

EqualOcean



Blockchain, China's Story

Dissecting the budding ecosystem

About EqualOcean

EqualOcean is an information service provider and investment research firm that aims to become a global platform for industrial innovation. We strive to make technology inclusive, accessible and transparent.

Founded in October 2018, EqualOcean is an international branch of EO Company, a leading Chinese tech media and investment research organization that is headquartered in Beijing and has offices in Shanghai, Shenzhen and New York.



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Introduction

Blockchain, one of the conceptual novelties of this new century, is a technology that some consider to be the next game-changer across all but a few industries. A decentralized, cryptography-based network mechanism that enables immutable data retention and secure transmission, it might be a panacea for multiple businesses – widespread adoption will reform the relationships among different parties, we hear, controlling costs and elevating efficiency. Or so a good many people – rich and poor, influential or merely aspirational – have insisted.

On the flip side, according to many others, it is arguably just another piece of techno-hype, one with huge projected market size but somehow meagre in its effects on the 'real economy.' Even worse, it may be the dubious object of a 'tulip craze' for the digital era, with Bitcoin representing a colossal bubble or Ponzi scheme that will shake real markets when it inevitably collapses to a valuation of zero. The positions have often seemed so polarized that it has been hard to conceive of a median point between them; yet, drawing clues from some of the key marketplaces, legislatures and actors in the business, there are some creeping signs of stability.

In the meantime, blockchain has become more or less a must-have in the ongoing digital arms race, stirring competitive twitching among global tech giants and governments alike. The zeal to embrace the technology brought just as much pushback. It is true that there has been no shortage of commercial excess, fraudulent chicanery and stupid schemes – all resulting in over-zealous attacks from suspicious policymakers. Whether high or low, many have been guilty of betraying the core value of the newborn 'trust machine.'

China – indisputably now one of the world's innovation hubs – is among those that want the biggest slice of the cake, if possible. While the country's blockchain industry cooled down in 2019, it was acknowledged by much of the Chinese 'digerati' that the transition was necessary to purge the 'fever' of scams and poor investments. It did not kill the enthusiasm of decent players in the field nor the confidence of their stakeholders.

Rather, it created a window of opportunities for those parties to return calmly and reexamine the market seriously. Good news came in the winter: on October 24, 2019, President Xi Jinping called for blockchain to become a focus of national innovation. This pushed the dynamic forces of research and investment towards the next stage. The shot in the arm from Beijing worked. From individuals and investors to state-owned enterprises and government officials, many of those who previously held negative opinions on blockchain – or even regarded the entire industry as a fraud – have more or less started to rediscover the technology and its potential applications in the real world.

We project that the year 2020 will be a turning point for China's blockchain industry, with heavier movements of the technology's developers bringing it from the realm of ideas into reality. Not only the immediate market for blockchain, but a number of related fields are expected to witness acceleration as the real application of blockchain matures.

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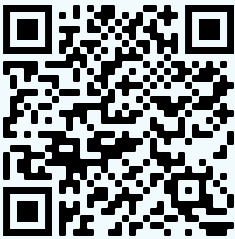
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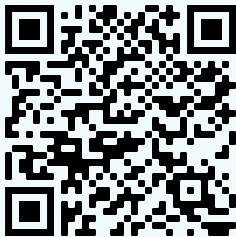
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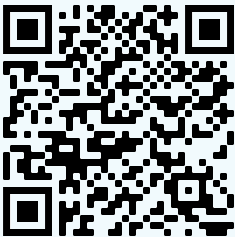
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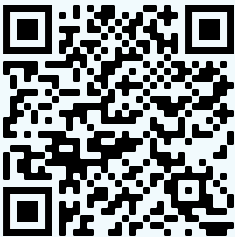
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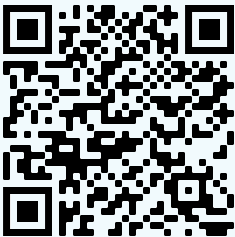
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In a narrow sense, blockchain is a special version of Distributed Ledger Technology (DLT) that combines blocks – which contain time-stamped data – in chronological order and employs encryption algorithms to help ensure that they are unchangeable and unforgeable. Data is recorded and stored by all nodes in the system.

Simply put, blockchain facilitates a trusted network that enables multiple parties to exchange data, information and assets directly without the need for any middlemen – a prime example of disintermediation.

Blockchain is more or less a combination of existing technologies, leveraging encryption, consensus and distributed mechanisms to achieve immutability, decentralization and transparency.

Encryption – Immutability

Blockchain uses asymmetric encryption to record the data in the blocks securely and to ensure the data are immutable in the transmission process.

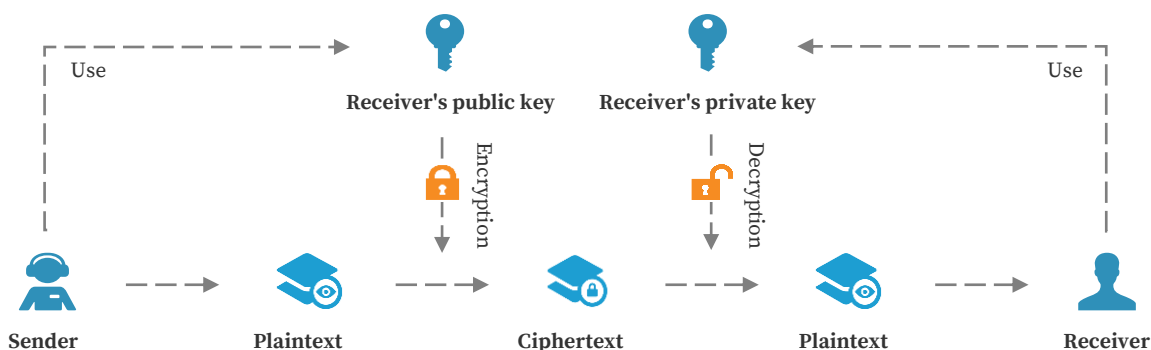
Under this mechanism, different keys are employed in the encryption and decryption process, namely public keys and private keys. In a blockchain network, each node has its unique pair of public and private keys.

In other words, the public key is like a bank account number that can be issued to anyone who requests it, while the private key is like its pin code that can only be kept by a single party and cannot be leaked. Information encrypted by the public key can only be decrypted by the corresponding private key and vice versa.

The private key is in the form of numbers or strings, and the public key is represented by two coordinates and is mathematically linked to the private key through certain algorithms. Typical asymmetric encryption algorithms in blockchain are RSA (Rivest–Shamir–Adleman) and ECC (Elliptic-Curve Cryptography), while some Chinese companies also use domestically developed algorithms to support anti-systemic risk control.

Compared with the symmetric encryption algorithms, the asymmetric method has a considerably higher security level but tends to be less efficient in terms of the encryption and decryption process.

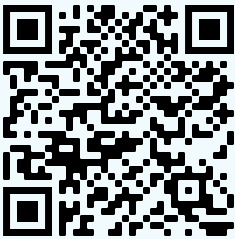
Process of asymmetric encryption



Source: EqualOcean analysis

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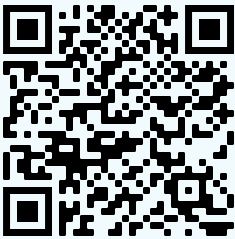
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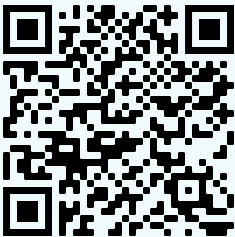
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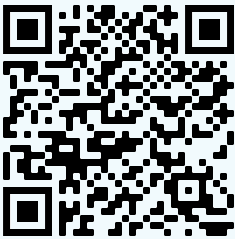
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A snapshot of the global blockchain industry: key players in China and beyond



Note: The grey shaded rectangular area in the middle contains logos of companies registered in China. Other logos belong to those registered outside of the country.

Category	Chinese companies	Companies from the rest of the world	
BaaS	Ant Financial, Huawei, Tencent	Amazon, IBM, Microsoft, SAP	Enterprise services
Data service	Chaindigg, CovenantSQL, Yunphant	CryptoMove, Factom	
Security	Chains Guard, PeerSafe	Acronis, StrongSalt	
Solutions	33.cn, Consensus Datatrust	BlocWatch, Ionixx	
Charity	China Everbright Bank, ICBC	BitGive, Citi	Industry applications
Supply chain	Hyperchain, Wanxiang Blockchain	Blocko, DHL	
Energy	Energy Blockchain Labs, YGSoft	Shell, Xage	
Legal affairs & e-government	Fadada, Thunisoft	CrimsonLogic, Procvivis	
Finance	CITIC, Hundsun, PingAn, ZhongAn	B3i, Figure	
Healthcare	Neusoft, TAI	Chronicled, HealthCombix, SimplyVital	
Protocol	Conflux, Ultrain	Bitcoin, EOS, Ethereum, Hyperledger	
Hardware	Bitmain, Canaan	Bitfury	

Notes: All the companies above are categorized based on their key business focus. The companies on the map are arranged in no particular order, their names on the list are arranged in alphabetical order.

Chinese entrepreneurs have been on the crest of the wave since Bitcoin first gained traction. Beijing-based mining hardware developer Bitmain, for example, is, for sure, among the biggest winners in the fast-growing domain. The company was valued at USD 15 billion in 2018 and is now preparing an initial public offering in the United States.

Overall, the country's startup ecosystem had aggregated enormous experience in building digital blocks before the proposal of Ethereum in 2013. Nonetheless, it took China three years to enter the 'white-papering' stage.

In June 2016, Alibaba's fintech arm Ant Financial was the first among the tech giants to focus on blockchain as something worth betting on (*read more in the Chapter 5*). In October the same year, the Ministry of Industry and Information Technology (MIIT) of China published its first guiding document on the new technology and its possible applications, triggering the boom in the industry and nominally ending the 'inception' phase.

Much like that of the US, China's tech scene is mainly a game of three sorts of players: the government, tech leviathans and (often) bootstrapped startups. The first two groups are famous for their ability to set trends and cause shifts in the local business landscape. In 2017, digital entertainment dominator Tencent was the first large-scale corporation to publish a white paper on TrustSQL (*read more in the Chapter 5*), its central blockchain project. The document has been updated twice since then.

Baidu, another prominent Chinese Internet company, invested in American peer-to-peer payment maverick Circle in 2016. In the following year, the 'Chinese Google' (as many used to call Baidu when it was picking up steam) joined Linux-hosted Hyperledger, which is a global open-source platform for blockchain development.

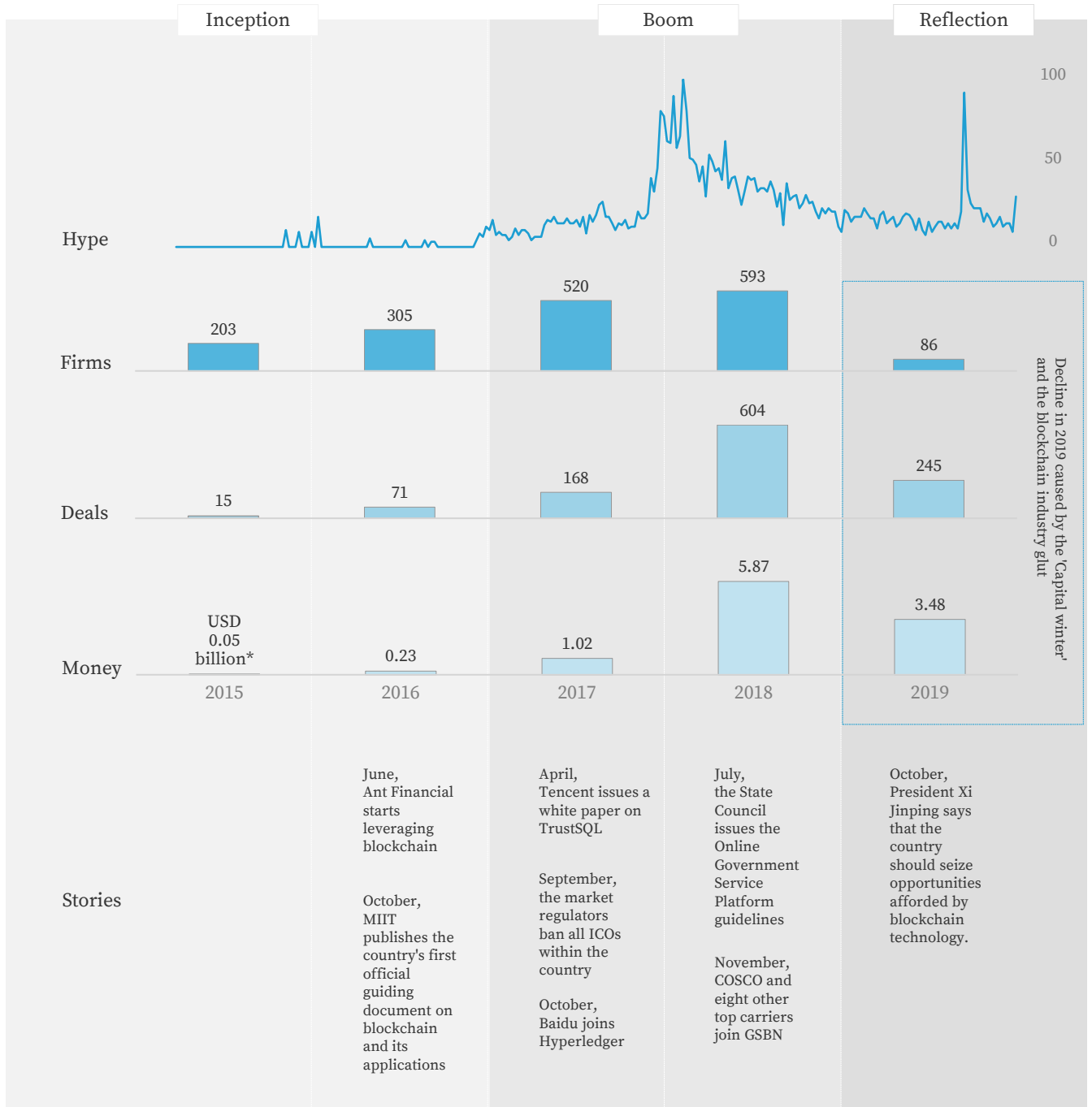
One consistent theme has been the claim that distributed ledgers will in future have a lot to say in the field of logistics; the world's enormous transcontinental carriers certainly seem to acknowledge this. China Ocean Shipping Company (COSCO), the country's top firm in the space, is currently developing a not-for-profit platform called the Global Shipping Business Network (GSBN), with participation from French container bigwig CMA CGM and German shipper Hapag-Lloyd, to name a few. Their alliance was announced in November 2018 at the first China International Import Expo (CIIE) in Shanghai. (*Read more in the Chapter 4*.)

In the meantime, the state, which has been curious about the new technology since the first signs of scaling-up, has, of course, put a spoke in its development. China's willingness to embrace blockchain is a fact: the network structure promises to take the country's security system to the next level. Tremendous progress might also be made in the financial sector, where cryptography has long been a crucial servant handling tasks like storage, transmission and transportation of capital (and value).

While the government is making overtures and tech kingpins are testing the new toy across their immense product mixes, new companies are appearing on the horizon. In 2015-2018, the period of a strong uptrend, 1,600-odd startups that claimed to be blockchain-driven were founded in China. Over the same period, the aggregated number of Venture Capital (VC) deals surpassed 850, more than 70% of which took place in 2018, with over USD 7 billion poured into the industry.

The figures are, unquestionably, impressive. However, as the old adage goes, 'this too shall pass.' The phase of unbridled excitement has apparently passed: in 2019, the annual numbers of registered companies, funding events and VC raised dropped by nearly 85%, 60% and 40% respectively.

China's blockchain industry has gone through three development stages



Notes:

'Hype' = the Google Trends Index, representing search interest relative to the highest point on the chart for the given region and time;

'Firms' = the number of blockchain companies registered;

'Deals' = the number of venture capital funding events carried out by blockchain companies;

'Money' = the total dollar volume of venture capital funding raised;

'Stories' = the most important narratives that shook the market.

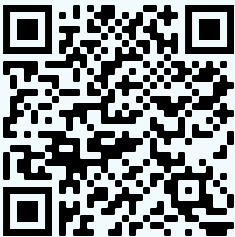
*Exchange rate as of February 21, 2020. USD/CNY 7.0301 as of 12:27 a.m. EST.

Acronyms in this chart include following:

MIIT = Ministry of Industry and Information Technology (of China), ICO = Initial Coin Offering, COSCO = China Ocean Shipping Company, GSBN = the Global Shipping Business Network.

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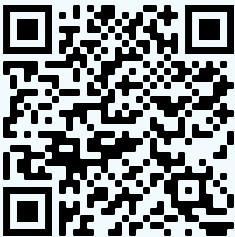
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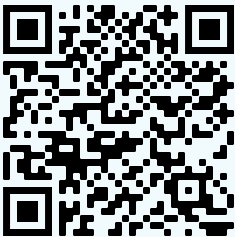
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DCEP – a new national digital currency?

PBoC has taken the lead in researching blockchain technology and has been preparing to issue its own digital currency since 2014.

In the past five years, the Digital Currency Research Institute of PBoC has investigated the possibility of a national digital currency from the aspects of 'top-layer design,' operating system, technology roadmaps and other components, defining these jointly with several commercial banks.

In August 2019, Mu Changchun, deputy director of the Payment and Settlement Department of PBoC, noted during the third China Finance 40 (CF40) Yichun Forum that China's national digital currency, which was named the Digital Currency Electronic Payment (DCEP), is ready to go.

Mr. Mu was appointed as Director of the Digital Currency Research Institute of PBoC concurrently in September 2019, suggesting an acceleration in launching DCEP.

So far, China is expected to be the first country to launch a national digital currency.

Main properties and mechanisms

1. Positioning as the replacement of M0

This implies that DCEP inherits the same characteristics as physical cash (banknotes and coins), in the sense that it does not pay interest, is a central bank liability, with unlimited legal tender, and has a certain anonymity.

2. Adopt a two-tier operation delivery system

PBoC serves as the upper layer (issuance layer), which provides credit guarantee for the digital fiat currency issued. Meanwhile the commercial banks compose the lower layer (distribution layer) in the system, where they have to pay 100% full reserves in issuing DCEP to the public, to ensure that the PBoC does not over-issue.

Compared to a single-tier system, in which PBoC directly issues DCEP to the public, this two-tier system will not change the existing currency placement system and binary account structure – thus it does not squeeze out the deposits in commercial banks and contributes to the stability of the entire financial system.

3. Technology neutral

Though it is clear that commercial banks are free to adopt blockchain in distribution of DCEP, whether this emerging technology will also be employed in the issuance layer is somewhat uncertain, based on the available information at present.

Regarding the issue, there are currently three official statements with considerably different attitudes:

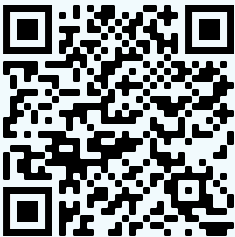
Neutral: Yi Gang, Governor of PBoC, commented that the central bank will not preset specific technical routes in developing DCEP. Both blockchain technology and existing electronic payment solutions are under consideration, and the final decision can be made through fair market competition.

Will not adopt: According to Mr. Mu, as the target application scenario of DCEP is retail, which tends to have high concurrency – therefore, this requires the underlying system to be capable of supporting at least 300,000 Transactions per Second (TPS). It is apparent that blockchain technology cannot realize this at the moment, therefore, PBoC itself is not adopting blockchain technology in issuing DCEP.

Will adopt: Huang Qifan, deputy director of the National People's Congress Financial and Economic Affairs Committee, described DCEP as 'blockchain-based' during the first Bund Summit in late October. As this remark was given after the time that Mr. Mu made his explanation, the question of whether DCEP would adopt blockchain in the issuance layer loomed over the issue.

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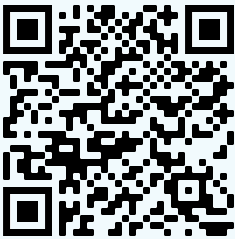
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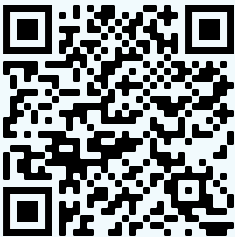
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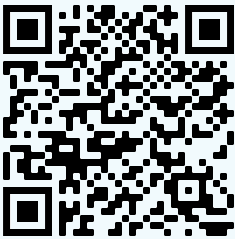
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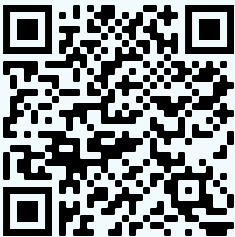
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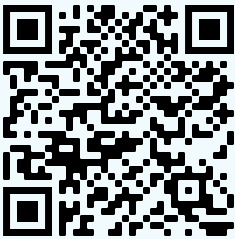
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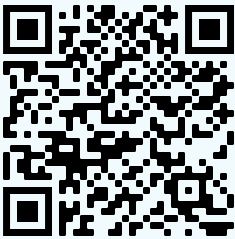
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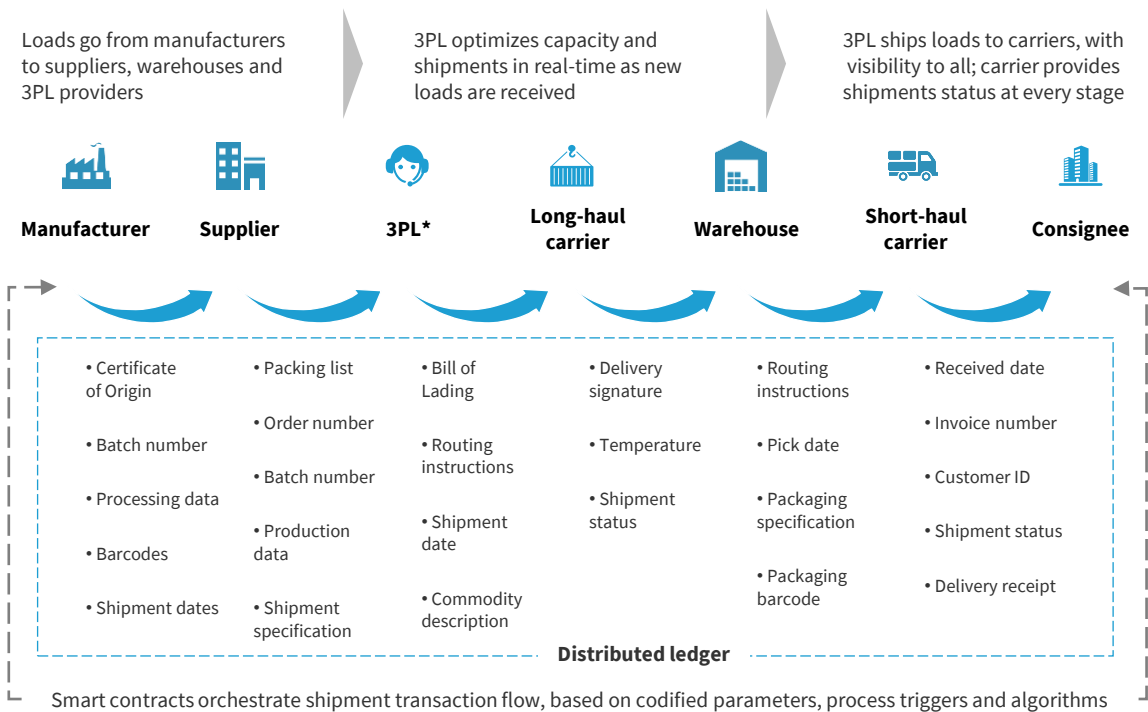
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Traditional supply chains can be improved systematically with blockchain

Logistics blockchain consortium



Note: *Third-party logistics

Source: IBM, MIT Sloan, GlobalTranz, EqualOcean analysis

However, a reform of this kind is plausible even in the current state of global supply chains, which are, in most cases, still filled with different intermediaries. In this scenario, all the necessary documents, including invoices, bills of lading and certificates of origin, can be digitized and encrypted. A third-party transportation service provider, a peculiar moderator of the whole process, is responsible for real-time transaction visibility, while carriers take charge of the shipment status data.

All this may work. It is a long shot, of course. So far, the scheme is sufficient only for high-end price segments, where final consumers are willing to pay more for supply chain transparency and premium quality.

As for the mass market, in practice, none of the distributed ledger applications currently help to cut costs. Even finance, which once was called the most likely domain for blockchain-driven

development, is presently in possession of better tools than the nascent technology can provide, in terms of both time and value. Not to mention logistics, a more complex area where 'physical' is as essential as 'digital' and eventual success depends on the way the two are connected.

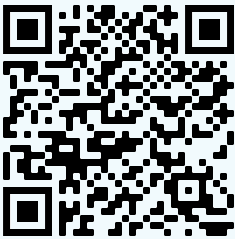
Containerchain?

The supply chain, a complex organism, comprises a bunch of subsectors, of which the marine shipping industry is pivotal. In 2019, Danish conglomerate A.P. Moller-Maersk Group, the biggest dog in the global container game, teamed up with arguably the most significant blockchain evangelist – tech veteran IBM (IBM:NYSE) – to create TradeLens, “an open and neutral supply chain platform underpinned by blockchain technology.”

A handful of other sea cargo giants have also joined the platform, among them:

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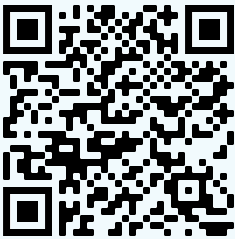
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The product system

Coming up to February 2020, Ant Financial has launched five blockchain products centered on its Blockchain-as-a-Service platform, all of which fall into the category of an permission blockchain, with emphasis on developing blockchain infrastructures that are able to connect through trustworthy processes in practical scenarios.

Currently, the commercialization capability of enterprise-level blockchain solutions is tightly bound to the level of speed and security that

they are able to achieve, as well as the prices they charge, where the ecosystem that Ant Financial builds with its product mix tends to have leading performance in all three aspects.

1. Ant Blockchain Blockchain-as-a-Service

Ant Blockchain-as-a-Service (BaaS) is a fundamental enterprise-level blockchain solution that allows clients to create and manage their private blockchains. Simply put, it directly deploys blockchain technology on the cloud service platform of Alibaba and Ant Financial.

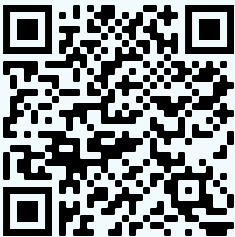
Product portfolio of Ant Financial blockchain segment

BaaS marketplace and solutions	On-chain finance			On-chain retail		On-chain lifestyle		
	Cross-border payment	Supply chain finance	Exchange	Cross-border logistics	Product traceability	Healthcare	House rental	Copyright
		Ticket	Insurance	Drug tracing	Advertising	Ticket	Charity	Contrast

Security management	BaaS Plus	Trusted evidence preservation		Universal tracing		In-person verification		O&M management
		Enterprise authentication		Cross-chain service		Smart contract security check		
Real-name authentication	BaaS Core	Consortium management	Smart contract management	SGX/TEE	Security and privacy	Browser and monitoring	Business view	Cloud Monitor
		Node management	User management	Certificate key management	Logging and auditing	Off-chain data synchronization	Large file processing	
Anti-DDoS	Hyperledger Fabric	AntChain, self-developed financial blockchain platform					Enterprise Ethereum Quorum	Resource orchestration
Key management service		Contract tool	Cloud IDE	Privacy production				
		Cryptography security	Trust execution environment	FDMT storage				
Access control	Cloud resource layer	Elastic IP address	Server load balancer	ApsaraDB	Container registry	Alibaba Cloud DNS	Cloud enterprise network	Log service
		Elastic compute service	ECS bare metal instance	Apsara block storage	Network attached storage	Virtual private cloud	Express connect	
IoT security	Cloud resource management platform (Alibaba Cloud Apsara platform)							Database management
Operation auditing	Infrastructure layer	Computing resources		Storage resources		Network resources		
		Public cloud and private cloud						

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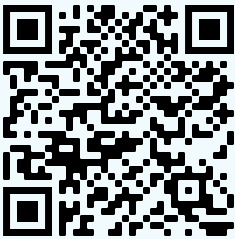
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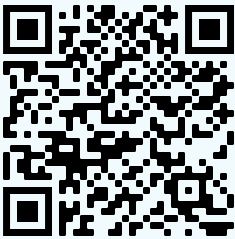
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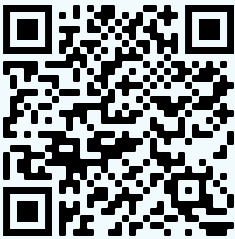
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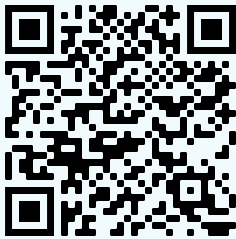
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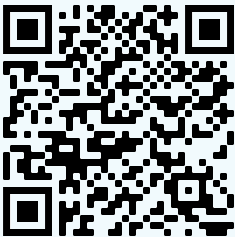
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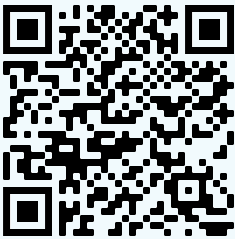
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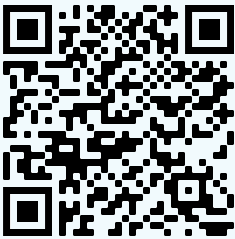
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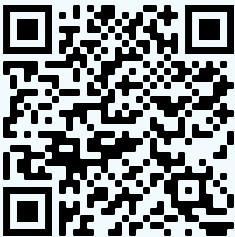
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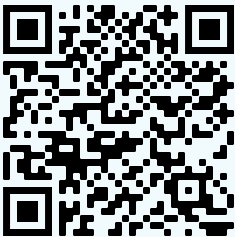
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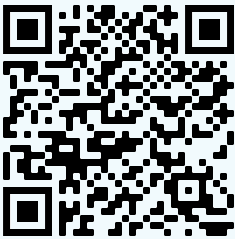
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