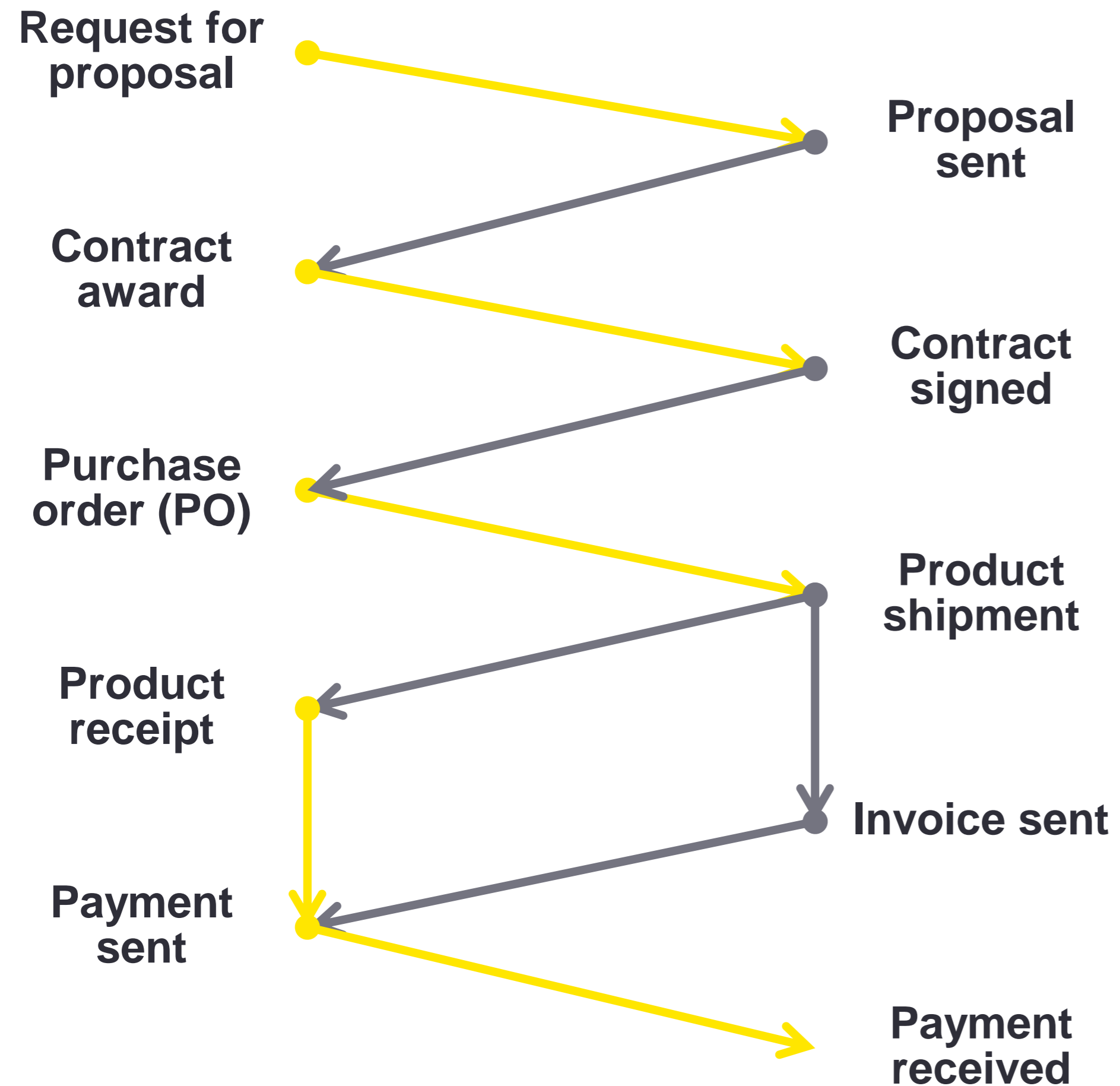
Why start with procurement?

1 Do one thing really well, before you generalize a platform.

2 This is the main way in which nonfinancial entities interact.

3 Procurement is perfect for blockchain — specific finite assets and money moving based on contracted rules.

4 It's really broken and fixing it will create lots of value.

EY

Procurement is broken because enterprises have changed and the technology that serves them has not

From vertically integrated …

► *River Rouge plant for Ford*

► *Vertically integrated end-to-end car manufacturing*

… to ecosystem partner

► *Foxconn's Shenzhen factory complex: assembly only, depending on a huge global network of suppliers*

EY

We are now in the era of network competition, and those networks are not static and competing networks often overlap. This makes procurement very complex

Network leaders

Owned subsidiaries

Subcontracting partners
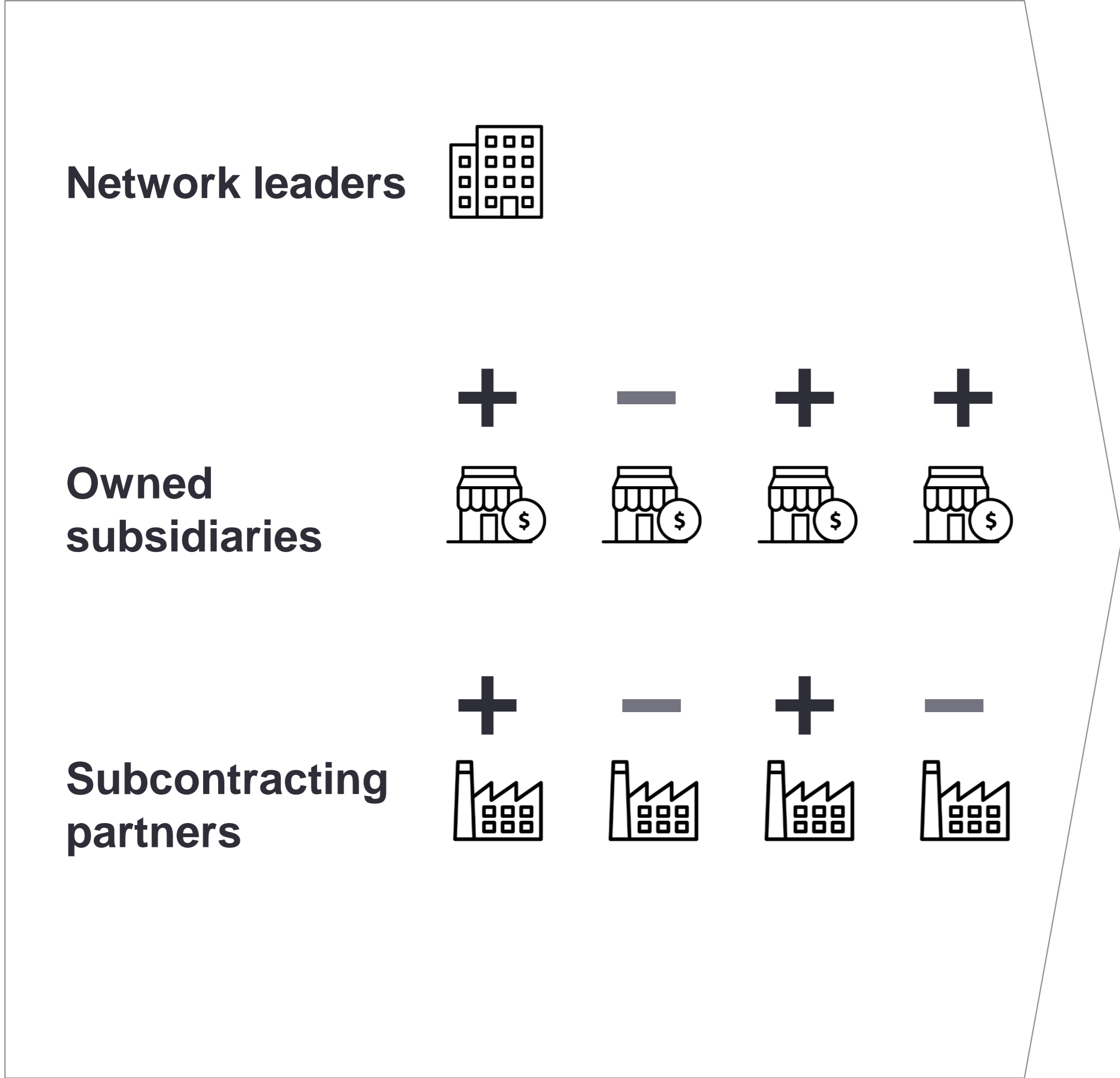
Running large scale global operations can be challenging in an environment of continuous change …

Total volume purchased
Track total volume across network, even through authorized subcontractors

Aggregated spend
Keep track of total volume across the network without disclosing volume totals to subcontractors

Correct pricing
Guarantee correct pricing at any given volume without disclosing discount table to partners

Authorized buyers
Easily add or remove authorized buyers from a contract

EY

You cannot run a network-level procurement activity from inside the four walls of your enterprise.

EY

EY OpsChain Network Procurement is designed for a world where networks of enterprises must operate like a single entity

Buyer networks actually have multiple different roles:

Network leader (buyer)

Negotiate the master agreements on behalf of their network of buyers and monitor the contract.

Owned subsidiaries

Can use the negotiated agreement and are part of the parent entity but may have different ERP systems.

Authorized buyers

They can buy off the agreements, but aren't authorized to see information about the terms and conditions or volume tiers.

Smart contracts track volume and enforce discounts:

Digitally signed contract
Total volume
Discount table
Authorized buyers
Authorized sellers

Blockchain smart contract

Requested volume →
← Approved price
Finalized PO →
Proof of delivery →

Received PO →
← Product shipment
Proof of delivery →
← Invoice

Seller networks have similar complexity:

Network leader (seller)

Negotiate the master agreements on behalf of their network and authorized distributors.

Owned subsidiaries

Fulfill based on the terms and conditions of the agreements across different ERP systems.

Authorized distributors

Agree to fulfill based on the contracted prices, but cannot see the detailed terms and conditions of the agreements.

Going Public: EY 2020 Global Blockchain Summit

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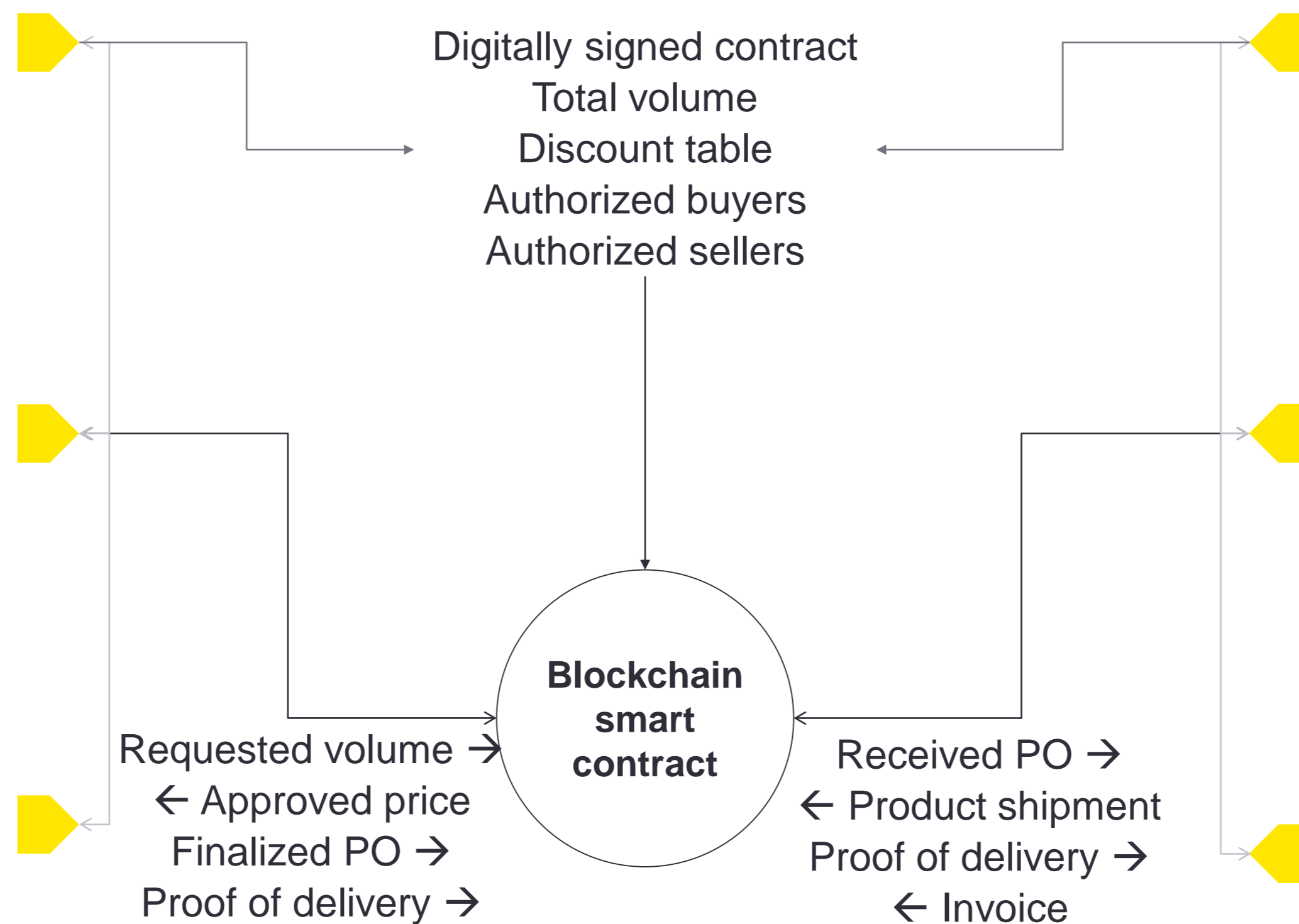
Early implementations have produced exceptional results even when moving from preexisting paper contracts to digital implementations

Case example: Microsoft's expected benefits from implementing a blockchain for digital software procurement for the Xbox video game network

Less time needed to calculate rights and royalties owed	**Less cost to administer the entire system**	**Full transparency for all leading to less litigation**
-99%	-40%	
▶ From 45 days to <4 minutes to complete statements of account	▶ Reduction in the cost to administer the system	▶ Increased trust from all parties being allowed to examine the transaction logs and business logic in detail
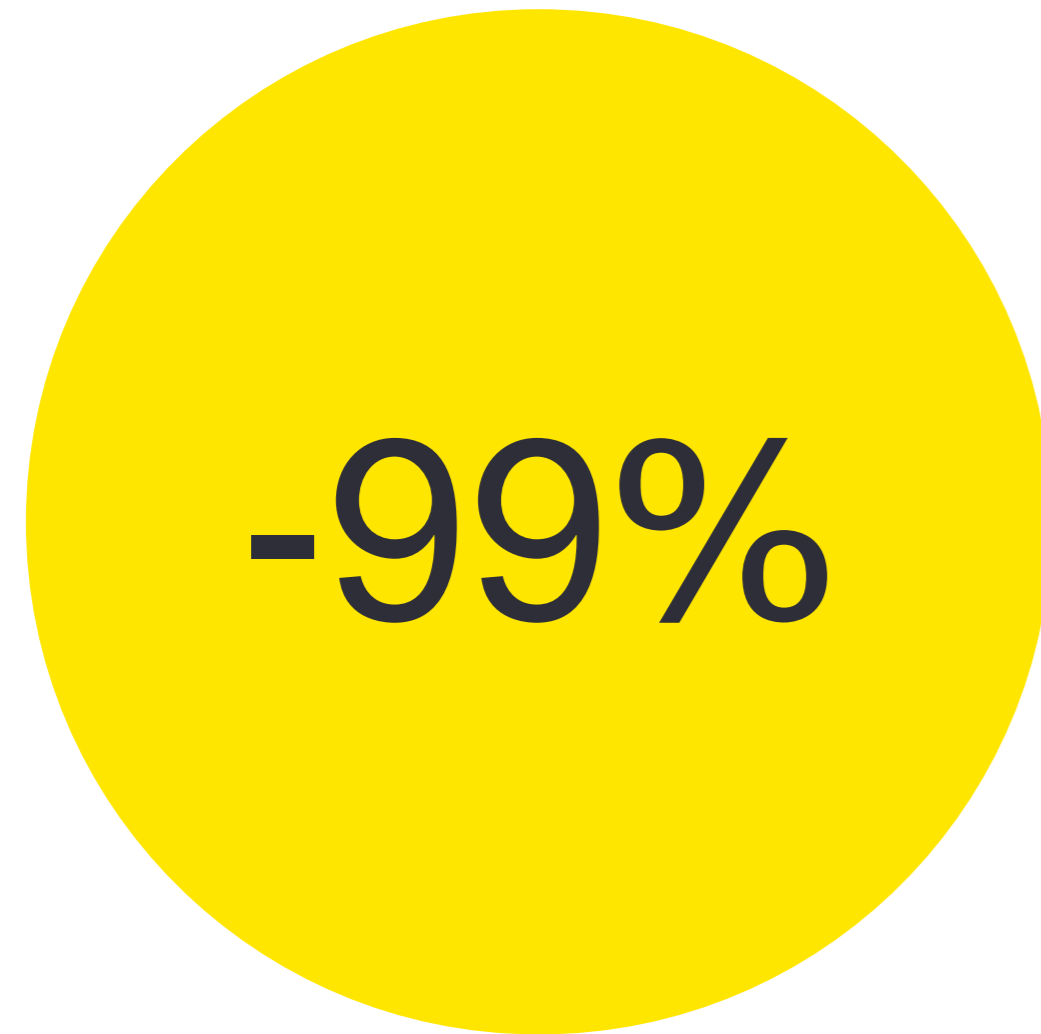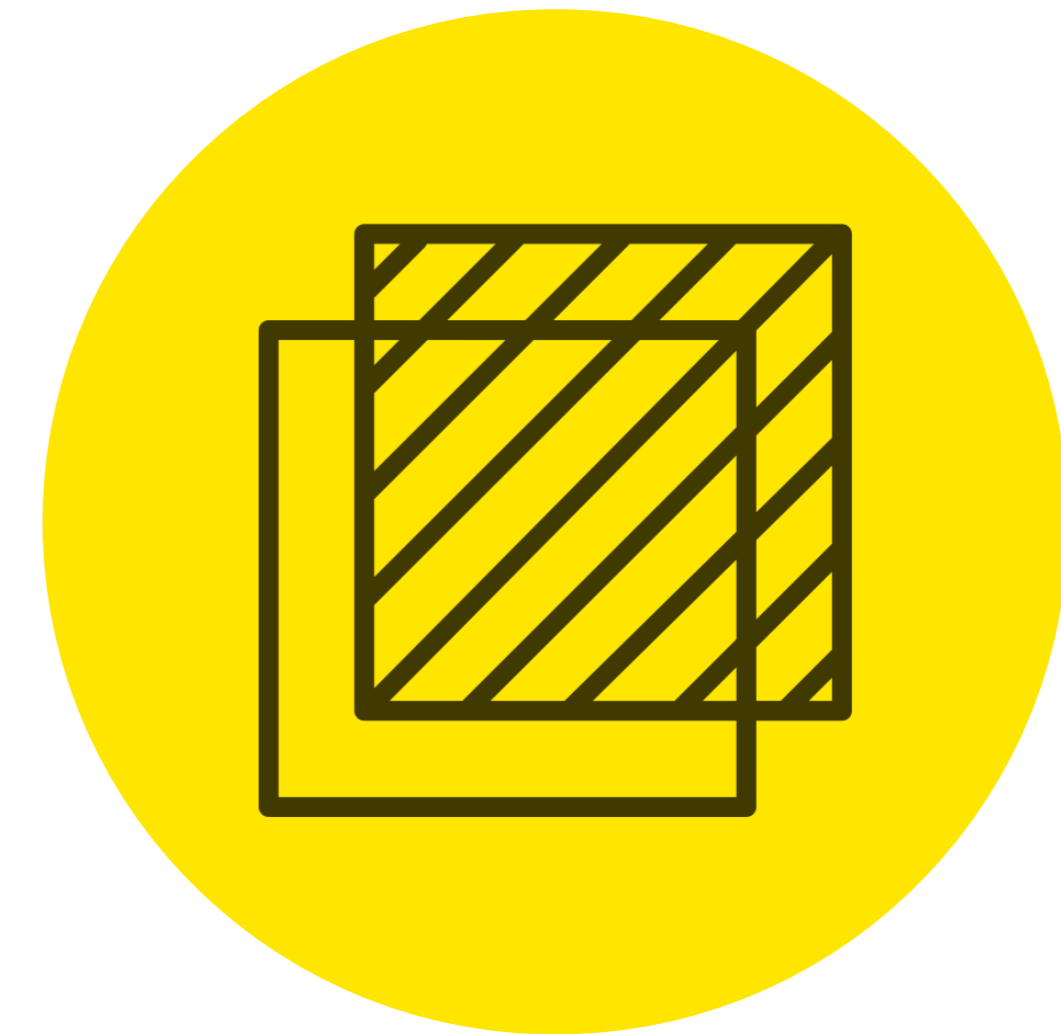
EY

You can do this with a web server.
Why do it with a blockchain?

EY

Because time and again, the intermediaries that run our digital marketplaces have turned out to be predators, not partners

Centrally controlled marketplaces are opaque and the flow of information is very asymmetrical …
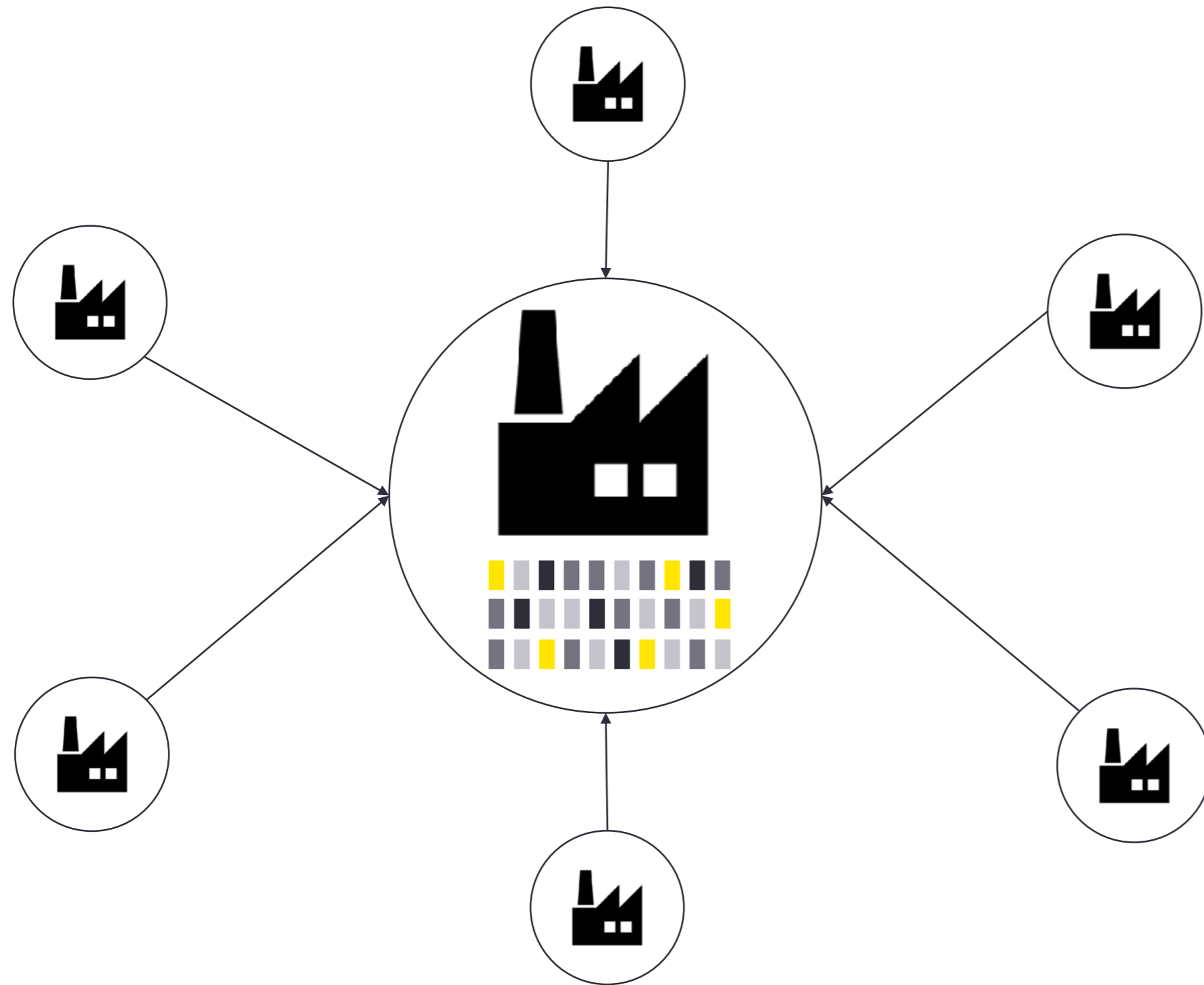
Public blockchains offer a level playing field and transparent rules for everyone:
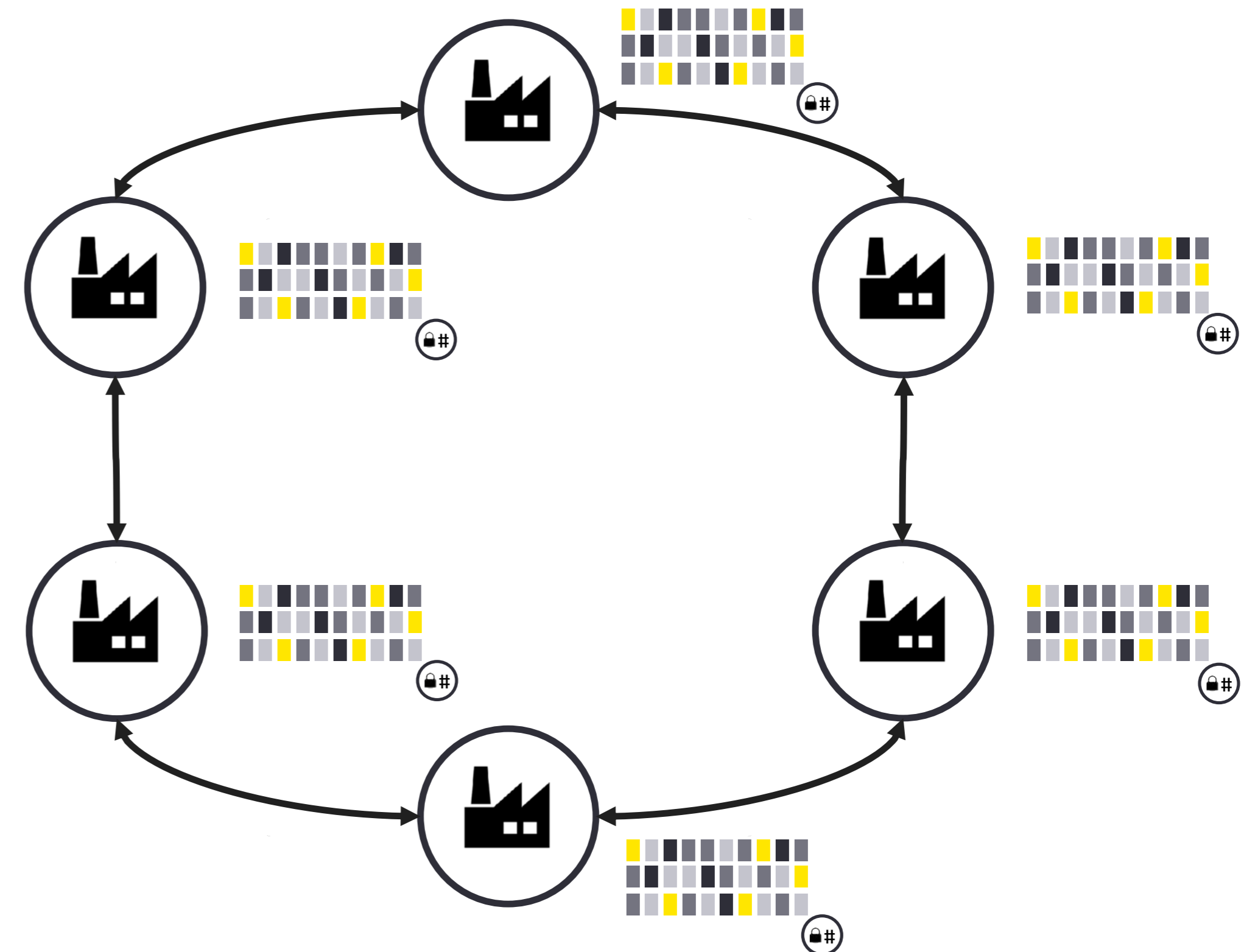
Blockchains can do the same work as centralized portals, without participants finding themselves facing a monopolist, a new competitor, or both.

EY

The EY commitment to public blockchains and open standards means no lock-in, no risk of having your data monetized and no barriers for partner onboarding

Open standards
No proprietary standards here, all core tech is public domain

+

Public blockchains
Fully decentralized ecosystem with no centralized manager

=

Easy onboarding
Open standards means many industry-wide blockchain tools can be used to onboard participants.

Choice of providers
Any major SI company and most IT departments can implement open-source blockchain code.

No predatory intermediaries
No sensitive data on-chain and no centralized operator to "monetize" that data.

Lower costs
Public blockchains are a variable cost, so there is no huge fixed cost to set up and run a private network.

Higher integrity
Only public blockchains can offer truly immutable, tamper-proof data systems.

Clients using blockchain.ey.com could use us today and unplug tomorrow without losing network access or data.

EY

With Baseline, we have gone far beyond just encrypting transactions. Enterprises never leave sensitive data on the blockchain
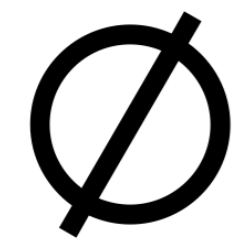
Zero-knowledge proofs

► Replacing sensitive data with proofs

► Enables consensus without losing privacy

Secure private messaging

► Communicate with entities without leaving a permanent record on-chain

► Keeps identities of users private

Blockchain as middleware

► Verifiable signatures and proof of delivery and completion

► Provable synchronization of process state without putting data on-chain
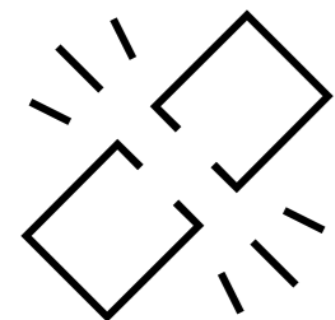
Off-chain storage

► Critical metadata accessible as needed

► If security compromised, access can be cut off
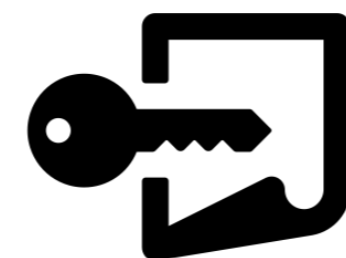
Proxy re-encryption

► Compartmentalizes encrypted data for each user/entity

► All data not compromised from one security breach

This architecture preserves key functionality of the blockchain but significantly reduces risk of future decryption and data loss for enterprises.

EY

EY Network Procurement will be available in beta at blockchain.ey.com for client pilots and testing starting in May

Rapid pilots through blockchain.ey.com

► End-to-end process can be run through a web user interface on blockchain.ey.com.

► Suppliers can onboard into blockchain.ey.com immediately.

► EY can support adding contract terms and conditions that are specific after pilot phase (standard logic is based on a volume discount table).

► Demonstrations can be done in under a day, pilots with supplier participation could be done in a matter of days or a week or two through the web UI.

Multiple paths and options to scale into production

Add suppliers and buyers

► Build a blockchain directory of partners for quick additions
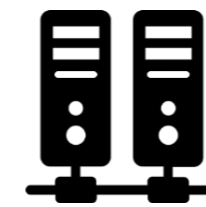
System integration

► ERP integration

► EDI messaging

► RESTful APIs

Integrated payments

► On-chain payments with tokenized fiat currency

► Banking integration

Legacy contract onboarding

► Extend total volume of spend covered by the system

EY

Now, next and beyond

EY

This is our time. This year. Next year. This is when the really important work of blockchain will be done, while much of the world isn't paying attention

Gartner Emerging Technologies Hype Cycle 2002

► Most of the technologies that were being "dissed and dismissed" in 2002 are standard today.

► Reality doesn't measure up to the overhyped promises made by some marketers.

► Foundations for market success are laid after the hype but long before a market matures.

EY

Major world events do not seem to stop technology adoption. At best, they slightly delay it, but most of the time, there is no visible slowdown

Technology adoption in US households

Technology adoption rates, measured as the percentage of households in the United States using a particular technology.

Our World in Data
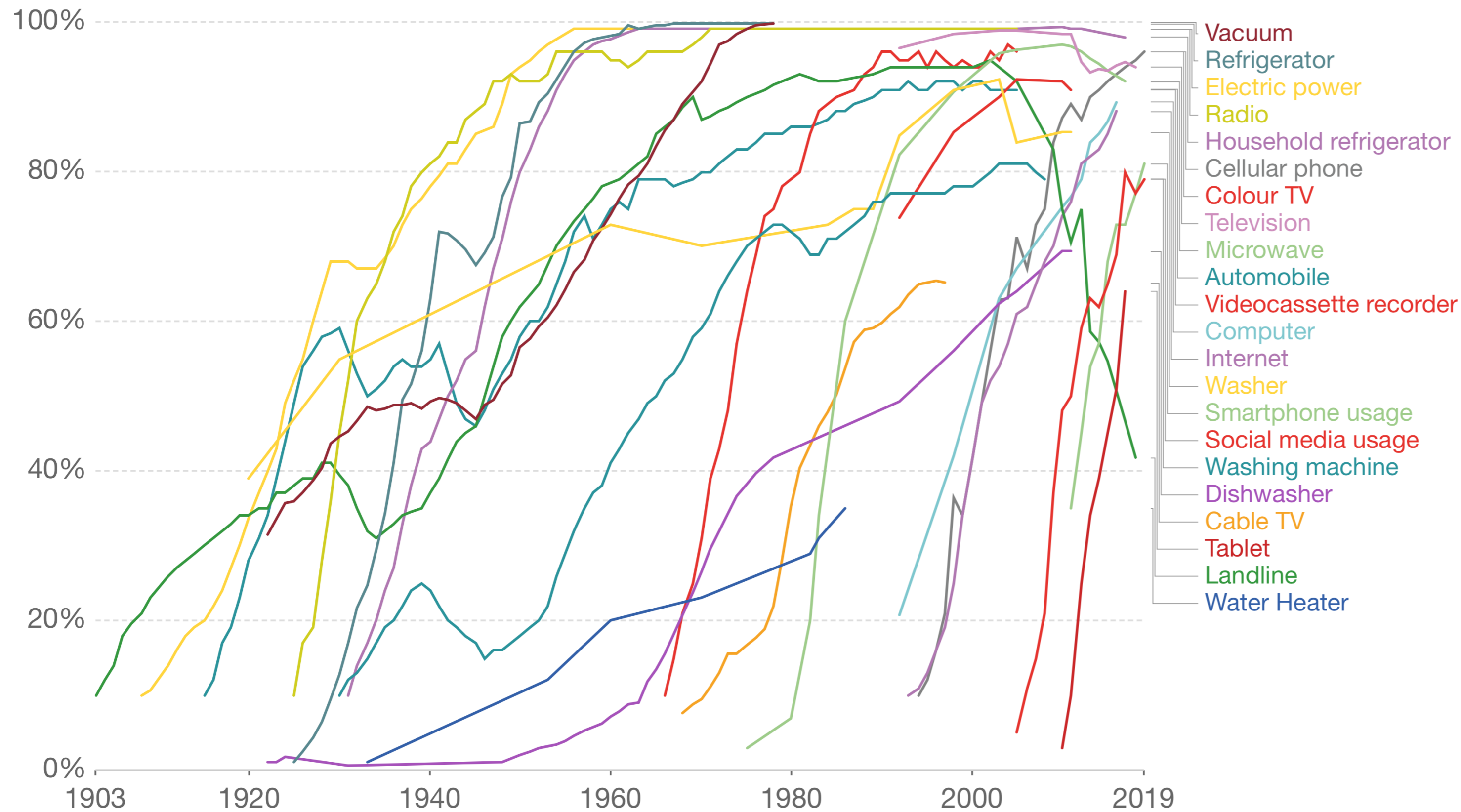
- ▶ The only clear delays in technology adoption came during WWII, as a lack of materials for consumer products slowed availability.

- ▶ The only consistent theme in the 50 years has been a gradual acceleration in the pace of new technology adoption.

Source: Comin and Hobijn (2004) and others

OurWorldInData.org/technology-adoption/ • CC BY

Note: See the sources tab for definitions of household adoption, or adoption rates, by technology type.

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Beyond basic adoption, we need the equivalent of DeFi in a wide range of industrial capabilities so that we can build truly composable enterprises

	Buy	**Make**	**Move**	**Store**	**Sell**
DeOps Decentralized operations	Raw materials	3D print	Air freight	Warehousing	Dealers
DeSys Decentralized systems	Procurement	Manufacturing operations	Logistics planning	Replenishment planning	Sales contracts
DeFi Decentralized finance	PO financing	Working capital	Shipping insurance	Inventory financing	Invoice factoring
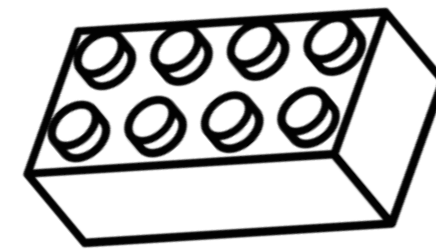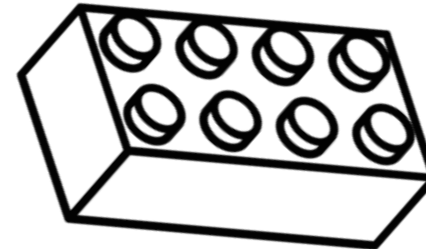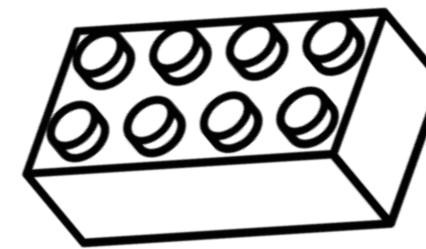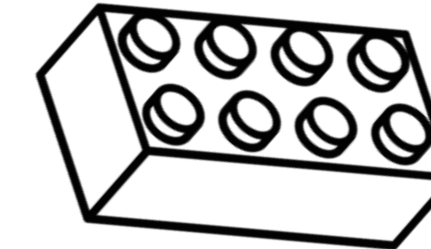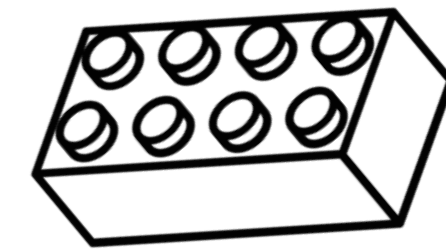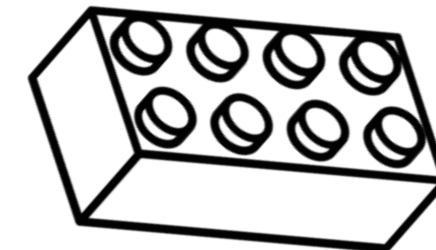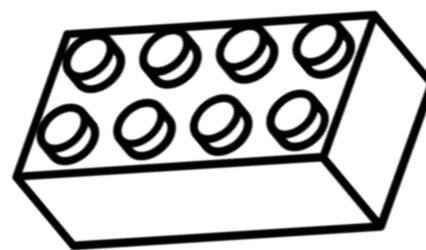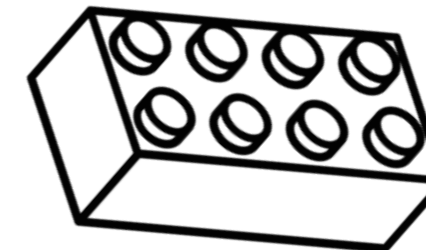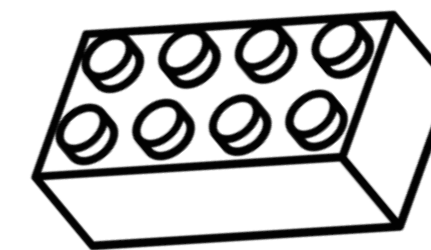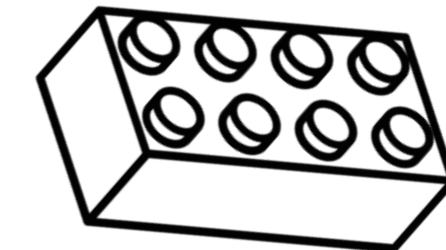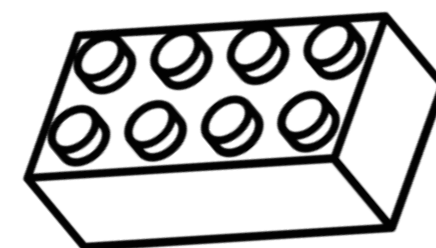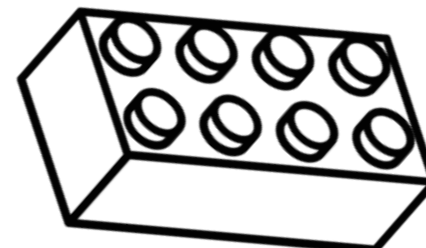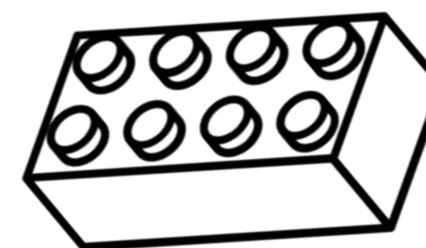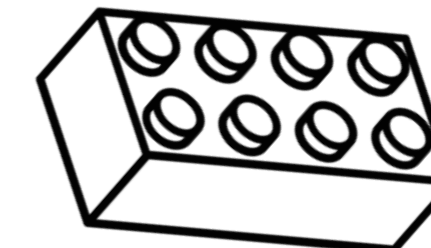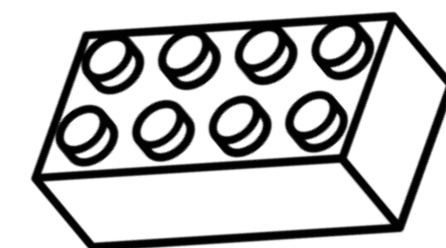
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Blockchains are going to reshape the global economy and reset the global competitive landscape

A widespread effect
Top four firms' share of total industry revenue, %
893 industries, grouped by sector, United States

- Accommodation & food
- Administration
- Arts & entertainment
- Education
- Finance
- Health care
- IT
- Manufacturing
- Other
- Professional services
- Property
- Retail
- Transport & warehousing
- Utilities
- Wholesale
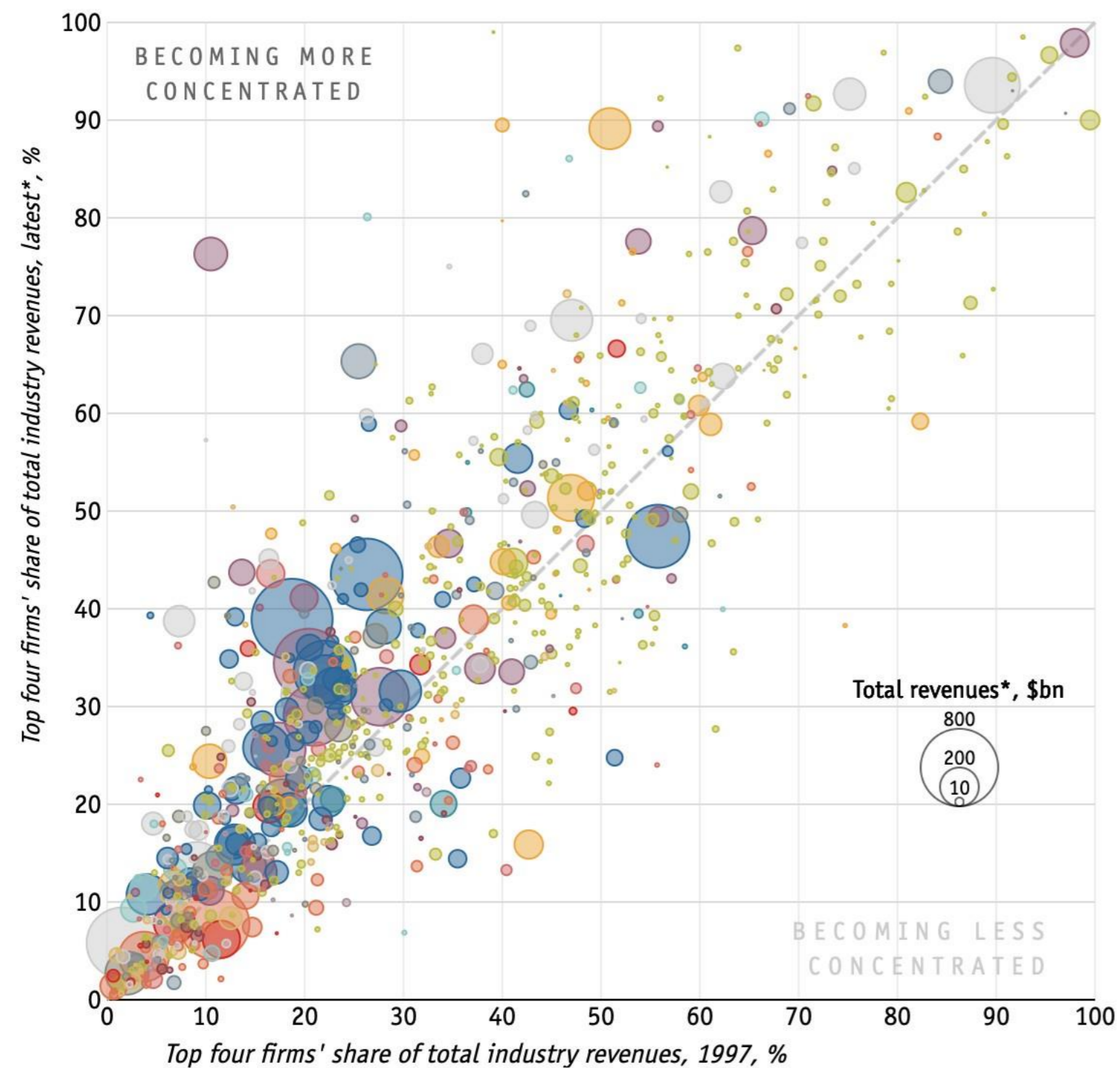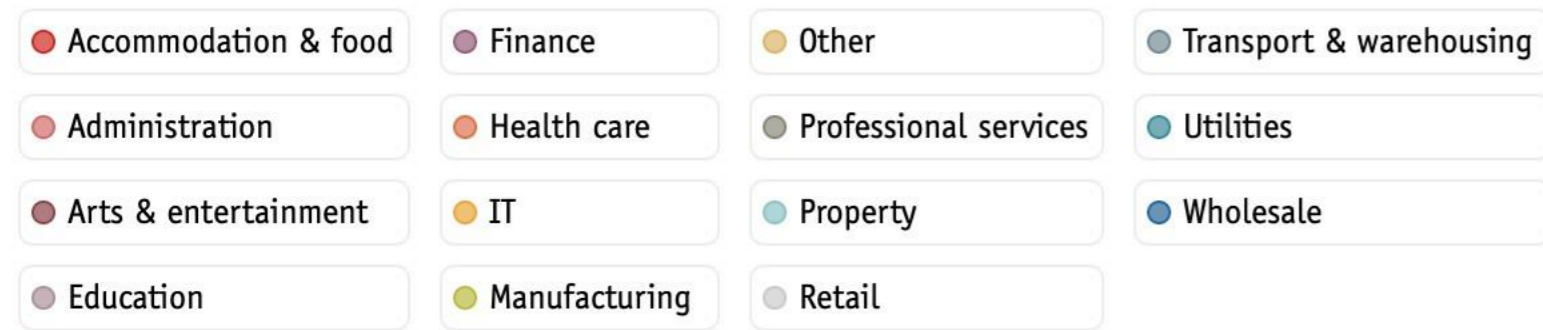
Sources: US Census Bureau; *The Economist*

*Latest available, 2007 or 2012

Zero marginal cost

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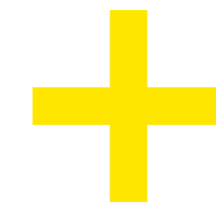
Network effects

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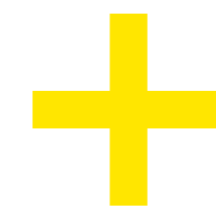
Vendor lock-in

=

Market dominance

>

Zero marginal cost

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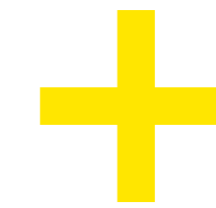
Network effects

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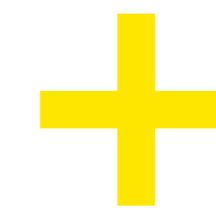
Open access

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Real competition

Source: data from the US Census Bureau, chart from *The Economist*

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Thank you!

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