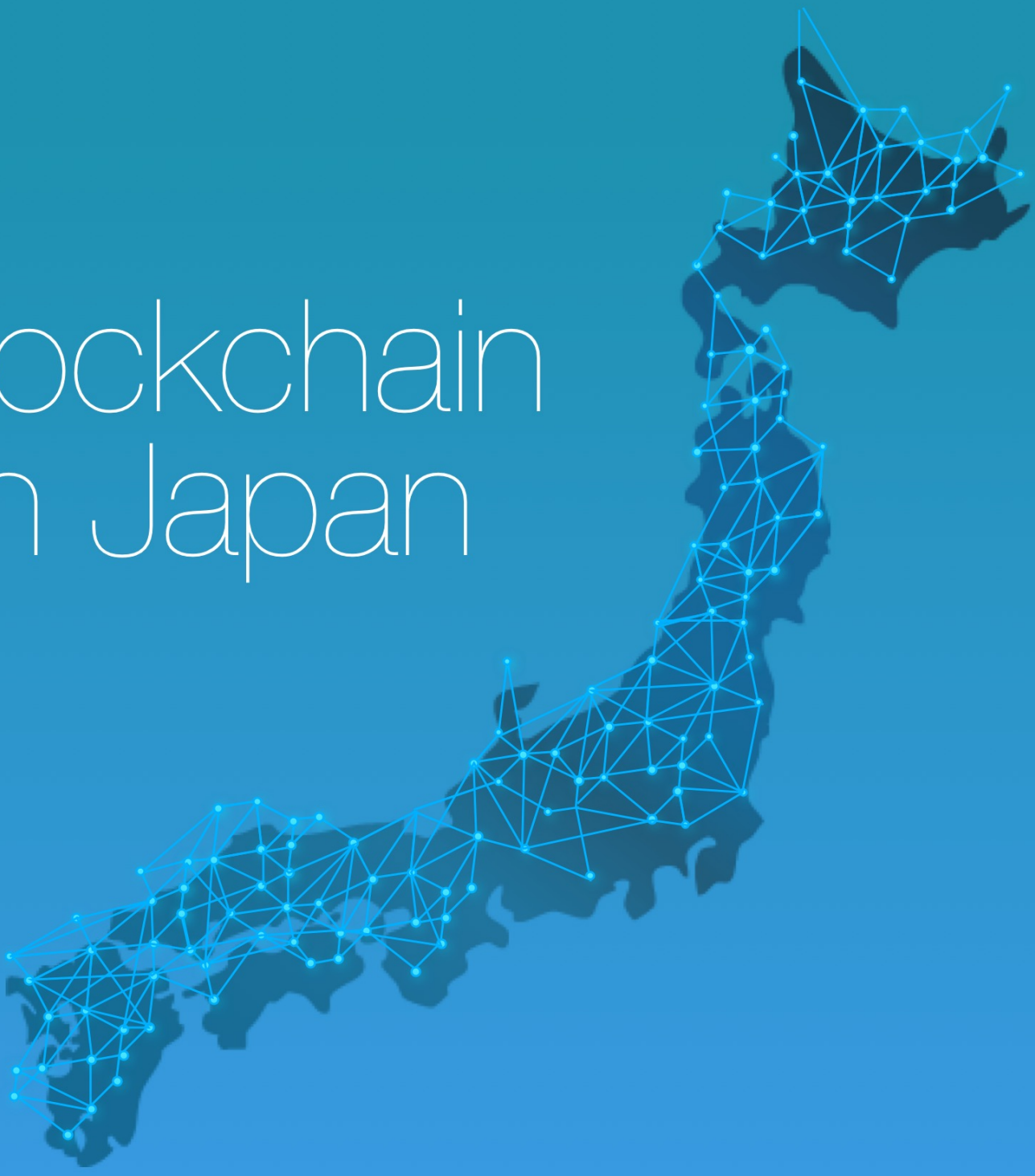
Blockchain in Japan



Marta González

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EU-Japan Centre
for Industrial Cooperation
日欧産業協力センター

"The impact of Blockchain is huge.

Its importance is similar to the emergence of Internet"

Ministry of Economy, Trade and Industry of Japan[1]

[1] Japanese Trade Ministry Exploring Blockchain Tech in Study Group, Coindesk

About this report

This report has been made by Marta González for the EU-Japan Centre for Industrial Cooperation, a joint venture between the European Commission and the Japanese Ministry of Economy, Trade and Industry (METI). The Centre aims to promote all forms of industrial, trade and investment cooperation between Europe and Japan. For that purpose, it publishes a series of thematic reports designed to support research and policy analysis of EU-Japan economic and industrial issues.

To elaborate this report, the author has relied on a wide variety of sources. She reviewed the existing literature, including research papers and press articles, and interviewed a number of Blockchain thought leaders and practitioners to get their views. She also relied on the many insights from the Japanese Blockchain community, including startups, corporation, regulators, associations and developers. Additionally, she accepted an invitation to give a talk[1] about the state of Blockchain in Europe, where she also received input and interest from Japanese companies to learn from and cooperate with the EU.

She has also received numerous manifestations of interest during the research and writing of the report, from businesses to regulatory bodies, revealing a strong potential for cooperation between Europe and Japan in Blockchain-related matters.

THE AUTHOR

Marta González is an Economist and Software Developer specialized in FinTech and Blockchain technology. One of her apps, Crypton, a Bitcoin and cryptocurrencies price tracker, reached the top-5 most downloaded finance apps on Apple's App Store in numerous countries including Japan. As an Economist she has worked at Trade Commissions in Latin America and at a former Spanish minister's office as Strategy Consultant. She has also completed a business program at Waseda University in Tokyo. Marta has written a book about doing business in Japan. After living in Japan she moved to New York where she learned iOS App Development while working as a Product Manager for a FinTech startup. Lately she has become a certified Blockchain Developer.

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[1] Invited by the GBA (Government Blockchain Association

Contents

Executive Summary

The Japanese population represented some of the earliest adopters of Blockchain technology. This was thanks to the rise of the now infamous Mt. Gox, once the world's largest Bitcoin exchange. By 2014, 70% of all Bitcoin transactions where handled from Mt Gox's small office in Shibuya, Tokyo. By the end of that year, Mt Gox was bankrupt.

The collapse of Mt. Gox awoke the Japanese government to create a constructive regulatory framework which fostered a healthy development of Blockchain and cryptocurrencies. All segments of the Japanese government are supporting the technology, either with crypto friendly initiatives or using the technology themselves.

While Blockchain technology is still in an incubation stage — with only 10 years since its inception — Japan is taking ambitious steps to become a worldwide leader. The lack of local ventures in the Blockchain scene opens a rich landscape of business opportunities for EU companies in multiple industries. During the elaboration of this report, the author received many interest manifestations from Japanese companies to collaborate with European counterparts in a variety of sectors, specially finance but also others like food traceability, education or cryptocurrency mining. Additionally, also Japanese public institutions showed interest in learning from the EU regarding regulating cryptocurrencies.

Japanese megabanks are on the move towards collaborating with and funding FinTech startups not only in Japan but also in foreign countries. Opportunities for EU companies to establish alliance with key Japanese players in the FinTech field are growing. Several concrete projects demonstrate that enterprises are teaming up to carry out Blockchain experiments and leveraging capabilities via partnerships with foreign Blockchain startups: Fujitsu partnered with IOTA (Germany), Softbank with TBCASoft (USA), TEPCO with Grid+ (Germany) and SBI with Wirex (UK).

Regarding cryptocurrency exchanges, there are 16 operating with a license and 100 other exchanges applications under review. New important players from other sectors are also stepping into this field launching their own exchanges like Yahoo Japan, Line, Mercari and Rakuten.

Japan's current regulatory framework facilitates Blockchain innovation, however the startup culture remains nascent. Compared to Europe, or even the US, there is a much lower proportion of Blockchain developers and diversity of startups in Japan. This opportunity shouldn't be underestimated as the EU could serve as a supplier of experts on this new technology considered by many as important and as revolutionary as Internet itself.

List of Abbreviations

AML	Anti-Money-Laundering
ASIC	Application Specific Integrated Circuit
BOJ	Bank of Japan
BTC	Bitcoin
DAO	Decentralized Autonomous Organizations
DLT	Distributed Ledger Technology
ECB	European Central Bank
ETH	Ethereum
ETF	Exchange Traded Fund
EU	European Union
FinTech	Financial Technology
GW	Gigawatts
FSA	Financial Services Agency
ICO	Initial Coin Offering
JBA	Japan Blockchain Association
JBCC	Japan Blockchain Collaborative Consortium
JVCEA	Japan Virtual Currency Exchange Association
KYC	Know-Your-Customer
METI	Ministry of Economy, Trade and Industry of Japan
P2P	Peer to Peer
PoS	Proof of Stake
PoW	Proof of Work
SRO	Self-Regulating Organization

Glossary

ADDRESS

A place where cryptocurrency can be sent to and from, in the form of a string of letters and numbers. A cryptocurrency address can be shared publicly in the form of text or QR code to those who want to send you cryptocurrency.

AIRDROP

A marketing campaign that distributes a specific cryptocurrency or token to an audience. It is usually initiated by the creator of a cryptocurrency in order to encourage use and build popularity of the coin or token.

ALTCOIN

As Bitcoin is the first cryptocurrency that captured the world's imagination, all other coins were subsequently termed "altcoins", as in "alternative coins".

API

API stands for Application Programming Interface. It is a set of routines, protocols, and tools for building software applications. APIs specify how software components should interact, such as what data to use and what actions should be taken.

ASIC

An acronym for "Application Specific Integrated Circuit." These are silicon chips specifically designed to do a single task and nothing else. A good example of an ASIC is the ASIC miners in Bitcoin. These have replaced GPUs since ASICs can mine Bitcoin faster and more efficiently than GPUs.

BITCOIN

The first decentralized cryptocurrency. Developed by the mysterious Satoshi Nakamoto. It is the most popular cryptocurrency as of now. more info can be found on bitcoin.org.

BLOCK

A container or collection of transactions occurring every time period on a blockchain.

BLOCKCHAIN

A blockchain is a continuously growing, append-only, list of records called blocks, which are linked and secured using cryptography.

BLOCK REWARD

An incentive for a miner who successfully calculates a valid hash in a block during mining.

CONSENSUS

Consensus is achieved when all participants of the network agree on the order and content of blocks and transactions contained in those blocks.

CRYPTOCURRENCY

A cryptocurrency is a digital medium of exchange using strong cryptography to secure financial transactions, control the creation of additional units, and verify the transfer of assets.

DECENTRALIZED APPLICATIONS (DAPPS)

A type of application that runs on a decentralized network, avoiding a single point of failure.

DECENTRALIZED AUTONOMOUS ORGANIZATIONS (DAO)

An organization that is run through rules encoded in smart contracts.

DISTRIBUTED LEDGER

Distributed ledgers are ledgers in which data is stored across a network of decentralized nodes. A distributed ledger does not necessarily involve a cryptocurrency and may be permissioned and private.

DISTRIBUTED LEDGER TECHNOLOGY (DLT)

The technology underlying distributed ledgers. This term is most often discussed in the context of enterprise use cases around adoption of distributed ledger technology.

ERC-20

A token standard for Ethereum, used for smart contracts implementing tokens. It is a common list of rules defining interactions between tokens, including transfer between addresses and data access.

ETHER

The form of payment used in the operation of the distribution application platform, Ethereum, in order to incentivize machines into executing the requested operations.

EXCHANGE

Cryptocurrency exchanges (sometimes called digital currency exchanges) are businesses that allow customers to trade cryptocurrencies for fiat money or other cryptocurrencies.

FIAT

Fiat currency is “legal tender” backed by a central government.

GAS

A term used on the Ethereum platform that refers to a unit of measuring the computational effort of conducting transactions or smart contracts, or launch dApps in the Ethereum network. It is the “fuel” of the Ethereum network.

GENESIS BLOCK

The first block of data that is processed and validated to form a new blockchain, often referred to as block 0 or block 1.

HARD CAP

The maximum amount that an ICO will raise. If a hard cap is reached, no more funds will be collected.

HASH

The act of performing a hash function on input data of arbitrary size, with an output of fixed length that looks random and from which no data can be recovered without a cipher. An important property of a hash is that the output of hashing a particular document will always be the same when using the same algorithm.

HASH POWER / HASH RATE

A unit of measurement for the amount of computing power being consumed by the network to continuously operate. The Hash Rate of a computer may be measured in kH/s, MH/s, GH/s, TH/s, PH/s or EH/s depending on the hashes per second being produced.

INITIAL COIN OFFERING (ICO)

A type of crowdfunding, or crowdsale, using cryptocurrencies as a means of raising capital for early-stage companies. It has come under fire due to the occurrence of scams and market manipulators.

INITIAL TOKEN OFFERING (ITO)

Similar to ICOs, but the focus is on the offering of tokens with proven (or unproven) intrinsic utility in the form of software or usage in an ecosystem.

KYC

Acronym for “Know Your Customer”, this process refers to a project’s or financial institution’s obligations to verify the identity of a customer in line with global anti-money laundering laws.

LEDGER

A record of financial transactions that cannot be changed, only appended with new transactions.

LIGHTNING NETWORK

The Lightning Network is a "second layer" payment protocol that operates on top of a blockchain. Theoretically, it will enable fast, scalable transactions between and across participating nodes, and has been touted as a solution to the Bitcoin scalability problem.

MINING

A process where blocks are added to a blockchain, verifying transactions. It is also the process through which new bitcoins or some altcoins are created.

MULTI-SIGNATURE (MULTI-SIG)

Multi-signature addresses provide an added layer of security by requiring more than one key to authorize a transaction.

NODE

A copy of the ledger operated by a participant of the blockchain network.

NONCE

When a transaction is hashed by a miner, an arbitrary number meant to be used only once is generated, called a nonce.

PAPER WALLET

A physical document containing your private key or seed phrase.

PERMISSIONED LEDGER

A ledger designed with restrictions, such that only people or organizations requiring access have permission to access it.

PRE-SALE

A sale that takes place before an ICO is made available to the general public for funding.

PRIVATE KEY / SECRET KEY

A piece of code generated in asymmetric-key encryption process, paired with a public key, to be used in decrypting information hashed with

the public key.

SATOSHI (SATS)

The smallest unit of bitcoin with a value of 0.00000001 BTC.

SATOSHI NAKAMOTO

The individual or group of individuals that created Bitcoin. The identity of Satoshi Nakamoto has never been confirmed.

SEGREGATED WITNESS (SEGWIT)

A Bitcoin Improvement Proposal (BIP) that aimed to fix transaction malleability on Bitcoin. In the past, when changing the “witness” information (signatures) on blocks, it would change the transaction ID and its subsequent hash; SegWit was aiming to fix this by segregating signature and block content; a side effect of this change was smaller block sizes and the ability to support second layer solutions.

SMART CONTRACT

A smart contract is a computer protocol intended to facilitate, verify, or enforce a contract on the blockchain without third parties.

SOFT CAP:

The minimum amount that an initial coin offering (ICO) wants to raise. Sometimes, if the ICO is unable to raise the soft cap amount, it may be called off entirely.

STABLE COIN

A cryptocurrency with extremely low volatility, sometimes used as a means of portfolio diversification. Examples include gold-backed cryptocurrency or fiat-pegged cryptocurrency.

TOKEN

A digital unit designed with utility in mind, providing access and use of a larger cryptoeconomic system. It does not have store of value on its own, but are made so that software can be developed around it.

WALLET

A cryptocurrency wallet is a secure digital wallet used to store, send, and receive digital currency, and are divided into two categories: hosted wallets and cold wallets.

WHITEPAPER

A document prepared by an ICO project team to interest investors with its vision, cryptocurrency use and cryptoeconomic design, technical information, and a roadmap for how it plans to grow and succeed.

Introduction

In the mid-1990s, the Internet was still very much a curiosity, hampered by slow connection speeds and disparate protocols that often made browsing the Web more frustrating than beneficial for anyone but the most dedicated users. Just 10 years later, however, the Internet had not only become a ubiquitous global business tool, but it had actually changed how business was conducted.

Blockchain is one of today's biggest ground-breaking technologies with potential to impact every industry. And while use cases may only be dribbling into production at this point in time, there is an absolute gold rush of ideas out in the marketplace. Big thinkers are continually coming up with new ideas for how Blockchain can be leveraged across their organizations. Businesses around the globe are spending significant time and resources creating new use cases and patenting their Blockchain innovations.

Originally invented in 2008 as the technology enabling Bitcoin, over the last ten years it has evolved in many directions, taking on myriad shapes and addressing a seemingly endless list of use cases.

A technology that allows groups of people and organizations to reach agreement and permanently record information without a central authority. It has been recognized as an important tool for creating trust online, providing the infrastructure for a fair, inclusive, secure and democratic digital economy. Blockchain is important because it has the potential to disrupt or transform fundamental economic, social and political institutions and structures through the mechanism of decentralization.

Blockchain is also expected to become an important industry. By providing trust in information without using third parties, Blockchain can greatly facilitate peer-to-peer transaction platforms, potentially catalyzing new, decentralized and highly automated digital markets that will create new businesses and be an ongoing source of innovation and economic growth.

As the success of Bitcoin and other crypto assets shows, Blockchain allows for viable, direct transactions between parties, challenging the authority of banks who today hold a virtual monopoly in the safeguarding and exchange of value.

Blockchain innovation will catalyze a dramatic step forward in how humans engage in economic activity.

Blockchain Concepts

WHAT IS BLOCKCHAIN?

Blockchain technology is a decentralized database that stores a registry of assets and transactions across a peer to peer network. It's basically a public registry of who owns what and who transacts what. The transactions are secured via cryptography. By design, the blockchain logs that transaction history in blocks of data which are cryptographically linked together and secured. The result is an immutable, tamper-proof record of all of the transactions across the network.

The more computers using a blockchain, the stronger it becomes. Because Blockchain is decentralized (not controlled by one entity), there are no central points of weakness. This makes Blockchain more secure than the centralized databases of all corporations and governments. While this might not be relevant in the case of a country like Japan, Blockchain can provide freedom to citizens living under corrupt regimes[1], with problems like hyperinflation[2], censorship[3] or surveillance[4].

Computers using Blockchain are incentivized to do the right thing because they receive rewards for doing so. At the same time, they are discouraged from going against the Blockchain because it would be a complete waste of time and resources to do that.

The first notable manifestation of Blockchain technology arguably occurred with the advent of Bitcoin, the first decentralized digital currency (cryptocurrency or, as Japan prefers to call it, virtual currency).

On 18 August 2008, the domain name "bitcoin.org" was registered. In November that year, a link to a paper authored by Satoshi Nakamoto entitled “Bitcoin: A Peer-to-Peer Electronic Cash System”[5] was posted to a cryptography mailing list. Nakamoto implemented the Bitcoin software as open source code and released it in January 2009 on SourceForge.

The identity of Nakamoto remains unknown.

He cleverly combined existing peer-to-peer network technologies, cryptographic techniques, digital signatures, and the potential power of network effects to design and develop the Bitcoin system.

Nakamoto was very clearly motivated in this effort by the fallout from the 2008 financial

[1] Third of Kenyan budget lost to corruption: anti-graft chief, Reuters

[2] Blockchain and the Battle Against Corruption & Fraud, Coin Central

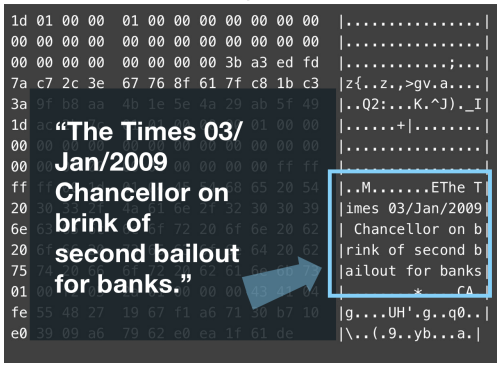
[3] Ethereum Blockchain Used to Bypass Censorship In China, Coincodex

[4] Blockchain Could Be the Savior of Free Speech, Fortune

[5] Bitcoin: A Peer-to-Peer Electronic Cash System, Satoshi Nakamoto

crisis. When the experiment was launched and the first 50 bitcoins (the so-called Genesis block) were mined, in January of 2009, he (or she, or they) included this line of text along with the data: “The Times 03/ Jan/2009 Chancellor on brink of second bailout for banks.”

Bitcoin Genesis block released by Satoshi Nakamoto in 2009



A second important milestone in the evolution of Blockchain technology occurred in late 2013. Vitalik Buterin, a 19 years old programmer involved with Bitcoin Magazine, drafted a whitepaper describing his vision that Bitcoin needed a scripting language for building decentralized applications on the Blockchain. Failing to gain agreement, he proposed development of a new platform with a more general scripting language which he called Ethereum.

CONSENSUS MECHANISMS

One of the most critical aspects to understand Blockchain is consensus algorithms. It determines everything from network security, confirmation speed, to environmental friendliness.

Blockchain provides a way for transactions to be ordered and verified in a distributed ledger, and ultimately provides a record of truth over a period of time. Without a central intermediary, the network of participating users that make up this system need to agree on the validity of what’s being added to the ledger, using a set of pre-defined rules. A consensus needs be reached for the majority of the nodes in the network. But just how effective it is to implement such a consensus remains a work in progress still these days. Here are five examples of how it’s done:[1]

PROOF OF WORK

Proof of work (PoW) is the first distributed consensus mechanism, pioneered by Satoshi Nakamoto. PoW requires that each validating user proves that he has performed a computational action as a way to prevent the network from being attacked by such forces as spam and denial of service. Each node tries to solve complex cryptographic problems using their own computational resources — the one who eventually finds the solution can confirm the transactions and write the block onto the chain.

This means that the nodes (also known as miners in Bitcoin) are competing with each other to create the next block of transactions on the blockchain. In turn, the winning miner receives cryptocurrency tokens as a reward for the exceptional levels of time and energy he spent generating the solution.

Given the heavy utilization of computational resources involved in mining, PoW is considered to be costly, wasteful and

[1] Review of blockchain consensus mechanisms, Gleb Kostarev (Waves)

inefficient. The electricity that is expended in the process of mining Bitcoin has become a topic of heavy debate over the past few years.

A study[1] estimates the Bitcoin network consumes at least 2.55 gigawatts (GW) of electricity currently, and that it could reach a consumption of 7.67 GW in the future, making it comparable with countries such as Ireland (3.1 GW) and Austria (8.2 GW).

And that's just for Bitcoin — a whole heap of new cryptocurrencies have emerged that utilize some forms of PoW algorithm.

Miners collectively verify the entire Blockchain, and transactions aren't considered to be fully 'confirmed' until several new blocks have been added on top of them. If a malicious actor tries to spend coins fraudulently, those transactions will be ignored by the rest of the network. The only way that an attacker could commit such a fraud is to possess a huge amount of computational power, such that they could mine block after block, winning the proof of work competition time after time.

This is known as a 51% attack[2] due to the need to possess more than half of total network hashrate[3].

In reality these attacks are extremely hard to perform, but not impossible[4], specially for altcoins or small blockchains.

Application Specific Integrated Circuits (ASICs) are a highly specialized piece that has been designed to exclusively mine Bitcoin and other cryptocurrencies. While ASICs significantly improve the efficiency of the mining process, the unique nature of such niche equipment makes it expensive.

Big mining companies like Bitmain[5] in China[6] are suspected to control a large amount of the ASIC mining operations. Some people in blockchain debate on whether this makes them too powerful or not.

PROOF OF STAKE

Proof of stake (PoS) is an alternative approach that has gained popularity in recent years and that requires no specialist hardware.

In contrast with PoW, where hashrate determines how likely a participant is to add the next block of transactions to the blockchain, in PoS, the participant's coin stake determines their likelihood.

[1] Bitcoin's Growing Energy Problem, Alex de Vries

[2] How a 51% attack works

[3] Hashrate is a unit used to measure computing power, often in units of hash/s (1 hash per second), of the Bitcoin network.

[4] Verge and Bitcoin Gold suffer the 51% attack, Crypto Insider

[5] Crypto Meets Wall Street as Bitcoin Mining Giant Bitmain Files for IPO, The Wall Street Journal

[6] Why the Biggest Bitcoin Mines Are in China, IEEE Spectrum

In other words, each network node is linked to an address, and the more coins that address holds, the more likely it is that they will mine (or 'stake', in this instance) the next block. It is like a lottery: the winner is determined by chance, but the more coins (lottery tickets) they have, the greater the odds.

An attacker who wants to make a fraudulent transaction would need over 50% of coins to process the required transactions reliably; buying these would push the price up and make such an endeavour prohibitively expensive.

Because it is not energy-intensive, like PoW, the costs do not need reimbursing in the same way as they do for Bitcoin. Thus PoS systems are well suited to platforms where there is a static coin supply, without inflation from block rewards. Stakers' rewards consist only of transaction fees. This is the approach taken by most crowdsale-funded platforms, where tokens are distributed based on investment.

Proof of stake is now a well-established consensus mechanism, but is not often used in its original form. Two variations, LPoS (Leased Proof of Stake) and DPoS (Delegated Proof of Stake), offer certain advantages.

OTHERS (LPOS, DPOS, POI)

In classic PoS, holders with small balances are unlikely to stake a block. It may be many years before a small holder is lucky enough to generate a block. This means that many holders with low balances don't run a node, and leave maintaining the network to a limited number of larger players. Since network security is better when there are more participants, it is important to incentivize these smaller holders to take part.

LPoS (Leased Proof of Stake) achieves this by allowing holders to lease their balances to staking nodes. The leased funds remain in the full control of the holder, and can be moved or spent at any time (at which point the lease ends). Leased coins increase the 'weight' of the staking node, increasing its chances of being allowed to add a block of transactions to the blockchain. Any rewards received are shared proportionally with the leasers.

A similar but different approach is taken by BitShares and a number of other platforms. With DPoS (Delegated Proof of Stake), coin holders use their balances to elect a list of nodes that will have the opportunity to stake blocks of new transactions and add them to the blockchain. This engages all coin holders, though may not reward them directly in the same way as LPoS does. Holders can also vote on changes to network parameters, giving them greater influence and ownership over the network.

A final variation on these consensus mechanisms is PoI (Proof of Importance). The first cryptocurrency platform to implement this was NEM. With PoI, it is not simply coin balance that matters. NEM's consensus system is based on the idea that productive network activity, not just the amount of coins, should be rewarded.

The odds of staking a block are a function of a number of factors, including balance, reputation (determined by a separate purpose-designed system), and the number of transactions made to and from that address. This provides a more holistic picture of a 'useful' network member.

There are many variations on these broad approaches, and some platforms use a combination of PoW and PoS — often using the first to distribute coins, and then shifting to the second at a later point to maintain the network. Another approach is to use Masternodes in conjunction with PoW mining, as is the case with DASH and Crown. These help to process transactions and receive a share of the block rewards from miners' activity.

In all cases, the aim of the consensus approach is to secure the network, predominantly through economic means: it should be too expensive to attack the network, and more profitable to help protect it.

TYPES OF BLOCKCHAINS

There are generally three[1] categories of blockchain-like database applications:

PUBLIC BLOCKCHAINS

Is a blockchain that anyone in the world can read, send transactions to and expect to see them included if they are valid, and participate in the consensus process.

As a substitute for centralized or quasi-centralized trust, public blockchains are secured by cryptoeconomics - the combination of economic incentives and cryptographic verification, following a general principle that the degree to which someone can have an influence in the consensus process is proportional to the quantity of economic resources that they can bring to bear.

These blockchains are generally considered to be fully decentralized.

CONSORTIUM BLOCKCHAINS

A consortium blockchain is a blockchain where the consensus process is controlled by a pre-selected set of nodes; for example, one might imagine a consortium of 15 financial institutions, each of which operates a node and of which 10 must sign every block in order for the block to be valid. The right to read the blockchain may be public, or restricted to the participants, and there are also hybrid routes such as the root hashes of the blocks being public together with an API that allows members of the public to make a limited number of queries and get back cryptographic proofs of some parts of the blockchain state.

These blockchains may be considered partially decentralized.

PRIVATE BLOCKCHAINS

Blockchains that are private or permissioned work similarly to public blockchains but with access controls that restrict those that can join the network, meaning it operates like a centralised database system of today that limits access to certain users. Private blockchains have one or multiple entities that control the network, leading to the reliance on third-parties to transact. A well-known example would be Hyperledger.

[1] On Public and Private Blockchains, by Vitalik Buterin

BLOCKCHAIN FORKS

A "fork," in programming terms, is an open-source code modification. Usually the forked code is similar to the original, but with important modifications.

Forks are related to the fact that different parties need to use common rules to maintain the history of the blockchain. Forks (in the sense of protocol changes) have been used in order to add new features to a blockchain, to reverse the effects of hacking or catastrophic bugs on a blockchain as was the case with the Bitcoin fork on 6 August 2010 or the fork between Ethereum and Ethereum Classic. Notably, Blockchain forks have been widely discussed in the context of the Bitcoin scalability problem.

Not all forks are intentional. With a widely distributed open-source codebase, a fork can happen accidentally when not all nodes are replicating the same information. Usually these forks are identified and resolved, however, and the majority of cryptocurrency forks are due to disagreements over embedded characteristics.

HARD FORK

A hard fork is a software upgrade that introduces a new rule to the network that isn't compatible with the older software. For example, a new rule that allows block size to be 2MB instead of 1MB would require a hard fork.

Nodes that continue running the old version of the software will see the new transactions as invalid. So, to switch over to the new chain and to continue to mine valid blocks, all of the nodes in the network need to upgrade to the new rules.

The problem comes when some sort of political impasse arises, and a portion of the community decides to stick by the old rules no matter what. The hash rate, or network computing power, behind the old chain is irrelevant. What matters is that its data (and ruleset) is still perceived to have value, meaning miners still want to mine a chain and developers still want to support it.

SOFT FORK

A soft fork, by contrast, is any change that's backward compatible. Say, instead of 1MB blocks, a new rule might only allow 500K blocks. Non-upgraded nodes will still see the new transactions as valid (500k is less than 1MB in this example). However, if non-upgraded nodes continue to mine blocks, the blocks they mine will be rejected by the upgraded nodes. This is why soft forks need a majority of hash power in the network. When a soft fork is supported by only a minority of hash power in the network, it could become the shortest chain and get orphaned by the network.

One of the important arguments in the Blockchain space is that of whether hard forks or soft forks are the preferred protocol upgrade mechanism.[1]

[1] Hard Forks, Soft Forks, Defaults and Coercion, Vitalik Buterin

CRYPTO CURRENCIES

A cryptocurrency is a digital asset designed to work as a medium of exchange that uses strong cryptography to secure financial transactions, control the creation of additional units, and verify the transfer of assets.

The decentralized control of each cryptocurrency works through distributed ledger technology, typically a blockchain, that serves as a public financial transaction database

Cryptocurrencies make it easier to transfer funds between two parties in a transaction. These transfers are facilitated through the use of public and private keys for security purposes (cryptographic keys). The main purpose of this component of Blockchain technology is to create a secure digital identity reference. Identity is based on possession of a combination of private and public cryptographic keys.[1]

There have been many attempts at creating a digital currency during the 90s tech boom, with systems like Flooz, Beenz and DigiCash emerging on the market but inevitably failing. There were many different reasons for their failures, such as fraud, financial problems and even frictions between companies' employees and their bosses. Notably, all of those systems utilized a Trusted Third Party approach, meaning that the companies behind them verified and facilitated the transactions. Due to the failures of these companies, the creation of a digital cash system was seen as a lost cause for a long time.

Then, in 2008, Satoshi Nakamoto introduced Bitcoin.

BITCOIN

Bitcoin (BTC) is a digital currency, which is used and distributed electronically. It was the world's first decentralized cryptocurrency.[2]

Satoshi described it as a 'peer-to-peer electronic cash system.' No single institution or person controls it.

Bitcoins can't be printed and their amount is very limited – only 21 million Bitcoins can ever be created.

Two concepts are interchangeably called "Bitcoin": In one side we have Bitcoin—the token, a snippet of code that represents ownership of a digital asset, and in the other, Bitcoin— the protocol, a distributed network that maintains a ledger of balances

[1] How Does Blockchain Technology Work?, Coindesk

[2] The History of Bitcoin In Pictures, Fried

of Bitcoin token (BTC). Both are referred to as “Bitcoin".[1]

ALTCOINS

Altcoins are the alternative cryptocurrencies launched after Bitcoin.

The success of Bitcoin as the first peer-to-peer digital currency paved the way for many to follow. Many altcoins are trying to target any perceived limitations that Bitcoin has and come up with newer versions with competitive advantages.

There are around 2000 cryptocurrencies (or altcoins) in existence as of this writing, and many of those tokens and coins enjoy immense popularity among a dedicated community of backers and investors.

Bitcoin continues to lead the pack of cryptocurrencies, in terms of market capitalization, user base and popularity. Nevertheless, cryptocurrencies such as Ethereum and Ripple, which are being used more for enterprise solutions, are becoming popular, while some altcoins are being endorsed for superior or advanced features.

Going by the current trend, cryptocurrencies are here to stay but how many of them will emerge as leaders amid the growing competition within the space will only be revealed with time.

1	Bitcoin	$109,137,603,999	$6,300.70
2	Ethereum	$20,524,542,643	$200.11
3	XRP	$16,768,929,664	$0.419248
4	Bitcoin Cash	$7,756,633,010	$445.74
5	EOS	$4,748,638,490	$5.24
6	Stellar	$4,087,812,508	$0.216394
7	Litecoin	$3,127,134,595	$53.26
8	Tether	$2,473,128,274	$0.986717
9	Cardano	$1,886,544,501	$0.072764
10	Monero	$1,685,139,594	$102.20

ETHEREUM

Ether (ETH) is the second largest cryptocurrency after Bitcoin and is the native digital currency of the Ethereum network[2].

Ethereum is an open-source, public, Blockchain-based distributed computing platform and operating system featuring smart contract functionality. It supports a modified version of Nakamoto consensus via transaction based state transitions.

At the time of public announcement in January 2014, the core Ethereum team was Vitalik Buterin, Mihai Alisie, Anthony Di Iorio, and Charles Hoskinson. Formal development of the Ethereum software project began in early 2014 through a Swiss company, Ethereum Switzerland

[1] What is Bitcoin?, Coindesk

[2] Ethereum Foundation

GmbH (EthSuisse). Subsequently, a Swiss non-profit foundation, the Ethereum Foundation (Stiftung Ethereum), was created as well. Development was funded by an online public crowdsale during July–August 2014, with the participants buying the Ethereum value token (Ether) with Bitcoin

Ether is the currency that powers the Ethereum blockchain and is meant to be used by businesses and developers who are building decentralized applications (DApps).[1]

DApps built on Ethereum support the interaction of Ether. However, these DApps can also be used to create tokens based upon a universal Ethereum standard. Referred to ERC-20, this token standard serves as a template for Ethereum-based tokens in order to be compatible with the blockchain. ERC-20 tokens can then be used within a DApp's ecosystem in a number of ways, including being sold in an initial coin offering (ICO) in order to generate funding for a project.

Around the world, hundreds of thousands of technologists and developers are working to build applications and platforms that will bring the potential of Ethereum's decentralized world computer to fruition. Although the Blockchain ecosystem will take time to fully develop and enmesh with economies-at-large, we're already seeing many organizations deliver applications that interact with the Ethereum blockchain to create new modes of creating and exchanging value.[2]

The versatility that Ethereum offers by letting users design smart contracts for specific actions, and the ability to have these smart contracts work in tandem with others, means that developers can literally program software programs that run on the Blockchain.

Ethereum counts with the largest developer community and number of projects so far, including most of ICOs and tokens launched. Even governments are interested on Ethereum: Austria recently used it to notarize the auction of a government bond worth €1.15 billion[3].

SMART CONTRACTS

With smart contracts, Blockchain goes one step further. In the future, most legal contracts, insurance claims, financial derivatives, pension funds, crowdfunding raises and investment strategies will be programmed into smart contracts on some sort of blockchain. Be it a private blockchain, which can only be accessed by a few, or a public blockchain, which is open to the world.

The term "smart contract"[4] comes from digital currency pioneer Nick Szabo, who coined it more than 20 years ago. The basic idea, he wrote, is that "many kinds of contractual clauses (such as collateral, bonding, delineation of property rights, etc.) can be embedded in the hardware and

[1] State of the DApps, State of the DApps

[2] 40 Ethereum Apps You Can Use Right Now, Consensys

[3] Austrian Government to Notarize $1.3 Billion Bond Auction Using Ethereum, Coindesk

[4] Smart Contracts: Building Blocks for Digital Markets, Nick Szabo (1996)

software we deal with, in such a way as to make a breach of contract expensive (if desired, sometimes prohibitively so) for the breacher."[1]

Szabo called physical vending machines a "primitive ancestor of smart contracts," since they take coins and dispense a product and the correct change according to the displayed price. He published formalized theoretical studies of such contracts including their expected properties and even tried to implement them in his Bit Gold[2] project in 2008. This made some people think he is Satoshi Nakamoto[3].

Today, the most common conception of a smart contract is a computer program stored on a blockchain. It's worth noting that Bitcoin was the first to support basic smart contracts in the sense that the network can transfer value from one person to another. The network of nodes will only validate transactions if certain conditions are met.

But, Bitcoin is limited to the currency use case. By contrast, Ethereum replaces Bitcoin's more restrictive language and replaces it with a language that allows developers to write their own programs.[4]

Smart contracts can:

- Function as 'multi-signature' accounts, so that funds are spent only when a required percentage of people agree
- Manage agreements between users
- Provide utility to other contracts
- Store information about an application

Running each contract requires ether transaction fees, which depend on the amount of computational power required.

Ethereum runs smart contract code when a user or another contract sends it a message with enough transaction fees.

RIPPLE

Ripple (XRP) is the native digital currency of the RippleNet payment network, which allows financial institutions to make ultra-fast low cost domestic and international payments.

Since Ripple is the currency used in RippleNet, it is no surprise that its value has increased substantially over the course of the year as Ripple has already managed to attract over 75 financial institutions to its payments network and is well-positioned to become one of the financial industry's leading Blockchain-based payment systems providers in the future.

Ripple has important partnerships in Japan and even a joint venture with SBI[5]. They are launching a payments application powered by Ripple.[6]

[1] Formalizing and Securing Relationships on Public Networks, Nick Szabo

[2] Bit Gold, Nick Szabo

[3] Decoding the Enigma of Satoshi Nakamoto and the Birth of Bitcoin, The New York Times

[4] Ethereum White Paper

[5] SBI Ripple Asia

[6] SBI to Roll Out Ripple DLT-Based Payments App on iOS, Android by Coindesk

Also in Japan, a consortium with 47 banks completed a pilot implementation of Ripple to enable real-time money transfers both domestically and internationally.[1]

BITCOIN CASH

In the summer of 2017, Bitcoin blockchain was upgraded to implement the SegWit[2] scaling solution. At this point, a group of community participants who disagreed with this update created a hard fork of the Bitcoin blockchain to create Bitcoin Cash (BCH)[3].

Bitcoin Cash has implemented an increased block size of 8mb, to accelerate the verification process, with an adjustable level of difficulty to ensure the chain's survival and transaction verification speed, regardless of the number of miners supporting it. In May 2018 Bitcoin Cash increased the block size up to 32 MB in another hard fork.

EOS

EOS is the digital currency of the EOS blockchain project which managed to raise over $4.2 billion during its ICO – the largest ever.

EOS is a blockchain platform for the development of decentralized applications (DApps), similar to Ethereum in function. It makes DApp development easy by providing an operating-system-like set of services and functions that DApps can make use of.

The idea behind EOS is to bring together the best features and promises of the various smart contract technologies out there (e.g. security of Bitcoin, computing support of Ethereum) in one simple to use, massively scalable DApp platform for the everyday user to empower the impending blockchain economy.

STELLAR

Stellar was born in 2014 as an offshoot of Ripple because Jed McCaleb, the co-founder (also founder of Mt. Gox), had philosophical differences with the rest of the Ripple board.

The Stellar network is a distributed Blockchain based ledger and database that facilitates cross-asset transfers of value, including payments. The native digital asset of Stellar is called Lumens (XLM).

LITECOIN

Litecoin (LTC) was released via an open-source client on GitHub on October 7, 2011 by Charlie Lee, a Google employee and former Engineering Director at Coinbase. It was a fork of Bitcoin, differing primarily by having a decreased block generation time (2.5 minutes), increased maximum number of coins, different hashing algorithm (scrypt, instead of SHA-256), and a slightly modified GUI.

TETHER

Tether (USDT) is a controversial cryptocurrency that's meant to be backed

[1] 47 Japanese banks move towards commercial phase using Ripple, Ripple

[2] What is a SegWit?, Coindesk

[3] What is Bitcoin Cash?, Cointelegraph

one-for-one by the US dollar. The idea is to have the price stability of the dollar combined with the operational ability of a cryptocurrency. This is known as a "stable coin".

The cryptocurrency was created in 2015, originally called Realcoin, and there is $2 billion-worth of so-called USDT in circulation today. It was hit by a $31 million hack in November 2017[1].

It plays a central role in the operation of many leading cryptocurrency exchanges, including Bitfinex, but critics suggest it doesn't have the dollar reserves it claims. Bitfinex denies this. The company has many of the same management team as Bitfinex. Academics at the University of Texas published a paper alleging that Tether was used to manipulate the price of Bitcoin.[2]

CARDANO

ADA is the digital currency of the Cardano blockchain project, which was launched in September 2017 by IOHK. Cardano uses an innovative variant of Proof-of-Stake (PoS) consensus mechanisms called Ouroboros.

The Cardano project has many connections with Japan. Firstly, because the majority of its ICO take-up was from Japanese investors, and also, because one of its three organizations is Emurgo, a Japanese startup based in Shibuya, that aims to promote the usage of Cardano protocol.

MONERO

Launched in 2014, Monero (XMR) is an open-source, privacy-oriented cryptocurrency. It is a Bitcoin fork made with privacy in mind. Monero doesn't only hide the addresses of the sender but also the amount of a transaction.

Recently, Japan has prohibited cryptocurrency exchanges to accept privacy coins like Monero, Dash, Augur and Zcash, in their platforms. The primary reason was attributed to the regulator's goal of eliminating bad actors from being able to conduct criminal activity under the guise of anonymity.[3]

[1] More than $30 million worth of cryptocurrency was just stolen by hackers, CNBC

[2] Tether (USDT), academics claim was used to manipulate bitcoin, Business Insider

[3] Japan's FSA Bans Private Cryptocurrencies, Investopedia

Blockchain Adoption in Japan

The Japanese population represented some of the earliest adopters of Blockchain technology.

Back in 2016, Japan's Ministry of Economy (METI) published a report about the impact of Blockchain technology with policy recommendations[1]:

> *"To promote implementation of Blockchain technology to society, it is not only required to support demonstration tests conducted by the private sector, but also to conduct demonstration by the government itself to make its usability public."*

The Japanese government followed this statement and we have seen numerous initiatives, as for example developing clear and fair laws to regulate cryptocurrency exchanges, or legally clarifying that Bitcoin is now considered an asset and a payment method[2].

Some of the merchants who already accept Bitcoin in Japan are: department store Marui[3], electronic retailers Bic Camera[4] and Yamada[5], and luxury car dealer L'Operaio[6].

At the beginning of 2018 Japan's biggest energy firm, TEPCO, invested in a British Blockchain startup[7]. Other companies like SBI, Rakuten, Nomura and Daiwa are just a few of the brokerages spearheading the venture into new cutting-edge technologies like the Blockchain. Additionally, SBI launched its Ripple blockchain-based payments app for consumers.[8]

Is easy to see both the tech-savvy population and the government engaging in and encouraging Blockchain technology in Japan, again putting the country at the forefront of international technological development.

Bic Camera store in Harajuku

[1] Report on Blockchain Technologies (Announcement) (Full text) (Outline), METI

[2] Bitcoin gets official blessing in Japan, Financial Times

[3] Major Japanese Retail Chain Marui Now Accepts Bitcoin Payments, Cointelegraph

[4] Electronics Retailer Bic Camera Begins Accepting Bitcoin, Coindesk

[5] Japanese Electronics Retail Giant Launches Bitcoin Payments, Coindesk

[6] Japanese Luxury Car Dealer To Accept BTC As Payment Option Through BitFlyer, Cointelegraph

[7] Japan's TEPCO invests in UK blockchain company Electron, Reuters

[8] SBI Ripple Asia Wins Payments License for Blockchain Money App, SBI (Japanese)

One specific application of Blockchain technology, Bitcoin, got the attention of the Japanese people at a fairly early stage. This was in part thanks to not one but two of the world's biggest hacks on cryptocurrency exchanges. The first, Mt Gox in 2014, and four years later, Coincheck, which saw even more money disappear.

MT. GOX

In January 2014, Mt. Gox was the largest Bitcoin exchange in the world. One month later, it went bankrupt.

The domain name mtgox.com is short for "Magic: The Gathering Online Exchange" and reflects the initial idea with which the founder, Jed McCaleb, had registered the website.

McCaleb, a US programmer who previously created the peer-to-peer application eDonkey and later co-founded Ripple and Stellar, conceived a platform where the fans of the then-popular fantasy game "Magic: The Gathering" could trade the game's cards like stocks.

In 2010, he'd become aware of Bitcoin and decided to create a cryptocurrency exchange under the Mt. Gox domain name. Trading ramped up quickly. On the first day of trading, July 17, volume was 20 BTC and by the fall, it hit 200,000 BTC.

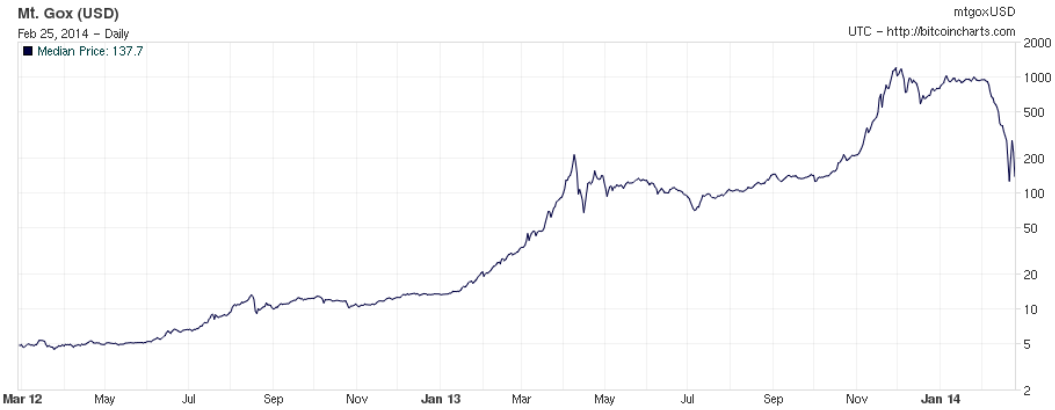
McCaleb sold the company to French developer Mark Karpelès, who was living in Japan, in 2011, saying "to really make mtgox what it has the potential to be would require more time than I have right now. So I've decided to pass the torch to someone better able to take the site to the next level." According to an email that would later surface in court, they knew that the exchange had already been hacked, leaving a hole of 80,000 BTC on the balance sheet. Worth around $60,000 at that time, the loss didn't seem dreadful then, but as Bitcoin prices caught wind, the void became ever harder to fill.

On 19 June 2011, a security breach of the Mt. Gox bitcoin exchange caused the nominal price of a bitcoin to fraudulently drop to one cent on the Mt. Gox exchange, after a hacker allegedly used credentials from a Mt. Gox auditor's compromised computer to transfer a large number of bitcoins illegally to himself.

In those early days it was virtually the only place to trade coins. But the exchange had been built quickly and it was ill equipped to handle the challenges of a global currency-trading platform. Karpelès found himself struggling to bring the platform up to speed, as Bitcoin's value surged from $1 in April to $30 in June 2013; during that same period, accounts on Mt. Gox rose from six thousand to sixty thousand.

By April 2013 and into 2014 the site had grown to the point where it was handling over 70% of the world's Bitcoin trades, as the largest Bitcoin intermediary and the world's leading Bitcoin exchange. Bitcoin price increased rapidly, jumping to a peak of more than $1,200.

In early 2014, customers started to complain that they had requested withdrawals from Mt. Gox but never received the money. The company confessed it had lost nearly 750,000 BTC of its customers' bitcoins in a theft which went undetected for years, and around



100,000 BTC of its own, totaling around 7% of all bitcoins, and worth approximately $473 million at the time of the filing.[1]

Karpelès was arrested in August 2015 by Japanese police and charged with fraud and embezzlement, and manipulating the Mt. Gox computer system to increase the balance in an account.

Mt.Gox also reported on its website that it had found 200,000 BTC in old-format digital wallets. These bitcoins remained held on trust for creditors while the company remained under bankruptcy protection. Mt. Gox creditors subsequently began a years-long process in a bid to retrieve their funds and finally, in June 2018 a Tokyo district court moved the exchange from bankruptcy to a civil rehabilitation process.

This opened the door for at least $1 billion worth of cryptocurrency to be paid back to its former customers.[2]

REGULATORY OVERVIEW

In response to the massive cryptocurrency heist of Mt.Gox, the Financial Action Task Force (FATF), the Paris-based international body that creates policies to combat money laundering, issued its “Guidance of Risk-Based Approach to Cryptocurrencies” in 2015.[3]

The 46-page report recommends that countries license cryptocurrency exchanges and subject them to the same rules and oversight as any other financial institution or money transmitting business.

Prompted by a desire to protect consumers and the FATF’s recommendations, Japan revised its Payment Services Act. The new law, which went into effect in April 2017, does two things. First, it legally defines cryptocurrency as a form of payment. Japan still does not define Bitcoin as legal tender (as some media have reported), but acknowledges that it can be used it to purchase things with.

[1] Mt.Gox hack of 744,000 BTC, Coindesk

[2] $1 Billion Bitcoins Lost in Mt. Gox Hack to Be Returned to Victims, Fortune

[3] Guidance of Risk-Based Approach to Cryptocurrencies, FATF

Second, the law requires any cryptocurrency exchange that wants to do business in Japan to register with the Financial Services Agency (FSA).

Because existing exchanges needed time to bring their operations up to date with the new standards, the FSA them a six-month grace period to apply for a license. Any exchange that applied for a license within that period was allowed to continue operating for an indeterminate period of time while their application was still pending.

Under this law, cryptocurrency exchanges in Japan are now required to be accountable to their customers. They have to keep customer assets separate from the assets of the exchange, maintain proper bookkeeping, undergo annual audits, file business reports and comply with strict know-your-customer and anti-money-laundering rules, and more.

VIRTUAL CURRENCY ACT

The Bill to Revise Portions of the Banking Act to Account for Changes to the Economy per the Growth of Telecommunications Technologies was approved in April 2018. [1]

Section 3 of this bill now includes wording on virtual currency and is being tentatively called the "Virtual Currency Act". Virtual currency as described in this Act refers to:

1. Asset-like values (limited to those items electronically recorded by electronic or other equipment and excluding Japanese currency, foreign currency, and currency-denominated assets; the same applies to the item below) usable as payment to indefinite parties for the cost of purchase or rent of items or receipt of services and which can be transferred by means of electronic data processing systems;

2. Asset-like values that can be used in exchange with indefinite parties for those items described in the preceding item and which can be transferred by means of electronic data processing systems.

The new law defines Bitcoin and other virtual currency as a form of payment method, not a legally-recognized currency. Bitcoin will continue to be treated as an asset unless there are future revisions or directives to Japanese tax law.

Virtual currencies are not financial instruments. In Japan, they are currently treated as "things" and considered assets for accounting purposes. We have received many inquiries asking whether they should be recorded at market rate or book value -- accounting practices differ from company to company, so this is left up to the individual organization in question.

TAXATION

Unlike winnings on stocks and foreign currencies, which are taxed around 20 percent, Japan's levy on profits from virtual money runs from 15 percent to 55 percent. The top amount applies to people with

[1] The Virtual Currency Act explained, BitFlyer

annual earnings of 40 million yen ($365,000). The revenue potential for the Japanese government is significant.

While Japan isn't alone in introducing capital gains taxes among major economies, those heightened rates have seen some investors move to jurisdictions like Singapore for tax relief.

Having ruled on 2017 that capital gains on these transactions are a form of "miscellaneous income," investors are now required to declare their profits in annual tax filings and subject to tax on aggregate income. As such, it is treated exactly the same as gain/losses from foreign currency transactions. However, this might change.

During a meeting with the budget committee of the Upper House on June 2018, Senator Kenji Fukimaki asked whether Japan's tax policy on cryptocurrency profits could be changed from its current "miscellaneous income" classification to "separate declared taxation".[1]

Taro Aso, the deputy prime minister and minister of finance, said he was cautious about making such a change. He cited the "international nature" of cryptocurrency as one reason why Japanese residents might dislike a change in tax classification. The finance minister also said he was unsure about the "tax fairness" of implementing such a change.

In December 2017, ahead of the annual tax return season from February 16 to March 15, the National Tax Agency released guidance on how it taxes cryptocurrency profits:[2]

- People who earn ¥200,000 or more from cryptocurrency trading, must pay tax. Such profits are considered miscellaneous income.
- Total income is taxed in seven bands, depending on the amount. The lowest band, covering those who earn ¥1.95 million or less, is taxed at 5 percent. The highest band, for those who earn more than ¥40 million, is taxed at 45 percent. Income is also subject to a residential tax of 10 percent. Together, the maximum tax rate is 55 percent.
- Purchases using Bitcoin are also taxed, taking into account the gains generated from Bitcoin if its price increased since it was acquired.
- Trading one virtual currency for another is also subject to taxation.
- Margin transactions on virtual currencies and virtual currency mining are also taxable events.
- Loses from cryptocurrencies cannot be deducted from income.
- Penalties can add as much as 20 percent on the tax.

It also provides instructions for the calculation of the acquisition cost of virtual currencies, including the event of a hard fork/branching.

[1] Japan's Finance Minister balks at changing crypto tax rules, Coindesk

[2] Cryptoprofits are taxable – have you filed?, The Japan Times

On a transaction basis, however, relief came with the “Cabinet Order for Partial Revision of the Order for Enforcement of the Consumption Tax Act”, effective July 1, 2017, exempting virtual currency transactions from consumption tax (8%).

MARKETS

The official legalization of Bitcoin and the exemption of tax for traders led to the surge of price in the Japanese and the global Bitcoin exchange market.

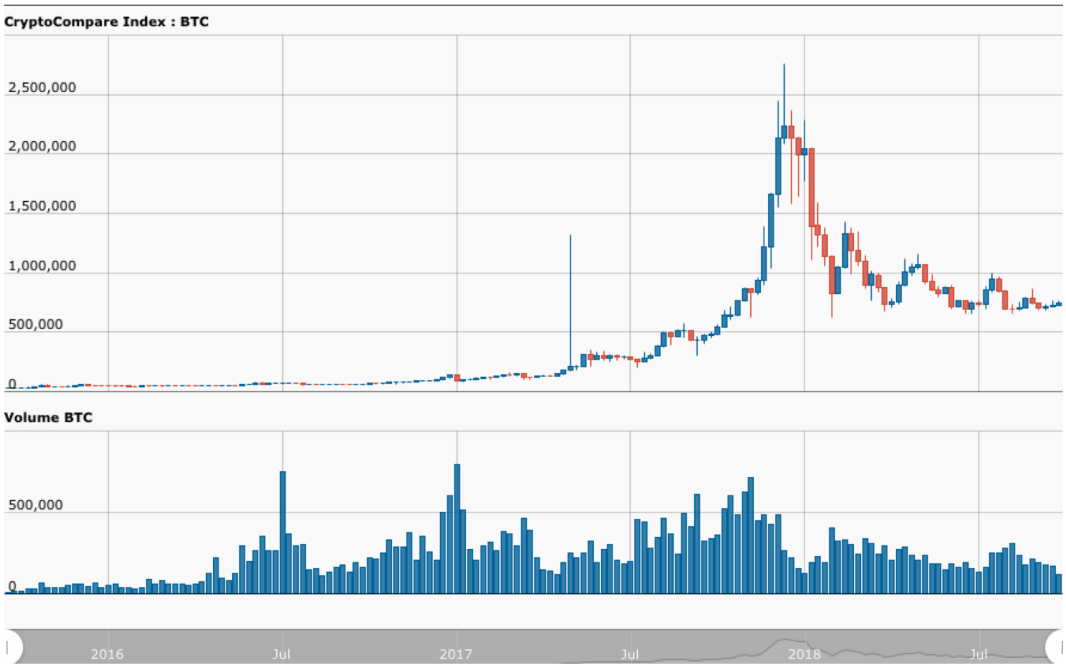
Speculative investment in cryptocurrencies increased steeply due to sharp rises in their value. With cryptocurrency prices skyrocketing, Bitcoin, the most dominant cryptocurrency, temporarily saw its price soar from ¥200,000 in spring of 2017 to above ¥2 million in December.

Transactions involving five major virtual currencies totaled ¥69 trillion in fiscal 2017, roughly 20 times the level of 2016, with the number of cryptocurrency users reaching 3.5 million.

The rapid growth of investments in cryptocurrencies can be attributed to an expansion of margin trading, in which investors with little capital could earn huge profits, or sustain massive losses, by borrowing money. While foreign exchange margin trading has a 25 times leverage limit, the absence of such a cap on cryptocurrency margin trading makes it possible for investors to experience wild financial swing.

Registering as an exchange in Japan is a long, involved process that can take up to six months. The FSA licensed the first 11 exchanges in September 2017. In early December 2017, it licensed another four, and at the end of December 2017, it

Historical Price of Bitcoin in Japanese Yen — Source: Cryptocompare



licensed the 16th exchange. At that time, 16 quasi-operators still had applications pending and were in the process of upgrading their internal operations.

Then, in late January 2018, disaster struck: Coincheck suffered one of the largest hacks in the history of cryptocurrency.

COINCHECK HACK

On January 2018, Coincheck, the biggest cryptocurrency exchange by the time, was hacked resulting in the loss of $534 million.[1]

The hack ranks among the largest of cryptocurrency since the launch of bitcoin.

XEM is the name of the cryptocurrency associated with NEM harvesting and it is those tokens that were stolen from Coincheck.

The core of the problem was that Coincheck was keeping the currency in a "hot" wallet, which meant that the method of storage was connected to the internet. The hackers managed to steal the private key for the hot wallet where NEM coins were stored, enabling them to drain the funds.

Shortly after the press conference, NEM representatives and its open-source development community firmly opposed the idea of conducting a hard fork to prevent user funds on a centralized

Coincheck CEO Koichiro Wada and COO Yusuke Otsuka, announcing the hack in February 2018

cryptocurrency exchange from being recovered. A hard fork could have been executed if NEM were stolen due to the fault of the NEM blockchain. But, because the security breach was caused by the lack of strong security measures of Coincheck, the NEM development team rightfully refused to conduct a hard fork. Instead, the NEM development team announced an automated tagging system to ensure that all funds stolen from Coincheck are traced:

> *"Hack update: NEM is creating an automated tagging system that will follow the money and tag any account that receives tainted money."*

Coincheck subsequently restricted deposits and withdrawals of most currencies pending investigation and resolution of the problems, and announced in their website a reparations policy to reimburse the 523,000,000 NEM stolen to 260,000 users[2]. New registrations are still suspended at the time of this writing.[3]

In April 2018 financial services provider Monex Group acquired Coincheck for 3.6 billion yen.[4]

[1] Coincheck: Stolen $534 Mln NEM Were Stored On Low Security Hot Wallet, Cointelegraph

[2] Reparations policy towards users affected by the illicit transfer of the cryptocurrency NEM, Coincheck

[3] coincheck.com

[4] About Monex Group Acquiring Shares of Coincheck, Inc.

In the aftermath of the hack, Japan's Financial Services Agency carried out on-site inspections of 15 unregistered crypto exchanges, eventually sending business improvement notices to 7 and temporarily halting operations at 2 more.

On September 2018, another exchange, Tech Bureau's Zaif, was hacked, resulting in $50 million stolen.[1]

Japan's plan is to pass on part of the work of overseeing cryptocurrency exchanges to a self-regulating body (SRO). To that end, in April 2018, the Japan Virtual Currency Exchange Industry Association launched.

BITCOIN ADOPTION

Mt. Gox and Coincheck failures awoke Japanese government early and encouraged it to craft a coherent strategy for cryptocurrency governance.

The Japanese government has demonstrated a deliberate intention to create a constructive regulatory framework which fosters the healthy development of cryptocurrency.

In April 2017 the government defined Bitcoin as a legitimate means of payment, leading to dramatically accelerated adoption of cryptocurrency. Over 5,000 retail locations are now accepting Bitcoin as payment in Japan.

BIC Camera is one of the first merchants to accept Bitcoin as a payment method through a partnership with BitFlyer for processing their Bitcoin payments. BitFlyer shows other merchant cases in their website[2].

The constructive regulation and adoption of Bitcoin by the government and corporate blue chip supporters brought a stamp of legitimacy to Bitcoin trading and inspired critical confidence in the market.

Japan has played an important role in the run-up of Bitcoin price and accounted for more than 50% of Bitcoin trading volume worldwide during the last years.

The growth of cryptocurrency in Japan has been dynamic, a phenomenon which can be witnessed particularly in the retail investor segment, where the adoption rate of cryptocurrency (predominantly Bitcoin) has reached an estimated 8% of the overall population.

The increase in adoption can be attributed to multiple reasons including:

A. The government's positive regulatory framework and certification of several cryptocurrency exchanges which make cryptocurrency widely accessible.

B. The legalization of Bitcoin as a form of payment.

C. The government's clarification that the purchase of cryptocurrency will not be subject to consumption tax (8% now, with plans to increase it up to 10%). The tax on aggregate income, however, can be up to 55%.

D. The historical popularity of foreign

[1] Zaif cryptocurrency exchange loses $60 million in recent hack, by ZDNet

[2] bitFlyer case studies, Bitflyer

exchange currency trading by retail investors. Japan is one of the largest retail Forex market in the world[1].

E. The highest proportion of liquid assets per capita of any large developed country.

F. The familiarity of virtual currency concepts from the mobile gaming culture.

G. A proliferation of events, conferences, meetups, interest groups, and collective investment clubs centered on cryptocurrency.

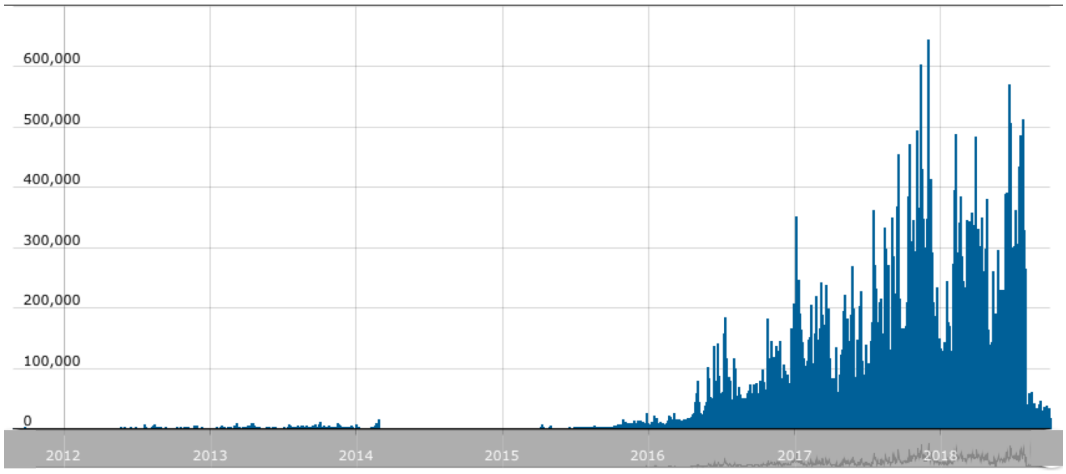
H. An increasing number of merchants, including respected brand-name retailers like Bic Camera who are starting to accept Bitcoin as payment in a few locations.[2] Peach airlines announced it will accept Bitcoin in the future and also some capsule hotels. In this interactive map[3] is possible to find Bitcoin-friendly stores and ATMs.

A survey made from January 2018 to March 2018 of male employees from ages 25-30 showed that 14 percent of the participants owns cryptocurrency. In regards to the value of holdings, 35 percent owned less than 50,000 yen of crypto, while only 10 percent owned 1 million yen or more.[4]

At the end of March 2018 the Financial Services Agency gathered information from 17 crypto exchanges and published a report about the state of the crypto market. According to the report there were at least 3.5 million crypto traders and Japanese' Yen accounted for about 55% of global Bitcoin trades at the time of reporting.[5]

According to Cryptocompare, this trend ended in August 2018, when the volume of BTC/Yen trading dropped sharply, from 500,000 BTC in July 25 to 40,000 on August 1 (or from 487billion yen to 34 billion yen), probably due to the exclusion of margin trading operations from the volume calculation on the site.

BTC/JPY Total Volume (BTC Volume) **Source: Cryptocompare**



[1] 10 countries with the biggest forex reserves, Investopedia

[2] What to buy with Bitcoins, Cointelegraph

[3] Interactive map of Bitcoin accepting shops, ATM's and venues, Coinmap

[4] Survey on Cryptocurrency Adoption (Japanese)

[5] Report on the current status of cryptocurrencies FSA (Japanese)

Cryptocurrency Exchanges

JAPANESE EXCHANGES

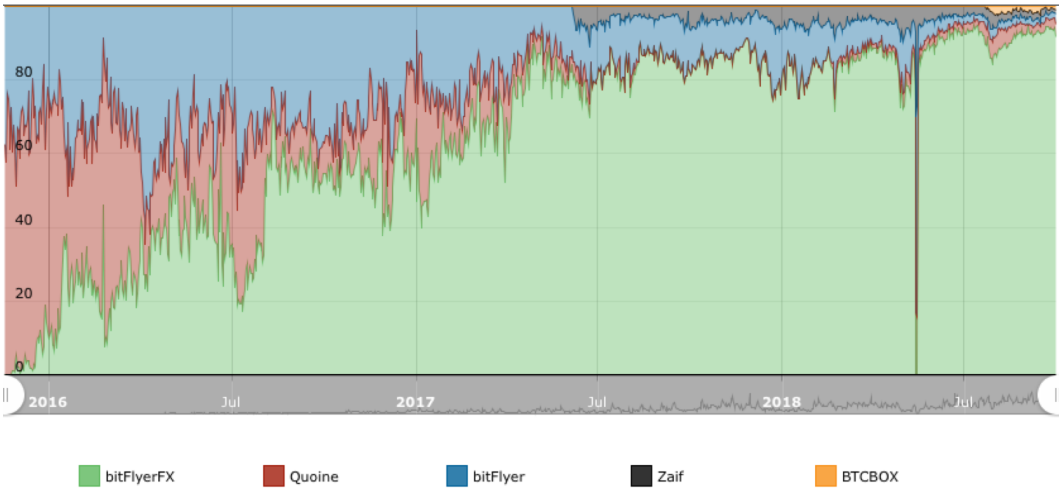
Cryptocurrency (or virtual currency as they prefer to call it) exchanges in Japan fall under supervision of the FSA, resulting in a relatively stable and safe investing climate for Japanese retail investors. Therefore, since the amendment of Japan's Payment Services Act (PSA) in April 2017, all crypto exchanges in the country are required to register with the FSA.

Aspiring cryptocurrency exchanges are classified into four stages depending on their fulfillment of regulatory compliance requirements: Licensed exchange, Exchange under review, Exchange in application for review and Suspended/ terminated exchange.

Currently there are 16 licensed exchanges in Japan: Money Partners, Liquid (Quoine), BitFlyer, Bit Bank, SBI Virtual Currency, GMO Coin, Bit Trade, BTC Box, BitPoint Japan, DMM Bitcoin, Bit Argo Exchange Tokyo, Bitgate, BITOCEAN, Fiscalo Currency Exchange, Xtheta and Zaif.[1]

[1] FSA's list of licensed exchanges, FSA (Japanese)

BTC/JPY Total Volume - JPY Exchanges Comparison. Source: Cryptocompare



BITFLYER

Bitflyer is Japan's largest cryptocurrency exchange by volume and it already operates in the US and Europe.[1]

The company was co-founded in 2014 by ex Goldman Sachs Yuzo Kano and it is one of the leading platforms by trade volume in Asia.

The majority number of trades of Bitcoin on BitFlyer are conducted in the national Japanese currency yen (JPY). The company is also well known for Miyabi — BitFlyer's development of an enterprise-grade blockchain technology. According to BitFlyer, Miyabi is able to operate over 1,500 transactions per second.

BitFlyer offers two trading platforms for different purposes. One for those who just need to buy Bitcoin and other one BitFlyer Lightning FX, has a range of special tools for various kinds of trading, including transactions with other users.[2]

QUOINE

Quoine is another FinTech company that provides trading, exchange and financial services powered by Blockchain technology. Founded in Singapore in 2014, and headquartered in Japan, by ex Credit Suisse Mario Gomez Lozada and ex Mitsubishi Mike Kayamori.

In September 2018 Quoine's exchange platforms Quoinex and Qryptos merged to create Liquid, a multi- currency exchange platform. It allows users to trade crypto/crypto and crypto/fiat pairs between them.[3]

NEW PLAYERS

RAKUTEN

In August 31, 2018, Rakuten announced the acquisition of the cryptocurrency exchange Everybody's Bitcoin.[4]

A number of customers, in particular

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[1] BitFlyer Granted EU Operational License, Cointelegraph

[2] BitFlyer Lightening Exchange, Cryptocompare

[3] Liquid Whitepaper, Quoine

[4] Announcement of Acquisition of Everybody's Bitcoin Inc., Rakuten

foreign exchange customers, of Rakuten Securities, had been calling for the provision of a cryptocurrency exchange service.

Rakuten Group said it decided to acquire Everybody's Bitcoin shares so that it can realize the early registration as a cryptocurrency exchange and develop cryptocurrency services to customers by combining the know-how of Everybody's Bitcoin as a cryptocurrency exchange, and the know-how of Rakuten Group as a provider of various financial services.

Rakuten said it expects that the role of cryptocurrency-based payments in e-commerce, offline retail and in P2P payments will grow in the future. In order to provide cryptocurrency payment methods smoothly, the company believes it is necessary to provide a cryptocurrency exchange function.

LINE

Line is Japan's most widely utilized messaging app with more than 200 million active users.

In August 31, 2018, Line revealed the launch of its own cryptocurrency, called Link.[1] Previously Line had launched its own cryptocurrency exchange, BitBox.[2]

Line decided not to conduct an Initial Coin Offering (ICO) to raise a significant amount of capital in exchange for the distribution of its token. Instead, Line utilized a mechanism called 'airdrop' to give users Link as compensation for utilizing products within the Line ecosystem.

Link is a token that is designed to increase the adoption of decentralized applications (DApps) deployed by the Line development team by incentivizing users accordingly based on their activity on the Link blockchain network.

In the near future, the Line team revealed that it will release DApps and services related to content, commerce, social, gaming and exchange — all of which will rely on Link as the main payment method.[3]

MERCARI

Tokyo-headquartered Mercari is a C2C marketplace app with 100 million of downloads at the end of 2017. After drawing great interest as a unicorn it filed an IPO in June 2018 at the Tokyo Stock Exchange raising $1.2 billion.[4]

Mercari plans the FSA registration for the virtual currency exchange business via its financial service subsidiary Merpay in 2018.[5]

Users could use cryptocurrencies such as Bitcoin for the payment.

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[1] LINE Launches Its 1st Cryptocurrency 'LINK', LINE

[2] BITBOX Digital Token Exchange Begins Operations, LINE

[3] Why Japan's Biggest Messaging App Line Decided to Create Its Own Crypto, Cointelegraph

[4] Rare Japanese unicorn Mercari sparkles in market debut, looks to U.S., Reuters

[5] Mercari virtual currency exchange registration, Nikkei (Japanese)

YAHOO

Yahoo Japan acquired 40% of BitARG Exchange Tokyo and announced plans to launch a full-blown exchange in April 2019 or later.[1] The Yahoo Japan exchange will be newly built but based on BitARG's system.

Yahoo Japan will make additional investments in BitARG, which is already registered with the Financial Services Agency.

The purchase of BitARG shares will be made through Tokyo's YJFX, a wholly owned Yahoo subsidiary that operates foreign exchange transaction services. YJFX will pay about 2 billion yen ($19 million) for a 40% stake in BitARG. The stake will be made up of outstanding shares and newly issued stock.

FOREIGN EXCHANGES

The local crypto industry has not been largely explored by international parties, although recently the situation has started to change.

On May 2018, the first foreign player entered the Japanese market, when local exchange BitTrade was bought for $50 million by Singaporean multi-millionaire and entrepreneur Eric Cheng.

Coinbase, one of the largest cryptocurrency companies but also one of the world's most valuable privately-held tech companies (valued at $8 billion) plans to establish their operation in Japan in 2019. [2]

A number of foreign players have chosen to leave the Japanese market because of the regulations.

This was the case of Binance, the biggest exchange in the world by traded value (around $1billion daily). Founded in 2017 in Hong Kong decided to move to Malta. Prior to Binance CEO Zhao Changpeng announcement, Binance had received a warning from the FSA for operating in Japan without a license. The prime minister of Malta, Joseph Muscat, tweeted his excitement for Binance's Malta move:[3]

> *"Welcome to Malta, Binance. We aim to be the global trailblazers in the regulation of blockchain-based businesses."*

US-based cryptocurrency exchange Kraken also stoped its trading services in Japan in June 2018, citing rising costs of maintaining its business there.[4]

[1] Yahoo Japan to open cryptocurrency exchange, Nikkei Asian Review

[2] Coinbase: Japan's Crackdown on Cryptocurrency 'Good for Us', CCN

[3] Warned by FSA, cryptocurrency giant Binance heads to Malta, The Japan Times

[4] Cryptocurrency exchange Kraken is leaving Japan, CNBC

REGISTRATION PROCESS

Japan's Payment Services Act allows foreign operators to register in the country as "virtual currency exchange service providers" under certain conditions.[1]

Under the Payment Services Act, only business operators registered with a competent local Finance Bureau are allowed to operate cryptocurrency exchange businesses. The operator must be a stock company or a "foreign cryptocurrency exchange business" that is a company, has a representative who is resident in Japan, and an office in Japan.

A "foreign cryptocurrency exchange business" means a cryptocurrency exchange service provider that is registered with a foreign government in the foreign country under a law that provides an equivalent registration system to the system under the Japanese Payment Services Act.

The Act requires cryptocurrency exchange businesses to separately manage customer's money or cryptocurrency apart from their own. The state of such management must be reviewed by certified public accountants or accounting firms. The exchange business must have a contract with a designated dispute resolution center with expertise in cryptocurrency exchanges.

The exchange business must keep accounting records of its cryptocurrency transactions and submit a report on the business to the FSA annually. The FSA is authorized to inspect exchange businesses and issue orders to improve their practices. The FSA may rescind the registration of a cryptocurrency exchange business or suspend its business for up to six months in cases where:

- the exchange business loses one of the requirements for registration;
- it turns out that the exchange business made the registration illegally; or
- the exchange business violates the Payment Services Act or orders based on the Act.

Japanese regulators give their own definition of cryptocurrencies in the Payment Services Act, and they consider two types:

1) Type I Virtual Currency
Proprietary value (i) available for a means of payment against unspecified persons in exchange for purchasing or borrowing goods or receiving services AND (ii) that is able to be exchanged with fiat currency against unspecified persons (limited to that recorded on an electric device or other materials in an electronic manner and excluding Japanese or foreign currencies or currency denominated assets), AND (iii) that is transferrable through a computer network; or

2) Type II Virtual Currency
Proprietary value that is mutually exchangeable with Type I Virtual Currency against unspecified persons, AND that is transferrable through a computer network.

[1] Details of Screening for New Registration Application as Virtual Currency Exchange FSA

The Act also states that cryptocurrency is limited to property values that are stored electronically on electronic devices; currency and currency-denominated assets are excluded.

More resources on Cryptocurrency Regulation:

- Japan's Virtual Currency Regulation and its Recent Developments by Masakazu Masujima. Mori Hamada & Matsumoto (Link)
- Role of Crypto-currency Exchange and Japanese VC Act by So Saito, So Law Office (Link)
- Guidance Note on the Japanese Virtual Currency Legislation and Overview on Registration Requirement thereunder by So Saito, So Law Office (Link)

FSA INSPECTIONS

One of FSA' main concerns is the exchanges' compliance with anti-money-laundering (AML) requirements. The agency's inspections revealed that several of the crypto exchanges under its aegis are failing to apply sufficient Know-Your-Customer (KYC) checks to confirm the identity of their users and prevent 'bad actors' from trading.

The regulator has also raised concerns about cases where it claims that customers' assets are not being adequately separated from those of the exchange.

The FSA issued orders to twelve crypto exchanges in total, two of which are officially licensed exchanges and ten of which are 'quasi-operators,' meaning that their application for an FSA operating license is still pending.

PUNISHMENT NOTICES

In March 2018, the FSA sent "punishment notices" to seven crypto exchanges and temporarily froze the activities of two more after a round of inspections. Business improvement orders were sent for a lack of "the proper and required internal control systems," with Coincheck being specifically cited as missing a framework for preventing money laundering and the financing of terrorism.

Shortly, two local exchanges, namely Mr. Exchange and Tokyo GateWay, decided to close up shop over regulatory compliance. As mentioned, Binance, world biggest exchange, turned to Malta after the FSA issued a warning for operating without a license.

In May 2018 the FSA laid out further regulatory stipulations for domestic crypto exchanges: a new requirement to monitor customer accounts multiple times daily for suspicious fluctuations, manage client assets separately from those of the exchange, and store crypto holdings on offline systems only. They will also face stricter anti-money-laundering (AML) measures, which demand know your customer (KYC) checks, such as ID verification, and multiple-password protection for large transfers.

The measures also confirmed that government-registered exchanges will face tight restrictions – effectively a ban – on the trading of anonymity-oriented altcoins, such as Dash (DASH), Monero (XMR), Zcash

(ZEC) or Augur's reputation (REP). Out of the 16 licensed crypto exchanges in Japan, none have listed XMR, ZEC, DASH, or REP on their applications with the FSA.

IMPROVEMENT ORDERS

On June 2018, the FSA handed out business improvement orders to five cryptocurrency exchanges: BitFlyer, Quoine, Bit Bank Corporation, Bit Point Japan and BCT Box. It gave them one month to present the formal business improvements. Until the time that the business improvement plan has been fully enacted, a monthly report has to be submitted by the tenth of each month detailing the previous month's progress and implementation status.

The business improvements requests are related to systems for risk management, anti-money-laundering, management of user assets, user protection measures, system risks, white label strategy and outsourcing.[1]

BitFlyer stands out as the only exchange that just has to conduct an "intense review of the management system". Short after, BitFlyer announced its response to the improvement order and also the resignation of its CEO Yuzo Kano as Vice President of the JVCEA (Japan Virtual Currency Exchange Association) and representative director of the JBA (Japan Blockchain Association). It has also suspended new customer registrations since then.[2]

RESULTS OF THE INSPECTIONS

The FSA published the results of the on-site inspections in August 2018.[3]

The document identified a wide array of problems across exchanges' business models, risk management and compliance, internal audits, and corporate governance. The agency further highlighted concerns over insufficient anti-money laundering (AML) measures among certain exchanges.

The FSA investigation revealed that exchange operators' maintenance of their internal control systems failed to keep pace with the rapid growth of transaction volumes, which it partly attributed to the "renaissance" of the crypto markets in fall 2017. The total digital assets of domestic exchanges surged to 792.8 billion yen, an over six-fold increase in one year. Meanwhile, most exchanges' workforces are fewer than 20 people, meaning that one employee on average was found to be managing digital assets worth 3.3 billion yen.

Based on its findings, the regulator decided to apply more rigorous oversight into new applications from exchanges hoping to receive an official operating license. Newly registered exchanges will be required to undergo on-site inspections at an early stage and the agency plans to closely examine the effectiveness of their business models.

There are currently more than hundred companies awaiting its review.

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[1] Details of FSA crypto exchange sanctions, Tokyo FinTech

[2] BitFlyer responds to improvement order from Japanese Financial Services Agency, Bitflyer

[3] FSA results of on-site inspections of cryptocurrency exchanges (Japanese)

Industry Associations

BLOCKCHAIN ASSOCIATIONS

Sixteen Japanese virtual currency exchanges registered with the Financial Services Agency (FSA) joined forces in April 2018 to establish the Japan Virtual Currency Exchange Association[1].

This new association seeks to restore trust in the cryptocurrency industry that was damaged by the hacking of Coincheck, and to become a certified fund settlement business association, which will serve as a self-regulatory body for crypto exchanges.

Its primary objectives include providing guidance and recommendations to members to comply with regulations, laws and self-regulation rules. The association hopes to contribute "to the sound development of the virtual currency exchange industry and the protection of the interests of users."

The JVCEA's founding members are the 16 fully licensed exchanges operating in Japan: Bitflyer, Money Partners, Bitbank, Bitpoint, Quoine, SBI Virtual Currencies, Fisco Virtual Currency, Btcbox, Zaif, GMO Coin, Bittrade, Tokyo Bitcoin Exchange (DMM Bitcoin), Bitarg Exchange Tokyo, FTT Corporation, Xtheta Corporation, and Bitocean.

The JVCEA applied with the FSA to

Exchange representatives at the Japan Virtual Currency Exchange Industry Association press conference, Tokyo, April 23, 2018.

[1] Japan Virtual Currency Association, JVCEA

become the authority for self-regulation, with the power to enforce rules on its crypto exchange members. The association has drafted nearly 100 pages of self-regulation that includes a number of restrictions on how crypto exchanges operate.

For the sake of this report, the JVCEA facilitated a provisional translated version of the self-regulatory rules.[1]

In late July 2018 the group sought to crack down on leverage trading, as the body believed that the widespread availability of high margin trades proved too much of a risk for consumers. As such, the JVCEA put a 4x leverage cap on trading platforms, which is a far from the previous 25x limit.

Most recently, and after the hack of the Japanese crypto exchange Zaif in September 2018, the group announced they wanted to tighten the management and security of consumer-owned cryptocurrency holdings.

The JVCEA will set a ceiling on the amount of crypto that can be held through exchange-operated hot wallets — which are perpetually connected to the internet. The exact ceiling that will likely be set in place is said to be around 10 to 20 percent of customer-owned crypto.

Once developed, the new and improved rule will be pushed through the FSA, who will be required to certify it in accordance with local payment services regulations and policies.

Apart from the JVCEA, Japan already had two existing associations in the crypto space:

- Japan Blockchain Association (JBA)[2]

- Japan Cryptocurrency Business Association (JCBA)[3]

Both two groups share a common goal in growing and nourishing Japan's Blockchain industry despite their differences in leadership.

Outline of the self-regulatory rules - JVCEA

① Basic rules on Virtual Currency related transactions

Rules on specific issues
② Rules and guidelines on the handling of Virtual Currencies
③ Rules and guidelines on management of user property
④ System related rules
· Rules and guidelines on the safety management of information
· Rules and guidelines on system risk management
· Rules and guidelines on emergency action
⑤ AML / CFT related rule
· Rules and guidelines on AML / CFT
· Rules on eliminating relations with antisocial forces
⑥ Rules on complaints management and dispute resolution
⑦ Rules on sales activity
· Rules and guidelines on solicitation and advertisement etc.
· Rules and guidelines on user management and explanation
⑧ Rules on transaction management
· Rules and guidelines on the improvement of order management system
· Rules and guidelines on the establishment of transaction monitoring system to prevent inappropriate transactions
· Rules and guidelines on the establishment of information management system
⑨ Rules and guidelines on margin trading
⑩ Rules on financial management
⑪ Business Ethics / Disciplinary Actions related Rules
· Rules on establishment and compliance of ethics codes
· Rules on employee management etc.
· Rules on procedures of self-regulatory diciplinary actions
· Appeal Board Rules
· Rules on investigation in members
⑫ Rules and guidelines on ICOs

[1] Self-Regulatory rules of JVCEA

[2] Japan Blockchain Association (JBA)

[3] Japan Blockchain Collaborative Consortium (JBCC)

While membership in the JBA and BCCC is pretty broad, including a number of professional services firms associated with the industry, the JVCEA membership, as it should be for an SRO, is limited to the market operators.

VIRTUAL CURRENCY GOVERNANCE TASK FORCE

Launched in 2018, the Virtual Currency Governance Task Force (VCGAF) is a study group established to develop safety measures for consumer protection. As they say "virtual currency perception has increased rapidly so in order to avoid large incidents consumer protection is an urgent task. Thereby improving the security of virtual currency exchange business by providing technical information from diverse perspectives beyond the virtual currency exchange industry officials and security experts, including through the aggregation of knowledge for security, contribute to the formulation of standards, etc."

The minutes of their past discussions are available on their website.[1]

VIRTUAL CURRENCY STUDY GROUPS

The FSA established a new Study Group on cryptocurrency exchange businesses in March 2018. It consists on discussions by academic and industry experts. At the time of this writing, there have been five meetings held already.

The first one was in April. The group discussed about leveraged trading and the need for a margin requirement with a limit on a maximum level of leverage, and also with respect to ICOs and an appropriate regulatory framework.

In September 2018, the FSA published the minutes of the 4th Study Group.[2] The 4th Study Group included Joichi Ito, Director of Massachusetts Institute of Technology Media Laboratory, Gary Gensler, previously Chairman of the Commodity Futures Trading Commission and Sagar Sarbhai, Head of Government & Regulatory Relations at Ripple.

The 5th Study Group took place also on September 2018, with lawyers, trading platforms, scholars, and government officials present. Unlike the previous one, no international participants were invited this time. According to a document released after the meeting, the FSA has been reviewing 16 cases, while more than 160 firms including public companies are now planning to submit applications for an

[1] Virtual Currency Governance Task Force (Japanese)

[2] 4th Study Group on Virtual Currency Exchanges (Japanese)

exchange license.[1]

The FSA will expand its team screening license applications from cryptocurrency exchange operators to meet soaring interest at a time when mainstream companies like Yahoo, Rakuten and Line are entering the sector.

This last meeting also remarked the importance of international cooperation in rule making and to share lessons learned in Japan and the established regulatory framework. They also talked about money laundering, margin trading, ICOs and unregistered dealers.

The FSA intends to consider the results of these meetings and take steps for additional rule making as it sees appropriate. In this regard, discussions at the Study Group could have a great impact on the future Japanese regulatory framework involving virtual currencies and ICOs.

FSA BLOCKCHAIN ROUND-TABLE

In March 2018 the FSA held a Blockchain Round-Table with foreign and Japanese regulatory and supervisory authorities and central banks: UK Financial Conduct Authority, Monetary Authority of Singapore, Australian Securities Investments Commission, Abu Dhabi Global Market Financial Services Regulatory Authority, France Autorité de Contrôle Prudentiel et de Résolution, Hong Kong Monetary Authority, Bank of Japan and Bank of Canada; as well as foreign and Japanese academic institutions: MIT Media Lab, The University of Tokyo and Keio University.[2]

It is an ad-hoc platform to share collective views concerning blockchain under the Multilateral Joint Research.

The round table meeting especially highlights the inherent technical risks and opportunities around blockchain. As a part of this initiative, FSA currently conducts a study on the vulnerability issues of public-blockchain and relevant security issues and its impacts from technical perspectives.

Among others, the round table is held to contribute to strengthening collaboration with academia and regulatory bodies that have established or will establish FinTech Co-operation Framework as well as central banks.

OTHER ASSOCIATIONS

THE FINTECH ASSOCIATION OF JAPAN

The FinTech Association of Japan (FAJ)[3] promotes open innovation in the Japanese FinTech industry by creating networking opportunities for its members, researching emerging market trends, and cooperating with domestic, international, and government organizations. The Association

[1] 5th Study Group on Virtual Currency Exchanges (Japanese)

[2] FSA Blockchain Round-Tables (Multilateral Join Research project)

[3] FinTech Association of Japan

promotes the Japanese FinTech ecosystem abroad and encourages the exchange of information internationally.

Main Activities:

- Sponsoring networking events and meetups
- Coordinating with domestic and international groups to exchange information and promote FinTech
- Working with government bodies, such as Japan Financial Services Agency (FSA), to exchange information and encourage open innovation in the Japanese financial industry
- Researching and publishing FinTech trends in Japan and globally

JAPAN ASSOCIATION OF NEW ECONOMY

In February 2010, the Japan e-business Association (JeBA)[1] was established as a general incorporated association for the purpose of strengthening Japan's competitiveness through the expansion of the Internet and e-business. The objective of the Association is to make proposals and suggestions from the point of view of private sector industry as well as to provide information.

In order to expand its activities not only in the field of e-business but also including the new industrial development field, the Association changed its name as the Japan Association of New Economy (JANE) in June 2012.

Furthermore, JANE promotes in-depth constructive discussions and contributes to an environmental maintenance as well as a framework in Japan through policy suggestions regarding actualization of innovation and growth strategies in all industries that make up the e-business as the core; environment for fair competition; increased participation of people in politics and more efficient administrative processes; and vitalization of regional communities.

Blockchain Associations

JVCEA
日本仮想通貨交換業協会

JBA

Blockchain Collaborative Consortium

Other FinTech and Business Associations

FINTECH ASSOCIATION OF JAPAN
一般社団法人 Fintech 協会

新経済連盟
Japan Association of New Economy

[1] Japan Association of New Economy

Government's position on Blockchain

MINISTRY OF ECONOMY (METI)

> *"The impact of Blockchain is huge. Its importance is similar to the emergence of Internet"*
>
> Ministry of Economy of Japan in 2015

For many years, with strict capital controls and money laundering policies, Japan has been known as a conservative region regarding policies pertaining to the finance sector and emerging industries. This position inevitably led Japan to drift off from the forefront of technological development and innovation. Due to overly strict and impractical regulations, neighboring countries like China and South Korea were taking over in FinTech and Blockchain.

However in the recent years, the Japanese government overhauled existing regulatory frameworks and created new policies to embrace startups, establishing a new and a more aggressive strategy to welcome emerging markets, new technologies, and asset classes. Regarding Blockchain, METI has played a proactive position, undertaking research on the technology and going as far as suggesting that other government organizations should pursue similar lines of inquiry. The ministry even sponsored a trip to Silicon Valley for some Japanese Blockchain startups.[1]

METI has been publicly researching Blockchain technology since late 2015, arguing the government itself should play a supporting role[2].

According to October 2015-meeting of METI's FinTech study group, the government agency became aware of the increasing interest in the Blockchain and distributed ledgers in the US as part of a wider inquiry into financial technology. There was broad opinion among meeting participants that Blockchain technology could "impact the whole financial industry".

> *"New business models without an intermediary third party will be developed and more efficient services will be provided. Value will be understood differently and it will become possible to directly exchange various assets and information with the use of virtual currency."* METI

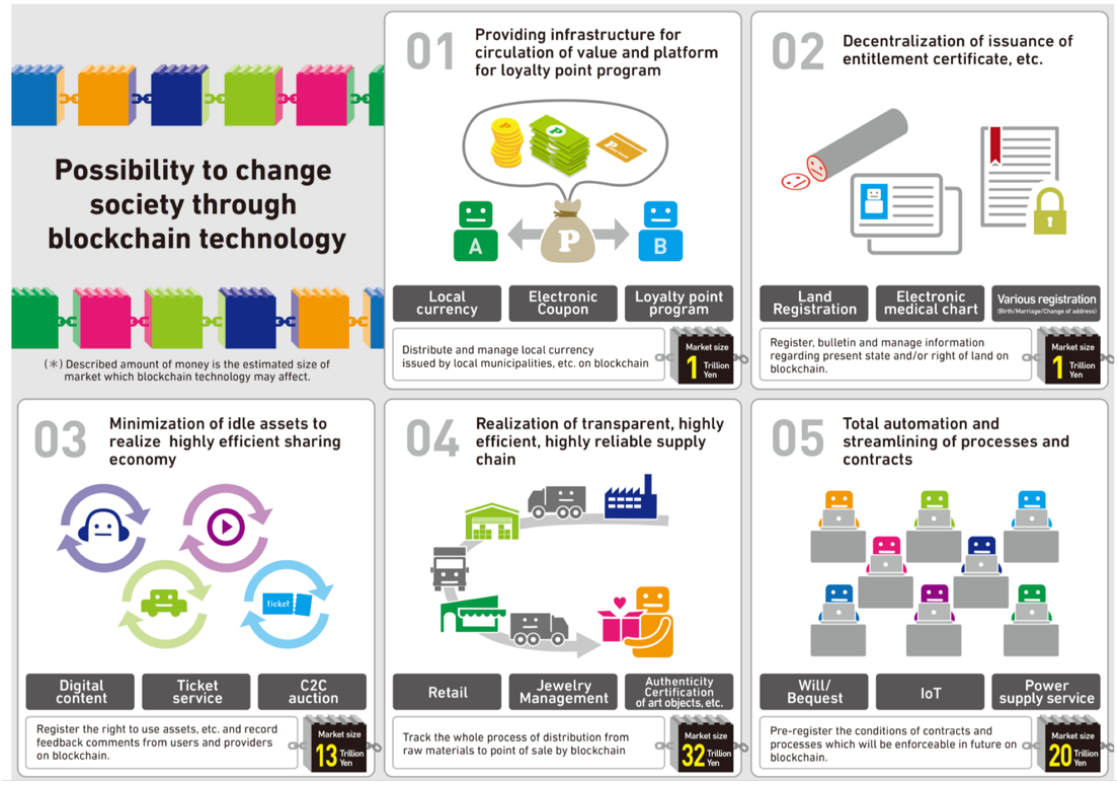
In May 2016, METI released a report on Blockchain technology, recommending that government groups play a leading role in "verifying the validity" of its use cases. Prepared in conjunction with Nomura Research Institute (NRI), the 75-page report provides an overview of the technology, from detailing the step-by-step workings of a bitcoin transaction to outlining how the mechanics of the protocol could create

[1] Japanese Government Sends Blockchain Startups Abroad for Innovation Program, Coindesk

[2] Japanese Trade Ministry Exploring Blockchain Tech in Study Group, Coindesk

Impact of Blockchain technology on society

Source: Japan Ministry of Economy (METI)



Survey on Blockchain Technologies and Related Services

Source: Japan Ministry of Economy (METI)

Things Required for Policy

- To promote implementation of the technology to society, it is not only required to support demonstration tests conducted by the private sector, but also to conduct demonstration by the government itself to make its usability public.

① **Promoting demonstration tests in the private sector to verify new business in which blockchains are utilized, and accumulating and broadly publicizing the results and challenges thereof, thereby facilitating the development of markets.**

ex : Demonstration experiments such as a point program in a limited area, an electric ticket service using blockchain technology. And formulate a standardized Service Level Agreement (SLA) for IT system/service using blockchain technology, etc.

② **Encouraging the verification of blockchains from the aspects of mathematics and information theory, which have been lacking areas, while taking advantage of the existing accumulated technologies, e.g., cryptography.**

ex : Academic networks among research institutions and researchers, etc.

③ **Advancing the introduction of blockchains into administrative areas, while further enhancing and promoting the efficiency of administrative services, thereby exercising leadership and showing a role model in the field.**

ex : document management, patent registration, land registration, voting, levy, marriage registration, birth registration, etc.

④ **Revising the related regulations or rules if necessary so as to smoothly implement blockchains in society.**

ex : Consumption Tax Act (taxation on virtual currency, etc.), Act on Settlement of Funds (International payment), electronic signature law (clarification of legal admissibility of evidence), etc.

11

stresses if applied to existing business practices.[1]

The report estimated that Blockchain technology impact has a market size of 70 Trillion Yen. It outlined the specific use cases it sees as being valuable for the government to explore, as well as why the government should have an incentive to play an active role in this experimentation process.

Use cases cited in the report included asset management, authentication, commercial distribution management, communication, content, crowdfunding, finance, Internet of Things (IoT), loyalty points and rewards, medical services, prediction markets, public elections, sharing and storage. The conclusion of the report was that to "promote implementation of Blockchain technology to society, it is not only required to support demonstration tests conducted by the private sector, but also to conduct demonstration by the government itself to make its usability public".

Some cases of the Japanese government using Blockchain technology are:

- Ministries of Justice and Land's Blockchain-based central repository of land and property registration.[2]
- METI's Blockchain-based platform for trade.[3]
- Japanese city of Tsukuba voting system using Blockchain.[4]

Additionally, and after the concern that the general public might not be able to understand Blockchain technology, which could lead to a potential unwillingness to use it, METI created a system for evaluating Blockchain projects. According to METI, this was the world's first comprehensive method for this field.[5] The Ministry published details about the methodology, which was created by the Information Economy Division of the ministry's Commerce and Information Policy Bureau. METI created the process as a way to assess projects for a variety of use cases, while evaluating 32 features such as scalability, privacy and overall reliability.

In recent years, starting with Japan's integration of a national licensing program for crypto exchanges, the FSA has focused on implementing policies that can create a better ecosystem for startups and innovative FinTech companies.

In an effort to lure even more investment capital to the market, the Tokyo Metropolitan Government Accelerator Program started hosting the "Blockchain Business Camp Tokyo." The program is scheduled to last two months and is aimed at stimulating private innovation in the sector. The goal is to promote blockchain projects that have the potential to improve Tokyo residents' quality of life.

Finnally, METI also published "Japan's FinTech Vision", a comprehensive range of policy initiatives to nurture innovative FinTech services and create a dynamic

[1] Survey on Blockchain Technologies and Related Services (Announcement) (Full text) (Outline), METI

[2] Japan Could Place Its Entire Property Registry on a Blockchain, CCN

[3] NEDO Project for Enhanced Efficiency of Trade Procedures in Global Supply Chains, METI

[4] Tsukuba first in Japan to deploy online voting system, The Japan Times

[5] Evaluation Forms for Blockchain-based Systems, METI

METI
Ministry of Economy, Trade and Industry

Japan's FinTech Vision

First Comprehensive Policy Recommendations

Lay the groundwork for FinTech

- Develop rules and processes to enable individuals to manage and use their own personal data

Facilitate the smooth flow of money

- Build a framework that enables fully digital personal identification
- Promote the adoption of open application programming interfaces (APIs) by banks and credit card companies
- Promote the use of blockchain technology

Promote the use of FinTech among SMEs

- Promote the use of cloud services for back-office operations and internet banking
- Support electronic data exchange (EDI) connections between finance and commerce
- Improve cash conversion efficiency across whole supply chains

Create regulatory framework to promote innovation

- Trial a "regulatory sandbox" to promote innovation and experimentation
- Regulatory reform designed to promote FinTech innovations
- Build globally competitive FinTech hubs

→ Generate innovative FinTech services

- Japan will develop **fully digitalized financial services** by promoting **open APIs** and leveraging **blockchain technology**.

Policy Recommendations

- **Promote the adoption of open APIs by banks**
  - In May 2017, a bill to amend a section of the Banking Act related to the treatment of intermediary service providers for banking settlements was passed in the Diet
- **Promote the adoption of APIs by credit card companies**
  - Establish technical standards and take necessary policy measures to promote API cooperation between credit card and FinTech companies
- **Set contract terms and prices for the opening of APIs and clarify required security protocols**
- **Promote the use of blockchain technology**
  - Align with international standards and promote test trials

market environment aimed at attracting entrepreneurs and companies from around the world.[1]

SHINZO ABE'S CABINET

It is noticeable the interest of the government in implementing regulatory sandboxes and promote FinTech and Blockchain technology.

In December 2017, the Cabinet Office under Prime Minister Shinzo Abe published an economic policy package with strategies to overcome the challenges that the country is facing:[2]

"In order to tackle the biggest challenge of falling birthrate and aging population, the government will promote both supply system innovation and human resources development revolution as the two wheels on an axle towards 2020.

Regarding new technologies and new business models that were not envisaged under existing regulations, the government will submit a bill aiming to establish a project based regulatory "sandbox" at the next regular session of the Diet. It will enable demonstration of certain projects under environments where relevant regulations are not applied immediately by limiting the number of participants and duration through a certain process under a cross-fields and cross-ministerial system.To improve users' convenience, strengthen companies' growth potential, and realize a cashless society, the government will consider how to promote use of FinTech."

The New Economic Policy Package included various measures:

- Establishment and enforcement of the "the Act on Special Measures for Productivity Improvement" (regulatory sandbox, promotion of industrial data utilization etc.)

- Tax reduction on capital investment by small and medium-sized enterprises (SMEs). Establishment and enforcement of tax policies such as the reduction of corporate tax on companies actively investing in equipment and IT.

- Execution of budget measures such as "Subsidy for Manufacturing and Service of SMEs "

- Promotion of regulatory reforms such as the "System Improvements of Self-Driving Cars"

REGULATORY SANDBOXES

Prime Minister's Cabinet remarked the desire of creating a Regulatory Sandbox in the last Package of Economic Policies. The Ministry of Economy, Trade and Industry (METI) is responsible for its implementation.

But, what is a regulatory sandbox? A regulatory sandbox is, broadly speaking, a framework within which innovators can test business ideas and products on a "live"

[1] Japan's FinTech Vision and Policy Recommendations), METI

[2] New Economic Policy Package, Prime Minister Cabinet Office

market, under the relevant regulator's supervision, without fear of enforcement actions in case it is determined that their business model does not comply with existing regulations. This "safe space" is usually subject to certain restrictions, typically focused on ensuring the protection of consumers, including a limited amount of time for testing.

Regulatory sandboxes encourage innovation by improving access to financing, minimizing legal uncertainty, and allowing entrepreneurs to experiment and fine-tune business models in a controlled testing environment. Such playgrounds allow regulators to stay abreast of new business ideas and products, and to learn where they might need to update or fill in gaps in existing regulatory frameworks.

Although certainly innovative, regulatory sandboxes appear to be part of a broader trend towards better targeted regulation in a number of countries. The UK Financial Conduct Authority first implemented a regulatory sandbox in 2016. Singapore was the second one, stating that they "should be prepared to allow business models to be piloted under conditions, even tight ones." They have since been implemented and proposed in several other countries, including Japan, Abu Dhabi, Australia, Canada, Denmark, Hong Kong, Malaysia, Singapore, UK, Indonesia, Russia, Switzerland, Taiwan, Thailand, and the United States.

The Bank of Tokyo-Mitsubishi UFJ and Hitachi are testing a Blockchain-based check digitalization platform through the Monetary Authority of Singapore's regulatory sandbox program.

In Japan, the Regulatory Sandbox is one of the measures under the METI's Act on Special Measures for Productivity Improvement, and the purpose is to "develop an environment in which businesses are able to conduct demonstration tests and pilot projects for new technologies and business models that are not envisaged under existing regulations with a limited number of participants and within the predetermined implementation periods". [1]

> *"[Regulatory sandboxes] will allow businesses to conduct demonstration tests and pilot projects quickly and collect data that may contribute to regulatory reforms."*
> METI

There is no limit to the type of technology that can access the Regulatory Sandbox or the industry it is meant to be applied to, however four areas of particular focus have been highlighted: Internet of Things, Artificial Intelligence, Big Data, and Blockchain.

The full text[2] reveals that there are three legislative measures that can support companies with promising technology but that lack the necessary funds to see such process through: the special cases under the Small Business Credit Insurance Act and the Small and Medium Enterprise Investment Training Corporation Act, as

[1] Act on Special Measures for Productivity Improvement, METI

[2] Regulatory Sandbox website (Japanese)

well as debt guarantee provided by the Independent Administrative Agency Small Business Infrastructure Development Organization.

The Regulatory Sandbox is open to both domestic companies as well as foreign ones. The overseas offices of the Japan External Trade Organization (JETRO) will handle enquiries and applications for non-Japan based firms.

The sandbox mentions priority areas to be addressed, and one of them is FinTech:

FINTECH / PROMOTING CASHLESS SOCIETY

"We will consider revising financial and commercial regulations in order to transform the current sector-based regulations to function-based and cross-sectorial regulations which apply same rules to services with identical functions and risks."

"We will consider creating a scheme which enables simple and secure identity verification by using technologies such as blockchain and timestamps and will consider introducing AI in market surveillance."

"The industry, the government, and the academia will establish Cashless Promotion Council. The council will consider measures to realize cashless society, including incentive programs available to business operators and consumers. The council will also consider and set out an action plan during this fiscal year to standardize formats of two-dimensional codes (QR code, etc.), keeping in mind to ensure simple and secure payment schemes."

The official documentation of the Regulatory Sandbox is in Japanese, but there is a summary available in English at Prime Minister and Cabinet's website [1].

FSA SANDBOX EXPERIMENTS

The FSA established their own sandboxes on different areas on FinTech.[2]

They call it "FinTech PoC (Proof-of-Concept) Hub", and it was created to "eliminate the hesitation and concern that FinTech firms and financial institutions are inclined to have in conducting unprecedented tests".

The Hub will offer continuous support in cooperation with other relevant authorities as necessary by forming a special working team within the FSA for each selected PoC project.

First FSA's Fintech Proof of Concepts:

1. KYC information sharing using Blockchain. This experiment consisted in using Blockchain to jointly implement customer identity verification system for financial institutions. Participants included Mizuho, Sumitomo Mitsui, Mitsubishi UFJ, Deloitte, SMBC and Nomura Securities.[3]

[1] Regulatory Sandbox overview, Prime Minister of Japan and its Cabinet

[2] FSA FinTech Proof of Concept Hub (Japanese)

[3] FSA Fintech Sandbox on KYC and blockchain (Japanese)

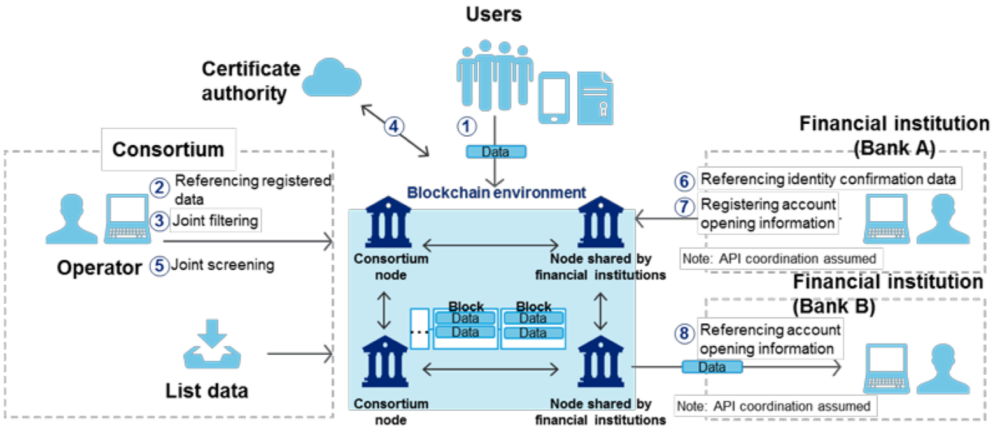
The Blockchain Study Group expected to establish a framework for simplifying KYC-related operations through steps such as allowing participating financial institutions to confirm with each other whether the customer in question has already undergone identification procedures. This verification test used Hyperledger Fabric, and was constructed on top of the Japanese Bankers Association's Collaborative Blockchain Platform.[1].

2. Compliance inspection system with AI voice recognition technology. The PoC consisted in conversion of voice data to text and thus enhance the efficiency of internal compliance operations. The solution is especially useful in situations when the company has to verify the contents of a phone conversation or has to find a problematic recording among tons of others. Participating financial institutions were Fronteo Corporation, Mitsubishi UFJ, Resona Bank, Bank of Yokohama and SMBC Nikko Securities.[2]

3. ATM cash card issuance with face recognition technology. Participants were Dai Nippon Printing and West Japan City Bank.[3]

4. Fintech Platform over SIM card. Enabling smartphone as an electronic certificate platform. Participants were Japan Communications, Gunma Bank, Chiba Bank, Tokushima Bank, Money Forward and Cybertrust.[4]

Verification report on KYC advanced platform utilizing blockchain technology by the Blockchain Study Group. Deloitte



[1] Verification report on KYC advanced platform utilizing blockchain technology by the Blockchain Study Group , Deloitte

[2] FSA Fintech Sandbox - Compliance inspection system with AI voice recognition technology (Japanese)

[3] FSA Fintech Sandbox - ATM cash card issuance with facial recognition technology (Japanese)

[4] FSA Fintech Sandbox – Fintech platform over SIM (Japanese)

Initial Coin Offering (ICO)

ICO stands for "Initial Coin Offering," and refers to the creation and sale of digital tokens. They are revamping the concepts of crowdfunding and seed funding.

In 2017, hundreds of start-ups collectively raised more than $3 billion via ICOs. Many economists and academics believe that ICOs will totally transform the global investment landscape in the next few years.

In an ICO, a project creates a certain amount of a digital token and sells it to the public, usually in exchange for other cryptocurrencies such as bitcoin or ether. Tokens are usually listed on exchanges, where initial buyers can sell their holdings and new buyers can come in at any time.

TOKENS

As a type of digital crowdfunding, token sales enable startups not only to raise funds without giving up equity, but also to bootstrap the project's adoption by incentivizing its use by token holders.

Buyers can benefit from both the access to the service that the token confers, and from its success through appreciation of the token's price. These gains can be realized by selling the tokens on an exchange.

Security tokens and utility tokens represent the two main categories of ICO tokens. It is important to delineate the difference between the two categories, namely because security tokens should be issued in compliance with legislation regulating conventional securities.

A security is a broad classification that refers to any kind of tradable asset. Through ICOs, investors have access to a wide variety of securities tokens, ranging from coins redeemable for precious metals to tokens backed by real estate.

Utility tokens give a user the ability to use a platform. Within a Blockchain-based platform that provides a certain service, tokens are required in order to access it. These tokens provide the holder with the authority to exist within a platform. A good analogy to use in order to understand how these tokens work is to consider paid APIs in the context of the Internet economy.

ICOS IN NUMBERS

The first token sales appeared in 2014, when seven projects raised a total of $30 million. The largest that year was Ethereum – over 50 million ethers were created and sold to the public, raising over $18 million.[1]

Activity started to pick up in 2016, when 43 sales – including Waves, Iconomi, Golem and Lisk – raised $256 million. Included in that total is the infamous sale of tokens in The DAO (Decentralized Autonomous Organization), an autonomous investment fund that aimed to encourage Ethereum ecosystem development by allowing

[1] Ethereum's ICO, Ethereum

investors to vote on which projects to fund.[1]

The DAO raised 11.5 million Ether, worth around $150M at the time (today it would be 2.2 billion) making it the biggest crowdfund ever. Due to a bug on the smart contract code an attacker managed to drain 3.6 million ETH, leading to the project's collapse and a polemic hard fork of the Ethereum protocol.[2] Since DAO contained 16% of all the ether supply, the failure had a huge impact on the Ethereum network and its cryptocurrency, leading the price of ether to drop from over $20 to under $13.

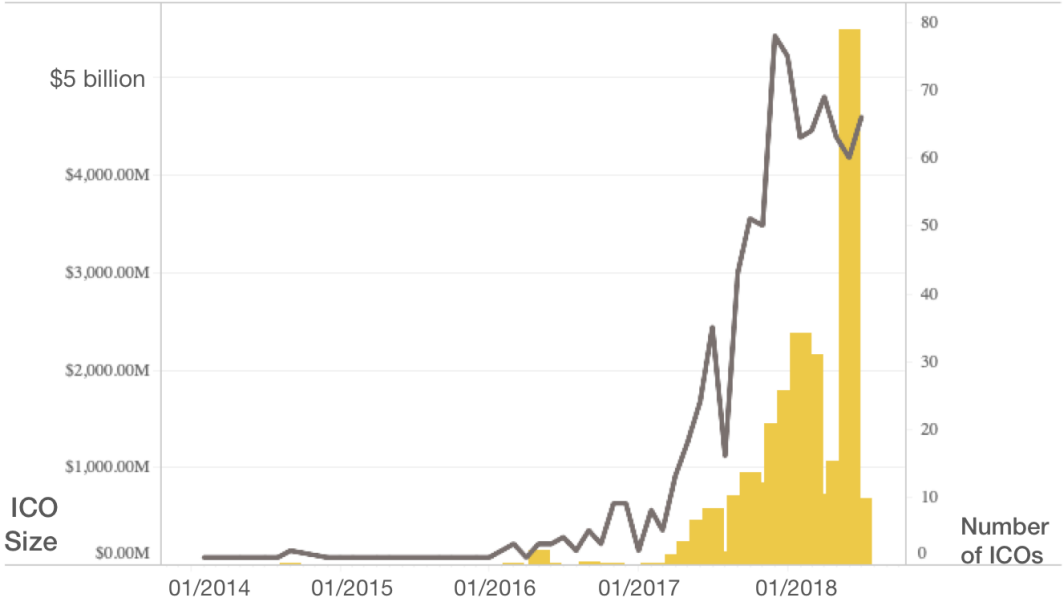
The DAO's failure did not deter the increasingly ebullient enthusiasm for the new asset type, and in December the first fund dedicated to token investment got significant backing from popular venture capitalists including Andreessen Horowitz (A16z), Boost VC and Union Square Ventures (USV).

2017 saw an explosion of activity – 342 token issuances raised almost $5.4 billion – and thrust the concept to the forefront of Blockchain innovation.[3]

Sales selling out in increasingly shorter periods of time fueled the frenzy, and in the haste to get "in on the action," project fundamentals became less important to would-be investors.

By the middle of 2017, ICOs had overtaken venture capital as the main source of funds for blockchain startups as they flocked to what appeared to be an easier and faster way to raise a huge amount of money without sacrificing equity in the company.

Monthly new ICO funding **Source: Coindesk**



[1] Understanding The DAO Attack, Coindesk

[2] Ethereum Hard Fork, Ethereum

[3] ICO Tracker, Coindesk

As the technology matures and the market gains more experience with the concept, and as investors become more sophisticated, the quality of the tokens and the viability of the business models are likely to improve.

Regulators will most likely pay more attention to token sales as the next few years unfold to protect investors from flimsy or fraudulent sales.

Meanwhile, new types of business models will continue to emerge, fueled by a new funding system and operating structure. The infrastructure that supports token sales will also continue to grow, with reputable advisors morphing into the "investment banks" of the sector, and new dedicated platforms increasingly enhancing the user experience.

TYPES OF ICOS

Most ICOs have 3 parts to their token sale, those are private sale, presale and crowdsale.[1]

ICO PRIVATE SALE

Also called Institutional Round. Typically defined as a sale of tokens to early investors that is not open to the public or not announced. If private sale is announced, ICOs usually have stricter requirements for participation and are very picky with who they let into private sale. Bonuses or discounts may be offered based on how big the contribution is.

ICO PRESALE

Presale refers to a token sale conducted before main crowdsale. Presales are announced and promoted on the website, social media and possibly through advertising. An ICO presale provides a good middle ground for investors wanting a higher discount or bonus compared to crowdsale without the drawbacks or the high risks associated in participating in private sale.

ICO CROWDSALE

An ICO crowdsale is the main tokensale of the ICO. It sometimes goes by several names like Token Generation Event (TGE) and Initial Token Offering (ITO). An ICO crowdsale is more widely promoted and advertised than presale. The crowdsale also usually offers the least risk of the 3 ICO sales but usually lesser bonuses or discounts compared to presale or crowdsale.

FSA ON ICOS

Japan's financial regulator, the FSA, issued a statement in October 2017 warning investors of the risks of ICOs[2]:

A digital token issued in an ICO has the following high risks:

- Price volatility: The price of a token may decline or become worthless suddenly.

- Potential for fraud: ICOs usually provide a white paper. However, there are possibilities that the projects in the paper are not

[1] ICO private sale, presale and crowdsale pros and cons

[2] FSA statement about the risks of ICOs, FSA

implemented, or the goods and services planned are not offered in reality. Frauds taking advantage of ICOs are reported in the media.

ICOs may fall within the scope of the Payment Services Act and/or the Financial Instruments and Exchange Act depending on how they are structured. Businesses involved in an ICO should adequately fulfill their duties required by related laws and regulations such as registration when their services are regulated by those acts. Delivering such services without registration is subject to criminal penalties.

If an ICO has the characteristics of an investment and the purchase of a token by a virtual currency is practically deemed equivalent of that by a legal tender, the ICO becomes subject to regulations under the Financial Instruments and Exchange Act.

Although the Virtual Currency Act web is in Japanese, there is a good summary available in English, elaborated by So Saito, a lawyer specialized in Cryptocurrency, Blockchain and FinTech Law.[1]

If ICO coins are deemed "Virtual Currency" (VC) as defined in the Virtual Currency Act, only the registered Virtual Currency Exchange Business Operators are authorized to handle such an ICO.

The Japanese Financial Services Agency presumes most ICO coins to fall under statutory "VC."

Even a registered VC Exchange Business Operator cannot deal in all existing VCs. The VCs to be handled should be reported to and approved by the Japanese Financial Services Agency.

ICO issuer has three choices when selling ICO coins. The first such choice is to get registered as VC Exchange Business Operator and sell tokens itself. The second is to delegate sales of ICO coins to a third party registered VC Exchange Business Operator. The last option is not to sell ICO tokens to Japanese residents.

The fund regulations pursuant to the Financial Instrument Exchange Act (FIEA) will apply, if ICO constitutes "collective investment schemes (fund)," i.e., a scheme that is:

1. to collect money from others

2. to invest in a business

3. to pay dividends to holders thereof.

ICO coins which do not satisfy the test in (B)(a) above are not regulated by the FIEA Fund Regulations. We believe that the coins such as Bitcoin and Ether do not constitute "funds" under the FIEA.

In principle, those funds that solicit not for "fiat," but for "VC" will not constitute "funds" under the FIEA.

From the general consumer protection point of view, appropriate explanation to the investors is required irrespective of whether such ICO coins are regulated by the VC Act, by the FIEA, or by neither thereof.

[1] Initial Coin Offerings (ICO) under Japanese laws, lawyer So Saito

GUIDELINES ON ICO REGULATION

In April 2018, a government-backed study group laid out basic guidelines for further adoption of ICOs, including rules for identifying investors, preventing money laundering, tracking progress of projects and protecting existing equity and debt holders.[1]

The report "proposes rules needed to establish ICO as a sustainable financing method based on discussions conducted by the research group".

The proposals were later deliberated by the Financial Services Agency, and could eventually become law in a few years.

The members of the Research Group consisted of experts from various industries and specialized fields. The members conducted discussions from November 2017 to March 2018.

The general adviser was Takuya Hirai, Member of the House of Representatives and an architect of last year's law that legalized cryptocurrency exchanges. The group also included bitFlyer CEO Yuzo Kano and members from Deloitte, Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group and Mizuho Financial Group. It was led by Toshifumi Kokubun, a professor at Tama University in Tokyo.

The ICO-friendly guidelines are in contrast to positions taken by China and South Korea, which banned the practice in 2017.

Since the ICO regulation is still a gray area in Japan, many Blockchain projects prefer to talk about private sales or pre-sales stage when they come to Tokyo to present their startup.

In the report, however, "ICO refers to all financing activities using a cryptocurrency, including preliminary sale activities".

ICO PROPOSAL ON RULE-MAKING

For the permeation and development of ICO, it would be desirable to set rules on "issuance of tokens" and "trading of tokens in the issue market." As for the purchase and sale of tokens in the trading market, there are certain rules set force in the Payment Services Act. However, there are no laws or regulations stipulating explicit rules for issue markets, which leads to cases of misunderstanding between parties and cases of investors being left without protection.

The ICO Business Research Group proposes the following two principles on the issuance of tokens, while paying attention to the viewpoint related to the innovativeness and flexibility of ICO as well as the viewpoint of investor protection:

Issuers should define and disclose conditions for the provision of conveniences such as services and rules on the distribution of procured funds, profits, as well as residual assets, to investors of tokens, shareholders, and debt holders.

This is based on the idea that, although ICO can be designed by issuers at their

[1] Call for Rule-making on ICO by ICO Business Research Group

discretion, potential influences (related to rights and obligations) on token investors, shareholders, and debt holders need to be clearly demonstrated prior to the issuance.

Issuers should define and disclose a means for tracking the progress of white papers. This is based on the idea that issuers need to explicitly define in advance a means to allow token investors to confirm the progress of the plans stated in the white paper. It is considered that the information to be disclosed should not necessarily be financial statements depending on the purpose of issuing tokens or physical strength of the company. In addition, white papers need to be manage in a highly transparent manner: for example, procedures for revising white papers are defined, a revision history is available for viewing, and so on.

In addition, as consequences of the above principles, we propose the guidelines below on requirements related to practical operations.

ICOs should be designed to be acceptable to existing shareholders and debt holders. ICO should not become a tool that brings advantage nor disadvantage to specific stakeholders.

ICOs should not become a loophole in existing financing methods as equity finance. To enable ICO to gain wide support in the society, a situation where it is abused as a tool for evasion of laws should be avoided

We propose the five principles below to ensure the protection of investors regarding the purchase and sales of tokens.

•Token sellers should confirm the identity (Know Your Customer: KYC) and suitability of customers.

•Administrative companies that support the issuance of tokens should confirm the KYCs of issuers.

•Cryptocurrency exchanges should define and adopt an industry-wide minimum standard on token listing.

•After tokens are listed, unfair trade practices of such tokens such as insider trading should be restricted.

•Parties related to the trading of tokens such as issuers, administrative companies, and token exchanges should make efforts to ensure cyber security.

The ICO Business Research Group proposes the above principles as the minimum principles that should be satisfied at this time.

To enable ICO to be used safely by a wide range of issuers and investors and to be accepted well in the society, more detailed rules may be required. For example, we have proposed that issuers be allowed to design rights and obligations related to ICO at their discretion. However, as more deals launched in the future, some rules may be required to restrict or encourage certain types of deals.

In addition, when tokens are issued, rules would contribute to facilitate reaching an agreement that issuers can refer to regarding procedures for obtaining agreements from existing shareholders and debt holders. As for the confirmation of KYC, if no concrete check items or means are specified, it may be difficult to confirm KYCs properly. In addition to all these, it would be indispensable to set fair accounting/taxation standards to reduce uncertainties regarding accounting and tax operations.

Japanese Private Blockchains

PUBLIC VS PRIVATE BLOCKCHAIN

There is no universal definition of Blockchain and a widespread disagreement over which qualities are essential in order to call something a blockchain.[1]

The Bitcoin system is considered the first Blockchain, designed to be public and allow anyone to join, and its blockchain was born out of the need to keep people honest in the absence of a central authority. The design sacrificed efficiency in order to ensure that theft wouldn't pay because rewriting the ledger would require so much computational power that it would be more costly than any potential upside.

In order to achieve this effect, the Bitcoin blockchain consists of a digital ledger that records all transactions from the beginning of time to the present. Copies of the ledger are not stored in a central place; instead, they are kept by superusers called "nodes."

There is an intense debate between public vs private (or permissioned) Blockchains.

Some experts say that the latest doest not constitute a Blockchain since is not open nor decentralized. They argue that private blockchains, run by private firms, are useless, since they make users dependent upon a third party – the firm managing the blockchain. Many believe that private blockchains currently being considered are not blockchains, but rather, distributed ledger technology which has already existed.[2]

Regarding private Blockchains Vitalik Buterin said that they have been a primary focus of interest from financial institutions and they are "compromising the whole point of decentralization, being a desperate act of dinosaurish middlemen trying to stay relevant"[3].

Others believe private blockchains could provide solutions to many financial enterprise problems that Bitcoin does not, such as abiding by regulations.

Bitcoin and Ethereum are examples of Public Blockchain. The Hyperledger project, R3CEV's Corda, and the Gem Health network are different private blockchain projects under development.

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[1] 'Blockchain' is meaningless, The Verge

[2] What Are the Use Cases for Private Blockchains? The Experts Weigh In, Bitcoin Magazine

[3] On Public and Private Blockchains Vitalik Buterin

ENTERPRISE BLOCKCHAINS

Businesses using private Blockchain argue that they have specific requirements that they cannot meet with public Blockchains, such as privacy, security, authentication features, transaction throughput, operational costs and finality.[1]

The traditional Blockchain paradigm is complete transparency. Business applications, however, need to meet certain privacy criteria and they prefer to use private permissioned blockchains. Not all transactions should be visible to everyone. The reason for this might be concerns of commercial confidentiality, but also regulatory and legal requirements such as Europe's General Data Protection Regulation (GDPR).

Enterprise blockchains need to implement authentication features and control who can participate in the network. They need to make sure all the actors in their application are clearly identified. Know Your Customer (KYC) and Anti-Money Laundering (AML) impose knowledge of real-world identities.

Enterprise applications are usually transaction intensive and need to scale in terms of transaction throughput. At the other extreme, public blockchains need to scale in terms of the number of nodes that can participate in the consensus protocol.

Enterprise blockchain applications should run on platforms with predictable and stable transaction fees, preferably no fees at all.

In Blockchain systems today, transactions are considered immutable. But, most blockchain systems only offer probabilistic transaction finality — that transactions are not immediately final, but become so eventually. Finality measures how long one has to wait to be given a reasonable guarantee the transaction written in Blockchain is irreversible, or in other words, will not be orphaned. This is a significant property for a business, because waiting an hour on a Blockchain network can have significant repercussions for businesses.

Achieving fast and secure finality is still quite an active area of research for Blockchain systems. For example, Ethereum is moving to a hybrid PoW and PoS Blockchain design that aids faster blockchain time to finality. Bitcoin Cash is also accepting a zero-confirmation transactions.[2]

Public chains run between thousands of consumer laptops on the public internet, whereas permissioned chains run between a much smaller number of nodes with fast internet connections, which may even be located physically close to each other. Hence, the latency, and time-to-finality, of permissioned chains will inevitably be lower than of public chains. For further reading on finality, read this article by Vitalik Buterin[3].

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[1] Enterprise Blockchain Platforms — A Comparison, Stefan Beyer

[2] Bitcoin Cash Community Embraces Zero Confirmation Transactions, Bitcoin.com

[3] On Settlement Finality, Vitalik Buterin

Japanese companies are already using private blockchains, for a wide range of projects, from finance to loyalty points[1] or for food traceability[2].

HYPERLEDGER IROHA

Iroha is a general purpose permissioned blockchain[3] system that can be used to manage digital assets, identity, and serialized data. This can be useful for applications such as interbank settlement, central bank digital currencies, payment systems, national IDs, and logistics, among others. Iroha is one of the Hyperledger Frameworks together with Fabric, Burrow, Indy and Sawtooth.

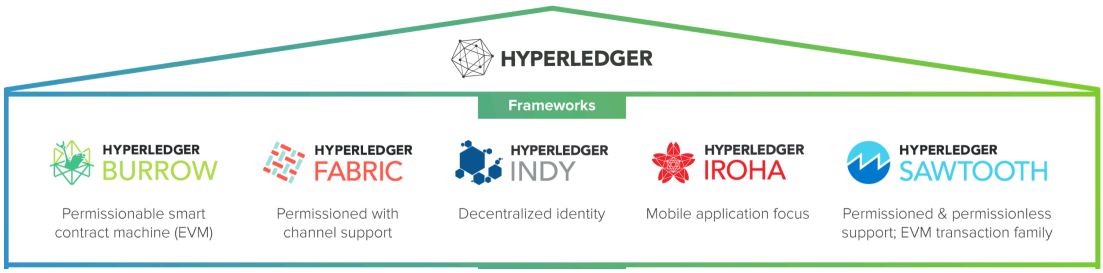
But, what is Hyperledger?[4] Hyperledger is an open source collaborative effort created to advance cross-industry blockchain technologies. It is a global collaboration, hosted by The Linux Foundation. The Hyperledger community is focused on the development, deployment and use of open, transparent, reliable and interoperable enterprise blockchains. As IBM puts it:

"Powering that transformation is Hyperledger. Innovators in finance, banking, IoT, supply chains, manufacturing and technology are creating open, standardized and enterprise-grade distributed ledger blockchain frameworks and code bases to produce tangible business results."[5]

> *"Blockchain can do for business what the internet did for communication".*

In October 2018, Hyperledger and Enterprise Ethereum Alliance (EEA) — a standards body promoting the adoption of Ethereum by businesses — announced a new collaborative framework with the shared goal of driving mass adoption of blockchain among companies and fostering greater collaboration across the two communities.[6]

Japanese companies are committed to the open source collaborative effort for standardized platform in the Hyperledger Project hosted by the Linux Foundation. Some of the members are Fujitsu, Hitachi, NEC, NTT Data and Soramitsu.



[1] Hitachi and Tech Bureau building NEM-based blockchain platform in Japan, NEM

[2] Japanese Use Blockchain to Track Game Meat, Cointelegraph

[3] What is the Difference Between Public and Permissioned Blockchains?, Coindesk

[4] Hyperledger

[5] Hyperledger: blockchain collaboration changing the business world, IBM

[6] Hyperledger And Enterprise Ethereum Alliance Join Forces In Enterprise Blockchain Boost, Forbes

Japanese Private Blockchain Technologies

Iroha was accepted into incubation status under Hyperledger in 2016,[1] contributed by Soramitsu, Hitachi, NTT Data and Colu.[2]

Hyperledger Iroha is written in C++ incorporating unique chain-based Byzantine Fault Tolerant consensus algorithm, called Yet Another Consensus and the BFT ordering service.

BITFLYER'S MIYABI

Miyabi is BitFlyer's enterprise blockchain platform. It claims to be the fastest enterprise-grade blockchain technology, delivering 1,500 - 2,000 transactions per second on average.

According to BitFlyer, "Blockchains modeled upon PoW (Proof of Work) or PoS (Proof of Stake) have always had the major problem of not being able to trust the data (finality) due to block divergence or isolated blocks resulting from processes like a hard fork. Miyabi was designed to always guarantee finality using a unique consensus algorithm […] solving problems such as transaction settlement and slow processing speeds."[3]

In 2017 BitFlyer was selected as a partner vendor to provide an experimental environment for Japanese Bankers Association's using Miyabi.

In 2016, three megabanks — MUFG, Mizhuo and SMBC — used Miyabi in a Proof of Concept for testing the viability of domestic money transfers over blockchain technology.[4]

The banks discovered that money transfers over a blockchain were just as fast, if not faster compared to traditional money systems.

[1] Hyperledger Welcomes Iroha, Hyperledger

[2] Hyperledger Iroha, Hyperledger

[3] Miyabi, BitFlyer

[4] Japanese MegaBanks Partner Bitcoin Exchange, Pilot 1,500 Tns/Sec Over a Blockchain, CCN

The proof-of-concept experiment lasted a whole nine months through September 2016, as a part of a concentrated effort between the unnamed banks to explore and develop blockchain solutions for interbank payments.

ORB DLT

Orb Distributed Ledger Technology (DLT) is a data and transaction platform that is consensually shared and synchronized across institutions, data centers, cloud providers, and geographic regions.[1]

Orb DLT's methods for sharing data, transaction logic, and workflow across partner networks help firms reduce costs, operational risk, and complexity.

Orb DLT's proprietary solution, SmartCoin, is a solution that can be used by businesses to define and configure their own coin economy.

TECH BUREAU'S MIJIN

Tech Bureau is a FinTech and cryptocurrency company that develops software and services based on blockchain technology.

Tech Bureau has developed Mijin[2] the private Blockchain, and Zaif, a Bitcoin and cryptocurrency exchange platform that was hacked in September 2018.[3]

Mijin is used in production environments delivering over 4.000 transactions per second (tps) and zero downtime.[4]

Mijin is used by the Belgian municipal governments of Ghent and Antwerp. The private Blockchain was offered to Digipolis which is an organization for inter-municipal Information and Communications Technology (ICT) for the two Belgian cities, as a part of The Blockchain Lab to demonstrate the possibilities of Blockchain technology in efficient and reliable administrative services.[5]

Tech Bureau also has a public Blockchain tool called NEM. It is using a combination of public and private Blockchain technologies which aims to offer low-cost and secure administrative services in Belgium.

Tech Bureau's NEM Blockchain has also been utilized in creating administrative services in the past, where NEM was used to create "Landstead," a land and property registry.[6]

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[1] Orb

[2] Mijin

[3] Zaif Crypto Exchange Reveals Takeover In New Hack Refund Plan, Coindesk

[4] Mijin Permissioned Ledger, NEM

[5] How Japanese Blockchain Technology Revolutionizes Municipal Government in Belgium, Cointelegraph

[6] Landstead

Corporate Blockchain Adoption

While most Blockchain use cases are taking place in the financial sector, some others are spotted in other areas such as industrial supply chain applications, loyalty point programs, energy sharing, and government administrations.

Typically, it is a collective experiment, one in which conventional corporations collaborate with startups on a given project.

Japanese corporations usually embrace Blockchain technology internally, or outsource its development in partnership with third parties such as domestic and overseas startups.

Messaging app LINE, for example, is establishing its own Blockchain platform. Systems integrator NTT DATA is looking to tap into startups and other partners around the world in bid to create new Blockchain-based solutions. Mitsubishi UFJ Financial Group (MUFG), the world's fourth-largest bank, will launch its own digital currency, called MUFG Coin. MUFG also conducted a pilot test for payments between Singapore and Thailand.[1]

Considering that existing Blockchain use cases in most industries remain today at the proof-of-concept stage, the approach of developing simultaneously on the application layer and the protocol layer lowers the risk. This strategy has been followed by major crypto exchanges. They are vertically integrated — like traditional Japanese Keiretsus[2] — providing services to themselves: protocols, middleware or applications. As for example, Bitflyer and TechBureau operating their own private blockchains, Miyabi and Mijin.

WHY BLOCKCHAIN

Japanese corporations are applying Blockchain in a wide range of projects. While Blockchain can be used in many different industries, not always is necessary or represents the best option for the company.

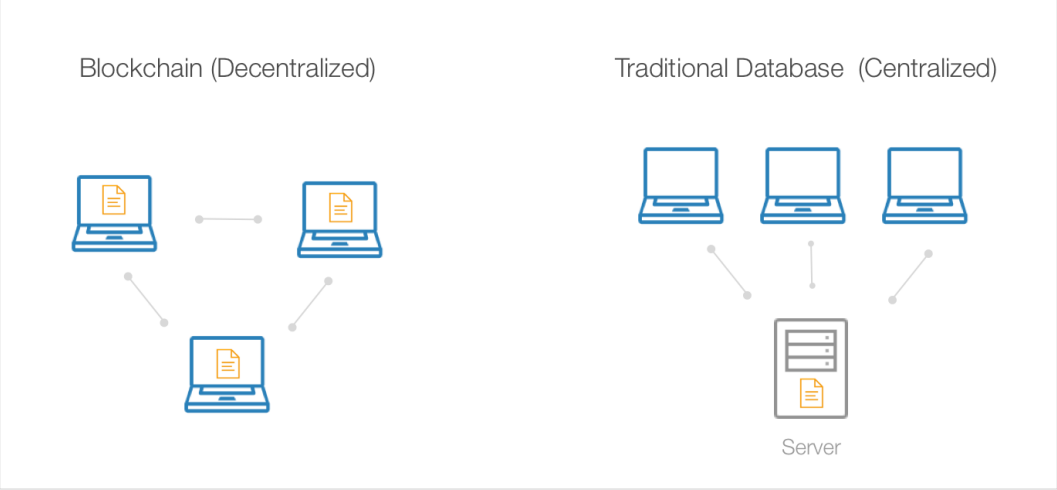
As Nolan Bauerle explained in his CoinDesk article, "What is blockchain technology?", Blockchain is "the particular orchestration of three technologies (the Internet, private key cryptography, and a protocol governing incentivization)" that resulted in a secure system for digital interactions without the need for a trusted third party to facilitate digital relationships.[3]

When viewed in this light, organizations can stop wasting time and effort focusing on the technology and, instead, focus on identifying areas of friction and outmoded processes that can benefit from the

[1] Mitsubishi, MUFG Conduct Successful Pilot Payment With Major Thai Bank's Blockchain, Cointelegraph

[2] Keiretsu Wikipedia

[3] What is Blockchain Technology?, Coindesk



democratization of trust and the ability to more securely verify the authenticity of both B2B and B2C digital transactions.

While organizations can't afford to ignore Blockchain, or its potential to disrupt the way they've done business for decades or even centuries, they also don't need to feel pressured to adopt new business solutions before they're ready to do so.

Having a healthy fear of disruption is fine, but there's no need for organizations to feel anxious and move toward Blockchain without first identifying and developing a solid use case.

BLOCKCHAIN VS TRADITIONAL DATABASE

Blockchain technology offers new tools for authentication and authorization in the digital world that preclude the need for many centralized administrators. As a result, it enables the creation of new digital relationships.

By formalizing and securing new digital relationships, the Blockchain revolution is posed to create the backbone of a layer of the internet for transactions and interactions of value (often called the 'Internet of Value', as opposed to the 'Internet of Information' which uses the client-server, accounts and master copy databases we've been using for over the past 20 years). But, with all the talk of building the digital backbone of a new transactional layer to the internet, sometimes blockchains, private cryptographic keys and cryptocurrencies are simply not the right way to go.

In order to decide between using a blockchain or a client-server database, there are certain questions that organizations should make to themselves.[1]

WHAT TYPE OF DATA DO I HAVE?

Paper can be hard to counterfeit because of the complexity of physical seals or appearances. But, if the data is in constant flux then paper as a medium may not be able to keep up the system of record. Manual data entry also has human

[1] Why Use a Blokchain? Coindesk

limitations.

If the data and its history are important to the digital relationships they are helping to establish, then blockchains offer a flexible capacity by enabling many parties to write new entries into a system of record that is also held by many custodians.

IS THE CONFIDENTIALITY IMPORTANT?

A permissioned blockchain, like a centralized database, can be write-controlled and read-controlled. That means the network or the protocol can be set up so only permissioned participants can read or write into the database.

If confidentiality is the only goal, and trust is not an issue, blockchain databases pose no advantage over a centralized database.

Hiding information on a blockchain requires lots of cryptography and a related computational burden for the nodes in the network. There is no way to do this that is more effective than simply hiding the data completely in a private database that does not even require network connectivity.

There remain many reasons why a third party should be in charge of some authentications and authorizations. There are times when third-party control is totally appropriate and desirable.

If privacy of the data is the most important consideration, there are ways to secure data by not even connecting it to a network. But if existing IT infrastructure featuring accounts and log-ins is not sufficient for the security of digital identity, then the problem might be solved by Blockchain technology.

Private key cryptography enables push transactions, which don't require centralized systems and the elaborate accounts used to establish digital relationships. If this database requires millions of dollars to secure lightweight financial transactions, then there's a chance Blockchains are the solution.

DO I NEED FAST TRANSACTIONS?

While blockchains can be used as systems of record and are ideal as transaction platforms, they are considered slow as databases when compared to what is possible for digital transaction technology that we see today with Visa and PayPal.

If high performance, millisecond transactions are what is required, then it's best to stick with a traditional-model centralized system. Blockchains as databases are slow and there is a cost to storing the data – the processing (or 'mining') of every block in a chain. Centralized data systems based on the client-server model are faster (for now).

STARTUPS

The number of startups in Japan is relatively low comparing with other countries. It lacks of diversity in applications and most use cases are related to the financial sector: payment apps, crypto wallets, virtual currency exchanges..

Corporations are partnering with startups with the goal to identify industry-specific applications of Blockchain technology,

Blockchain Startup Landscape in Japan

By Hitoshi Kakizawa and Mayato Hattori

mainly center on financial services.

Japan's Blockchain startup ecosystem has an opportunity to expand. Startups by nature can assume a higher tolerance for risk, especially given that traditional enterprises in Japan are known for being risk-averse.

More and more FinTech solutions are entering the market, threatening to shrink traditional banks' share. This also explains the banks' attempts to improve their customer service functions by using Blockchain.

Japanese Blockchain landscape it is still in its infancy. Most of the projects are still reaching a proof-of-concept stage and we will witness a rich diversity of applications of blockchain technology in the coming years.

Apart from financial sector, Japanese startups are creating products for other key segments, like supply chain, marketplaces, copyrights, identity/authentication, advertising, reward point system, IoT and governance.

BLOCKCHAIN IN FINANCE

Traditional financial services require a middleman to complete a transaction. The process of clearing and settlement is time-consuming and adds friction and extra cost to the service. As Blockchain handles the operational issues facing a transaction network, economies of scale will be reached, increasing operational efficiency and money circulation.

This upgrade brings value to banks via cost reduction thanks to efficiency and increased capacity to process transactions.

Japanese banks are one of the most active worldwide exploring ways to improve their service by using blockchain, usually by partnerships.

Projects using Blockchain technology can be found in a handful of applications in the financial industry, ranging from enhancing existing banking functions such as money transfer, payment apps or trading to improving the customer experience.

SBI Holdings is taking the lead, with a partnership with Ripple. Japan's three mega-banks (Mizuho, MUFG and SMFG), together with Fujitsu, deployed Hyperledger in money transfer.[1]

SBI & RIPPLE DLT-BASED PAYMENTS APP

SBI Holdings created a payments application for iOS and Android devices powered by Ripple's distributed ledger technology (DLT).[2]

The application will let customers conduct domestic transactions 24 hours a day by using a phone number or scanning QR codes in an effort to eliminate the time constraint imposed by traditional banking methods.

The project was supported by the Japan Banking Consortium. SBI Ripple Asia said that the service would be first rolled out for consumers of SBI Net Sumishin Bank, Suruga Bank and Resona Bank, three members of the consortium. After an official launch, it expected to expand the service to another 61 members of the banking consortium.

SBI also launched its own cryptocurrency exchange this year.[3]

MUFG & AKAMAI PAYMENT NETWORK PLATFORM

By combining MUFG's payments business expertise with Blockchain technology implemented on Akamai's global cloud delivery platform, they aim to offer a new global payment network service in 2019 compatible with IoT and other new technologies.[4]

MUFG COIN

MUFG has been the first largest bank to launch its own cryptocurrency.

MUFG Coin is designed to offer currency functionality first and foremost, with test customers to download an app that will automatically convert their deposits. According to NHK's report, one MUFG will be equal in value to one yen.[5]

[1] Fujitsu to trial blockchain payments with three Japanese banks, Banking Tech

[2] SBI to Roll Out Ripple DLT-Based Payments App on iOS, Android, Coindesk

[3] World's First Bank-Backed Crypto Exchange Finally Opens to the Public, Coindesk

[4] MUFG and Akamai Develop a New Blockchain Service To Offer New Payment Network Platform, MUFG

[5] World's Fifth Largest Bank To Trial Own Cryptocurrency In 2019, Cointelegraph

SOFTBANK & STARTUPS CROSS-CARRIER MOBILE PAYMENTS

Japanese telecoms giant Softbank Corp. completed a Blockchain proof-of-concept (PoC) that allows P2P mobile payments across different carriers.[1]

The technology was developed in partnership with Blockchain startup TBCASoft, as well as Synchronoss, a Nasdaq-listed firm that delivered a SMS-replacement communications protocol called RCS in Japan.

The system is intended to be deployed among mobile carriers in an effort to replace the traditional SMS text messaging system with a richer pool of features, such as sending multimedia content, documents and voices calls via carrier networks instead of mobile apps. Users can also send funds stored in their wallets within the RCS system from one carrier to another in a peer-to-peer fashion – which would be especially useful when traveling abroad.

5 BANKS JOIN R3 BLOCKCHAIN CONSORTIUM

Nomura Holdings, Daiwa Securities, Mizuho Financial Group, Sumitomo Mitsui Banking Corporation and SBI tested a prototype that uses distributed ledger technology (DLT) to streamline international transaction agreements.[2]

Developed by R3, a consortium of global financial institutions, Corda is a distributed ledger platform providing APIs and codes for companies to build up Blockchain applications.

NOMURA CRYPTO CUSTODY SOLUTION

Nomura Bank launched a crypto custody solution for institutional investors. The new digital asset custody venture is called Komainu, and will provide infrastructure and an operational framework for institutional investors to integrate their traditional investment vehicles into the “frontier” crypto industry.[3]

FUJITSU CONNECTIONCHAIN

Fujitsu Laboratories Ltd. created "ConnectionChain," a security technology that can safely and easily execute exchanges and payments in different virtual currencies.[4]

SBI & WIREX CRYPTOCURRENCY PAYMENTS CARD

SBI Holdings, entered into an agreement with Wirex, a UK-based cryptocurrency payment system, to partner up for a joint venture that would initiate a cryptocurrency card for Japanese customers.[5]

The joint venture company will issue a

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[1] SoftBank launches blockchain-based mobile payments service, SoftBank

[2] Japan's Financial Firms Test Distributed Ledger With R3 Corda Trial Coindesk

[3] Nomura Bank Announces Crypto Custody Solution For Institutional Investors, Cointelegraph

[4] Fujitsu Develops Security Technology to Safely Connect Blockchains, Fujitsu

[5] SBI Holdings Partners with Wirex to Create a Cryptocurrency Payments Card, Cryptovest

cryptocurrency payment card in Japan, as well as develop other co-businesses in the field of cryptocurrencies, DLT and payment.

The new product created by Wirex, in collaboration with SBI Holdings, will be called SBI Wirex Asia and will have Yen as the main fiat currency. The companies also announced their plans to shift to other Asian markets besides Japan.

> *"We regard blockchains as the core of FinTech innovation and are working on various measures both in Japan and abroad"* SBI

BLOCKCHAIN IN TRADE

Digitizing trade information on the blockchain can help change the way information is shared, infusing greater trust into transactions to make it easier for parties involved in the supply chain, including exporters, importers, shippers, insurance companies, port operators and port authorities, to share critical shipment data in near real-time.

MIZUHO & IBM TRADE FINANCIAL PLATFORM

Mizuho Financial Group, Mizuho Bank and IBM Japan created a trade financial platform using Blockchain.[1]

Mizuho is aiming to streamline trading operations and improve supply chain efficiency. The timely and highly secure exchange of trade documents is essential for stakeholders in the supply chain ecosystem.

MINISTRY OF ECONOMY & NTT PLATFORM FOR TRADE

New Energy and Industrial Technology Development Organization (NEDO), Japan's largest public management organization that promotes research and deployment of industrial and energy technologies, is developing a Blockchain-powered project to streamline the infrastructure for trade information sharing.[2]

The organization is operating under the instructions of its parent body, the Ministry of Economy, Trade and Industry (METI).

The project, dubbed "Development of Infrastructures for Creating New Industrial Models Taking Advantage of IoT" aims to establish an infrastructure system that will digitize and enhance the process of logistics data sharing between trade entities, such as shipping companies, brokerage operators, port authorities, banks and insurance companies.

Specifically, the project intends to explore a more efficient and accurate system of sharing data by replacing the current processes that use paper-based media or PDF files. These processes require expensive and time-consuming manual work, such as checking for errors and redundant data inputs.

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[1] Mizuho Financial Group, Mizuho Bank and IBM Japan Building Trade Financial Platform Using Blockchain by IBM

[2] NTT Data & Ministry of Economy Blockchain-Based Platform for Trade by METI

The blockchain project by NEDO is a joint venture conducted in partnership with Japan's NTT Data, one of the largest IT companies in the country. NTT also plans to introduce social implementation of the new infrastructure platform during 2019, in order to boost the global supply chain.

BLOCKCHAIN IN INSURANCE

TOKIO MARINE, NICHIDO & NTT'S CARGO INSURANCE

In 2017, Tokio Marine & Nichido Fire Insurance and NTT DATA Corporation completed testing the first Blockchain based insurance policy for marine cargo insurance certificates.[1]

Trade finance and supply chain management is one of the many areas of cumbersome complexity that innovation departments hope to digitally synchronize on shared ledgers. The majority of shipping documents used in global trade are still paper-based; possession of the physical document means custody of the assets.

The use of Blockchain technology can allay fears that important documents can be duplicated. In the case of supply chain, this has added optimisation benefits by keeping all parties updated as to the work-flow of the trade, making everything run faster, more efficiently and working out much cheaper.

"The blockchain based system will cut 85% of the shipper's time of data inputting work". Tokio Marine

Tokio Marine created a "data" bill of lading, letter of credit and a commercial invoice on a Blockchain, and tested this from the perspective of a shipper that needs a certificate of insurance in order to satisfy the insurance requirement on the letter of credit.

TOKIO MARINE'S SHARING MEDICAL INFORMATION SYSTEM

Tokio Marine & Nichido Fire Insurance was recognized at the second Efma-Accenture Innovation in Insurance awards held in London. The Japan-based insurer won in the "Connected Insurance & Ecosystems" category.[2]

The insurer was awarded for its "Sharing Medical Information on Blockchain" offering, which allows the sharing of patients' medical information among relevant parties using Blockchain. The project showed that by using the technology, there were less unnecessary medical examinations lower administrative costs, and better quality of service.

This project aimed not only improving insurance claims process, but also solving Japanese social issues. The unique combination of insurance company, local government and tech-startup, and obtaining security and openness at the same time by combining Blockchain and

[1] Tokio Marine and NTT DATA complete blockchain-based cargo insurance certificates, IBTimes

[2] Innovation in Insurance Awards 2018, Accenture

data sharing platform "avenue - cross" developed by a tech startup “Planetway” are also appreciated.

BLOCKCHAIN IN FOOD TRACEABILITY

ORGANIC VEGETABLES FARM AYA, MIYAZAKI

Organic Farm Aya, in Miyazaki Prefecture, together with Information Services International-Dentsu (ISID) and Sivira, worked on a pioneering blockchain pilot that will see organic vegetables grown in the prefecture logged on a distributed ledger.[1]

The system allows all parties to ensure the quality of organic produce from field to table. The pilot scheme also involves an Italian restaurant in Tokyo, which will begin sourcing its ingredients from farmers via the new platform.

This will allow the restaurant, organic certification bodies, farmers and even customers to trace the status of their produce at every step of its journey.

> *“If this technological innovation becomes widespread, the safety of foods will be secured”*
> Organic Farm Aya

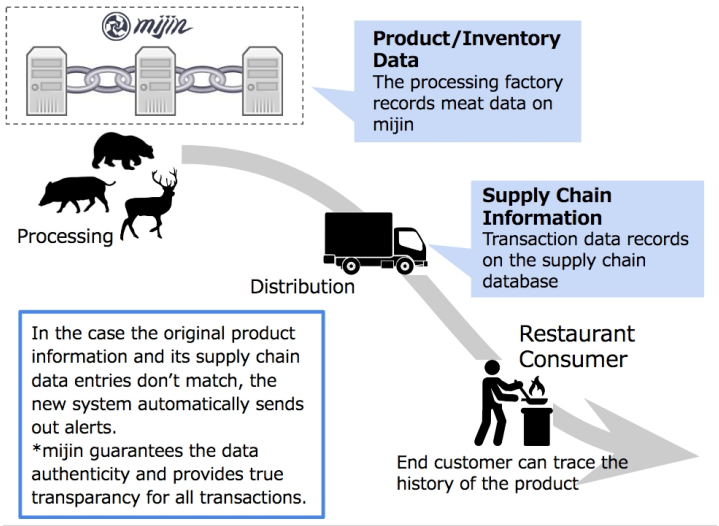
In words of Aya Farm: “By scanning the QR code on the vegetable bag with your mobile phone, you can instantly see the information stored with blockchain “where”, “who”, and “how” the vegetable is grown.”[2]

MIJIN BLOCKCHAIN FOR MEAT SUPPLY CHAIN

In 2017, Tech Bureau announced a first blockchain use case for a division of the Japanese Ministry of Agriculture, Forestry and Fisheries. Japan Gibier Promotion Association needed a secure supply chain to comply with Japanese distribution standards for wild game meat. Their aim is to build a safe supply chain and distribution channel to ensure quality food for public health. [3]

The agency has chosen to use the Mijin blockchain to build and store its transaction records. From the hunting ground to the restaurant, the agency requires to record

mijin Blockchain in the Food Supply Chain



[1] Aya Farm Blockchain Project Announcement and Images, Organic Farm Aya (Japanese)

[2] “Organic Farming”,“Blockchain” – the day innovation of food safety starts in Roppongi. Organic Farm Aya

[3] Blockchain Technology to Track Game Meat from Hunting Ground to Restaurant, Mijin

data generated from the meat supply chain. This is the first government deployment of the Mijin Blockchain.

Once meat data from the processing factory is recorded on the Mijin blockchain, it cannot be tampered with. It will be used as benchmark to match data in the traditional supply chain. In case the entries don't match, the new system automatically sends out alerts. This creates a transparent and traceable supply chain to monitor game meat, which guarantees the highest quality control of the perishable end product.

"Some rural communities suffer from wildlife overpopulation, amounting to over 178m USD per year. The power of blockchain technology is that it can transform one of the oldest food supplies into an asset for local communities," said Takao Asayama, CEO of Tech Bureau, Corp.

BLOCKCHAIN IN EDUCATION

SONY & IBM STUDENT DATA MANAGEMENT

Sony partnered with IBM to use Blockchain in student data management and will launch the product through its subsidiary Sony Global Education. The new service will be offered to both primary and higher educational institutions.

The product utilizes Hyperledger Fabric.

For its future plans, Sony will continue developing additional educational services that will use the Blockchain platform as the data-sharing layer beneath them.

FUJITSU BLOCKCHAIN INNOVATION CENTER

Fujitsu opened a Blockchain Innovation Center in Brussels to accelerate development of next generation applications[1].

The new center will undertake research with external partners, collaborating on specific projects to explore the technology's potential. With growing interest from customers in better understanding Blockchain technology and its impact on business, Fujitsu aims to develop Blockchain beyond financial services – where it has already created widespread disruption to business models – as a new architecture for information systems and sectors of all kinds.

BLOCKCHAIN IN REWARD POINTS

This particular application of Blockchain technology enables retailers to enhance business from unused loyalty points collected by consumers.

This brings value through revenue enhancement by extending the monetizable network. It allows retailers to reach more consumers by providing a unified channel to receive data from different sources, such as via web, in-store, and points

[1] Fujitsu opens Blockchain Innovation Center in Brussels, Fujitsu

transactions. It also provides value to consumers since it will allow them to accumulate points (in the form of tokens) under a common unit of denomination, thus allowing consumers to aggregate their loyalty rewards when shopping across multiple member retailers.

FUJITSU'S BLOCKCHAIN ASSET SERVICE

Fujitsu launched "Blockchain Asset Service," and leverages user transaction data to promote regional revitalization[1].

The Blockchain-based data storage system tokenizes traditional retail promotional strategies such as coupons and loyalty points, which the company claims will revitalize local economies by increasing consumers' willingness to buy, as well as improving data analysis methods in retail industries.

With this service, users can collect digital points or stamps reading QR codes located in specific areas with smart devices, and then exchange them for coupons and other benefits that can be used in stores and shopping centers within the specified area.

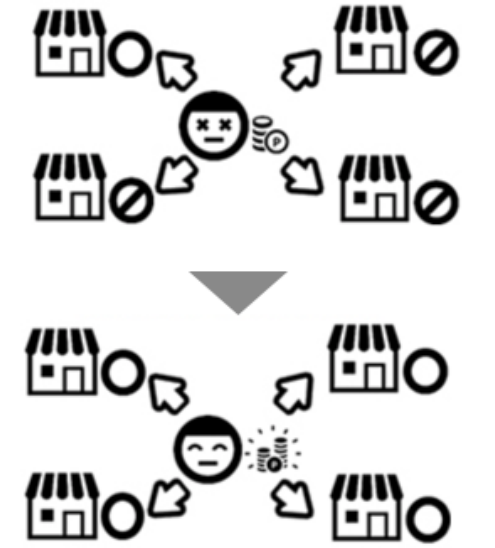
In addition, collection and usage data for the points, stamps, and coupons, which are recorded on the Blockchain distributed ledger, can be linked with user information for analysis.

HITACHI & TECH BUREAU

Hitachi partnered with Tech Bureau to use its NEM-based Mijin Blockchain platform onto Hitachi's point management solution "PointInfinity",a platform with over 150 million members in Japan.[2]

The PointInfinity program is one of the most successful loyalty solutions in Japan and allows merchants to deploy point-based and electronic money managements systems, wherein they can design their own membership programs and Point of Sale (PoS) software for loyalty programs and special offers.

Hitachi's point management solution "PointInfinity"



Hitachi's solution for managing sales is particularly popular with restaurants, cafes and shopping outlets offering customized services, coupon and loyalty program points.

Tech Bureau and Hitachi are implementing blockchain Mijin platform to autonomously

[1] Fujitsu Launches "Blockchain Asset Service," Leverages User Transaction Data to Promote Regional Revitalization, Fujitsu

[2] PointInfinity, Hitachi (Japanese)

process loyalty points and manage electronic money settlement platforms within a more secure, transparent, efficient and immutable ecosystem.

BLOCKCHAIN IN DATA MANAGEMENT

FUJITSU, MICROSOFT & IOTA DATA MONETIZATION

Fujitsu, Microsoft and IOTA launched a platform for data monetization.[1]

IOTA announced a major platform release allowing data monetization using micropayments through their distributed ledger technology.

The data solution has already garnered huge partnerships from Microsoft, Fujitsu, Bosch, Deutsche Bank Telekom, and others.

FUJITSU SECURE DATA EXCHANGE NETWORK

In June 2017 Fujitsu developed Blockchain-based software for a secure data exchange network.[2]

With a proprietary data access control technology it has developed, Fujitsu aims to promote interchanges of data accumulated by various organizations and companies.

In May 2018 Fujitsu launched the Intelligent Data Service Virtuora DX Data Distribution and Utilization Service (Virtuora DX), a cloud service that enables companies and organizations to bring visibility to the value in the data they have, share it, and accelerate co-creation across industries using outlines of the data. Virtuora DX incorporates Fujitsu VPX(virtual private digital exchange) Technology from Fujitsu Laboratories Ltd. that extends the function of the blockchain to create data interchanges among companies without placing the data in external environments.[3]

In September 2018, Fujitsu Laboratories Ltd. announced "ChainedLineage," a blockchain extension technology that enables the safe use of data obtained from a variety of companies and individuals, confirming its provenance and processing history.[4]

Data that can be used by companies often consists of data from multiple sources, and in many cases has been processed in stages by multiple companies.

For companies using such data, it is important to ensure the reliability of the data they obtain, and they currently need to trace back the provenance of each data. There are also issues with obtaining data that complies with regulations such as Japan's Act on the Protection of Personal Information or Europe's GDPR.

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[1] IOTA Partners With Microsoft, Fujitsu, Others For IoT Data Monetization, Cointelegraph

[2] Fujitsu Develops Blockchain-based Software for a Secure Data Exchange Network, Fujitsu

[3] Fujitsu Puts Blockchain to Use for "Virtuora DX" Data Distribution and Utilization Service, Fujitsu

[4] Fujitsu Develops Technology to Improve Reliability of Data Distribution across Industries, Fujitsu

FUJITSU TECHNOLOGY TO VERIFY BLOCKCHAIN RISKS

Fujitsu Laboratories Ltd. and Fujitsu Research and Development Center Co., Ltd. developed a technology that can verify, in advance, risks associated with smart contracts, which are programs that automatically execute transactions on blockchain platforms.[1]

SOFTBANK & SIVIRA CONSUMER DATA MANAGEMENT SYSTEM

The Japanese telecom SoftBank Group built a Blockchain-based system to manage personal financial data. Banks will be able to instantly access the credit history and consumer activity of potential borrowers. [2]

The system has been developed by SoftBank Technology, a subsidiary of SoftBank Group, in collaboration with Sivira, a Blockchain startup. Sivira is an Osaka-based company that develops platforms and products based on distributed ledger technology (DLT). The startup has already developed several systems, including Broof, Proof log, Hublive, and Soul Gem.

The new system developed by SoftBank will help financial institutions conveniently estimate the borrower's solvency. Currently, this process requires a relatively long time, as the banks have to request, evaluate, and confirm income data and the account balance, among others. Personal information is generally stored on a server or a cloud, which makes them vulnerable to hacker attacks.

BLOCKCHAIN IN ENERGY

According to Accenture, nearly 80 percent of utilities executives worldwide predict that Blockchain will be integrated into their systems within the next three years.[3]

Blockchain technology could provide the infrastructure for sophisticated networks that manage payments, sales, trading, and distribution. The applications range from ways to promote buying, selling or trading of clean energy between individuals (also called peer-to-peer trading), to balancing wholesale electricity markets (ensuring that supply always matches demand), to trading carbon credits.

As McKinsey puts it, given the potential to streamline transactions and cut costs, Blockchain and smart contracts could help to remove pain points and friction. That said, Blockchain is still in its infancy, and questions remain about security, scalability, and governance[4]. In any case Japan is also showing notable interest in Blockchain use case for Energy.

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[1] Fujitsu Develops Technology to Verify Blockchain Risks, Fujitsu

[2] Softbank developed a blockchain-based consumer data management system, Cryptovest

[3] Blockchain for Utilities, Accenture

[4] What every utility CEO should know about blockchain, McKinsey

TEPCO

Tokyo Electric Power Company (TEPCO) is Japan's largest energy firm and the sixth in the world.[1] The firm is also known for the meltdown at its Fukushima Dai-ichi nuclear-power plant in 2011.

Tepco is embracing Blockchain technology in different ways, specially investing in foreign startups such as Electron, Grid+, Conjoule and Electrify.

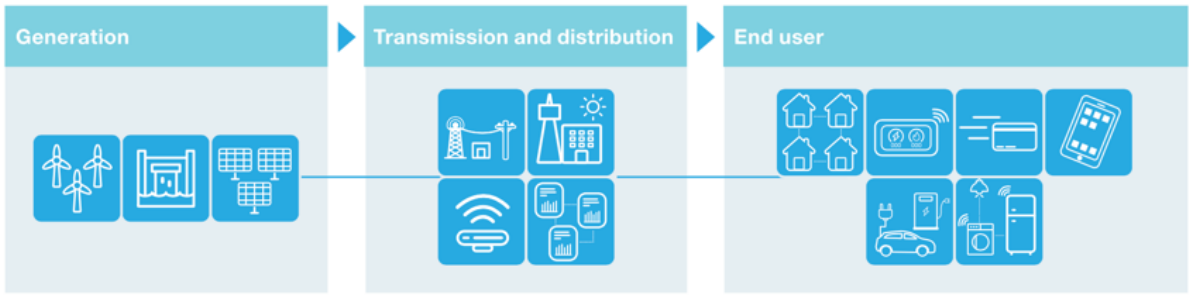
In July 2017, Tepco invested in Conjoule, a German start-up developing peer-to-peer marketplace for producers and consumers

> *"Blockchain technology will redefine what is possible within the energy ecosystem"* TEPCO

of renewable energy, as well as owners of batteries and other sources of flexibility, to transact with each other without the need for traditional intermediaries.[2]

Later that year, Tepco invested in Electron, a British blockchain company that is focusing on handling the multiplying options for flexible demand in electricity systems. The two companies say they plan to develop uses of the tech around energy distribution, with the goal of creating a

Blockchain technology through the power system — Source: McKinsey



Secure power generation and **supply data transcribed to blockchains** allow for visibility, security, and accuracy.

Renewable energy credits based on actual production are semi-autonomously awarded and traded.

Wholesale power is traded via smart contracts that minimize the need for brokers and indexing agencies.

Blockchain-enabled sensors and controls allow for secure, centralized data and improved grid resilience.

Real time customer-utility interactions facilitate faster payment cycles, more efficient energy use, and streamlined account management.

Peer to peer microgrids run autonomously, with **blockchains managing contracts for energy flows and instant payments.**

Electric vehicles seamlessly connect with infrastructure executing transactions through 'smart wallets.'

Smart home appliances coordinate electricity purchase and use with the grid, promoting grid efficiency and extending appliances' useful life.

[1] Ranking of the world's largest electric utilities in 2018, based on sales (in billion U.S. dollars), Statista

[2] Conjoule closes Series A investment from innogy Innovation Hub and TEPCO, TEPCO

more efficient and reliable infrastructure.[1]

Using the Ethereum blockchain, Electron demoed a platform simulating data from 53 million metering points at individual homes from 60 energy providers and proved that energy supplier switches could be executed up to 20x faster than current switching rates.

In April 2018, Electrify, a Singapore-based startup, said it had signed a memorandum of understanding with Tepco to experiment with peer-to-peer electricity trading.[2]

The Japanese group is also one of more than 70 firms, including utilities Duke Energy and Centrica, and oil firms Royal Dutch Shell and Equinor, that are part of the Energy Web Foundation (EWF), a non-profit initiative aimed at promoting the use of blockchain in the energy space. Among many initiatives, the EWF is pioneering a blockchain application that tracks renewable-energy certificates used to offset carbon emissions to make them more transparent and granular.[3]

Tepco also talked with the Ethereum startup Grid+, looking to make energy systems more efficient and reduce reliance on nuclear power, oil and coal. Grid+ allows the broader power grid to work with both traditional electricity sources and household solar panels. Grid+ developed a piece of hardware designed to let individuals pre-pay for energy using either Ether, Ethereum's native token, or fiat currencies.

By plugging Ethereum-enabled devices into other smart machinery – such as the Tesla charging wall – the company believes it can write algorithms based on customer energy usage that will allow them to buy energy when it is cheap.[4]

In May 2018, Tepco established an online renewable electricity retail startup called Trende, leaded by serial entepreneurs Jeffrey Char and Tadatoshi Senoo (co-founder of Orb, a blockchain startup mentioned in the Private Blockchain chapter).[5]

KEPCO

Power Ledger and Japan's second-largest electricity utility Kansai Electric Power Co. (KEPCO) announced in April 2018 they will partner to trial peer-to-peer renewable energy trading in Japan.[6]

The aim of the trial is to provide communities with cheaper energy systems to offset existing energy costs and allow generating customers to monetize their renewable energy investments by selling their excess energy peer-to-peer.

Kepco intends to use the platform to support the development of Virtual Power Plants (VPP) where consumer-owned generating and storage capacity can be used to support local energy demands.

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[1] TEPCO looks to the transformative potential of blockchain by investing in Electron, TEPCO

[2] Singapore-based Blockchain Company Sparks Interest from TEPCO, Renewable Energy World

[3] Energy Web Foundation

[4] No More Nuclear: Japan's Biggest Utility Turns to Blockchain in Power Pivot, Coindesk

[5] TEPCO launches renewable energy startup TRENDE, TEPCO

[6] Power Ledger & KEPCO To Trial Peer-To-Peer Renewable Energy Trading In Japan, Power Ledger

Power Ledger will provide KEPCO access to the Power Ledger trading platform to facilitate and monitor energy trading between participants to increase the incentive for the development of renewable distributed energy resources (DER's).

FUKUSHIMA BLOCKCHAIN-ENABLED SMART GRID

Tokyo energy company Eneres together with Aizu Laboratory, with the support of the authorities of the Fukushima prefecture, is testing the capabilities of the distributed registry technology for its application in renewable energy, and in particular, for building "smart micro networks" on the blockchain.

The purpose of the experiment is to study the possibility of building a shared energy economy. According to the plan of the developers, thanks to the technology of the blockchain house households with installed solar panels and other sources of renewable energy will be able to share the surplus of energy with other members of the network, while receiving a certain reward.[1]

MINING

Japanese internet giant GMO Internet started selling bitcoin mining machines in the summer of 2018: the GMO miner B2 equipped with 7nm ASIC mining chips.[2]

The mining capacity is 24 TH/s and the price of the machines will be adjusted monthly according to demand. Using GMO's mining rigs, the power consumption can be reduced up to 20% and the cost of network equipment can be reduced to 1/55.

GMO said that so far the crypto mining industry is dominated "by mining machines provided by Bitmain, a major mining hardware company in China," and that they "noticed the fact that not a single Japanese company that is good at manufacturing is able to participate." GMO invested nearly 10 billion yen for the development of the product.

BLOCKCHAIN IN IDENTITY

GAIAX & CYBERTRUST AUTHENTICATION PLATFORM

Gaiax and Cybertrust collaborated to launch an identity management system among various sharing economy services.[3]

SHARED DIGITAL ID FOR BANKS

The Financial Services Agency worked with three financial institutions—Bank of Tokyo-Mitsubishi UFJ, Sumitomo Mitsui and Mizuho—on a shared digital ID system based on Blockchain.[4]

Essentially, any two-way transactions become registered and available to

[1] Japan will use blockchain in energy management, Hype codes

[2] GMO Internet Group is Launching the New Mining Machine GMO

[3] Identity management among various sharing economy services, Cybertrust (Japanese)

[4] Japan Develops Customer Digital ID Blockchain for Banks, CCN

everyone to consult, completely independently of a central authority—such as a bank—to keep that record.

The idea is that a consumer with an account at one of the participating banks would use the Blockchain-backed digital ID to access banking services at other institutions taking part in the program.

Those consumers would use a smartphone app to confirm their identities, which would be biometrically authenticated via fingerprints or facial recognition software.

TSUKUBA VOTING SYSTEM

A new online voting system based on the My Number identification system and blockchain technology was introduced in Tsukuba, Ibaraki Prefecture.[1]

Tsukuba, well known as a center for scientific research, is the first in the country to start using such a voting system, according to the city.

The system allows voters to cast ballots via a computer display after placing the My Number card on a card reader. Blockchain technology is used to prevent the voting data from being falsified or read.

> *"I had thought it would involve more complicated procedures, but I found that it's minimal and easy"*
>
> Tsukuba Mayor Tatsuo Igarashi

BLOCKCHAIN IN INTELLECTUAL PROPERTY

An important application for creative content would be coding smart contracts into Blockchain to trace the use of artwork in digital format and request micropayments for using or selling such content.

This would allow greater control over the licensing and ownership of content for all the participants involved in content rights management.

Once this is solved there needs to be a channel attached to the IP rights management ledger that links the registered owner of the content to the promotion of it so the it can facilitate the monetization of it. This will allow Japanese content creators to distribute and promote their content outside of Japan.

There are some companies exploring Blockchain for art traceability, like Startbahn, that is being accelerated by a Japanese university, who allows creators to get paid when their work is being re-distributed.

Japan is studying a Blockchain system for contents management. The government is aiming to support Japanese contents business (e.g. game, character) by providing a system which realizes smooth copyrights handling by using smart contract and other functions based on

[1] Tsukuba first in Japan to deploy online voting system, The Japan Times

blockchain technology.

The Japanese government is reportedly planning to proceed to the validation phase in 2019.[1]

In addition to this government project, Sony seems considering using blockchain technology for Digital Rights Management (DRM). Sony has filed a patent application for digital rights storage on Blockchain.[2]

BLOCKCHAIN PROOF OF CONCEPTS (POCS)

Japan has been implementing PoCs on Blockchain for some years already:

BLOCKCHAIN STUDY GROUP

Mizuho Financial Group, Inc., Sumitomo Mitsui Banking Corporation, Mitsubishi UFJ Financial Group, Inc., and Deloitte Tohmatsu Group participate in the Blockchain Study Group and promote research on blockchain technology.

The Blockchain Study Group was established in December 2015, recognizing that Blockchain technology is one of the elemental technologies which are necessary for Japan to grow further continuously.

The objective is to "contribute to domestic financial institutions' establishment of the foundation of blockchain technology, and to improve their technology to the level equivalent to that of financial institutions in Europe and the United States".

The Study Group aims to identify the scope of blockchain's application to financial system and to determine direction toward practical use:

1. Blockchain Technology in Japanese Domestic Interbank Payment Operation[3]

2. Verification report on KYC advanced platform utilizing blockchain[4]. This one was approved to participate at the FSA's FinTech PoC Hub.

JAPAN EXCHANGE GROUP

Japan Exchange Group, Inc. (JPX) was established via the business combination between Tokyo Stock Exchange Group and Osaka Securities Exchange on January 1, 2013. JPX operates financial instruments exchange markets to provide market users with reliable venues for trading listed securities and derivatives instruments.

In cooperation with a wide range of stakeholders, such as financial institutions and IT vendors, the consortium of Japanese financial institutions[5] conduct proof of concept (PoC) testing and research to discuss the possibility of applying

[1] Japan to initiate a government-led blockchain project, Watanabe Research & Consulting

[2] Sony Files Patent for Digital Rights Storage on a Blockchain, CCN

[3] Report on Practical Experiment of Blockchain Technology in Japanese Domestic Interbank Payment Operation, Deloitte

[4] Verification report on KYC advanced platform utilizing blockchain technology, Deloitte

[5] The 44 members of the consortium, JPX

Blockchain or distributed ledger technology (DLT) to capital market infrastructure:

1. PoC on applicability of Distributed Ledger Technology to Capital Market Infrastructure. Project owner: Tokyo Stock Exchange, Inc.[1]

2. Study on Applicability of Distributed Ledger Technology in Trade Matching Processes. Project owner: Daiwa Securities Group Inc.[2]

3. SBI Holdings, SBI BITS and NEC Commence Joint Demonstration Trial of KYC Operations Using Blockchain Technology. Project owner: NEC Corporation, SBI BITS Co., Ltd. and SBI Holdings, Inc. [3]

4. Analysis of the Use of Distributed Ledger Technology in Pre-Settlement Process of Cross-Border Securities Trade. Project owner: Nihon Unisys, Ltd.[4]

MORE PROOFS OF CONCEPTS

1. Japan Net Bank. Apply Blockchain technology to banking infrastructure with Mijin/NEM, Fujitsu and Hyperledger.[5]

2. SBI Sumishin Net Bank and Nomura Research Institute. Test Blockchain technology in banking using DragonFly Fintech Ltd and Mijin[6].

3. Shizuoka bank / ORIX. Cross border money transfers and various settlement service with Orb.

4. Mizuho Financial Group. Syndicate loan with Microsoft Azure BaaS. Custody operation for international.

5. Mizuho Bank and Fujitsu. Blockchain technology on cross-border securities settlement.

6. Japan Stock Exchange and Nomura Research Institute. Test Blockchain technology in the securities industry in markets that have low transaction data volume.

7. MUFG and NTT Data. Prototype leveraging blockchain technology that would strengthen trade ties between Singapore and Japan.[7]

8. MUFG, Hitachi and BTMU. Test for utilizing Blockchain technology for check digitalization in Singapore.[8]

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[1] The Trend of Exploring the Use of Distributed Ledger Technology in the Capital Market, JPX

[2] Study on Applicability of Distributed Ledger Technology in Trade Matching Processes, JPX

[3] SBI Holdings, SBI BITS and NEC Commence Joint Demonstration Trial of KYC Operations Using Blockchain Technology, SBI

[4] Analysis of the Use of Distributed Ledger Technology in Pre-Settlement Process of Cross-Border Securities Trade, Nihon Unisys (Japanese)

[5] Japan's First Online Bank Tests Blockchain Technology with Mijin and Hyperledger, Mijin

[6] SBI Sumishin Net Bank succeeds in using blockchain using Mijin by Tech Bureau Corp, Mijin

[7] MUFG and NTT DATA lay foundation for digital trade between Singapore and Japan using blockchain, MUFG

[8] Hitachi and BTMU Start Proof of Concept Testing for Utilizing Blockchain Technology for Check Digitalization in Singapore, Hitachi

9. MUFG and Chain. Exchange of promissory notes using Blockchain[1]

10. MUFG, IBM, Deutsche Bank, Cargill and HSBC. Blockchain-based shared KYC[2]

BLOCKCHAIN PATENTS

NTT "CONTRACT AGREEMENT METHOD"

The world's fourth-largest telecoms provider, Japan's Nippon Telegraph and Telephone (NTT), filed a patent for using Blockchain technology for contract agreement, according to a U.S. Trademark and Patent Office (USPTO)[3].

The patent is called "Contract Agreement Method, Agreement Verification Method, Contract Agreement System, Agreement Verification Device, Contract Agreement Device, Contract Agreement Program and Agreement Verification Program".

NTT will use the application to store contracts without allowing documents to be tampered with. As outlined, the system would use a blockchain to both encrypt the contract, as well as store it in a decentralized manner, which can simplify the process by which it is verified by removing the need for a centralized management system.

NTT's patent application writes that a problem with contracts on Blockchain is that each transactions "contains only the electronic signature of the sender" as the "evidence of contract agreement but the receiver is not left in the transaction."

SONY

"Electronic Node and Method for Maintaining a Distributed Ledger"

Sony describes an electronic device for maintaining a Blockchain based on multiple electronics nodes, including multiple blocks associated with at least one of the existing blocks. The patent explains a scheme of adding new blocks on a distributed ledger in a compressed format, which contributes to the establishment of a competitive manner of nodes that perform mining process, implying that a smaller block produced by the node can achieve a bigger reward.

"Device and System"

Sony proposes a way of maintaining a blockchain by multiple virtual nodes, suggesting a mechanism of accessing the distributed ledger via at least one of these nodes. By incorporating virtual nodes, Sony intends to ensure the integrity of the blockchain in cases "where the number of devices is small or becomes small;" for example, if a number of devices went down.

[1] MUFG Building Blockchain Proof-of-Concept for Promissory Notes, Coindesk

[2] IBM Completes Proof-of-Concept Blockchain-Based Shared KYC, Fintech News

[3] NTT Blockchain Patent Application in the US by US Patent & Trademark Office

“Client, server, method and identity verification system”

A patent application for a Blockchain-powered multi-factor authentication system (MFA), proposing a combination of two different distributed ledgers to conduct the login process.

One of the proposed Blockchain platforms would create the authentication codes that will be used by a user to gain access to a website or program after they enter their standard username and password.

The other platform is responsible for receiving the codes to confirm a user’s identity when they try to conduct a transaction through the platform. The possible transactions that can be conducted include data transfer, contract generation, and asset transfer.

"Electronic Apparatus, Method for Electronic Apparatus and Information Processing System”

The patent contained key information concerning Sony’s use of Blockchain technology for the education platform.

Sony mentioned in their patent that “the [blockchain] which is a trust chain, may be used to store information such as education experiences, certificates and so on of a user. The information contains, for example, studying which courses and possessing which certificates. In addition, based on concepts of a smart contract and a smart property, knowledge may also be exchanged, transacted and transferred via the blockchain as a property.”

The application goes on to explain third parties that need information, like teachers or administrators, can run the network nodes – computers connected to the blockchain network. It also refers to cementing educational experiences on the chain once relevant users have validated it.

“Blockchain-Based Digital Rights Management”[1]

Sony explains the pain point in the DRM process that the Blockchain can solve, and it involves the disruption of yet another market. The way that businesses use DRM technology now is to engage a third-party vendor for a digital rights locker or other data storage methods that let users access their digital entertainment.

Sony warns in the patent application: “However, these conventional solutions may not be very reliable and rely on one unique point of failure. If the rights locker provider or system goes out of business or otherwise fails, the user loses all the acquired content.”

Blockchain-fueled DRM would remove the need for the third-party service provider and create a host of possibilities, erasing the friction in the process and giving Sony and its customers more control of data.

The use cases for the technology appear limitless, but Sony describes in one scenario how “content data can be for various types of content or other data, such as movies, television, video, music, audio, games, scientific data, medical data, etc.”

[1] Sony Files Patent for Digital Rights Storage on a Blockchain, CCN

More patents:

1. "Information Processing Device, Information Processing Method, And Program". SONY CORP. 2017 Patent Application, JP 2016080200 W.

2. "Method For Managing Data In A Network Of Nodes". NEC EUROPE LTD. 2017 Patent Application, EP 2016054597 W.

3. "Method For Provably Secure Erasure Of Data". NEC EUROPE LTD. 2017 Patent Application, US 201515502506 A.

4. "Method For Storing An Object On A Plurality Of Storage Nodes". NEC EUROPE LTD. 2017 Patent Application, EP 2015070206 W.

5. "Method For Provably Secure Erasure Of Data". NEC EUROPE LTD. 2016 Patent Application, EP 2015074410 W.

6. "Method And System For Providing A Proof-of-work". NEC EUROPE LTD;;UNIV MANNHEIM. 2017 Patent Application, EP 2015068111 W.

7. "Method For Proving Retrievability Of Information". NEC EUROPE LTD;;UNIVERSITÃ„T MANNHEIM. 2017 Patent Application, US 201515310801 A.

8. "Method And System For Verifying Information Of A Data Item In A Plurality Of Different Data Items". NEC EUROPE LTD;;UNIVERSITÃ„T MANNHEIM. 2016 Patent Application, EP 2015053242 W.

9. "Method For Proving Retrievability Of Information". NEC EUROPE LTD;;UNIVERSITÃ„T MANNHEIM. 2015 Patent Application, EP 2015060917 W.

10. "Block Chain Generation Device, Block Chain Generation Method, Block Chain Verification Device, Block Chain Verification Method And Program". NIPPON TELEGRAPH & TELEPHONE. 2017 Patent Application, JP 2016083063 W.

11. "Method And System For Processing A Monetary Transaction". SONY CORP. 2016 Patent Application, JP 2016000143 W.

12. "Method And System For Processing A Monetary Transaction". SONY CORP. 2016 Patent Application, US 201514621599 A.

13. "Method And Apparatus For Generating Time Series Data Sets For Predictive Analysis". FUJITSU LTD. 2017 Patent Application, GB 201603472 A.

14. "Sharing Economy Third Party Notification And Negotiation". FUJITSU LTD. 2016 Patent Application, US 201514705541 A.

EU & Japan

Japan is one of the most reliable EU's strategic partners, with close bilateral relations. In addition, Japan is a world-leader on digital and has set-up an ambitious digital policy initiative called "Society 5.0"[1], similar to the EU's Digital Single Market[2].

JAPAN: SOCIETY 5.0

Society 5.0 is Japan's vision for the next step in human evolution after hunter-gather, agrarian, industrial and information society stages. It will enhance industrial competitiveness and help with the establishment of a society more attuned to individual needs.

The focus is on the vast potential of accumulating data, and new technologies of the fourth industrial revolution, in order to find solutions to social issues such as the declining birth rate, an aging population, and environmental and energy issues

Society 5.0 talks about FinTech [3] :

A high proportion of Japanese money transactions are still conducted in cash and bank procedures are cumbersome. Usage of IT in companies is limited and installation of cashless payment and convenient financial services is slow.

Overseas remittance is burdensome because you have to spend time and pay bank fees. Blockchain technology will reduce time and cost while assuring safety in global business transactions.

> *"Blockchain technology will reduce time and cost while assuring safety in global business transactions."*
>
> Society 5.0. Abenomics. Government of Japan

[1] Society 5.0, Japanese Government

[2] Digital Single Market, European Commisson

[3] Society 5.0 Overview, Japanese Government

EU: DIGITAL SINGLE MARKET

The decentralized and collaborative nature of Blockchain and its applications allows exploiting the full scale of the Digital Single Market from the outset.

Close cooperation between Member States can help avoiding fragmented approaches and can ensure interoperability and wider deployment of blockchain-based services.

The recently signed European Blockchain Partnership[1] will contribute to the creation of an enabling environment, in full compliance with EU laws and with clear governance models that will help services using blockchain flourish across Europe.

Objectives of Digital Single Market:

1. Boosting e-commerce in the EU by tackling geoblocking, making cross-border parcel delivery more affordable and efficient
2. Modernising the EU copyright rules to fit the digital age
3. Updating EU audiovisual rules and working with platforms to create a fairer environment for everyone, promote European films, protect children and tackle hate speech
4. Scaling up Europe's response to cyber-attacks by strengthening ENISA, the EU cybersecurity agency, and creating an effective EU cyber deterrence and criminal law response to better protect Europe's citizens, businesses and public institutions
5. Unlock the potential of a European data economy with a framework for the free flow of non-personal data in the EU
6. Ensuring everyone in the EU has the best possible internet connection, so they can fully engage in the digital economy, the so-called "connectivity for a European gigabit society"
7. Adapting ePrivacy rules to the new digital environment
8. Helping large and small companies, researchers, citizens and public authorities to make the most of new technologies by ensuring that everyone has the necessary digital skills, and by funding EU research in health and high performance computing

EU-JAPAN DIGITAL WEEK

The first EU-Japan Digital Week was held in October 2017 in Tokyo[2], with Dialogues between the European Commission and the Ministry of Internal Affairs & Communications (MIC) and the Ministry of Economics, Trade & Industry (METI).

These Dialogues are extremely useful for the Commission as they allow reviewing digital policy and regulatory issues as well

[1] European countries join Blockchain Partnership | Digital Single Market, European Commission

[2] Celebrating EU-Japan Digital Week In Tokyo, European Commission

as research cooperation with Japan on a yearly basis.

They discussed about the Economic Partnership Agreement (EPA) and the Strategic Partnership Agreement (SPA) signed between the EU and Japan earlier in 2017.

The EPA will substantially liberalise trade, as Japan will liberalise 91% of its imports from the EU at entry into force.

The parts of the agreement covering telecoms and e-commerce are ambitious both for the EU & Japan, and provide a good basis for modernising their relations on the digital economy & society.

It reduces barriers for investment, for example, for European cable TV, satellite or IP-based operators in Japan as well as strengthening a common approach among like-minded partners in multilateral talks.

They started with a government-to-government session discussing platforms, digital trade and ICT Statistics on which they can reach a common approach in terms of policy setting.

On 3rd October representatives of EU and Japan governments and industries discussed topics related to the EU's Digital Single Market strategy and the Japanese Society 5.0 initiative at the 6th workshop on Digital Strategies.

They focused on standardization (5G and IoT), Blockchain, electronic authentication, IPR polices and data economy (data flow, data market, liability, cybersecurity, connected cars).

They decided to deepen the discussion by setting up within 6 months dedicated expert groups (with academics and other outside experts/stakeholders) on digital economy issues, and on content and competition aspects of platforms.

Other topics where the rules to govern the free flow of non-personal data in the EU, reforms to ICT regulatory policy, deployment of 5G during the 2020 Olympic Games, IoT and Cloud.

EU and Japan presented their respective strategies on Artificial Intelligence, Robotics and High Performance Computing (HPC)

A panel involving the European Commission, the Japanese government, the EU and Japanese industries discussed lessons learned from the current EU-Japan cooperation and how it can be enhanced.

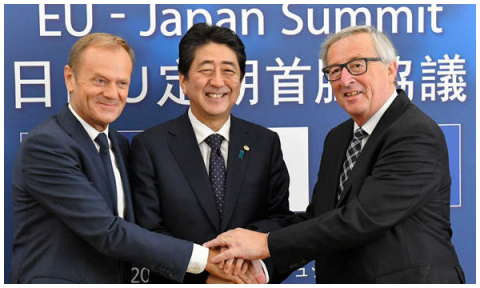
EU – JAPAN SUMMITS

The 24th Summit[1] between the European Union and Japan, was held in July 2017 in Brussels.

They discussed about the Economic Partnership Agreement and the Strategic Partnership Agreement, which will bring huge benefits to the populations of both the European Union and Japan and represents a significant step in their relations.

[1] 24th EU-Japan Summit, European Commission

The European Union was represented at the Summit by the President of the European Commission, Jean-Claude Juncker and the President of the European Council, Donald Tusk, whilst Japan was represented by its Prime Minister, Shinzō Abe.



The 25th EU-Japan Summit[1] was held in July 2018 in Tokyo, where EU and Japanese leaders signed two landmark agreements to increase their trade and cooperation:

TRADE

Leaders signed the EU-Japan Free Trade Agreement (FTA), the largest trade deal ever negotiated by the EU. It will create a trade zone covering 600 million people and nearly a third of global GDP.

Once fully implemented, the free trade agreement will remove most of the duties that EU companies pay annually to export to Japan. It will also eliminate several regulatory barriers.

COOPERATION

The EU-Japan Strategic Partnership Agreement (SPA) was also signed at the summit. This agreement will take the EU's longstanding partnership with Japan to a new level, with deeper and more strategic cooperation.

Both sides reaffirmed their strong commitment to implement the Paris agreement on climate change by focusing on emission reduction and improving energy efficiency.

EU-JAPAN ON PRIVATE DATA

Leaders also welcomed the conclusion of the talks on an adequate level of data protection by the EU and Japan. This should create the world's largest area of safe data transfers with a high level of data protection.[2]

Each side will now launch its relevant internal procedures for the adoption of its adequacy finding. For the EU, this involves obtaining an opinion from the European Data Protection Board (EDPB) and the green light from a committee composed of representatives of the EU Member States. Once this procedure will have been completed, the Commission will adopt the adequacy decision on Japan.

The processing of personal data in the EU is based on the General Data Protection Regulation (GDPR), which provides for different tools to transfer data to third countries, including adequacy decisions.[3]

[1] 25th EU- Japan Summit, European Commission

[2] The European Union and Japan agreed to create the world's largest area of safe data flows, European Commission

[3] GDPR, European Commission

This mutual adequacy arrangement will create the world's largest area of safe transfers of data based on a high level of protection for personal data.

Europeans will benefit from strong protection of their personal data in line with EU privacy standards when their data is transferred to Japan.

This arrangement will also complement the EU-Japan Economic Partnership Agreement, European companies will benefit from uninhibited flow of data with this key commercial partner, as well as from privileged access to the 127 million Japanese consumers.

With this agreement, the EU and Japan affirm that, in the digital era, promoting high privacy standards and facilitating international trade go hand in hand. Under the GDPR, an adequacy decision is the most straightforward way to ensure secure and stable data flows.

STELLA

In December 2016, the Bank of Japan (BOJ) and the European Central Bank (ECB) launched their joint research project entitled “Stella”, which studies the possible use of Distributed Ledger Technology (DLT) for financial market infrastructures.

But, what is the difference between a DLT and Blockchain? As World Bank explains[1], “a DLT refers to a novel and fast-evolving approach to recording and sharing data across multiple data stores (or ledgers). This technology allows for transactions and data to be recorded, shared, and synchronized across a distributed network of different network participants. A ‘blockchain’ is a particular type of data structure used in some distributed ledgers which stores and transmits data in packages called ‘blocks’ that are connected to each other in a digital ‘chain’.”

The joint work is being conducted at conceptual level and through practical experimentation with the technology. Legal aspects are not part of the studies. Project Stella aims to contribute to the ongoing broader debate around the potential usability of DLT while not being geared towards replacing existing central bank services with DLT-based solutions.

Depending on technological developments and implementation models, this technology could increase efficiency, for example by facilitating the automation of record-keeping and streamlining complex processes, and possibly lead to improvements in safety and resilience to a range of non-financial risks.

Both the BOJ and the ECB, in their capacity as providers of market infrastructure services, are currently exploring DLTs. Their joint research is based on experimental work with the technology

[1] Distributed Ledger Technology (DLT) & Blockchain, World Bank

and contributes to the ongoing broader debate concerning the usability of DLTs for financial market infrastructures.

In the first step of their cooperation, the BOJ and the ECB conducted in-depth experiments on whether specific existing functionalities of their respective payment systems could be run in a DLT environment in an efficient and safe manner.

In September 2017 the first findings of project Stella were published[1]. The analysis focused on efficiency and safety aspects of the operation of payment system functionalities in a DLT environment.

Moving from payments to securities settlement, the second phase of the Stella project explored how the delivery of securities against cash could be conceptually designed and operated in a DLT environment. [2]

It draws on existing delivery-versus-payment (DvP) approaches as well as innovative solutions that are currently being discussed for DLT.3 In order to gain practical understanding of DvP functioning on DLT, prototypes were developed using three DLT platforms: Corda, Elements and Hyperledger Fabric.

EU BLOCKCHAIN INITIATIVES

In Europe, in April 2018, 23 countries signed a Declaration on the establishment of a European Blockchain Partnership[3]. The Partnership will be a vehicle for cooperation amongst Member States to exchange experience and expertise in technical and regulatory fields and prepare for the launch of EU-wide blockchain applications across the Digital Single Market for the benefit of the public and private sectors. This should ensure that Europe continues to play a leading role in the development and roll-out of blockchain technologies.

The Blockchain partnership declaration was launched at the Digital Day 2018, and was signed by twenty-two Member States: Austria, Belgium, Bulgaria, Czech Republic, Estonia, Finland, France, Germany, Ireland, Latvia, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, UK. Greece and Romania joined later this year.

Mariya Gabriel, Commissioner for Digital Economy and Society, welcomed the signature of the declaration:

“In the future, all public services will use blockchain technology. Blockchain is a great opportunity for Europe and Member States to rethink their information systems, to promote user trust and the protection of personal data, to help create new business opportunities and to establish new areas of

[1] STELLA - First report on DLT, ECB and BOJ

[2] STELLA – Second report on DLT, ECB and BOJ

[3] European countries join Blockchain Partnership, European Commission

leadership, benefiting citizens, public services and companies."

The European Commission also launched the EU Blockchain Observatory and Forum[1] in February 2018. The Commission wants the observatory to build up both technical expertise and regulatory capacity with the ultimate aim of developing a common approach to blockchain. The observatory is managed in cooperation with ConsenSys, a venture production studio for decentralized applications primarily focused on Ethereum.

To date the European Commission has granted approximately EUR 80 million to EU projects dealing with blockchain in many sectors and has announced plans to increase funding by up to EUR 340 million[2] by 2020 (Horizon 2020). Horizon 2020 program is the biggest EU Research and Innovation programme ever with nearly €80 billions of funding available over 7 years (2014 to 2020).

Other developments of note include the EUR 5 million "Blockchains for Social Good" Contest, the recently announced Fintech Action Plan[3], which calls for "a comprehensive strategy on distributed ledger technology and blockchain addressing all sectors of the economy"; and the recent resolution[4] of the Industry, Research and Energy Committee of the European Parliament recognizing the role blockchain can play in enhancing innovation in Europe and around the world.

The European Commission will conclude a regulatory assessment for the governance of crypto assets, because they are "here to stay". Valdis Dombrovskis, vice president of the European Commission, said member states are supportive of moves to chart regulations governing the cryptocurrency industry in the economic region. He also said "We also had a good exchange of views on crypto-assets. We see that crypto-assets are here to stay. Despite the recent turbulence, this market continues to grow." Further, he suggested that ICOs have the potential to become a viable form of alternative financing.[5]

To make the most of this potential, European Commission's Vice President said the challenge right now is how to "categorize and classify" crypto assets and whether the EU should use existing financial market rules or create a set of dedicated regulations for cryptocurrencies.

A Member of the European Parliament, Ashley Fox, suggested a new rule governing ICOs that would place an upper cap on token sale proceeds, but would also make eligible projects accessible across EU member states. The MEP's proposal would limit the proceeds for ICOs to 8 million euros, mandate know-your-customer/anti-money laundering rules, and provide token startups with access to the entire EU.[6]

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[1] EU Blockchain Observatory and Forum

[2] Boost for blockchain research as EU increases funding four-fold, The Irish Times

[3] Fintech Action Plan, European Commission

[4] European Parliament passes a blockchain resolution, Open Access Government

[5] Remarks by Vice-President Dombrovskis on crypto assets, European Commission

[6] EU Lawmaker Wants Standard Regulations to Allow 'Passport' for ICOs, Coindesk

OPPORTUNITIES FOR EU COMPANIES

While Blockchain technology is still in an infant stage — only 10 years since its creation — Japan is taking huge steps to become a world leader, paying keen attention to various types of Blockchain-based business models.

The lack of local ventures in the Blockchain scene opens a rich landscape of business opportunities for EU companies in multiple industries.

Finance. Japan is experiencing a FinTech boom. The number of Blockchain and FinTech companies in Japan is still small from an international viewpoint, but a growing number of startups in the country have now been delivering new financial products and services with their high-quality financial technologies. Japanese megabanks and other financial institutions are on the move towards cooperating with and funding FinTech startups not only in Japan but also in foreign countries, including EU countries.

Opportunities for EU companies to establish alliance with key Japanese players in the FinTech field are rising. When expressing collaboration strategies for Japanese counterparts, it is important for European FinTech companies to identify what competitive advantages their technologies have to offer.

The most popular FinTech services now are cryptocurrency-based payment and transfer services. Several banks are already making trial projects using cryptocurrencies like Ripple for international transfers.

Wiring money internationally can be expensive but if instead users send cryptocurrencies to other users the cost can be much lower. One of the main targets is the increasing number of foreign tourists to Japan in anticipation of the coming 2020 Tokyo Olympics. Japanese financial companies are very keen to collaborate with foreign ventures to promote blockchain-based virtual currency schemes for international money transfer.

Food traceability. The EU-Japan Economic Partnership Agreement (EPA) will increase trades of foods and beverages between the EU and Japan. Creating Blockchain-based food traceability systems between the EU and Japan may become a hot topic, especially in relation to the traceability and authenticity of wine, one of the most counterfeited products.

In the EU, there are a growing number of trial projects using Blockchain technology to combat wine fraud. Like the one being promoted by the London-based blockchain venture Everledger in collaboration with IBM.

Food traceability is especially interesting when applied to seafood as global fish supplies are rapidly declining. The Cabinet Office of the Japanese government is showing interest in knowing how to promote seafood traceability in Japan. More and more large retail store chains in Japan, including Seven & 11 Holdings Company, Aeon and Seiyu, have expressed concerns concerning food sustainability, and have adopted policies to secure the traceability of food through global food

supply chains.

The momentum for food traceability and sustainability is expected to further increase in Japan as the Tokyo Organizing Committee of the Olympic Games interested in promoting food traceability and sustainability.

Blockchain technology can provide confidence around certain characteristics of purchased goods such as origin, ethical values and authenticity. Consumers can have confidence on where and how products are being made.

European companies developing Blockchain-based global food traceability systems will also gain keen attention in Japan.

Trade. Some of the procedures of international trade are the exchange of contracts, certificates and other information through many regulatory agencies and customs. Blockchain can help gathering tracking information, proof of purchase, insurance, and other information in one location which will help lower the cost of transactions and the cost of accounting and auditing among others.

As mentioned in the report, there are already some trial systems, like the one leaded by Mitsubishi UFJ Financial Group's (MUFG), that will create effective trade processes and practices. In view of the continuance of trade between the EU and Japan thanks to the EU-Japan EPA, Blockchain-based trade management systems may be established to facilitate the creation of efficient trade procedures and practices between the two areas with the use of innovative EU blockchain ventures.

Energy. The Japanese government introduced the feed-in tariff (FIT) system to promote the generation and use of renewable energy in 2012. Since then, the renewable energy sector in Japan hasn't stopped expanding, and the percentage of renewable energy soared from about 9 percent in 2011 to 15 percent in 2016.

Now that the first feed-in-tariff for residential solar power plants is planned to end in 2019, attention is being paid to the creation of peer-to-peer energy transaction marketplaces. With peer-to-peer energy trading system, a household can sell electricity to another house in their neighborhood. This is also important in terms of Japan's commitment to reaching the United Nations' Sustainable Development Goals.

As mentioned in the report, Tokyo Electric Power Company (TEPCO) has been investing in foreign blockchain ventures in the field of energy exchange through P2P technologies.

Automated Driving. The car manufactured behemoth Toyota is studying the application of Blockchain technology to automated driving vehicles. Certain Blockchain applications can make a great contribution to automated driving systems and increase the resistance against hacking, lowering the cost of servers, continuation of data through P2P and others.

Toyota together with the MIT's Media Lab and other companies have partnered to launch various projects based on Blockchain technology that will be applied to automated driving systems. Toyota is actively investing in ridesharing companies with Blockchain P2P technology from the

EU, US and Israel.

Cybersecurity. More and more people are connected and will get connected and billions of devices and sensors are also interconnected. This huge networks are exposed to cyberattacks and keeping this infrastructure safe is one of Japan's most critical priorities as well as for the successful organization of the Olympic games of 2020. Japan has already put its eyes on several EU companies using Blockchain to solve these security problems.

Insurance. Several local companies applying Blockchain technology for insurance services and products are also getting attention in Japan and it is another industry that is experiencing an important growth. As an example, Sompo Japan Nipponkoa Insurance has been using Blockchain technology from third party companies on its insurance and financial products.

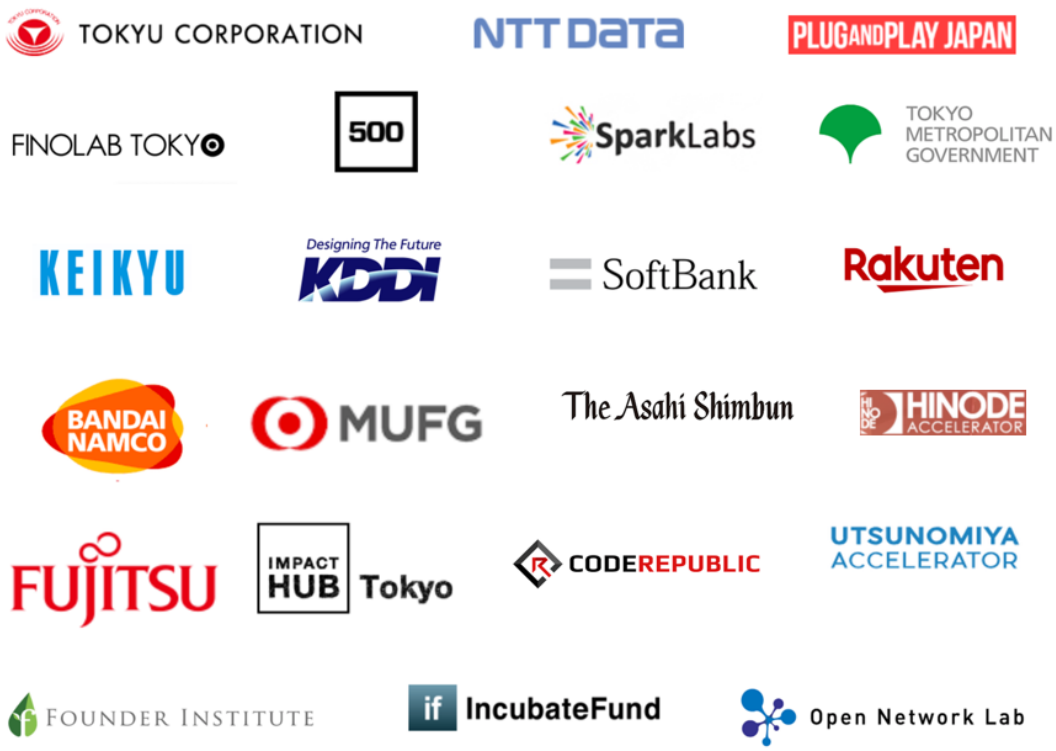
Public Services. Other governments have experience some success in the digitalization of several public services. The next level for these ventures is the application of Blockchain technologies to those services. Some examples could be the registration, management, transfer of land or other properties using Blockchain technology and making the process more efficient. Some Japanese companies already working on creating a public system for land transaction are Nomura Research Institute and Fujitsu.

Health. Blockchain technology can allow patients to keep all their medical data in a unique, secured and decentralize system that can then be shared with different doctors and companies. This is something that it is not optimized with current technology and in some cases the same patient has to redo their medical history and tests if they want to change doctors, hospitals or insurance companies.

Some UK blockchain based initiatives that work on improving the exchange and use of medical data have received the attention of Japan and can be replicated by other EU companies.

Research. Several Japanese universities have shown interest in collaborating with foreign companies and universities to do research on Blockchain technology. Some of these collaborations come from the US but EU companies and universities can also benefit from the willingness of Japanese companies of finding synergies and developing long term partnerships in the field of research om Blockchain technology.

Accelerators



BLOCKCHAIN BUSINESS CAMP

Aiming to become a global financial city, Tokyo Metropolitan Government (TMG) is working to push forward the implementation of blockchain into both financial and non-financial sectors. As part of this movement, TMG has launched Blockchain Business Camp Tokyo[1].

This is the third business camp held by TMG, followed by FinTech and New Tech business camp. By running this short-term intensive program over the course of two months, TMG aims to generate ground-breaking innovation to improve convenience for Tokyo's residents and re-energize the city's economy.

Target companies are foreign startups which have not yet entered the Japanese market, and which have blockchain technologies, or products/services utilizing said technologies to support the several industries.

[1] Blockchain Business Camp, Tokyo Metropolitan Government

FINTECH BUSINESS CAMP TOKYO

The Accelerator Program FinTech Business Camp Tokyo has been held by Tokyo Metropolitan Government with the goal of inviting foreign startups with cutting-edge technologies and business models to come to Tokyo and deepen their knowledge of both Japan's unique market and the various needs of companies in the capital city.

Further, by providing Tokyo companies the opportunity to familiarize themselves with technologies possessed by foreign companies, the program aims to cultivate business matching and attract foreign companies to Tokyo.

Target companies are foreign startups possessing the latest FinTech technologies and business models (payments, management and procurement of funds, asset management, insurance, security, etc.), and which do not yet have a presence in Japan.[1]

TECH BUSINESS CAMP TOKYO

The Tokyo Metropolitan Government also launched an accelerator program targeting foreign startup companies possessing cutting-edge technologies related to the Fourth Industrial Revolution, such as IoT, artificial intelligence, and robotics, etc.

Tech Business Camp Tokyo invites foreign companies to come to Tokyo to learn about the uniqueness of the Japanese market and needs of companies within the city, while also aiming to create business matchups between the foreign companies and Tokyo companies by providing the latter with opportunities to gain a deeper understanding of the former's technologies.

By matching up Tokyo companies and foreign companies with leading software technologies, the TMG hopes to achieve its vision of becoming a "Safe City", a "Smart City" and a "Diversity (Diverse City)".

Target companies are foreign startups possessing the latest IT technologies and business models, and which do not yet have a presence in Japan.[2]

MUFG FINTECH ACCELERATOR

Mitsubishi UFJ Financial Group Inc. runs an intensive 4 months program for startups once a year with the usual Demo Day at the end. The program is aimed to FinTech companies applying advanced technologies like Blockchain, IoT, AI, quantum computing, etc…

They offer participating companies a working space in the Tokyo Nihonbashi area, networking and partnering opportunities with their network of MUFG and MUFG affiliated companies. Also they provide mentoring from other MUFG companies.[3]

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[1] Fintech Business Camp Tokyo, Tokyo Metropolitan Government

[2] Tech Business Camp Tokyo, Tokyo Metropolitan Government

[3] MUFG Fintech Accelerator, MUFG

SOFTBANK INNOVATION PROGRAM

The giant holding conglomerate Softbank runs a program aiming to match Softbank's resources and technology with those of the applying companies or startups.

They want the entrants to be already equipped with their own technology.

They will only allow entries in the form of a real product, solution or service.

The final product's cost will be covered by Softbank and the prototype will be tested and market using Softbank's own channels.[1]

PLUG AND PLAY

The California based accelerator has a Japan branch for startups who plan on reaching Silicon Valley and other markets thanks to Plug And Play's wide international network. They operate in 26 different locations.

The program runs for 12 weeks with the opportunity to pitch your company in Silicon Valley at the end. They also offer free office space for the companies accepted in the program. One of the accelerator's interest is FinTech. They claim they are a "Silicon Valley style" accelerator and they have partnered with big Japanese companies and service partners to help entrepreneurs reach their goals.[2]

500 STARTUPS

One of the most well known early-stage venture funds and seed accelerators in the world, based in California, has a Japan branch too. They have presence in more than 60 countries and a vast network available to the community of companies accepted into the program.

During their 4-months seed program they give access to mentorship, hands-on sessions with startup experts and office space. They also claim to bring Silicon Valley best practices to Japan including financing documents, fundraising and more.[3]

To learn more about FinTech Accelerators in Japan, visit this well documented article.[4]

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[1] Softbank Innovation Program, Softbank

[2] Plug and Play

[3] 500 Startups

[4] FinTech Accelerators of Japan, Finetiq

Tokyo Blockchain Events

Tokyo hosts a number of good quality Blockchain events, which among other things provide a chance for networking on a global level and observe industry trends in various applications of blockchain technology.

Most of the visitors of these summits are foreign companies visiting for the first time. It is interesting to note that usually they are still not sure if their services are in compliance with local Japanese regulations, but in the meantime they get to network, present their ideas and learn other projects in a key technology hub as Japan is.

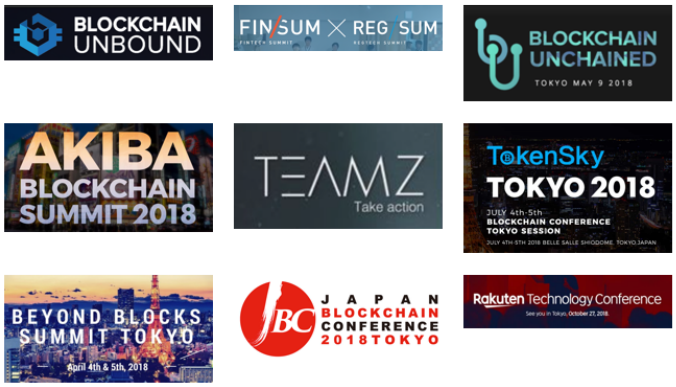
The Japan Blockchain Conference was supported by Ministry of Economy, Trade and Industry (METI) and Ministry of Foreign Affairs (MOFA). It took place in Tokyo on June 2018. The conference featured over 70 companies and 30 speakers from around the world whose businesses and interests lay in blockchain technology.[1]

The Financial Services Agency (FSA) will organized “FIN/SUM 2018,” jointly with the Japan Nikkei Inc in September 2018. The aim of this event was to advocate to the global community the current developments and growth potential inherent to the Japan’s FinTech, and to create a global eco-system among startups, in which Japan serves as a hub.[2]

It is worth noting that due to local legislation in China, Tokyo also has hosted several blockchain events organized by Chinese companies and with hundreds of Chinese participants flying to Tokyo just for those events: TokenSky and FinWise are two examples of this, the latest held just in Chinese.

Less formal but more frequent than conferences, meetups have become one of the means of choice for the blockchain community to get together in relaxed venues present projects, talk about ideas or get inspiration. They play an important role in he ongoing development of this young industry. Their influence should not be underestimated. Tokyo FinTech Meetup[3] and Government Blockchain Tokyo Meetup[4] are one of the most active ones. Every month they discuss how Blockchain is disrupting traditional financial services.

Blockchain Summits in Japan 2018



[1] Japan Blockchain Conference

[2] FIN / SUM x REG / SUM

[3] Tokyo FinTech Events, Meetup

[4] Government Blockchain Tokyo, Meetup

Conclusions

Japan has a strong Blockchain ecosystem, with all the stakeholders embracing the technology – the government, corporations, Blockchain startups and the general public. Japan's current regulatory framework facilitates Blockchain innovation for specific industries, specially the financial sector; somewhat they are less strict of this emerging technology in other industries.

Most Blockchain initiatives are primarily driven by corporations collectively rather than by startups at the origin.

Japan has a strong retail market for cryptocurrencies thanks to the guidelines established by the FSA. This environment can to some extent attract more Blockchain developers to relocate to the local ecosystem, but Japanese companies would need to adapt salaries to able to compete with other places such as the US.

Over the relatively short course of the history of cryptocurrencies and Blockchain technologies, Japan-based crypto exchanges have been rather susceptible to hacks in comparison to their European and American counterparts.

Japan promulgated the Virtual Currency Act, under the Payment Services Act in April 2017.[1] The creation of the law was largely driven by the collapse of the Mt Gox bitcoin exchange in 2014. The Act recognizes Bitcoin and Ethereum, the two most established cryptocurrencies, as forms of payment, but not as legally-recognized currencies. Under the law, cryptocurrency exchanges must register with the government and may only obtain a license after meeting their requirements. Exchanges also have to comply with the Act on Prevention of Transfer of Criminal Proceeds, the Japanese law targeting AML/CFT.

Japan's financial regulator, the Financial Services Agency (FSA), issued a statement in October 2017 warning investors of the risks of ICOs (Initial Coin Offerings). Several of the Blockchain startups with substantial development teams in Japan have established parent companies based in Singapore. In a commonly-echoed view, Japan still has a somewhat more restrictive ICO framework which relies on existing laws to regulate new innovations, whereas Singapore took an approach of radical openness by default with a gradual tightening slowly over time. Other countries in Asia[2], such as China and South Korea, have banned ICOs, and others have issued clarification statements on ICOs.

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[1] Virtual Currency Act FSA (Japanese)

[2] ICO regulation in Asia (International Financial Law Review)

Final thoughts on EU and Japan

Japan is still weak in number of developers but also in number of innovative Blockchain projects compared to Europe. This situation makes space for opportunities, as the EU has a large and highly educated overall community of engineers and developers, and an effervescent Blockchain entrepreneurial scene.

The Japanese government has developed a predictable framework for regulating Cryptocurrency and Blockchain technology; however, the frameworks tend to be less flexible in fostering more innovative Blockchain applications and adapting to the market pace. Europe can count its well-developed legal and regulatory environment as an advantage in developing a suitable framework for blockchain technology over the long term, but today there are fundamental areas that this technology touches on in which there is none or little legal and regulatory clarity or unity. Such lack of clarity can slow the innovation speed. Top of the list is resolving the tensions between GDPR and Blockchain.

The legal, fiscal and accounting status of tokens must be clarified as well, along with the rules surrounding the exchange of crypto assets and fiat money. One way in which European regulators can foster innovation is by implementing regulatory 'sandboxes', as Japan has done[1], where companies can experiment with new products and services under the eye of the regulators but without fear of costly compliance breaches.

European governments are hardly the only ones to put national resources on Blockchain. The EU already has experience in the sustained promotion of innovation and new technology adoption. Worth mention the Horizon 2020 program[2], the biggest EU Research and Innovation program ever with nearly €80 billions of funding available over 7 years (2014 to 2020), from which €300 million are reserved for Blockchain-based projects.

Both Europe and Japan count on a number of strengths in common. One is the number and quality of its Blockchain events, which among other things provide a chance for the different local communities to get together and cross-pollinate ideas and experiences. Both governments decided to support this technology. Such support is extremely important for catalyzing sustainable innovation on any field, and Blockchain is no different.

[1] Japan's Regulatory Sandbox, Finetiq

[2] Horizon 2020, European Commission

Resources

BLOCKCHAIN PUBLICATIONS

- "Bitcoin: A peer-to-peer electronic cash system". Satoshi Nakamoto (Link)
- "Blockchain: Blueprint for a New Economy". Melanie Swan (Link)
- "Hawk: The Blockchain Model of Cryptography and Privacy-Preserving Smart Contracts"A Kosba, A Miller, E Shi, Z Wen (Link)
- "Blockchain Revolution: How the Technology Behind Bitcoin and Other Cryptocurrencies Is Changing the World". Don and Alex Tapscott (Link)
- "The Age of Cryptocurrency: How Bitcoin and the Blockchain Are Challenging the Global Economic Order". Paul Vigna and Michael J.Casey (Link)
- "Land of the Rising Blockchain: How blockchain can bring Japan, and then the world, into Industry 5.0". Mark Bivens.(Link)
- "Mastering Bitcoin: Programming the Open Blockchain". Andreas M. Antonopoulos (Link)
- "SoK: Research Perspectives and Challenges for Bitcoin and Cryptocurrencies". J Bonneau, A Miller, J Clark (Link)
- "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction" A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder (Link)
- "Distributed Ledger Technology (DLT) and Blockchain". World Bank (Link)
- "Deloitte's 2018 global Blockchain survey" (Link)
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- METI's Method for Evaluating Blockchain-based Systems (Press Release) (Outline) (Full text in Japanese)
- "Blockchain Forum Japan Company". Hitachi (Link)
- "Blockchain Landscape from Japan". Masanori Kusunoki (Link)
- Public and Private Blockchains. Vitalik Buterin (Link)
- Blockchain & Energy: "What every utility CEO should know about blockchain". McKinsey (Link)

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- The Trend of Exploring the Use of Distributed Ledger Technology in the Capital, Japan Exchange Group (Link)
- Study on Applicability of Distributed Ledger Technology in Trade Matching Processes, Japan Exchange Group (Link)
- Applicability of Distributed Ledger Technology to Capital Market Infrastructure, Japan Exchange Group (Link)
- Report on Practical Experiment of Blockchain Technology in Japanese Domestic Interbank Payment Operation.

Blockchain Study Group -- Mizuho, SMBC, MUFJ and Deloitte -- (Link)

- The Japan Net Bank Tests Blockchain Technology with Mijin, NEM, Fujitsu and Hyperledger (Link)

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- Japan Virtual Currency Exchanges Association (JVCEA) Self Regulatory Rules (Link)
- Call for Rule-making on ICO Proposal by ICO Business Research Group (Link)
- Japan's Virtual Currency Regulation and its Recent Developments by Masakazu Masujima. Mori Hamada & Matsumoto (Link)
- Role of Crypto-currency Exchange and Japanese VC Act by So Saito, So Law Office (Link)
- Guidance Note on the Japanese Virtual Currency Legislation and Overview on Registration Requirement thereunder by So Saito, So Law Office (Link)
- Initial Coin Offerings (ICO) under Japanese laws by So Saito, So Law Office (Link)

EU & JAPAN

- Society 5.0 Portal from Japanese Government (Link)
- Society 5.0: Aiming for a New Human-centered Society, Hitachi (Link)
- Blockchain Innovation in Europe (Link)
- EU-Japan summit, Tokyo (Link)
- EU-Japan Economic Partnership Agreement (Link)
- EU – Japan Centre for Industrial Cooperation (Link)
- STELLA - a joint research project of the European Central Bank and the Bank of Japan. Phase 1 - (Link). Phase 2 - (Link)
- EU Blockchain Observatory and Forum (Link)
- European Blockchain Partnership (Link)
- EU - FinTech Action Plan (Link)
- EU - Digital Single Market (Link)
- EU - Horizon 2020 (Link)
- EU - GDPR (Link)

DISCLAIMER

The information contained in this publication reflects the views of the author and not necessarily the views of the EU-Japan Centre for Industrial Cooperation, EU Commission or Japan authorities. The author believes that this paper is reliable and reasonably clear. While utmost care was taken in the preparation of the report, the author and the EU-Japan Centre cannot be held responsible for any errors. This report does not constitute legal advice in terms of business development cases nor investment.

The author tried to provide concrete examples where she could, these mentions are not meant to be indications nor endorsements. Instead, they serve to give a taste of what is out there. She encourages any and all interested in Blockchain to explore on their own and discover this vibrant community and all the activity it has spawned in Japan and Europe. Hopefully this paper can serve a useful purpose as an initial guide.

 https://www.eu-japan.eu