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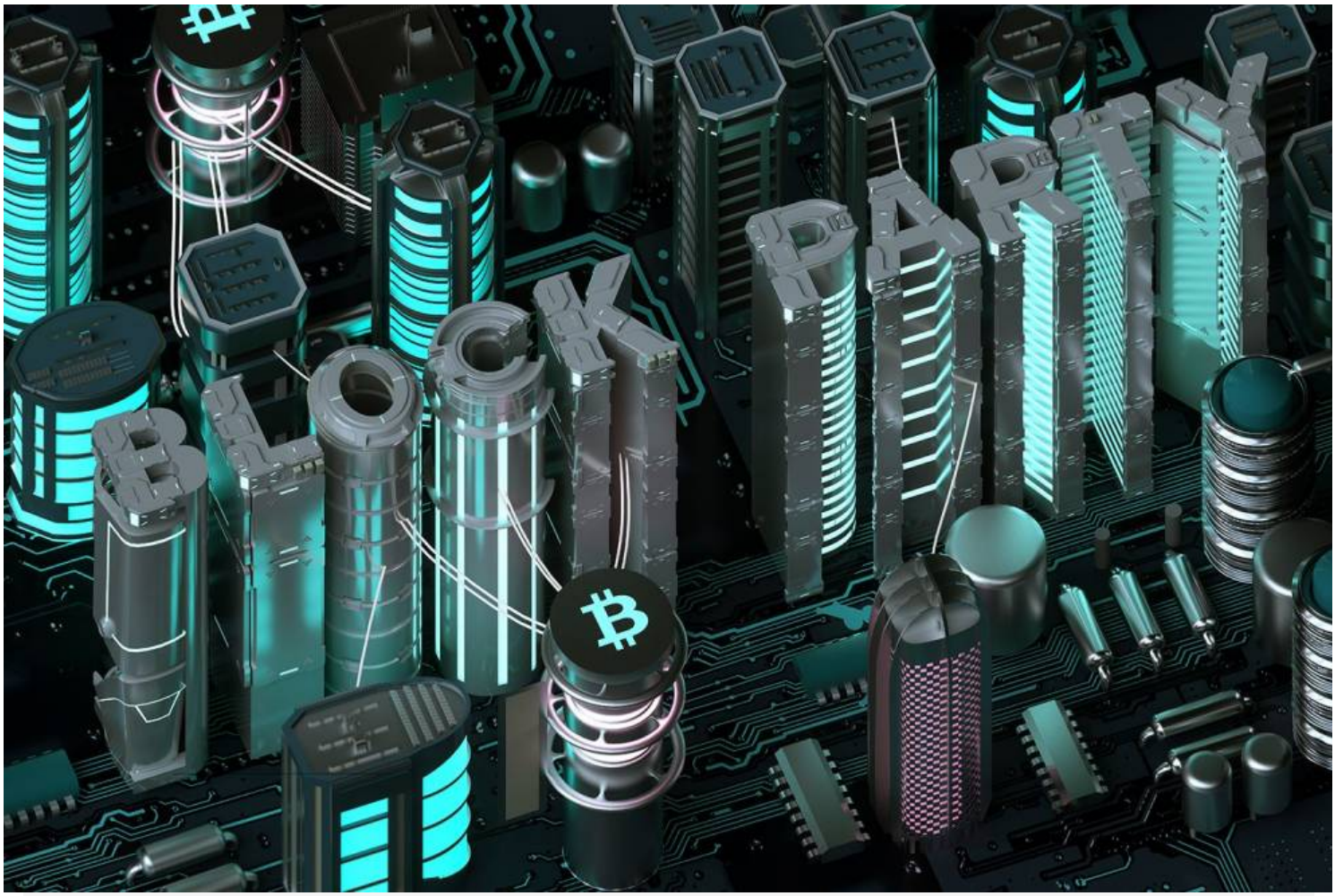
New Internet: Blockchain Technology Could Help Us Take Back Our Data from Facebook, Google and Amazon

BY ADAM PIORE ON 11/19/18 AT 5:09 PM EST



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BUSINESS INTERNET AND TECHNOLOGY

Joe Lubin was living in Jamaica in 2014 when he had the meeting that would transform him into a crypto billionaire and a high priest in a new technological ecosystem that some believe may one day prove more significant than the internet.

Lubin, a 53-year-old Princeton-educated engineer with a résumé that included stints at Goldman Sachs and several hedge funds, had long since "checked out." Alarmed by global debt and what he was seeing on Wall Street and in Washington, D.C., he had considered hoarding precious metals long before the 2008 financial crisis was in full swing. He'd even trekked through Peru and Ecuador with his brother, looking to buy South American farmland that might help insulate them from what he saw as an inevitable global reckoning.

Instead, once the crisis finally hit, Lubin decamped to the Rasta nation with a female friend. They built a home recording studio in Kingston, not far from the beach, and began producing music and videos. For a time, Lubin did all he could to avert his gaze from the carnage he'd left behind. "We felt like doing the music project in Jamaica would be much less expensive and more fun," he says. "I'm a terrible guitar player, so I was more of the facilitator."

Then, in 2011, Lubin read about bitcoin, the cryptocurrency invented by a mysterious figure known only by the pseudonym Satoshi Nakamoto. Like countless others, Lubin became "infatuated" with Nakamoto's idea of digital money that could operate outside global financial systems, remaining impervious to the manipulations of governments and central bankers. Lubin began buying coins and reading everything he could find about the technology.

Nakamoto's singular innovation was the creation of an encrypted, parallel ledger system known as the "blockchain," along with an incentive structure to get people to run it on their computers. Using Nakamoto's software, thousands of people could simultaneously serve as custodians of a continuously updating body of records. The time and origin of every bitcoin transfer and transaction were recorded and revised at the same time on a multitude of independently run computers. A majority of these computers had to validate any new "block" of transactions to make it stick. For these reasons, it was virtually impossible for anyone to hack it, cheat it or manipulate it.

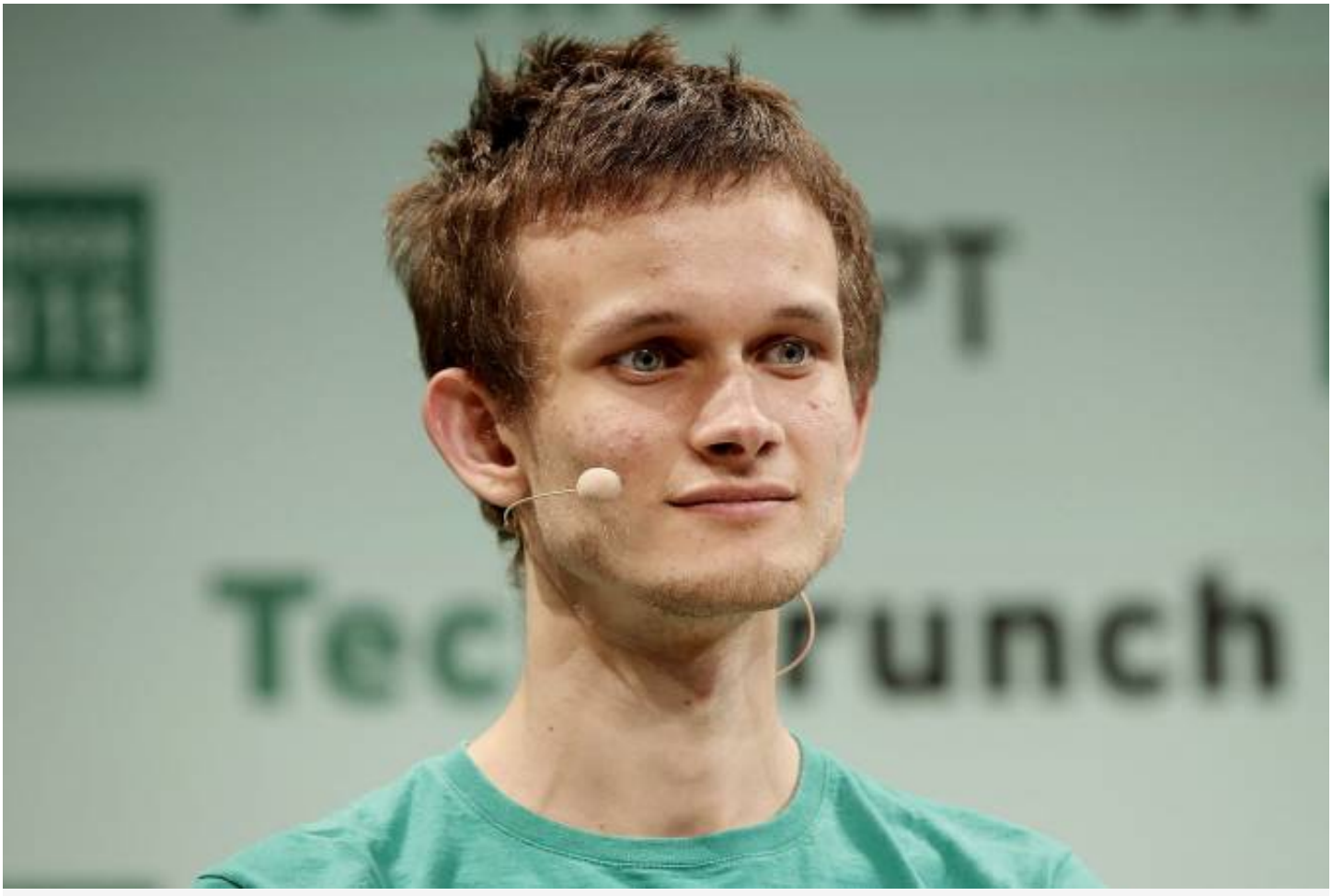
Joseph Lubin - Founder of ConsenSys Inc
JESSYE HERRELL/CONSENSYS

Still, it wasn't until five years ago when Lubin encountered a 19-year-old math savant at a meeting for crypto enthusiasts in downtown Toronto that the Canadian-born engineer's time as a recording impresario drew to a close. The young man was Vitalik Buterin, a

college dropout whose own infatuation with cryptocurrency had led him to co-found Bitcoin magazine. That evening, on January 1, 2014, Buterin told Lubin he'd been working on a wholly new blockchain application—similar to but far more ambitious than the distributed ledger created by Nakamoto.

Buterin's platform could indelibly record not just bitcoin transactions but any kind of transaction on a distributed ledger. It could be programmed to automatically execute complex agreements, or "smart contracts," involving the sale of a stake in a property, the adoption of bylaws by an organization or the purchase of 1,000 bales of cotton in six months at $1.50 a pound. And since it would be run in many places on many computers around the world at the same time, all of it could be done beyond the jurisdiction, and without the interference, of any government or corporate entity. Buterin had already given the platform a name: Ethereum.

To most people—particularly those who haven't spent time contemplating how much we are at the mercy of corporations and governments that control the internet's servers and data centers—Buterin's pitch might have elicited a blank stare. But when Lubin read Buterin's proposal, or white paper, he realized it was the solution he had been waiting for: a tangible way to finally put into motion the possible global transformation he'd envisioned with the introduction of bitcoin.



Founder of Ethereum, Vitalik Buterin during TechCrunch Disrupt London 2015 - Day 2 at Copper Box Arena on December 8, 2015 in London, England.

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All of those centralized servers could be replaced by a hive mind composed of independent, individual actors—one controlled by everybody and nobody at the same time. The toll keepers and middle men would be cut out, enabling new kinds of institutional, commercial and governmental structures, and a different sort of World Wide Web—a truly democratic "virtual machine." We could take back our data from the Facebooks, Googles and Amazons of the world. Even the disrupters would be disrupted.

"This technology has the potential to shatter the silos of power and re-balance the information asymmetries that disadvantage so many," Lubin would later write.

Almost five years later, that vision has grown into a global movement. As many as 250,000 developers are now building on the Ethereum platform, launched in July 2015 by Buterin, Lubin and a small core of other pioneers. It has spawned scores of imitators, spin-offs and would-be usurpers, and made Lubin and his young friend unimaginably rich.

How much Buterin's pioneering re-engineering of blockchain will actually change the world remains to be seen. But we may soon find out.

A Virtual Avalanche

In recent months, the first of what many expect will be a virtual avalanche of blockchain-based projects—on Ethereum and on the many distributed ledger platforms that now compete with it—have begun to move from their pilot phases to full implementation. The group of people pushing these new technologies is no longer limited to a small band of crypto-anarchists, disillusioned Wall Street cast-offs and geeky computer programmers. It now includes corporate and government leaders at the center of the power structures many of blockchain's early converts once hoped to disrupt.

Although the uses these leaders have in mind for the technology are prosaic—supply-chain custody tracking, back-office banking settlements, the re-engineering of food safety systems—they talk about blockchain with an almost religious fervor. That has created a manic hype around a technology many people are too embarrassed to admit they don't really understand.

"Every consulting company is obsessively engaged with this stuff now," notes Sheila Warren, who heads a blockchain project at the World Economic Forum focused on encouraging the development of common technical protocols and common standards. "There are a lot of blockchain labs in big companies—IBM, Microsoft, Facebook, Google, SAP. All these companies are paying attention."

Some of blockchain's more radical early innovators look askance at the efforts of Big Business to co-opt their idealistic visions for a universal "truth machine" and modify its architecture to better suit more mercenary uses. But others, like Lubin, see this development as a useful step toward a larger vision of a new World Wide Web for transactions of all kinds.

Corporate spending on blockchain technologies is expected to rise from under $2 billion in 2018 to $11.7 billion by 2022, according to a report by the International Data Corporation. The firm looked at 16 different use cases, such as regulatory compliance, food safety and digital identity. Ironically, the most aggressive spenders so far have come from the very industry the original bitcoin blockchain sought to bypass: financial services firms. They are expected to spend $552 million in 2018 alone, according to the IDC report. Another study based on a survey of 200 banking industry honchos placed the number at $1.7 billion, with one in 10 of the banks and other companies surveyed reporting blockchain budgets in excess of $10 million. The typical "top-tier bank" had 18 full-time employees working on the technology and planned to go live within the next 24 months, according to a report from Greenwich Associates.

Those pushing the blockchain technology no longer see much connection to the virtual coin so long excoriated by industry leaders—most famously by Jamie Dimon, the chairman and CEO of JPMorgan Chase who has called bitcoin a "fraud" and a "scam." Rather, they argue, the existence of their own distributed ledgers of transactions will someday save financial services firms billions of dollars in various ways: by increasing the accuracy and shortening the time for settlement in the trading of equity shares, speeding up and simplifying cross-border payments, and allowing self-executing smart contracts that automatically enforce the obligations of all parties in a contract. And all of that would be accomplished without the added expense of the human intermediaries currently needed to monitor and make sure the transactions happen.

"Transactions are grouped in blocks, recorded one after the other in a chain of blocks (the 'blockchain')," the consulting giant Deloitte recently wrote in a report issued to its banking clients. "The links between blocks and their content are protected by cryptography, so previous transactions cannot be destroyed or forged. This means that the ledger and the transaction network are trusted without a central authority—a 'middleman.'"

The technologies could benefit smaller players in myriad other industries as well. The lowered cost of doing business that will result from efficiencies could unlock $1 trillion in trade that otherwise wouldn't occur, mostly in emerging economies and among small- and medium-size companies, according to the World Economic Forum. (It would do so by, among other things, mitigating credit risk, lowering fees and speeding up processing times at borders.)

Supply-chain specialists, meanwhile, have emerged as some of the technology's most devout proselytizers. Jerry Cuomo, an IBM fellow and the company's vice president of blockchain development, talks about the day he first learned about Ethereum and read Buterin's report as if it were a white-light experience.

"I realized it was going to change the world," he says. "I caught blockchain fever. Everything suddenly made sense."

Cuomo was at the time a founding member and chief technology officer of an IBM business unit with a $6 billion portfolio of offerings that focused on "middleware," the software and systems that act as a bridge between different server networks, and different businesses. When an employee first explained Buterin's idea to him, Cuomo's mind immediately went to the kind of prototypical dispute he saw every day: "A supplier calls a customer and says, 'Hey, you didn't pay me.' The customer says, 'I'll pay you when you send me the bloody thing I ordered.' The supplier says, 'But I sent it.' The shipping company says, 'We delivered it.'"

From there, says Cuomo, it can take an average of 44 days for IBM's supply chains to settle up. "In IBM, we see tens of millions of dollars—a hundred million dollars easily—in any given supply chain, on any given day, tied up in these disputes, and it's accepted as

normal business practice."

If there was one set of digital, immutable records shared by everyone involved, updated instantly and simultaneously on every party's corporate computer every step of the way, there would be no need to argue over three different sets of books, engage in contentious phone calls and involve numerous personnel in these disputes. One look at blockchain, and you could resolve it and locate the lost item almost instantly.

Such a system, Cuomo realized, had the potential to drastically reduce costs in myriad other ways too. Insurance premiums would go down, since merchandise would be more easily trackable. Computer security costs might be cut or shared between different actors. And since there would be only one set of records, administrative personnel might be freed up to do other things.

After reading Buterin's paper, Cuomo "fell in love with Ethereum" and pushed IBM to invest heavily in blockchain technologies. But when Cuomo and his team actually began looking at what it would take to meet the privacy and security requirements of IBM's corporate clients, they developed reservations. Cuomo knew his firm's corporate clients would love the idea of a distributed ledger, but he also knew they'd want to control to whom it was distributed, an issue Ethereum's programmers had not yet begun to consider. Cuomo and his team thus set to work examining how they might create "permissioned" blockchains that only a select few could access and see. Building such a "walled garden" on top of the existing Ethereum ecosystem, they concluded, would require "deep surgery" on the core Ethereum code. Furthermore, says Cuomo, when IBM's corporate lawyers approached the nonprofit Ethereum Foundation—set up to oversee the creation of the new blockchain ecosystem—they found its communitarian intellectual property and licensing rules to be too restrictive: The foundation, rather than IBM, would own the rights.

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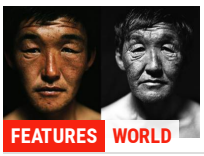

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"So any commercialization would have to go through the Ethereum Foundation," says Cuomo, "and for lawyers within IBM specifically, but more generally from a commerce perspective, those kind of open-source licensing terms are usually not looked upon very well."

That was 2015, and IBM decided to go its own way, leading the efforts to set up a parallel open-source collaboration with more corporate-friendly IP, or internet protocol, rules. Known as Hyperledger, the project is run out of the Linux Foundation and likely has the second-largest number of developers working on it, behind Ethereum. The project is overseen by a governing board consisting of 20 members, among them Cisco, Intel, Hitachi, Bank of New York Melon, Wells Fargo and Accenture. It is chaired by Blythe Masters, a former JPMorgan executive and the current CEO of Digital Asset Holdings, a company she co-founded to build distributed ledger technologies for regulated financial institutions. (Prior to getting involved with blockchain, Masters was perhaps best known for inventing the credit default swap, a financial instrument that would later play a notorious role in the 2008 financial crisis—the same crisis many people credit with fueling the rise of bitcoin).

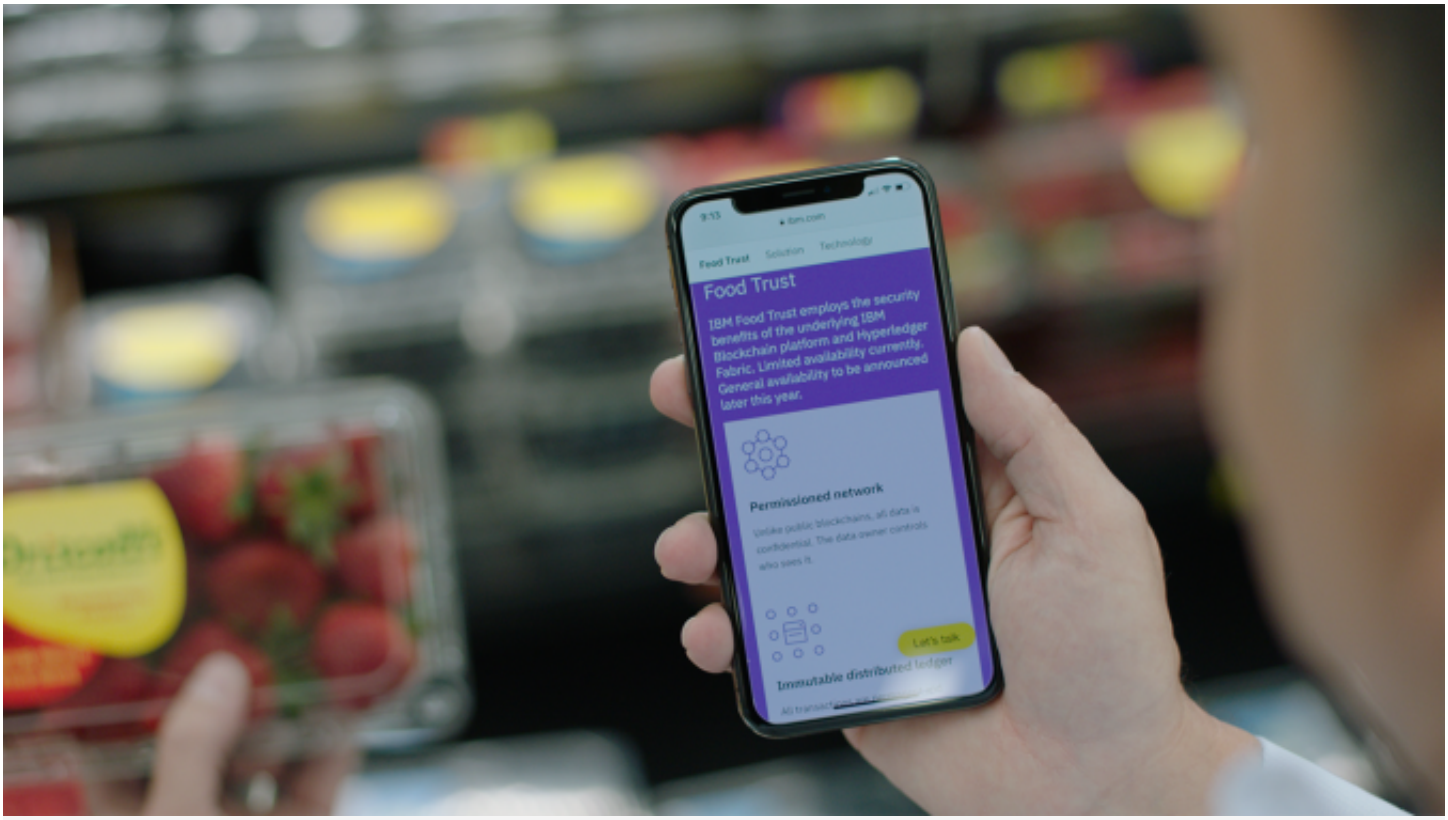
IBM building on Madison Avenue in New York City.
MICHAEL BROCHSTEIN/SOPA IMAGES/LIGHTROCKET/GETTY

You're liable to hear a lot more about Hyperledger in the months ahead. Recently, some of the first corporate blockchain projects have moved from proof-of-concept phase to fully operational programs, using infrastructure designed by IBM consultants, deployed on the technology called Hyperledger Fabric that IBM helped develop and reliant on IBM to provide the initial computers on the blockchain and "onboard" participants.

Among them is We.Trade, a consortium of 10 European banks—including HSBC, Santander and Société Générale—which launched last spring. The network provides a blockchain that connects the parties involved in cross-border trade transactions—including the

buyer, the buyer's bank, seller, seller's bank and transporter. It is accessible from any connected device and is now being used to manage, track and execute a small but rapidly increasing number of domestic and international trade transactions. A high-profile rollout is expected sometime this fall.

An IBM-backed food safety effort called Food Trust went live in August. According to the Centers for Disease Control and Prevention, every year, about 28 million people fall ill in the United States as a result of foodborne illnesses; about 3,000 die. Recalls and the cost of ongoing monitoring and tracking efforts cost the industry billions. In 2017, IBM and Walmart's vice president for food safety, Frank Yiannas, demonstrated how blockchain might facilitate the rapid response to an outbreak or simply make it easier to comply with regulatory inspections. Yiannas assigned a team to trace the origin of a single package of mangos using traditional methods. It took them 6 days, 18 hours and 26 seconds. Using the blockchain, it took 2 seconds.



IBM Food Trust. Food Traceability Goes Global with IBM Blockchain
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Since Food Trust blockchain went live, more than 2 million transactions have been recorded, and more than 4 million individual products have now been logged on it by Walmart, Kroger and other big-name suppliers, according Brigid McDermott, vice president of IBM Food Trust, who is overseeing the project. That, of course, is just a fraction of the food moving through the system with just a small group of the major players involved. (There are an estimated 1.2 million food suppliers, 200,000 retailers and 500 million farmers worldwide.)

To start, each of the participating suppliers—including Driscoll's, Dole, Nestlé baby food, Unilever and Tyson Foods—have begun tracking some portion of their foods from farm to table. "We're in the early stages now with a small number of products," says McDermott. "We're not to scale—that's next. But we've moved from a one-off, carefully controlled situation to one where you have production data and real products running through the system."

IBM is not the only Fortune 500 company whose blockchain efforts are beginning to come to fruition. A consortium called R3 has more than 100 of the world's largest financial services firms as members, and its participants continue to announce new partnerships and initiatives. But what of Ethereum and that original mission? When is that great equalizing "Web 3.0" coming, and whatever happened to Lubin's big dreams?

Spawn of the Genius Alien

The office of ConsenSys, the for-profit company that today serves as Lubin's home base, in Brooklyn, New York, seems a world away from IBM's buttoned-down, corporate campuses. It's pretty far from Jamaica too. The building is located in Flatbush, a gritty industrial neighborhood dominated by hulking, low-slung warehouse spaces, and its front door is surrounded by graffiti and covered with an explosion of decals. A placard on the sidewalk in front of a ground-floor coffee shop advertises its specials: "cannabis cold brew" and "kombucha on tap." On a recent afternoon, the heavy metal front door opened to disgorge a gaggle of casually dressed hipsters and techies carrying Wiffle ball bats, on their way to a team-building exercise.

Initially, upon his return to Jamaica, Lubin had been intent on maintaining his island lifestyle and participating in the blockchain revolution from afar. But it didn't take long for him to go all in. Within weeks, in late January, Wired magazine spotted him at a bitcoin conference in Miami in the company of his baby-faced new friend. Buterin, he explained to the reporter, was "a genius alien that had arrived on this planet to deliver the sacrosanct gift of decentralization."

With Lubin's background in both tech and business, he quickly emerged as a key strategist and took the title of chief operating officer of the entity that would bring Buterin's vision to fruition. After that, things moved fast. A foundation headquarters was established in Switzerland ("There was a fear that we had about how the United States would treat blockchain projects," Lubin recalls). In July 2014, Buterin, Lubin and the core team launched a "presale" of a new cryptocurrency called Ether that was to serve as the native token on the Ethereum platform.

ConsenSys
COURTESY OF CONSENSYS

By then, word of Buterin's big idea had spread through the blogs and chat rooms frequented by the small, obsessively devoted bitcoin community. His white paper had been widely read, and anticipation of the Ether coin launch had been building for months. The presale of the coin raised 3,700 bitcoins in the first 12 hours, valued at $2.3 million. By the time it ended six weeks later, it had sold almost 10 times that.

The money was used to fund the operations of Ethereum Switzerland GmbH and the Ethereum Foundation, the two organizations set up to oversee the project. Lubin founded ConsenSys in the months leading up to the 2015 platform launch to build applications on

Ethereum and catalyze the developer community to join him in doing so. He chose to set up in New York City to help "activate" the United States.

The growth of ConsenSys, like the growth of Ethereum itself, has been explosive. Today, the company has 1,000 employees, working in 28 countries, some from their homes or coffee shops, some in formal office setups in Brooklyn; San Francisco; London; Tel Aviv, Israel; Bucharest, Romania; and Sydney and Queensland, Australia. The company structure is inspired by Lubin's utopian ideals. Employees choose their own titles, and instead of a traditional hierarchy, there's a governance structure called a "holocracy," a - decentralized system of management where power is "distributed" among self-organizing teams. Funds are doled out for individual projects by a "resource-allocation circle"—individuals who are chosen by their co-workers to serve based on their abilities.

In Brooklyn, Lubin's desk is in the far corner of a vast, open workspace crammed between those of casually dressed coders, furiously pecking away on their computers. On this afternoon, he's dressed in tan shorts, a T-shirt and a pair of what look like Nike shower shoes. At 53, he appears to be the oldest in the room, distinguished further by a fully shaved head.

While IBM was creating Hyperledger, ConsenSys initially focused on building out the underlying infrastructure for what Lubin and Buterin refer to as their "virtual machine," the global web of thousands of interlinked computers running the continuously updating Ethereum blockchain. And in the months after it went live, programmers at ConsenSys invented tools that would make it easier—and more attractive—for independent developers to build applications that could be run on Ethereum.

One of those efforts was a plug-in for Google's Chrome browser called Metamask that provides a portal allowing developers to directly connect to the Ethereum blockchain through the World Wide Web. Another, Truffle, billed as a "Swiss Army knife" for developers, contains a toolbox of boilerplate coding and shortcuts for creating new "smart contract" applications.

As an added incentive, ConsenSys established its own venture production studio, ConsenSys Labs, which supports entrepreneurs with funding and advice. They are currently assisting 42 projects, with teams ranging in size from two to 50 employees, according to Ron Garrett, managing partner of the studio. Garrett and others at ConsenSys refer to the kinds of applications that will eventually populate Ethereum and other public blockchains (a number of would-be Ethereum usurpers have launched in recent months with their own native tokens) as Web 3.0 applications, or Dapps, for decentralized applications.

Web 3.0

Perhaps the biggest evidence that ConsenSys and Ethereum
have begun to mature is that by 2017 both had built out enough of the ecosystem's fundamental infrastructure to begin to address the concerns IBM's Cuomo recognized a couple years earlier.

To make sure Ethereum is attractive to businesses as blockchain evolves, Lubin has lured away some of the core developers involved in the creation of IBM's Hyperledger fabric and other corporate blockchains. He's put them to work designing ways to build private, permissioned blockchains, so-called "side chains," off of the public blockchain.

John Wolpert, a former IBM executive who served as global head of blockchain products under Cuomo, joined Lubin soon after the launch of Hyperledger Fabric in 2017. "You want to come start businesses on the next internet?" Wolpert recalls Lubin asking him. "Joe's pretty hard to say no to," he adds. "And it excited me because I'm an applications guy. Now that Ethereum has matured, we can do really interesting things. You follow the ecosystem, and the ecosystem is clearly behind the Ethereum chain."

Wolpert believes that by 2020 the distinction between private and public blockchains will disappear, and increasingly most will become interoperable and connected.

Clark Thompson, who came over from R3, a consortium of financial firms that built Corda, a platform for banking services, notes that there is "an enormous difference between a community of several hundred thousand active developers" and the smaller teams devoted to commercially sponsored applications.

"You've got literally more than 100,000 people who are actively contributing to the code base," says Thompson, the global solutions architect lead at ConsenSys. Any suggestion that Ethereum can't compete for corporate business because it doesn't offer a "walled garden" that shields proprietary information from the public, like Corda or Hyperledger, is "an artifact," Thompson says. "It's a piece of the past. It's no longer true."

In 2017, the Ethereum Foundation itself pushed for the founding of an organization called the Enterprise Ethereum Alliance (EEA) to develop technical standards that will ensure the interoperability of different kinds of permissioned blockchains. It will run on the Ethereum blockchain but will also interact with the rest of the public blockchain. It's now working with more than 500 members, including JPMorgan, Intel and Microsoft.

Initially, says Thompson, the blockchain movement was dominated by "a lot of 20-year-old kids in black T-shirts who were like, 'We're going to blow up the banks, and we're going decentralize everything.'" Today, he says, "there's a continuum, and where you deliver a solution on the continuum is going to determine the scale, the reliability, the security and, in particular, the regulation that you have to meet to be able to support it. And it's already happening. I would say last year was about proof of concept. This is a year of pilots."

Ron Resnick, a former lead developer of 4G for Intel, who now heads the EEA, says that some financial services, including Santander and JPMorgan, are already integrating Ethereum-based blockchains into their business for settlement and other purposes. But the transition to widespread use is likely to be gradual and won't begin in earnest until standards that ensure interoperability are completed, probably next year.

Today, Lubin chafes at suggestions that private enterprises can't operate with the confidentiality and security they need on the Ethereum blockchain. "We have plenty of exciting projects up and running," he says, ticking off ConsenSys's own supply chain and banking settlement initiatives. "IBM just has a bigger marketing budget than us."

A collection of Bitcoin (virtual currency) tokens are displayed in this picture illustration taken December 8, 2017.
REUTERS/BENOIT TESSIER/ILLUSTRATION

The blockchain ecosystem is often compared to the state of the World Wide Web in 1993, just before it took off. Wolpert, though, believes the analogy is flawed. "I keep hearing 1993," he told an audience at the Distributed conference in San Francisco this past July. "I heard that last year and people are still saying it. We seem to be static. I think that's because we're really in the 1980s somewhere, maybe the '70s. We've got a long way to go, and we're going to go through epics of divergence and convergence, and it's OK."

Michael Casey, co-author of the 2018 book "The Truth Machine: The Blockchain and the Future of Everything," and a senior adviser for the Digital Currency Initiative at MIT's Media Lab, says before mass adoption can occur Ethereum and other blockchain companies will need to address and upgrade the speed and scalability of the technology—problems that thousands of developers are actively working to address. "The internet was developed over 40 years. It's really complicated stuff," he says. "The technology has to evolve and become scalable."

Those kinds of comments from the experts have done little to dampen the hype. The year 2017 saw a speculative frenzy that many compared with the dot-com bubble, when scores of blockchain-based companies—some aiming to compete directly with Ethereum, some looking simply to build on it—also raised money through so-called initial coin offerings. That led to one of the many cryptocurrency boom-and-bust cycles seen since the invention of bitcoin, with value rising to almost $20,000, and Ethereum rising from a 2015 price of around 46 cents to $1,300. (In February, Forbes magazine put Lubin's fortune, based in large part on his estimated holdings of Ether, at between $1 billion and $5 billion; Lubin declined to confirm it.)

Although the hype has for the moment settled down, with bitcoin valued, at the end of October, around $6,300 and Ethereum worth about $200, few would be surprised to see it start up again. "The entire global system of record keeping is going to go through a 5,000-year paradigm shift," says Casey. "We've tracked and checked records, and records are the foundational layer of economic exchange systems, they go right back to Sumerian tablets. We had centralized versions of that for 5,000 years. Now, we're doing a decentralized thing that is a game changer."