1. The year of solid progress
2. Blockchain industry transformation
3. Going Public
4. Now, next and beyond
The year of solid progress
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
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
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:
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
Our newest application, EY OpsChain Public Finance Manager (PFM), is making headway with clients like the City of Toronto.

PFM is designed to build accountability and transparency without imposing a centralized IT system on all parties.
We launched our first, true software-as-a-service (SaaS) application at blockchain.ey.com with smart contract review.
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
- Dogecoin
- EOS
- Dash
- TRC20
- Stellar

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

- 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.

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

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.

Expect very strong alignment with China’s digital strategy over time.

Source: McKinsey report on China’s global economic integration, 2019
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)**

- Digital payments only
- Initially between banks and later directly available to individuals as a substitute for cash

**Segment 2: private domestic blockchains**

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

**Segment 3: global trade connectivity**

- B2B transactions and payments for international trade into/from China
- Gradual interconnection between private networks
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**

- 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.

**Global blockchain networks for international transactions**

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

- 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
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%
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 believe public blockchains are in their future.

- Not at all likely: 3%
- Not likely: 22%
- Somewhat likely: 43%
- Very likely: 32%

75%
Finally, we made enormous technological progress in 2019 around enabling private transactions and business agreements on public blockchains.

- 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
Finally, we made enormous technological progress in 2019 around enabling private transactions and business agreements on public blockchains.
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 identities. 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.
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
Our vision hasn’t changed

Blockchains will do for networks of enterprises and business ecosystems what ERP did for the single company.
Not everyone has experienced the life-changing joy of an ERP implementation.

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.
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.
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.

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
For enterprises, there will be a wide variety of ways to interact with blockchain.ey.com, including installing your own on-premises implementation.

<table>
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<th>Application suites</th>
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<tr>
<td>EY OpsChain</td>
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<tr>
<td>EY Blockchain Analyzer</td>
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<tr>
<th>Foundation services</th>
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<tbody>
<tr>
<td>Token management</td>
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<tr>
<td>Business directories</td>
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<tr>
<td>Smart contracts</td>
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<tr>
<td>Transaction analytics</td>
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<tr>
<td>Security and forensics</td>
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<tr>
<td>Tax and compliance</td>
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</tbody>
</table>

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
blockchain.ey.com will interact with both public and private blockchains
Today, we are announcing the deployment of three new applications into blockchain.ey.com to join our security testing service already available.
**Key features**

- **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

- **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.
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**

- Bitcoin
- Ethereum
- NFTs
EY OpsChain 4.0 and our first module, Network Procurement, is our first solution to be deployed on the Baseline Protocol.

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

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
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.

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

<table>
<thead>
<tr>
<th>Network leaders</th>
<th>Total volume purchased</th>
<th>Track total volume across network, even through authorized subcontractors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owned subsidiaries</td>
<td>Aggregated spend</td>
<td>Keep track of total volume across the network without disclosing volume totals to subcontractors</td>
</tr>
<tr>
<td>Subcontracting partners</td>
<td>Correct pricing</td>
<td>Guarantee correct pricing at any given volume without disclosing discount table to partners</td>
</tr>
<tr>
<td></td>
<td>Authorized buyers</td>
<td>Easily add or remove authorized buyers from a contract</td>
</tr>
</tbody>
</table>
You cannot run a network-level procurement activity from inside the four walls of your enterprise.
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

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.
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**: -99%
  - From 45 days to <4 minutes to complete statements of account

- **Less cost to administer the entire system**: -40%
  - Reduction in the cost to administer the system

- **Full transparency for all leading to less litigation**
  - Increased trust from all parties being allowed to examine the transaction logs and business logic in detail
You can do this with a web server. Why do it with a blockchain?
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.
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.

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

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

<table>
<thead>
<tr>
<th>Zero-knowledge proofs</th>
<th>Secure private messaging</th>
<th>Blockchain as middleware</th>
</tr>
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<tbody>
<tr>
<td>▶ Replacing sensitive data with proofs</td>
<td>▶ Communicate with entities without leaving a permanent record on-chain</td>
<td>▶ Verifiable signatures and proof of delivery and completion</td>
</tr>
<tr>
<td>▶ Enables consensus without losing privacy</td>
<td>▶ Keeps identities of users private</td>
<td>▶ Provable synchronization of process state without putting data on-chain</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Off-chain storage</th>
<th>Proxy re-encryption</th>
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<tbody>
<tr>
<td>▶ Critical metadata accessible as needed</td>
<td>▶ Compartmentalizes encrypted data for each user/entity</td>
</tr>
<tr>
<td>▶ If security compromised, access can be cut off</td>
<td>▶ All data not compromised from one security breach</td>
</tr>
</tbody>
</table>

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

► System integration

► Integrated payments

► Legacy contract onboarding

► Build a blockchain directory of partners for quick additions

► ERP integration

► EDI messaging

► RESTful APIs

► On-chain payments with tokenized fiat currency

► Banking integration

► Extend total volume of spend covered by the system
Now, next and beyond
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.
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.

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.
Beyond basic adoption, we need the equivalent of DeFi in a wide range of industrial capabilities so that we can build truly composable enterprises.
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
- Finance
- Other
- Transport & warehousing
- Administration
- Health care
- Professional services
- Utilities
- Arts & entertainment
- IT
- Property
- Wholesale
- Education
- Manufacturing
- Retail

Network effects
- Zero marginal cost
- Real competition
- Market dominance
- Open access
- Vendor lock-in
- Network effects

Source: data from the US Census Bureau, chart from The Economist
Thank you!
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