Innovation of Payment Infrastructure and Potential of Digital Currencies in Japan

Digital Currency Study Group
November 2020

— Table of Contents —

③ **Promotion of innovation and economic DX**

（３） Attributes required for digital currency

① **Stability, security, and reliability of infrastructure**
② **Availability, immediacy, and interoperability**
③ **Development through programmability, etc.**

（４） Designing digital currencies to solve problems

① **Design premise**
② **Two-tiered digital currency**

（High credibility and reliability）
（Promoting innovation）
（Utilization of data）
（Ensuring interoperability）

３． Use Cases of Digital Currency

（１） General Discussion

（２） Legal, institutional, and economic issues

（３） Examples of Specific Use Cases

① **Linkage between supply chain and payment settlement in manufacturing industry**
② **Linkage between supply chain and payment settlement in retail industry**
③ **Linkage of logistics and delivery with payment and settlement**
④ **Improving efficiency and reducing risk in financial asset transactions**
⑤ **Use of digital currency in trade finance**
⑥ **Use of digital currency in electricity transactions**
⑦ **Linkage between e-money and digital currency**
⑧ **Use of digital currency in interbank settlements**

⑨ **Use of digital currency in local currencies**

⑩ **Use of digital currency in administrative work**

⑪ **Use of digital currency in point services and economic zone activation**

⑫ **Use of Digital Currency in Finance**

⑬ **Use of digital currency in credit card companies' merchant payments**

⑭ **Use of digital currency in insurance business**

⑮ **Use of digital currency for NFT (Non-Fungible Token) transactions**

⑯ **Use of digital currency for Mobility as a Service (MaaS)**

⑰ **Use of digital currency for overseas remittance**

⑱ **Offline small-amount payments between smartphones**

⑲ **Use of digital currency for group financial management**

４．Conclusion

Executive Summary

Today, amidst the innovation of information technologies and data revolution, digital innovation of payment infrastructure is taking off globally.

Due to the rapid popularization of smartphones, billions of people have become able to access to mobile payments and other basic financial services in many countries, including emerging and developing economies. Moreover, the digitization of payments is fostering the developments of new economic activities such as e-commerce, sharing economies and "as a Service" (XaaS), through the utilization of data associated with payments. The payment innovation is playing a critical role in the digital transformation (DX) of the economy.

Crypto-assets (virtual currencies) using blockchain and distributed ledger technology (DLT) have rarely been used as payment measures due to their large volatility in value. However, a new concept of "stable coin" such as "Libra" has emerged recently. Indeed, Libra aims at stabilizing its value through backing it fully with safe assets. Although there are a variety of views, including cautious ones, on Libra, it implies the potential of blockchain and DLT as promising technologies to be applied to payment infrastructures.

Many countries have recently accelerated research and/or experiments on central bank digital currencies (CBDCs). Sveriges Riksbank is deliberating whether to issue its own central bank digital currency called "e-krona". In April 2020, People's Bank of China started the experimental issuance of its CBDC called "Digital Currency/Electronic Payments (DC/EP)". In October 2020, European Central Bank (ECB) and the Bank of Japan announced their plans to conduct research and experiments on general-purpose CBDCs.

Japan's payment infrastructure still faces challenges. Japan remains one of the most "cash-oriented" countries, where cash is heavily used for transactions and storage of value. Accordingly, Japan bears substantial costs associated with handling, storing and transporting banknotes and coins. Moreover, reliance on cash makes it difficult to utilize data attached to payments and settlements. Although there are many platforms of digital payments available in Japan, they are rarely inter-operable and users need to choose from

many payment options, including cash, in each transaction.

Many of business applications of blockchain and DLT are still on the agenda for the future in Japan and many other countries. Moreover, the experiences of COVID-19 have reminded us of the importance of further digitalizing the economy in order to maintain economic and social activities while taking appropriate measures against epidemics. In this respect, DX of the economy and options of contact-less payments are becoming strongly needed.

In light of these issues, the Digital Currency Study Group was established by a group of leading Japanese banks, companies, and experts, with the participation of relevant ministries and the Bank of Japan as observers. The study group has been working on the issues of "innovating payment and settlement through private-sector-led initiatives to promote DX in the economy" and "Japan's leadership in financial infrastructure innovation". While discussing the requirements, definitions, and feasibility of a digital currency, the study group decided to consider "a yen-based digital currency issued by the private sector" as one of the most promising options, and to examine the specific applicability to various use cases.

In order for privately-issued digital currencies to be highly secure, reliable, available, interoperable, and developable, and to contribute to innovation and economic development through both healthy competition and cooperation, banks and other institutions should issue a "two-tiered" digital currency that has both common and additional domains. In the additional area (upper layer) of the digital currency, programs can be written to meet various business needs (e.g., linkage between logistics/commercial flow and finance, supply chain management, simultaneous delivery of securities and funds, and efficiency improvement of back-office operations) to improve the efficiency and sophistication of transactions. At the same time, it is conceivable that these digital currencies can be exchanged with each other using a common area (lower layer) where value information is written.

A two-tiered digital currency is by no means exclusive to existing digital payment instruments (e.g., electronic money, credit cards, debit cards), centralized payment

infrastructures (e.g., the Zengin system), or even the consideration of a central bank digital currency.

This kind of private-sector-led payment innovation using new technologies will increase the convenience and efficiency of a wide range of transactions, contribute to economic DX and the realization of "Society 5.0,". It will also contribute to the robustness of the economy and society against infectious diseases.

In the future, we will develop this study group into a "Digital Currency Forum" and promote Proof of Concept (PoC) for various use cases of the digital currencies mentioned above. In the PoC, we will invite not only the members of the study group but also other major companies to participate, and work to build an all-Japan payment innovation and ecosystem. Through these efforts, we hope to contribute to improving the efficiency and convenience of Japan's financial infrastructure and promoting DX in the economy, while leveraging new technologies and private sector initiatives.

（Study Group on Digital Currency Settlement Infrastructure）

Chair: Mr. Hiromi Yamaoka, Director, Future Corporation (former head of the Payment and Settlement Systems Department, Bank of Japan)

Secretariat: DeCurret Inc.

Period: June to September 2020 (once or twice a month)

Main discussion topics:

- Case studies of digital settlements and digital currencies in Japan and overseas
- Application of new digital technologies such as blockchain and distributed ledger technology in transactions and settlement infrastructure; potential usage areas of digital currency settlements and their impact; vision and future potentials
- Issues to be addressed for the realization of digital currency settlements including the scope of service provision, consideration for its usage value, roles of providers and concerned parties, and standardization

Final deliverable: Publication of a report summarizing discussions at the study group, among other things

■Participants

○Participating companies

Mizuho Bank, Ltd.	MUFG Bank, Ltd.
Sumitomo Mitsui Banking Corporation	
Internet Initiative Japan Inc.	KDDI Corporation
Seven Bank, Ltd. (Seven & i Holdings Co., Ltd.)	NTT Group
East Japan Railway Company (JR East)	Mori Hamada & Matsumoto

○Cooperating companies

Accenture Japan Ltd.	SIGMAXYZ Inc.

○Observers

Financial Services Agency, Japan	Ministry of Finance, Japan
Ministry of Internal Affairs and Communications, Japan	Ministry of Economy, Trade and Industry, Japan
Bank of Japan	

１．Introduction

（１）Digital innovation in payment infrastructure

In recent years, in the midst of information technology innovation and data revolution, innovation in payment using digital technology has been advancing worldwide.

Against the backdrop of information technology innovation, the development of the digital economy, and the explosive growth of smartphones, including in emerging and developing countries, cashless payments are rapidly expanding worldwide, and new technologies such as artificial intelligence (AI) and biometric authentication are being applied to the field of payments. In addition to banks, a wide range of players, including "BigTech" giants, FinTech companies, and startups, are entering the digital payment field one after another.

This digital innovation in payment infrastructure has brought about a variety of benefits, including the following.

（Reduce economic and social costs）

・Digital payment methods contribute to cost savings in cash handling, change preparation, cash storage, transportation, and security, as well as improving the efficiency and convenience of a wide range of economic and social activities[1].

（Promoting financial inclusion）

・With the recent explosive spread of smartphones and the entry of giant network companies into the payment field, billions of people, including those in emerging and developing countries, are now able to use digital payment methods such as smartphones, and financial inclusion has advanced significantly. Today, many people in emerging and developing countries do not have bank accounts, but they

[1] For example, the development of transportation e-money has been linked to a wide range of economic benefits, such as more efficient travel through reduced congestion at station ticket gates and ticket offices, resource conservation, and the development of "ekinaka" commercial facilities that utilize passenger data.

do have cell phones and smartphones[2].Through these mediums, many people are able to access financial services[3].

・This has enabled the development of a wide range of economic activities (e.g., e-commerce and distance learning in emerging and developing countries) that previously could not be developed due to the lack of payment and settlement instruments.

（Utilization of data and development of digital economy）

・Digital payment methods promote the collection and use of data associated with payment and settlement, and encourage the development of new economic activities such as e-commerce, sharing economy, and "as a service".

・While cash carries no information other than value, digital payment methods enable the collection and processing of a wide range of information and data associated with payment transactions (e.g., who bought what, when, and where).

・Digital payment methods also serve as a tool to link a wide range of services, such as payments through apps.

During this time, in 2009, blockchain distributed ledger technology (DLT) was introduced, along with Bitcoin, the first cryptographic asset (virtual currency)[4] . Until now, cryptographic assets, including Bitcoin, have not been widely used as a means of payment due to their volatile value. However, blockchain/DLT itself is seen as a

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[2] According to a study by the World Bank Group (2017), of the approximately 1.7 billion unbanked adults in the world, about 1.1 billion already own a cell phone or smartphone.

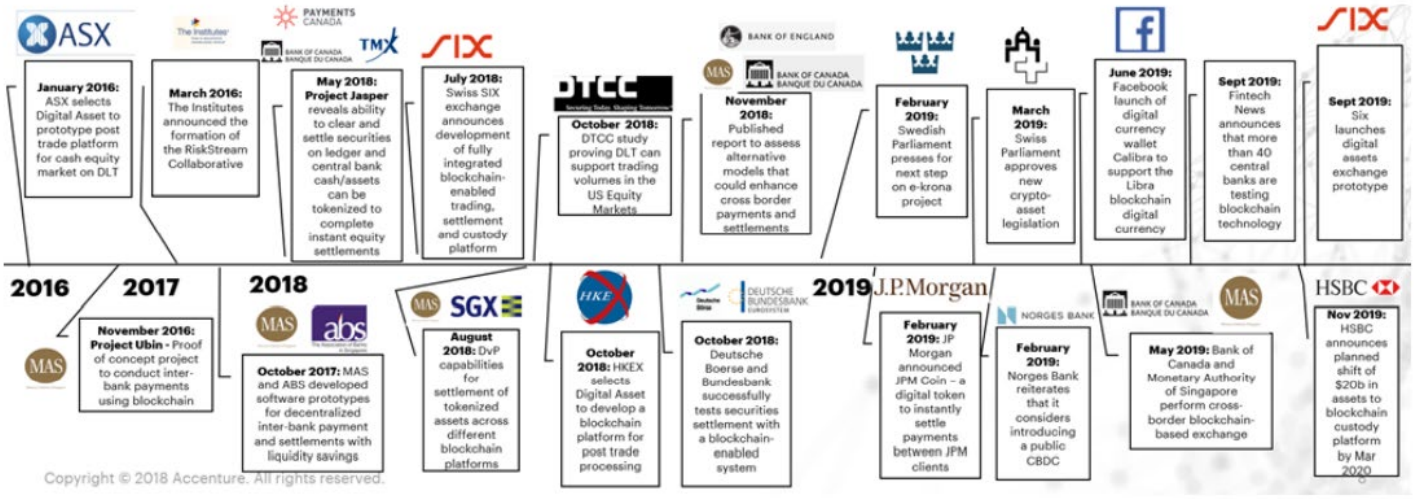
[3] For example, China's WeChat Pay service was launched in 2013, but now the number of users of the service has quickly grown to about 1 billion.

[4] The definitions of blockchain and DLT vary from speaker to speaker, but in general, DLT is a generic term for technologies that manage ledgers under a decentralized structure, and blockchain is often viewed as a subset of DLT (i.e., there can be DLT that does not adopt the structure of blockchain).

promising technology, and various proof-of-concept (PoC) and demonstration experiments are being conducted in various countries, including the application to financial transactions linked to commercial distribution and logistics, and the realization of simultaneous delivery of securities and funds (Delivery Versus Payment, DVP). A variety of Proof of Concept (PoC) and demonstration experiments are being conducted in various countries.

Efforts are also underway to use blockchain and DLT for the management and transfer of various assets and rights, as seen in security tokens (ST). As blockchain and DLT are increasingly applied to traded assets and rights, there is a growing need to apply these new technologies to the settlement of funds in exchange.

（Figure 1）Applications of Blockchain in Finance



（Materials）Accenture Japan Ltd.

（２）Recent New Developments

More recently, there have been some major new developments related to digital innovation in payments.

（Libra project）

First of all, there is the movement of the digital currency "Libra" led by Facebook, one of the "GAFA" in the U.S. that constitutes "BigTech".

Until now, cryptographic assets have been the subject of investment and speculation and rarely used for payment settlements because their value fluctuated too much and they did not have sufficient scale or network externality as a means of payment. In this regard, the Libra, whose issuance plan was announced in June 2019, is a digital currency designed to stabilize its value by making it a "stabled coin" backed 100% by safe assets denominated in multiple currencies, while utilizing the blockchain DLT, and to be used for easy remittance and settlement through smartphones and other devices. It is a digital currency designed to be used for easy remittance and payment through smartphones[5][6].

Libra is designed to be used for payment settlement by solving the problems that conventional crypto assets had, such as "too much fluctuation in value" and "insufficient scale of network," by (1) backing with secure assets and (2) the existence of more than 2 billion Facebook users.

However, if libra backed by assets denominated in multiple currencies were to circulate in a country in place of fiat currencies, it could lead to an indirect outflow of funds. In addition, the G20 and national authorities have expressed strong caution on the issues of money laundering and data protection. As a result, the issuance of libra, which was

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[5] Stablecoins are not always 100% backed by safe assets, but some are not 100% backed by safe assets, and some use algorithms to adjust the amount of coins issued in order to stabilize their value. In addition, the actual degree of value stability depends on the design of the security.

[6] The Libra is built using a development language called "Move", and its specifications are publicly available. https://developers.libra.org/docs/move-overview

scheduled for the first half of 2020, is now expected to be delayed significantly. In April this year, the Libra Association, which is expected to be in charge of issuing libra, also announced a major change in policy, saying that it would issue libra for domestic payment settlement that is 100% backed by assets denominated in the currency of the country concerned.

However, the issue raised by Libra should be taken seriously by all concerned: "Information technology innovations have made it possible to send e-mails to the other side of the world instantaneously, but these benefits have not been fully extended to payment settlements. In fact, with the increasing burden of KYC (Know Your Customer), AML (Anti-Money Laundering) and CFT (Countering the Financing of Terrorism) compliance (regulatory compliance), there is a growing need to address this issue. In recent years, banks have been withdrawing from the international remittance business against the backdrop of increasing burdens. Under these circumstances, there is a need to utilize digital technology to improve payment infrastructures, while linking new technology to lower compliance costs.

Libra's initiative is also interesting in that it shows the possibility of real-world application of blockchain DLT to payment infrastructure by introducing the scheme of "safe asset-backed stable coins". In fact, other projects have started to experiment with safe asset-backed stable coins in recent years[7].

[7] Examples include the JPM Coin, led by JP Morgan Chase, the Utility Settlement Coin (USC), in which several large banks participate, and the USD Coin (USDC), issued by Circle.

（Central Bank Digital Currency）

In recent years, there has been increasing discussion about the possibility of central banks using new information technology to issue their own digital currency (Central Bank Digital Currency, CBDC) as innovations in information technology drive the digitization and cashless operation of payment infrastructures.

Conceptually, there are two types of central bank digital currencies: (1) general-use CBDCs, which can be used by anyone in place of banknotes, and (2) wholesale CBDCs, which are used exclusively for large settlements. Wholesale CBDCs can be seen as a way to innovate central bank deposits that have already been digitalized, using new technologies such as blockchain and DLT. On the other hand, (1) "general use CBDC" has a wider range of economic issues than (2) wholesale CBDC, such as the possibility of shifting funds from bank deposits.

Most of the specific discussions so far have been related to the wholesale CBDC. For example, the Bank of Japan has been conducting a joint study with the European Central Bank (ECB), "Project Stella," since 2016. Similar projects have been undertaken in Singapore (Project Ubin) and Canada (Project Jasper).

And while the announcement of the "Libra" project and others have attracted global attention, many countries have recently accelerated their efforts in general use CBDC. Originally, Sweden (e-krona Project), where cashless society was rapidly progressing and cash was decreasing to 1% of GDP, and Cambodia (Project Bakong), where "dollarization" was progressing, had been studying and experimenting with the issuance of CBDC for general use. In April of this year, China began trial issuance of Digital Currency/Electronic Payment (DC/EP) in four cities in the country. In October, the European Central Bank and the Bank of Japan announced their plans to conduct demonstration tests of a "general use" central bank digital currency[8].

[8] On October 2, the European Central Bank released a report on a digital euro, a general-purpose central bank digital currency. By the middle of next year, the European Central Bank will decide whether to formally launch a project on the digital euro or not.

（Figure 2）Representative projects on central bank digital currencies and blockchain/DLT

Implementing body	Main contents
Dutch National Bank (DNB Coin)	Simulation of Bitcoin-type digital currency
Bank of China (DC/EP)	Development of a digital currency that contributes to the prevention of tax evasion, etc.
Sveriges Riksbank (e-krona)	A comprehensive review of the pros and cons of issuing a digital currency, e-krona
Bank of Canada, etc. (Project Jasper)	Large-scale settlement, trade finance, securities financing DVP, international trade, etc.
Monetary Authority of Singapore (Project Ubin)	Large-scale settlement, trade finance, securities financing DVP, international trade, etc.
European Central Bank and Bank of Japan (Project Stella)	Large-lot settlement, securities fund DVP, international transactions, etc.
Hong Kong Monetary Authority (Project LionRock)	Large-scale settlement, tokenization of securities, international transactions, etc.
Deutsche Bundesbank (Blockbaster Project)	Large-lot settlement, securities fund DVP, etc.
Bank of Thailand (Project Inthanon)	Large-lot settlement, securities fund DVP, international transactions, etc.
South African Subbank (Project Khokha)	Large-lot settlement, securities fund DVP, international transactions, etc.
Central Bank of Uruguay (e-Peso)	Testing of small mobile payment infrastructure
National Bank of Cambodia (Project Bakong)	Development of mobile payment infrastructure, etc.

（Global Spread of COVID-19 Infections）

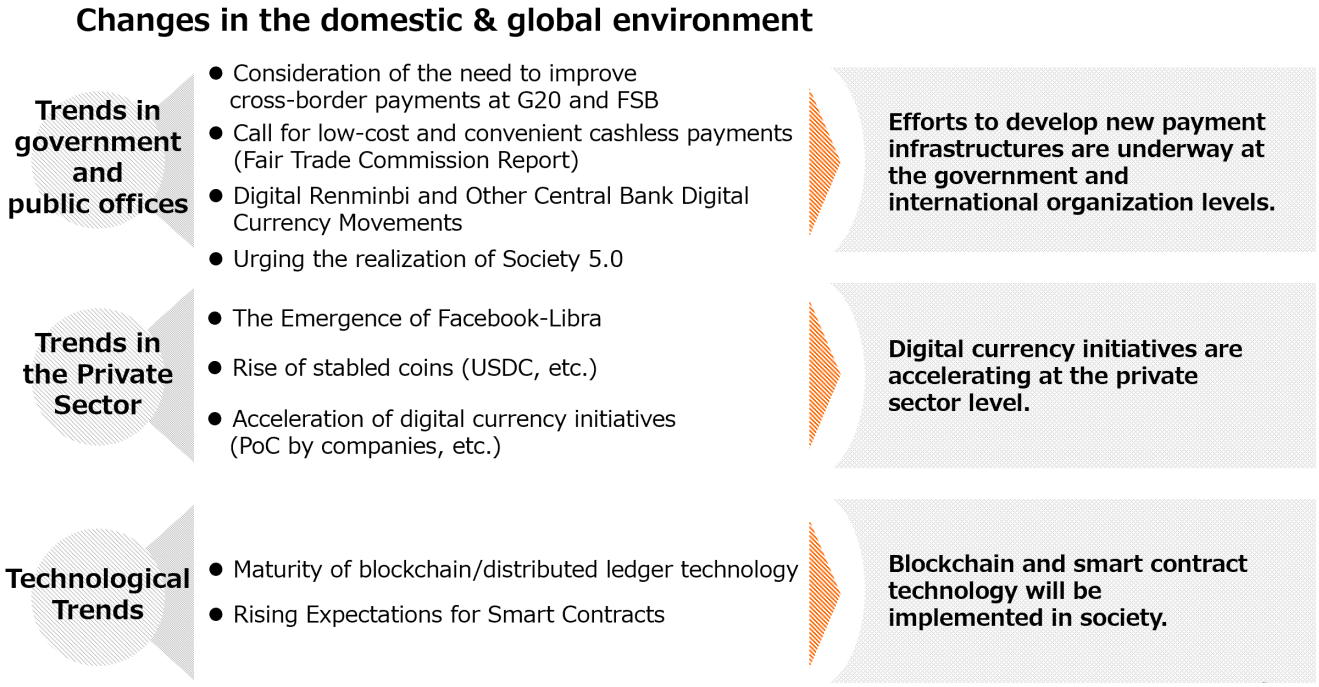
With the global spread of COVID-19 (novel coronavirus) since the beginning of this year, countries are making efforts to secure "social distance" and other measures, as well as strengthening economic DX initiatives such as the use of remote work and increased use of e-commerce. These changes in the environment are further encouraging the shift to cashless and digital payments.

As COVID-19 spreads, more and more consumers in many countries are trying to avoid contact with cash and cards as much as possible, and the number of ATM visits has plummeted in many countries.[9] In addition, there is a growing need for contactless payment methods.

In Japan as well, the use of electronic payments has been included in the proposal for "new lifestyles" by the Expert Committee on Countermeasures against New Coronavirus Infections. Thus, digital innovation in payment has become an important theme for the post-COVD-19 society.

[9] During this period, it is believed that many people withdraw large amounts of cash at one time and keep it on hand, and many countries have seen their cash balances increase rather than decrease.

（Figure 3）Environmental change and digital innovation in payments



（３）Challenges of Japan's Payment Infrastructure

Under the concept of "Society 5.0", the Japanese government is currently working on a vision of using digital technology to achieve both economic development and to solve social issues.

A digital payment infrastructure that is secure, efficient, and helps to utilize and protect data is an important prerequisite for the realization of "Society 5.0. However, Japan's payment infrastructure still faces many challenges.

（Problems associated with the "cash society）

Japan is still one of the world's leading cash societies. Currently, the cashless payment ratio (cashless payment amount/GDP-based consumer spending) is in the 20% range, which is as low as Germany in the world. In addition, the balance of cash is about 20% of GDP, which is outstandingly high in the world (by the way, Sweden's ratio is in the 1% range).

This is probably partially due to the relatively low level of counterfeiting of cash and the high level of reliability and convenience of the cash infrastructure, as well as the efforts of Japanese financial institutions to improve their branch and ATM networks. On the other hand, the extremely strong "network externality" (the property that the utility of each holder increases as the range of users expands) of existing cash makes it difficult for other means of payment to develop[10] .

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[10] Although cash is the legal tender in many countries, the degree of its use varies greatly in each country, with some countries having made considerable progress in going cashless. Network externalities are believed to be behind this. For example, if stores stop accepting cash and only accept cashless methods, they do not need to keep a large amount of cash, including coins, at the cash register, and this can lead to cost reductions, such as shortening employee training and reducing the burden on safes and security (in fact, in Sweden, many stores do not accept cash for this reason). (In fact, in Sweden, there are many "no cash" stores for this reason, and the fact that cash is less widely available than cashless methods,

Thus, several issues have been raised regarding the high use of cash and the relatively low use of cashless payment methods.

First, there is the issue of the costs associated with cash.[11] The distribution of cash involves a variety of costs, including handling, storage, transportation, and security. Japanese banks have a dense network of branches and ATMs compared to those in other countries, but to maintain this network, Japanese banks incur considerable costs. Stores also incur costs in accepting cash at the cash register, preparing change, setting up a safe for the cash, and physically transporting it. These costs are borne by the economy and society in one form or another.

In addition, cash has no information other than its "value" and is "anonymous" in the sense that the issuer, such as a central bank, cannot know who the holder is. While such anonymity is an advantage in terms of protecting the privacy of transactions, it also means that it is difficult to utilize information and data associated with payment and settlement, such as who bought what, when, and where. This can be a constraint to the development of the digital economy[12].

In addition, global scrutiny of money laundering has become increasingly stringent in recent years. In this context, the use of cash, especially for high-value transactions, has come under increasing scrutiny.

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especially in urban areas, has contributed to the decline in cash use. However, as many people continue to use cash for payment, it is difficult for stores to choose to stop accepting cash, as it would immediately lead to a decrease in sales. Thus, if existing payment methods have strong network externalities, it will not be easy for new payment methods to overcome them. The slow pace of cashless transactions in cash-intensive countries such as Japan and Germany, suggests the existence of such mechanism.

[11] Fujiwara, then chairman of the Japanese Bankers Association, referred to the cost associated with cash as being "about 8 trillion yen.

[12] For example, economic activities such as Mobility as a Service (MaaS) are almost predicated on the fact that payments are digitalized (e.g., paying for a rental bicycle ride with cash greatly increases the risk of theft of cash or the bicycle itself).

（Numerous digital payment platforms）

Although many digital payment platforms have emerged in Japan, the amount of money spent on each of them is still limited, and none of them has been able to break the stronghold of cash. The inter-operability of these digital payment platforms is also not high at present. As a result, digital payment methods in Japan have yet to acquire sufficient network externalities[13].

According to international comparisons, there is a significant amount of various payment settlement cards (credit cards, debit cards, electronic money) held in Japan. In addition, many digital payment methods using smartphone applications and QR codes have recently emerged. However, none of these methods have yet become a "universal" means of payment that can be used anywhere and for anything. As a result, many people carry many cards in their wallets, download apps for payment, and even carry cash. Thus, although there are many means of payment in Japan, none of them can be used anytime, anywhere, except for cash, and this is a limitation on the efficiency and convenience of the payment infrastructure.

On the other hand, it cannot be said that the efficiency of these networks will naturally advance under the market mechanism.

First, in Japan, where cash infrastructure is widely spread among people and people are accustomed to using it, the consolidation and rationalization of infrastructure supporting cash distribution (e.g., bank branches and ATMs) is likely to face opposition from existing users. In addition, it is not easy for entities that have been building infrastructure and networks, including platforms for cashless payments, at reasonable cost to accept the sunk cost incurred in scrapping them. Furthermore, the mutual opening of

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[13] Payment instruments are prone to strong "network externalities" (i.e., relationships in which the utility for each participant increases as the size of the network increases). For example, the more people who have credit cards, the more benefits there are to becoming a merchant, and the more merchants there are, the more incentives there are to have credit cards.

networks involves the problem of "free riding," which is not easy to negotiate[14].

With a fast pace of technological innovation, well-developed existing infrastructures can become rather "negative legacy" and work in the direction of slowing down the catch-up process. In the meantime, there have been notable cases overseas where countries with light existing infrastructures (e.g., emerging and developing countries) have adopted new digital technologies and rapidly caught up in the development of financial infrastructures[15]. Japan also needs to be fully aware of these global trends and actively promote innovation.

（Cost of cashless means）

In promoting the cashless and digitalization of payments - a challenge shared by many countries - there are several costs that need to be addressed, including.

① Costs associated with the installation and maintenance of reading terminals for digital payment

② Fees charged per use of digital payment

③ Time lag between transaction and receipt of payment (and liquidity costs during this period) when receiving payment by digital payment

These costs are also a factor that makes people hesitant to digitalize their payments. In April this year, the Japan Fair Trade Commission published a report titled "Competition Policy Issues for Improving Financial Services Using FinTech", which calls for the "realization of low-cost and highly convenient settlement", and there is growing interest

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[14] For example, if one entity opens up a network that it has spent a lot of money to build to newcomers, the entity that paid for it first will lose money. However, it is not easy to determine a reasonable cost burden between the two parties.

[15] Typical examples include Estonia, which has rapidly become a digital nation since the restoration of independence in 1991, and Kenya, which popularized mobile payments (M-Pesa) through the exchange of prepaid cell phone balances before the spread of banking services.

in this issue.

（Room to utilize new technologies）

New decentralized technologies, such as blockchain and DLT, are expected to have a variety of potential applications, such as linking logistics and commercial distribution with finance using smart contracts, realizing the simultaneous delivery of securities and funds (DVP), improving the efficiency of back-office operations, balancing anonymity and data utilization, and contributing to ESG through the designation of the use of funds. However - and this is also true for many countries - there is a need for a new way of doing things. However - and this is a challenge common to many countries - the application of these technologies to real-world business is still far from complete.

Simply applying digital technology to the payment and settlement side is not enough for the whole economy to reap the benefits of these technologies. It is also necessary to apply new technologies to the management and transfer of traded goods, services, and assets, as well as to streamline related paperwork and make effective use of data. In other words, to maximize the fruits of digital innovation in payments, it is necessary to build an efficient ecosystem while also reviewing transaction practices and conventions. For this purpose, cooperation and coordination among a wide range of actors beyond the framework of finance will be important.

（４）Significance of this study session

To innovate Japan's payment infrastructure through the application of new technologies, the Digital Currency Study Group was established in June this year with the participation of Japan's leading banks, major companies in a wide range of fields including retail, transportation, and information and communications, as well as experts. In June this year, the "Digital Currency Study Group" was established with the participation of leading Japanese banks, major companies in a wide range of fields including retail, transportation, information and telecommunications, and experts. The study group was joined by the Financial Services Agency, the Ministry of Internal Affairs and Communications, the

Ministry of Finance, the Ministry of Economy, Trade and Industry, and the Bank of Japan as observers.

Japan has produced many outstanding technologies, such as QR codes and contactless short-range communication technology. However, to avoid the "siloing" of the many platforms and to realize innovation in Japan's payment infrastructure as a whole and economic DX, it is necessary for a wide range of actors, including financial institutions, companies, users, relevant ministries and agencies, and the central bank, to cooperate and unite their individual efforts into a major driving force. With these issues in mind, this study group, consisting of a wide range of participants and led by the private sector, aims to examine the possibility of realizing a valuable digital payment infrastructure suitable for the digital society in Japan. The competition for the world's financial infrastructure is accelerating in the midst of the Corona disaster. In addition, payment infrastructures are inherently cross-business and cross-industry in nature. Furthermore, new technologies such as blockchain and DLT are most likely to reach their full potential in cross-industry areas, such as logistics and commerce, where a wide range of businesses and finance are connected.

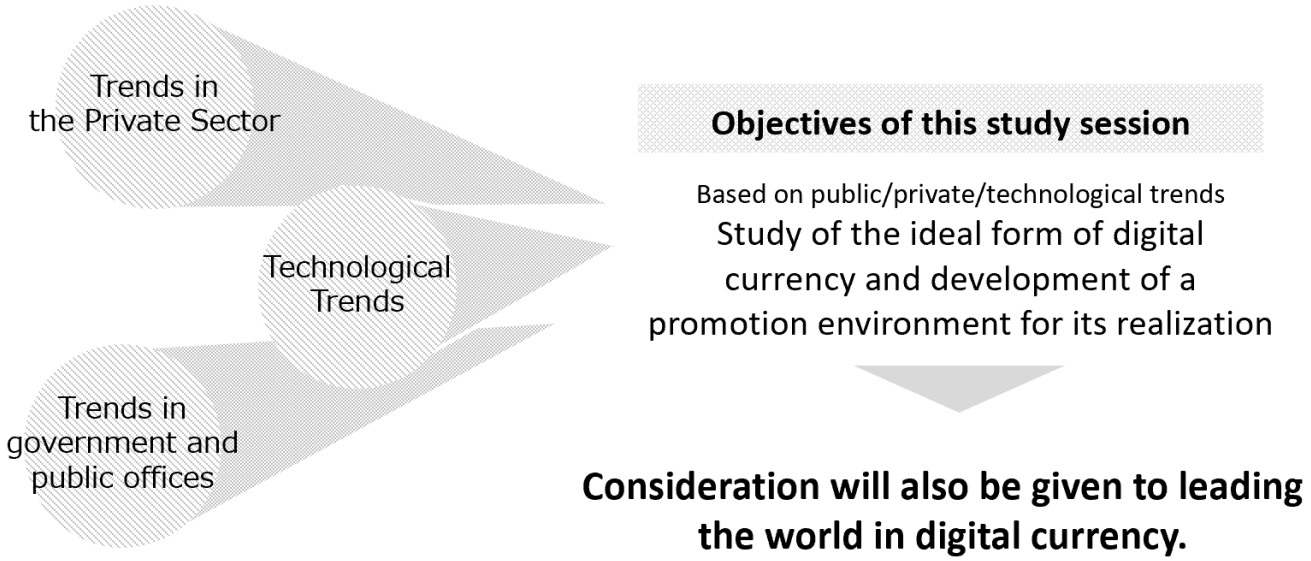
In addition, collaboration among a wide range of actors is necessary to address the issues surrounding payment infrastructure in Japan, such as the strong network externalities of cash, the existence of numerous payment platforms, and the lack of interoperability. In this regard, the participation of companies from a variety of fields in addition to financial institutions in this study group is of great significance.

By the end of September, the study group had held nine meetings and had been vigorously discussing the issues of "promoting private-sector-led innovation in an 'open' and 'agile' manner" and "Japan leading the way in global settlement infrastructure reform". The materials and the summary of the proceedings are available to the public[16].

In the meantime, the Zengin Net (Japanese Bankers' Network for Funds Settlement) established the "Task Force to Study the Next Generation Funds Settlement System" in

[16] https://www.decurret.com/company/studygroup-2020/

May. In July, the Bank of Japan established the Digital Currency Group within the Settlement Mechanism Bureau, and in October, as mentioned above, it announced its intention to conduct demonstration tests of a "general use" central bank digital currency. It is hoped that these efforts and the results of the study group will create a positive synergy that will improve the convenience and efficiency of Japan's payment and settlement infrastructure, leading to the revitalization of the Japanese whole economy.



２．Basic design and function of digital currency

（１）Definition of Digital Currency

－Relationship with Central Bank Digital Currencies (CBDCs) and crypto assets－

The term "digital currency" is polysemous, and its definition often differs from speaker to speaker. While some consider cashless payment methods to be "digital currency" in a broad sense, others consider only digital currency issued as central bank obligations, i.e., central bank digital currency, to be "digital currency.

In this study group, we will broadly define "digital currency" as "a means of payment and settlement that uses digital technology (electromagnetic technology)" so as not to exclude specific means a priori, from the perspective of promoting developmental studies for the future[17].In addition, from the perspective of "promoting innovation in payment infrastructure from the standpoint of the private sector," central bank digital currencies are not directly in the scope of consideration. On that basis, the study has been conducted with a strong awareness of "overcoming various issues (e.g., improving interoperability and coordination of commercial, logistical, and financial flows) through the application of new technologies and cooperation among a wide range of entities.

In addition, the study group is considering payment and settlement instruments that are compliant with the "yen," excluding from its scope those that use units other than the sovereign currency unit (yen, dollar, euro, etc.) and whose exchange ratio with the sovereign currency fluctuates, such as bitcoin and other conventional cryptographic assets[18].This is because the main objective of this study group is "innovation of Japan's payment and settlement infrastructure," and because we believe that the stability of the value of payment and settlement instruments is an important premise for solving the

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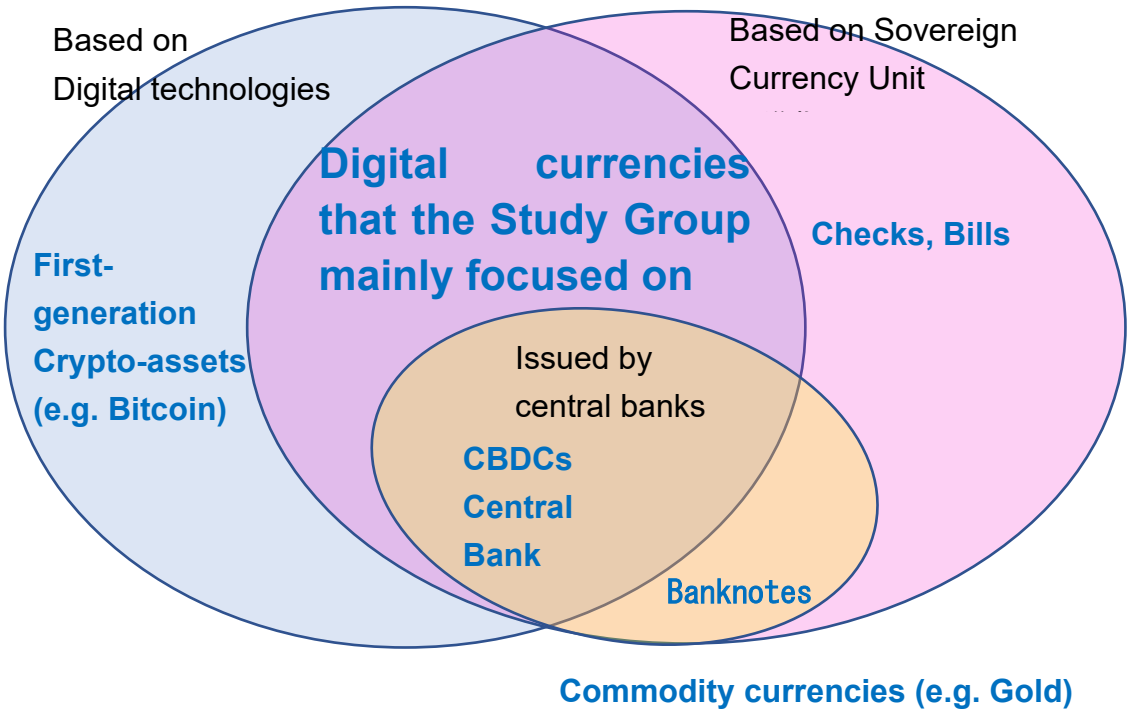
[17] In other words, a "central bank digital currency (CBDC)" is a subset of a "digital currency" (a digital currency issued as a debt of the central bank).

[18] In other words, it covers digital payment instruments that are denominated in yen or that can be exchanged for yen-denominated assets (cash or deposits) on a 1:1 basis.

current issues.

（Figure 4）Digital currencies that the Study Group mainly focused on



（２）Significance of Digital Currency

Through the following channels, digital currencies are expected to contribute to overcoming the challenges facing Japan's payment infrastructure, improving the efficiency and convenience of economic activities, and lead to the DX of the economy.

①　Reduce economic and social costs

The replacement of cash payments with digital means will reduce the costs associated with cash, including cash acceptance, storage, security, transportation, and change preparation.

Financial institutions currently incur considerable costs in maintaining their store and ATM networks. However, with the aging of the population and the prospect of a post-Corona society, it will become increasingly important to provide access to financial services at home, without physically visiting a store or ATM. Digital currency can be used for this purpose, while streamlining the existing infrastructure to make financial services sustainable.

Forcorporates, the incorporation of smart contracts into digital currencies will also expand the possibilities of automating back-office operations and reducing the cost of inventory clearance by linking logistics and commercial information with payment and settlement.

Furthermore, if the digital currency received in exchange for goods and services can be immediately used for payment, the time lag until funds are converted can be shortened for the recipient, leading to savings in liquidity costs.

②　Risk reduction

The use of digital currency could also contribute to risk reduction.

For example, the transfer of financial assets and goods, such as securities, and the performance of services, as well as the delivery of digital currency, can be realized simultaneously through smart contracts, thereby reducing risks for both parties involved in the transaction.

In addition, the experience of COVID-19 has further encouraged the digitalization and remote support of economic transactions. With the spread of infectious diseases, the use of e-commerce and other services is increasing in many countries, but these transactions also inevitably involve payment settlement. In Japan, cash on delivery (COD) has been used in which a courier driver receives payment in cash in exchange for the package.

For people to use payment infrastructures, including digital payment infrastructures, with confidence, it is essential that their security is sufficiently reliable. From this perspective, the use of new technologies such as blockchain, DLT, cryptography, and biometrics for security and privacy protection will be important to reduce risks and promote digital innovation in payments while gaining people's trust.

③ Promote innovation and economic DX

The use of digital currency is expected to have the effect of promoting a wide range of innovations through the utilization of data associated with payment and settlement, and to facilitate the development of the digital economy and economic DX.

Historically, money has served as a medium for connecting the economic activities of people and companies, facilitating the exchange of various goods and service and forming the foundation of the economy and society. The application of digital technology to money will further strengthen the function of such money. Furthermore, digital currency can be a tool to collect, accumulate, and utilize various information and data associated with payment and settlement.

Around the world, BigTech companies such as GAFA and BAT are entering the digital payments space, offering services that connect a wide range of businesses such as retail, transportation, and telecommunications with finance. These companies are utilizing the data associated with payment and settlement for a variety of businesses and seamlessly connecting a wide range of services through payment functions. In Japan as well, the use of digital currencies led by the private sector is expected to significantly automate and streamline transactions, utilize data associated with payment and settlement, and seamlessly link a wide range of services.

In recent years, efforts to apply blockchain and DLT to the management and transfer of various assets and rights have been progressing. A typical example is "security tokens," which have been attracting attention with the introduction of the "right to transfer electronic records" in the amendment to the Financial Instruments and Exchange Law this year. If blockchain and DLT are used for the management and transfer of goods, assets, and rights that are the subject of transactions, there will be more room to improve the efficiency of transactions and reduce risks by applying these means to the settlement side. For example, smart contracts could be used to simultaneously transfer financial assets and consideration, thereby reducing stripping risk and streamlining administration.

Promoting innovation through ① cost reduction, ② risk reduction, and ③ data utilization will be important from the perspective of monetizing the use of digital currencies and autonomously covering the cost of maintaining the infrastructure.

（３）Attributes required for digital currency

To overcome the challenges of Japan's payment infrastructure and promote DX in the economy, digital currencies need to have the following attributes.[19]

①　Stability of value, security, and reliability of infrastructure

For digital currencies to be used with confidence, their value must be stable, and credit risk must be reduced to a level sufficient to gain trust as a means of payment and settlement, including large size settlements[20].

It is also important that the infrastructure of digital currency is sufficiently resilient to cyber-attacks, natural disasters, and power outages, and that it can operate stably.

In addition, there is a need to adequately address the risks of crime, misuse, and misappropriation for money laundering and terrorist financing. From this perspective, it will be important to apply new technologies such as cryptography, digital signatures, and biometrics to the security field.

In addition, it will be necessary to provide sufficient scalability to handle an increase in the volume of transactions.

②　Availability, immediacy, and interoperability

Cash is a means of payment that can be used widely by anyone, at any time (365 days a year, 24 hours a day <often referred to as "24/7" overseas>), anywhere, between individuals, and offline. Therefore, for digital currency to be as convenient as cash, it

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[19] Of course, the solution to these problems is not limited to issuing a new digital currency, but can also be approached by improving the existing infrastructure. Digital currency and improving existing infrastructures should be complementary, not exclusive, approaches.

[20] The creditworthiness required of a payment settlement instrument depends on the amount of money involved. For example, it goes without saying that a high level of creditworthiness is required for instruments used for payments of large amounts, such as intercompany payments. On the other hand, if the payment method is limited to the settlement of small amounts, it may not be required to have such high creditworthiness.

is desirable to ensure "universality" in that it can be used by anyone, at any time[21].It is also desirable to have a high level of "availability" so that it can be used for offline money transfers between individuals (Peer-to-peer, P2P), cell phones, smartphones, cards, etc., in case of natural disasters or power outages[22].

In this regard, by combining blockchain, DLT, and cloud computing, it is possible to build an infrastructure that can be used 24 hours a day, 365 days a year, without being constrained by the operating hours of specific computers, and that can be applied to offline money transfers between individuals.

In addition, cash has "immediacy" in that the entity that accepts it can immediately use the cash for its own payment. For digital currency to have immediacy similar to that of cash, it is desirable that there is a short time lag before the entity that receives payment in digital currency can use it for its own payment.

Furthermore, payment and settlement infrastructures have a network externality: the larger the network, the greater the utility for individual network participants. From this point of view, a situation in which many networks are "siloed" is not a situation of high convenience for users[23].Inter-operability between different platforms could be a

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[21] In addition, it will be important to have a user interface (UI) that is convenient and familiar, and a user experience (UX) based on this UI, so that it can be easily accepted by a wide range of users.

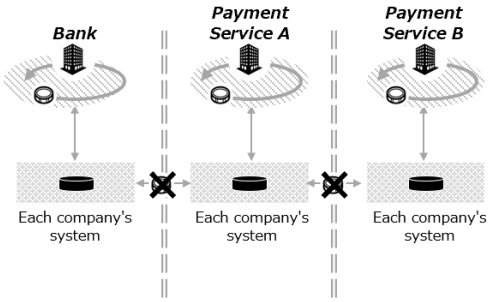
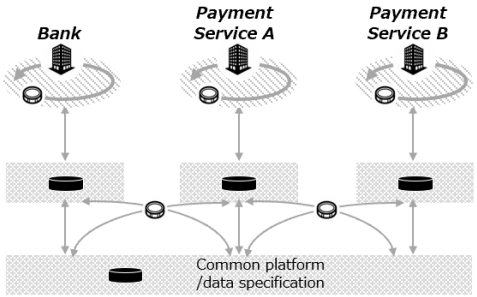
[22] To enable offline remittance between individuals 24 hours a day, 365 days a year, it is conceivable to give digital currency a "token" character (enabling "stored value type" transfers). In this case, the following questions need to be addressed: (1) what is the legal and institutional status of such token-like digital currency; (2) how to deal with the possibility of discrepancies between the records on the terminal and the records on the online ledger when remittances are made between terminals offline; and (3) how to deal with money laundering in terms of the transfer of rights offline.

[23] On the other hand, individual platform operators are likely to be reluctant to open up their costly platforms to smaller platforms due to concerns about "free-riding. Therefore, in addition to overcoming technical issues, negotiation and coordination among stakeholders will be important in enhancing interoperability.

solution to increase user convenience while promoting healthy competition among networks[24].

（Interoperability required for digital currencies）

New payment infrastructures are required to ensure interoperability among diverse companies and economies, and to achieve cash-like network externalities.

Lack of interoperability and distributability (siloing)	✓ What is required for digital currency? Ensuring interoperability and distributability
If each company or economic zone builds a separate digital currency platform, the system will be siloed, creating unnecessary costs, operations, and lead time.	By using a common data specification and platform for each company, value exchange is made seamless and highly distributable. Costs and operations are optimized, and lead times are shortened.
	
1 Cost reduction ✕ To cross siloed systems, it costs money to go through intermediaries and relay systems. (e.g., it is necessary to go through an intermediary bank when withdrawing funds to a merchant's bank account of a code payment provider, etc.)	1 Cost reduction ○ No need for intermediaries, relay systems, data conversion, etc. to connect systems of different companies, and no need for commissions through intermediaries.
3 Innovation Promotion ✕ Each company's system is siloed, making it difficult to utilize data effectively. This is a barrier to the creation of innovation across companies.	3 Innovation Promotion ○ Promotes cross-company data utilization and can serve as a foundation for innovation creation

[24] From the perspective of preventing the siloing of "authentication methods" between different platforms, it will also be important to improve the interoperability of authentication.

③ Development through programmability, etc. [25]

As we move forward with DX in the economy, it will become increasingly important to use digital technology to solve a variety of business needs, such as the utilization of data associated with payment and settlement, and the linkage of finance with commercial distribution and logistics. For this purpose, the use of digital currencies that can be embedded in programs (i.e., that have "programmability") can be an effective measure [26] .In addition, in incorporating such programs, new technologies such as blockchain/DLT and smart contracts have the potential to contribute to solving problems.

Areas where programmable digital currency can make a significant contribution	Use Case Example
Streamline and automate transactions involving multiple players (sometimes spanning goods, commerce, and money).	• Manufacturing and retail supply chain payments • Payment for as a Service (e.g., MaaS)
Improving the efficiency and immediacy of settlement for transactions involving multiple levels of commercial flow	• Manufacturing, retail supply chain payments, etc.
Provision of new added value through the use of payment data, etc.	• Insurance • Finance

[25] The "Central Bank Digital Currencies: Basic Principles and Characteristics" published by the seven central banks and the Bank for International Settlements (BIS) on October 9, 2020 also states that central bank digital currencies "may offer opportunities that have not previously been possible with cash," and cites the supply of "programmable money" as one such possibility.
https://www.bis.org/publ/othp33_summary.pdf

[26] This does not mean that blockchain, DLT, etc. must be used for digital currencies, but it would be beneficial to use the right technology for the right application. Particularly, for simple transfers of value, where there is little need for smart contracts, the approach of improving the existing centralized infrastructure may be effective.

Efforts are also currently underway to use blockchain and DLT for the management and transfer of a wide range of goods and assets. Examples include inventory management, logistics, supply chain management, security tokens, and the management of real estate, precious metals, and paintings. From the perspective of maximizing the economic benefits of these initiatives, it would be beneficial to realize payment methods that can be embedded with blockchain/DLT-based programs to connect the exchange of funds with goods and assets.

（４）Designing a digital currency to solve problems

① Design assumptions

One possible way to enhance the creditworthiness of digital currencies is for central banks, which do not bear credit risk, to issue digital currencies (central bank digital currencies, CBDCs) as their own obligations. However, the study group is aiming for "innovation in payment and settlement infrastructures through private-sector initiatives," and from this perspective, a central bank digital currency is not within the direct scope of the study group.

CBDCs are not necessarily the only option to ensure that digital currencies have sufficient creditworthiness. Even today, payment settlement using deposits (commercial bank money) is widely used, including for large payments between companies. The creditworthiness of deposits is ensured by special regulatory supervision of banks (e.g., capital adequacy regulations) and deposit insurance. Therefore, one possible way to realize a digital currency is to use new technologies such as blockchain and DLT to upgrade private bank liabilities such as deposits.

In addition, based on the "deposit" of issue guarantees in prepaid means of payment and the recent scheme of "stabled coins" such as Libra, the creditworthiness of private-sector debt can be enhanced by backing it with assets (cash, deposits, government bonds, central bank deposits, etc.).

While discussing the requirements, definitions, and feasibility of digital currencies,

the study group decided to first envision a "digital currency issued by a private bank" and then consider schemes to back up the creditworthiness of the currency with safe assets, from the perspective of promoting studies with a wide range of future applications and high potential for development.

The study group does not have a specific view on the pros and cons of central banks issuing digital currencies. However, even if a central bank digital currency is issued in the future, it will coexist with private-sectordigital currency, and private-sector initiatives will be respected in payment innovation[27].In other words, even if a central bank digital currency were to be issued, this would in no way diminish the role of the private sector as a digital payment instrument, but rather the two sides should work together to contribute to digital innovation in payment infrastructure.

In fact, even if a central bank digital currency were to be issued, it would be unrealistic to expect the central bank to implement services and programs in the CBDC to meet individual business needs, develop interfaces for customers, provide wallets, and handle KYC (Know Your Customer) and money laundering. It would be unrealistic to implement such a system. In addition, there are many problems associated with the large-scale accumulation of information and data associated with daily payments and settlements at a central bank rather than a private entity[28]. In fact, the People's Bank of

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[27] In the "Central Bank Digital Currencies: Basic Principles and Characteristics" published by the seven central banks and the Bank for International Settlements (BIS) on October 9, 2020, the basic principles and characteristics for general-use CBDCs are that they "can coexist with and complement other existing forms of money while promoting innovation and efficiency. It also states, "It should be robust and compatible with public money. It further states that "the coexistence of public money and robust private money will be maintained" and that "CBDC systems should be set up so that the private sector plays an appropriate role and competition and innovation are promoted.
https://www.bis.org/publ/othp33_summary.pdf

[28] The "Bank of Japan's Policy on Central Bank Digital Currency," released by the Bank of Japan on October 9, 2009, also states that "from the perspective of promoting innovation, it is necessary to carefully consider the coordination and roles and responsibilities of the central bank and private sector.

China, the European Central Bank, and the Bank of Japan have all stated that when they issue CBDCs for general use, they will consider issuing them in an "indirect" format, while maintaining the "two-tier structure" of the central bank and the private sector[29].Thus, the merits of a central bank digital currency will be fully realized only when it is coupled with digital innovation by the private sector. Therefore, the deepening of the study on central bank digital currencies will further enhance the significance of the study on private-sector digital currencies by this study group.

Furthermore, even in cases where non-banks and other entities other than banks will be the issuers of digital currencies, the consideration of digital currencies mentioned above with a view to "strengthening creditworthiness through backing assets" can be widely applied.

In this way, it will be beneficial to study digital currencies with the schemes of "issuance by private banks" and "reinforcement of creditworthiness by backing assets" in terms of future applicability and development of the discussion[30].

Of course, there are many areas that have not been fully explored at this stage, and we need to continue to examine how digital currency can benefit various economic entities and economic society, and what kind of transformation it will bring. However,

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In addition, it is necessary to consider the division of roles between the central bank and the private sector in terms of "who will acquire and manage data, to what extent, and under what conditions.
https://www.boj.or.jp/en/announcements/release_2020/data/rel201009e1.pdf

[29] Based on this awareness, the concept of "sCBDC (Synthetic, Central Bank Digital Currency)," in which a private economic entity issues a digital currency and its creditworthiness is secured by a current account at the central bank, has recently attracted attention. The concept of "sCBDC (Synthetic, Central Bank Digital Currency)" is gaining attention. For more information on sCBDC, please refer to the following
https://blogs.imf.org/2019/09/26/from-stablecoins-to-central-bank-digital-currencies/

[30] Digital currency here is assumed to be able to be issued without restriction through a 1:1 exchange with cash or deposits (because if a cap were placed on the amount of digital currency issued, it would be difficult to maintain a 1:1 exchange ratio).

the speed of information technology innovation and economic and social change is extremely fast, and it is difficult to completely cover the future that lies beyond our imagination even if we only continue to discuss it on the table. Under these circumstances, if we are too quick to say, "We will start concrete efforts only after the consequences of introducing digital currency and the institutional environment are clear," there is a risk that our financial infrastructure will miss the wave of technological innovation.

Based on this awareness of the problem, this study group decided to embark on a search for use cases through a proof of concept (PoC) and other means, based on the idea that it is important to first consider what can be done and then take concrete steps to study. In the course of these studies, we will continue to deepen our examination of the economic impact and institutional issues of digital currency in light of specific use cases.

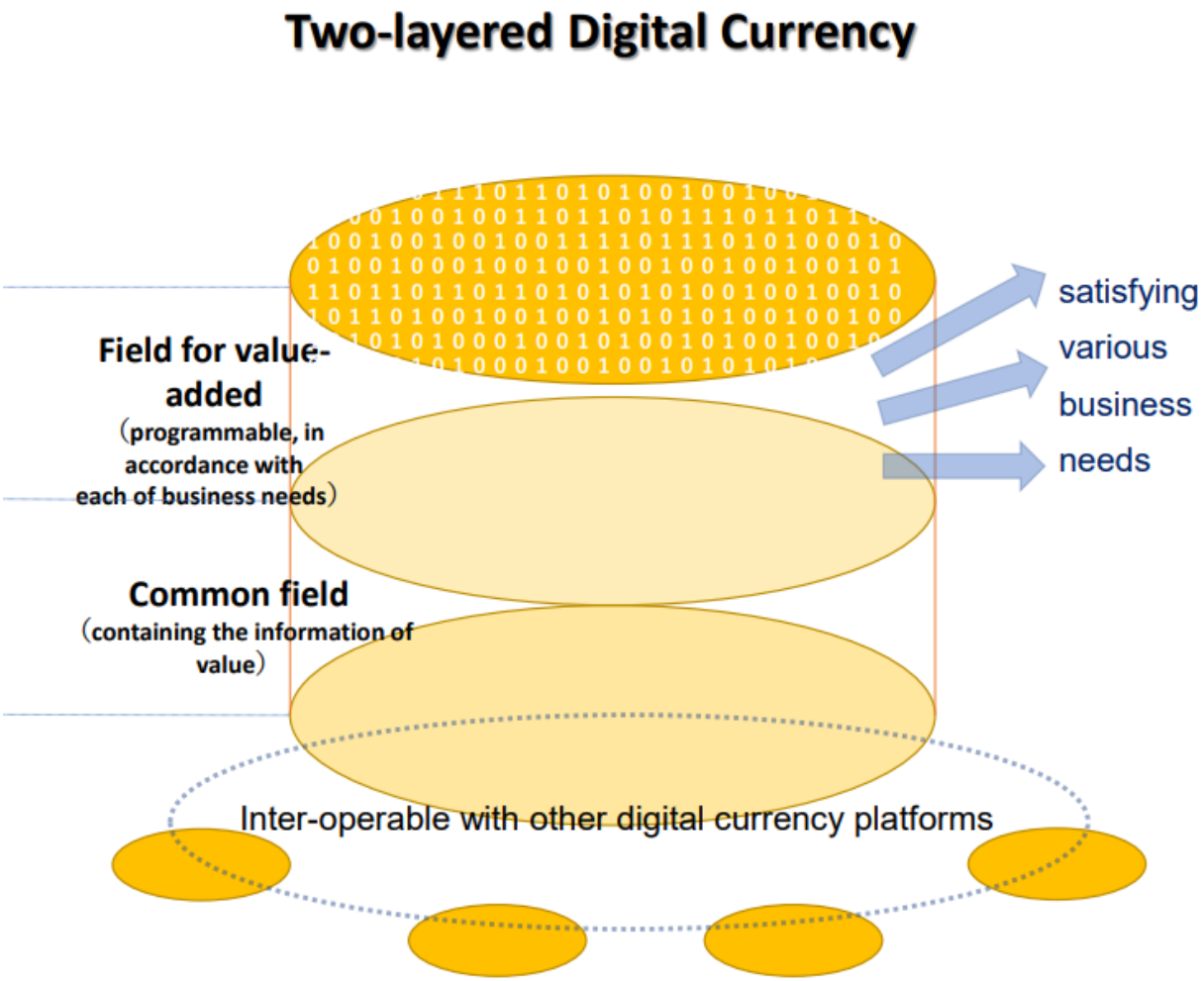
With this in mind, we welcome the initiatives for digital innovation in payments by various entities, including the Bank of Japan's consideration of a central bank digital currency. We hope to contribute to the innovation of Japan's financial infrastructure by creating positive and interactive synergies with these initiatives.

② Two-tiered digital currency

For a digital currency to have both high interoperability and development potential, as well as (a) sufficient cooperation to provide "network externality" as a means of payment, and (b) a competitive environment that is important in realizing private-sector-led innovation, the digital currency itself should have a "two-tier structure" consisting of common and additional domains.

No matter how innovative a digital currency may be, if it lacks interoperability and is created for each individual business need, it will not be easy to achieve "network externality" and will likely be buried among existing platforms. With these issues in mind, the "two-tier structure" described above was devised so that digital currencies

can contribute to the improvement of Japan's overall financial infrastructure through both cooperation and innovation. First, the common area (infrastructure area) is the common area for all digital currencies issued under the scheme, where data on the "value (~yen)" of the digital currency will be written. Based on this, digital currencies issued by different entities may be exchanged or used as a "bridge" between various payment and settlement platforms. Through this area, there is a prospect of enhancing interoperability between payment and settlement platforms, providing them with sufficient network externality, and increasing user convenience. In addition, simple inter-personal remittances that do not require smart contracts, etc., may be processed only in the common domain.



The additional area is where the issuing entity writes programs such as smart contracts according to individual business needs. By utilizing this additional area, it is possible to link finance with logistics and commercial distribution to meet advanced business needs such as streamlining supply chain management and erasing inventory. Furthermore, it will be possible to meet a variety of needs, such as the realization of simultaneous delivery of securities and funds (DVP) and the streamlining of back-office operations. In addition, a digital currency with such a dual structure will support the utilization of information and data associated with payment and settlement.

The following is a tentative scheme for the issuance and circulation of a digital currency with a two-tiered structure.

① First, the issuer of the digital currency (e.g., a private bank) writes a program based on various business needs on the upper layer of the digital currency in response to customer requests, etc., and issues the program in exchange for cash or deposits (of course, the company receiving the digital currency could write the program itself).[31]

② This digital currency will be used for a variety of transactions, including payments to suppliers and companies tied to the supply of parts and delivery of goods, payments to shipping companies for the delivery of goods, and DVP settlement for securities and security token transactions.

③ Another bank that collects this digital currency will exchange it for deposits or another digital currency. This will ensure interoperability between different platforms[32].

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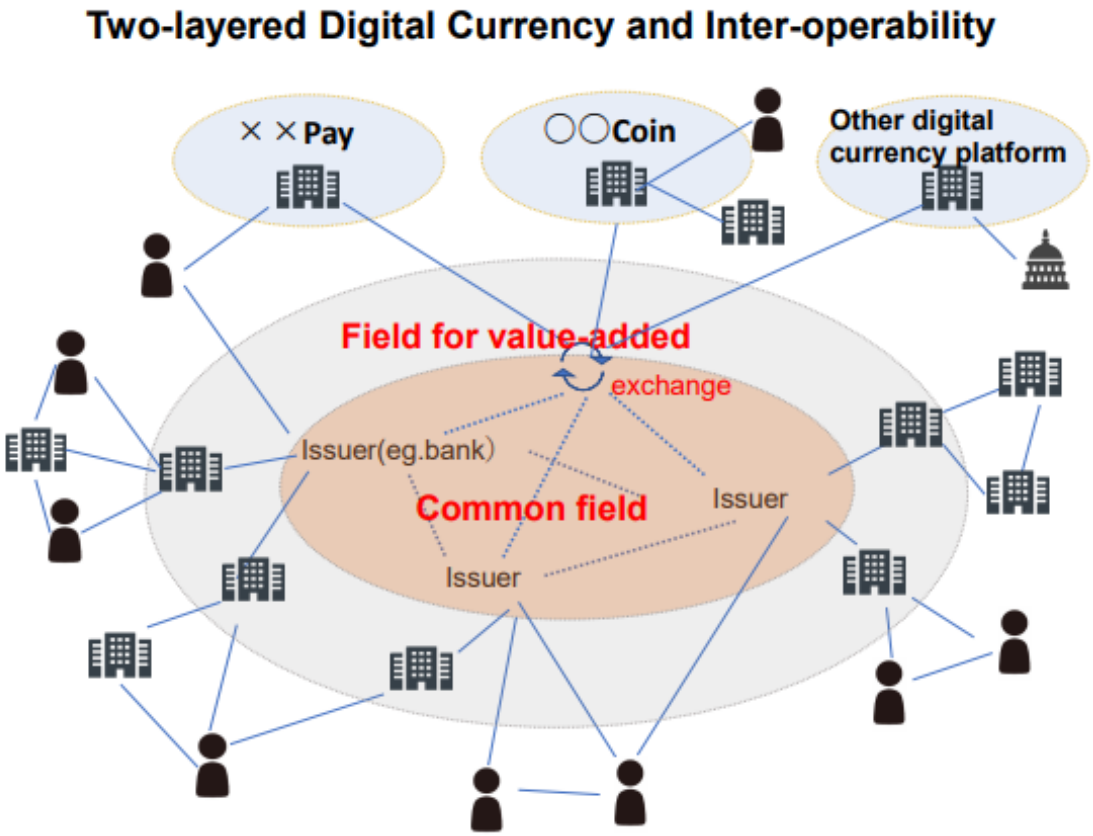
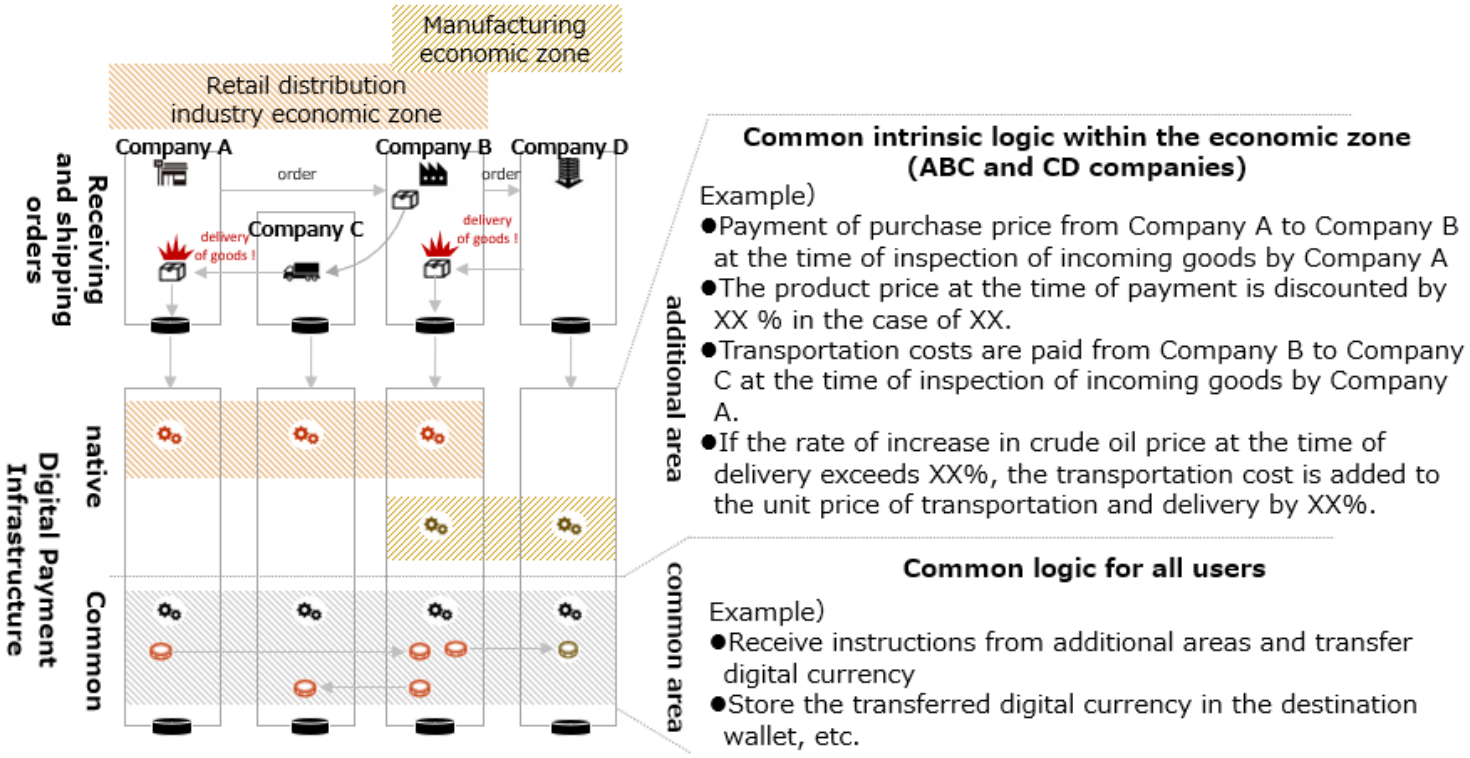
[31] This kind of writing of programs that reflect unique business needs in the additional parts is often referred to as "colored coins" in the world of crypto assets.

[32] To improve interoperability, it is also important to work on the front end (the point of contact between the customer or store and the payment service provider), such as common QR codes and payment terminals.



The specifications of the digital currency and the related API (Application Programming Interface) will be made public as much as possible, and this will support the participation of many companies in the provision of services tied to the digital currency. In other words, the common area of the two-tiered structure will be used extensively as a "non-competitive area," while the additional area will be used as a "competitive area," and the parties involved will be able to write programs with their wisdom. In this way, we aim to achieve both "cooperation" to ensure the network externality of the payment infrastructure and healthy "competition".



Another possible advantage of a digital currency with a two-tiered structure is that the advantages of the current financial structure of "central bank, private banks, general corporations and individuals" can be incorporated to a significant degree in the digital world. Specifically, they are as follows.

（Stability as a means of payment, high creditworthiness and reliability）

It can be "yen-denominated" and its value can be stabilized through issuance in exchange for cash or deposits. In addition, through issuance by banks that are subject to regulation and supervision, and through the enhancement of creditworthiness through safe assets, digital currencies will have creditworthiness and reliability similar to that of central bank debt, and can be used for large settlements between companies in the same way as deposits.

（Promoting Innovation）

Through the ability to write programs that meet various needs into additional parts of

the system, it will be possible to encourage innovation in the payment infrastructure while leveraging private sector incentives.

（Utilization of data）

This will allow the private sector to utilize the data associated with payment and settlement without concentrating it in the hands of a specific entity such as a central bank.

（Ensuring Inter-operability）

The common part of the digital currency can be used to enable digital currencies to be exchanged with each other, thereby enhancing interoperability.

Of course, how to technically realize a digital currency with such a two-tiered structure is itself an issue for the future. Careful consideration is also required on how to ensure the security of such a digital currency and how to deal with KYC and AML/CFT, for example, to what extent the framework of KYC and AML/CFT currently used by banks can be applied. It will also be necessary to continue to consider how to separate the common domain from the additional domain, and to what extent the common domain should have functions. These issues will be further discussed in the future.

３．Use Cases for Digital Currency

（１）Summary

Next, we will enumerate specific use cases where digital currency can contribute to solving various issues, improve the efficiency of transactions, and promote DX in the economy.

In this study group, we have been examining specific use cases where digital currency can contribute to improving the convenience and efficiency of economic transactions, reducing costs, and creating added value in reality. As a result, a number of use cases have been proposed, as described in this chapter.

In this study group, we are looking forward to developing these use cases into proof of concept (PoC) and demonstration experiments in the future. For the use of digital currency to fully demonstrate its effects, the key is to conduct a comprehensive review of the practices and structure of transactions and to build an efficient ecosystem. In the course of such efforts, the use of sandbox systems may be an option, if necessary.

The use cases listed here are only examples and are not exhaustive. It is not the intention of the participants of this workshop to conduct PoC for all of these use cases, and there may be other promising use cases in addition to those described in this report. The study group expects that the results of the study, including the specifications of the digital currency to be developed, will be widely disclosed and that a wide range of companies and economic entities will voluntarily engage in PoC and demonstration experiments based on these results.

（２）Legal, institutional, and economic issues

It is also important to consider the legal and institutional status of digital currencies and the economic impact if they are widely used.

Regarding the legal and institutional issues, there are a variety of digital payment instruments currently in use, some of which are positioned as exchange transactions by banks and money transfer companies, some as prepaid means of payment, and some as

cryptographic assets. How the newly issued digital currency will be positioned will largely depend on the scheme, and it is difficult to determine at this point.

As for economic issues, the impact on financial intermediation and the economy may vary depending on the issuer of the digital currency, the scheme of the underlying assets, and the degree to which it replaces cash or bank deposits[33].Furthermore, how to cover the cost of operating digital currency infrastructure and how to build an autonomous and sustainable ecosystem, and at the same time, how to secure incentives for users to use digital currency, are also issues to be addressed.

From the perspective of promoting innovation without being overly constrained by legal issues and economic implications, the study group plans to proceed with PoC and demonstration experiments without deciding on the legal status and economic impact of digital currency at this stage. Then, we will deepen our study on the legal, institutional, and economic aspects of digital currency in parallel, based on the PoC and other studies.

To promote digital innovation in payment infrastructures and link it to the DX of the entire economy, it will be important to bring together a wide range of stakeholders in an open environment and work on it autonomously. Based on this awareness of the issues, the Digital Currency Forum to be formed in the future will strive to create an environment in which the results of the study, such as the specifications for a two-tiered digital currency, can be shared with as wide a range of actors as possible, so that they can be involved in the innovation from their respective standpoints. In this way, we would like to call for the voluntary participation of a wide range of actors in the digital innovation of payment infrastructures and promote initiatives in an open and agile manner.

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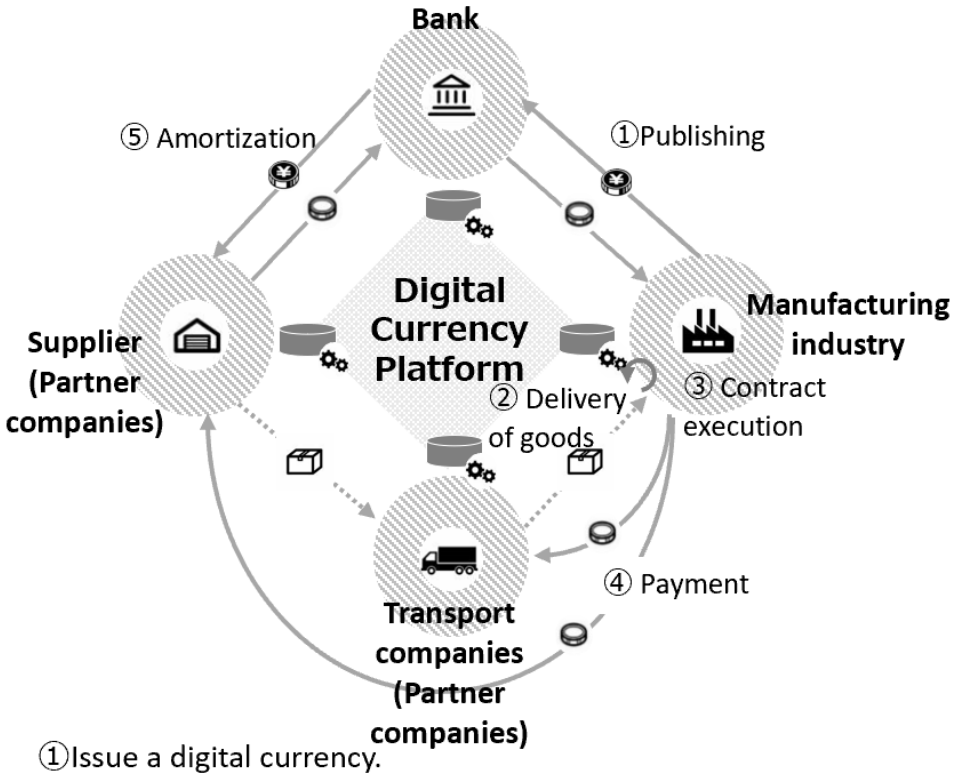
[33] For example, if the creditworthiness of a digital currency issued by a private bank is secured by 100% backing from central bank deposits, the impact on financial intermediation would be the same as that of a central bank digital currency, since central bank deposits cannot be invested in any other way in exchange for the issuance of the digital currency. On the other hand, if a private bank transfers its deposits to a separate account and issues a digital currency in exchange for the deposits, the bank will be able to use the deposits for investment.

（３）Examples of specific use cases

①　Linking Manufacturing Supply Chains and Payment Settlements

In the supply chain of the manufacturing industry, a large number of parts are delivered and payments are made between companies. By linking the exchange of such parts with the settlement of payments in digital currency, it is conceivable to streamline and improve the efficiency of related administrative work as well as to improve the efficiency of cash management.



①Issue a digital currency.
②A supplier delivers a product to a manufacturing company
③Execute a smart contract triggered by the delivery.
④Automatically execute payment processing for each transaction with digital currency.
⑤Amortize the digital currency.

Specifically, through a smart contract, the delivery or inspection of parts from a parts manufacturer to an assembly company triggers an automatic payment in digital currency for each transaction. In other words, the idea is to link the logistics and

commercial flows in the supply chain with the flow of funds.

This could lead to cost savings in reconciliation work for invoicing and payment, and in transfer operations. For example, there is currently a cost associated with the verification and reconciliation of amounts for monthly payments, which could be saved.

In the PoC, in addition to verifying the feasibility and identifying issues, the feasibility of executing smart contracts across multiple companies and whether or not they can be linked to existing systems will be subject to verification. In addition, the degree of efficiency improvement in fund management and operations, and the processing capacity when transactions increase will also be subject to verification.

To build an ecosystem that can improve the efficiency of the entire business, it will be important to make component supply contracts between companies more suitable for digital transactions, redefine the business itself, and standardize business practices. For example, standardization of order and supply systems (EDI, etc.), which currently differ from company to company, standardization of the numbering system for identifying parts, etc., and review of business practices such as price fixing after parts have been shipped are likely candidates. In addition, if business and processes can be standardized across multiple supply chains, systems and contracts can be standardized as much as possible.

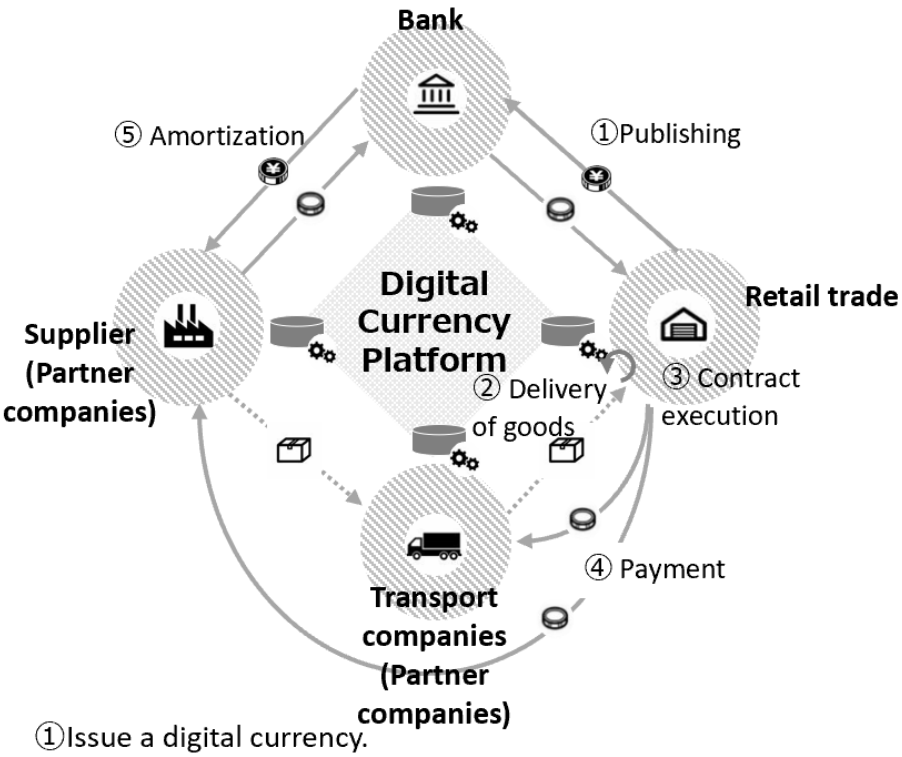
Through such efforts, it will be possible to apply the scheme of using digital currency to a wide range of supply chains that are not limited to a specific group of companies. In the current supply chain, many component manufacturers do not deliver to only one specific company, but to multiple companies, thus creating an economic sphere with a diverse mix of companies. Therefore, the more the scheme is standardized, the greater the benefits will be.

In addition, to realize real-time payment, the ordering (paying) company may need to prepare funds earlier, and the interests of the ordering company and the delivering company may not coincide. Therefore, to improve the financial efficiency of the supply chain as a whole, it may be important to coordinate a wide range of stakeholders and to respond to changing financial needs. In addition, smart contracts could be used to

address such needs, for example, by incorporating programs such as "payment is made after a certain period of time from the delivery of parts" into digital currencies.

② Linking Retail Delivery Chains and Payment Settlements

Number of products are delivered from suppliers to retailers, and payments for these products are made between companies. By linking these product deliveries with payment settlements in digital currency, it is conceivable to streamline and improve the efficiency of related administrative work, as well as to improve the efficiency of cash management.



①Issue a digital currency.
②Suppliers deliver products to retailers.
③Execute a smart contract triggered by the delivery.
④Automatically execute payment processing for each transaction with digital currency.
⑤Amortize the digital currency.

Specifically, payment in digital currency could be triggered by the delivery of goods from a supplier to a retailer. In other words, it is assumed that the logistics and commercial flow will be linked to the flow of funds through smart contracts to streamline and improve the efficiency of accounts receivable administration and fund management.

The main contents of the PoC verification will be the identification of business issues, the feasibility of executing smart contracts across multiple companies, the linkage with existing systems, and the ability to respond to increased transactions.

In retail supply chains, it is common for supplier companies to deliver to multiple destinations. Therefore, it is desirable for this scheme to be widely applicable as well, from the perspective of building an efficient ecosystem. For this purpose, standardization of contracts and business practices may be important. For example, a possible point of discussion is the handling of business practices in which sales proceeds are collected through "closing" at each store before payment is made to suppliers and franchisees.

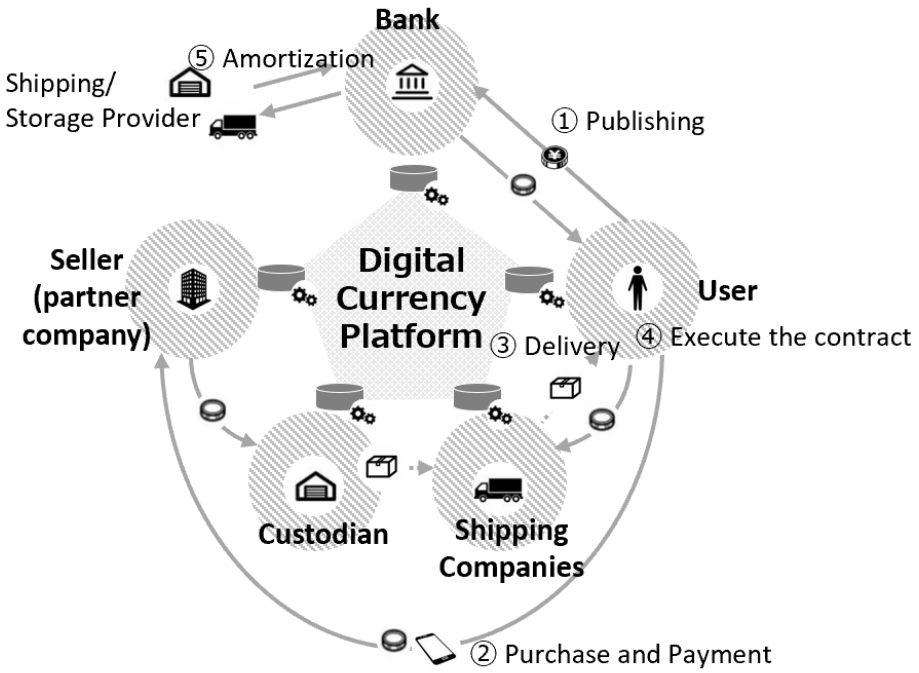
There is also the possibility that the expanded use of digital currency will lead to a reduction in the cost of handling cash at each level, including retail stores. For example, immediate remittance of funds directly from the user's wallet to the store's wallet or the head office's wallet through payment in digital currency could be considered.

③ Cooperation between logistics, delivery and payment settlement

Logistics companies are contracting with many delivery companies and working together to achieve efficient logistics, and the tracking of goods being transported has become increasingly accurate in recent years.

In this context, digital currency can be used to link the flow of goods with the flow of funds. For example, through the automatic payment in digital currency each time a delivery company carries goods, it is possible to improve the efficiency and streamlining of related administrative work and the efficiency of fund management.

Furthermore, if cash handling, which is currently done in the form of "cash on delivery", etc., can be replaced by digital means, it can be expected to contribute to reducing the administrative burden on drivers, etc., and to reducing the risk of infection.



①Issue a digital currency.
② The user purchases the product.
③ The product is delivered.
④ Smart contracts are executed (e.g., automatic processing of payments to shipping companies and storage companies)
⑤ Amortize the digital currency.

Specifically, the tracking of goods to be delivered would be linked to the flow of funds, and payments between multiple businesses would be triggered by the completion of the delivery of goods. This could improve the efficiency of clearing operations, such as checking which package is being paid for delivery.

Currently, the tracking of the flow of goods is becoming more and more precise, but on the other hand, payments between companies involved in the delivery and storage of goods are often made in the form of settlement at a later date. In the future, when goods are delivered to the consumer and the consumer pays for them in digital currency, the companies involved in the delivery will also be paid automatically.

The contents of the verification in the PoC include the identification of business issues, the feasibility of payments linked to the movement of goods by smart contracts, and the effect of improving the efficiency of corporate clearing operations.

For example, in the current "cash on delivery" system, the cash collected by the driver from the consumer is stored at the business office, the cash is transported, and then the payment is made to the shipping company or the seller. This entails the burden of cash handling costs by the driver, preparation of change, cash management (to prevent the risk of theft and loss, etc.) associated with traveling with cash, and reconciliation of accounts after delivery. In addition, the exchange of cash at the delivery destination is time-consuming, and there is a risk of errors associated with the receipt and delivery of change. In addition, since cash on delivery (COD) cannot be "left at home," there are cases where goods are redelivered due to absence, or goods are returned due to refusal to accept payment. In this respect, the ability to make digital payments in place of cash on delivery could lead to more efficient administration.

To realize the full effect of the introduction of digital currency in logistics, it will be important to standardize related contracts and practices, as well as to promote the digitalization of all operations and services related to logistics. In addition, if digital currency can be used not only in the networks of specific logistics companies but also in multiple networks, the benefits will be even greater.

Furthermore, if digital currency can be used to finance transportation companies and

finance services that meet the "post-payment" needs of purchasers of goods, business opportunities will expand further. In addition, from the perspective of utilizing return deliveries and avoiding traffic congestion, AI and other technologies could be used in the future to flexibly change the compensation for deliveries paid in digital currency according to road conditions and congestion[34].

④ Improving efficiency and reducing risk in financial asset transactions

Currently, most financial assets (such as securities) are digitalized, and the payment of funds associated with these transactions is also made by digital means (such as bank transfers). However, individual assets and payments are not always linked, and financial transactions incur a considerable back-office administrative burden. In addition, in financial transactions where large amounts of funds and assets are exchanged, simultaneous delivery of financial assets and funds (DVP) is strongly required from the viewpoint of risk reduction, but this is not always easy to achieve.

In recent years, there has been a growing trend to apply blockchain and DLT to the management and transfer of financial assets, with "security tokens" being a typical example[35]. In the transaction of such assets, the application of blockchain/DLT on the fund side as well will greatly expand the room for risk reduction and streamlining and efficiency of back-office administration through DVP.

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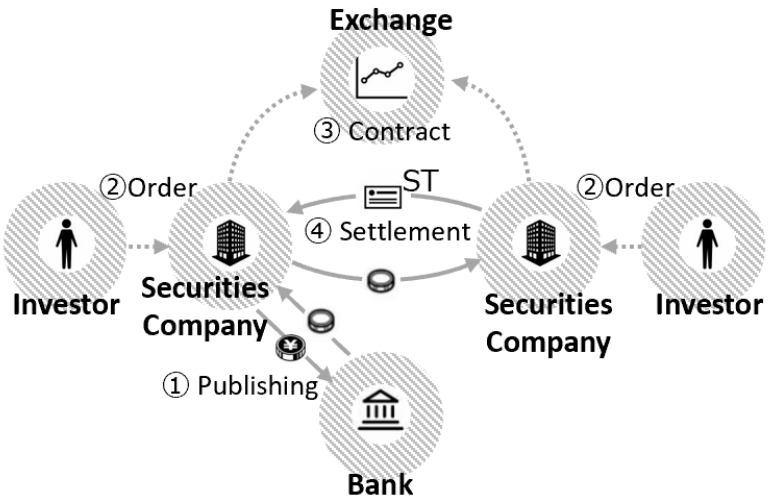
[34] For example, a business model that offers contracted shipping companies a discount on gasoline the more goods they transport is spreading around the world, and by using digital currency, it is possible to provide various incentives to shipping companies.

[35] In other countries, securities that can be programmed in this way are sometimes referred to as "programmable security.



① Issue a digital currency.
②The investor places a buy or sell order through a securities company.
③The transaction is executed.
④DVP payments will be made with security tokens and digital currency. In addition, back-office operations are automatically performed.

In the field of financial transactions, many PoC and demonstration experiments have been conducted in recent years to apply blockchain and DLT to a wide range of transactions, including securities transactions, securities lending and collateral transactions, and overseas remittances. In this article, we focus on security tokens as an example, but a variety of other use cases can be considered.

In the PoC on security tokens discussed here, it is assumed that blockchain DLT will be applied to both the assets to be traded and the digital currency as a means of settlement, and that "atomic swaps" will be used to realize DVP settlement and improve the efficiency of back-office operations[36]. Specifically, it is expected that the DVP of

[36] Of course, this does not mean that DVP cannot be realized without the use of blockchain, but it can also be realized by linking centralized securities settlement systems with fund settlement systems. One of the advantages of using decentralized technology such as

security tokens and digital currencies will be performed for each transaction, and that bookkeeping and other operations on the part of financial institutions will be performed automatically.

The PoC will identify business issues, technical feasibility of DVP of security tokens and digital currencies through smart contracts, and processing capacity when transaction volume increases[37].

The use of new technologies can have a wide range of benefits for financial trading practices. For example, thorough Straight-Through Processing (STP) of trading operations could improve the efficiency of a wide range of operations, including post-trade processing, custody operations such as securities lending and borrowing, interest and dividend payments, and redemptions, as well as reduce settlement and operational risks by shortening settlement periods and automating operations. In addition, there is the possibility of reducing settlement risk and operational risk by shortening settlement periods and automating administration.

Such new trading practices are also expected to lead to innovation in financial markets in general. In other words, blockchain/DLT can be used as a technology to "determine the destination of cash flows," making it possible to newly securitize and standardize various assets and cash flows. This could have the effect of encouraging the development of decentralized exchanges (DEX) and decentralized finance (DeFi).

Furthermore, if blockchain/DLT is applied to the framework for monitoring and compliance of such decentralized transactions, a "decentralized finance" ecosystem may be established[38].This could lead to changes in the overall financial infrastructure,

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blockchain is that DVP can be realized 24 hours a day, 365 days a year, without a centralized trading infrastructure.

[37] A typical example of such technical validation is the "Phase 2" of "Project Stella" (2018), a joint study by the Bank of Japan and the European Central Bank.
https://www.boj.or.jp/en/announcements/release_2018/rel180327a.htm/

[38] From this perspective, for example, a mechanism to prevent contract violations such as resale or a mechanism to support the exercise of voting rights could be incorporated as a

including the creation of small investment markets and securitization markets for various assets, which have been difficult to achieve under conventional technologies[39].

⑤ Use of Digital Currency in Trade Finance

In trade, in addition to the movement of goods, a great deal of information, data, and documents are exchanged, including payment for goods, letters of credit and bills of lading that serve as collateral for payment and as tools for financing. In addition, unlike the settlement of large sums of money in Japan, these operations are carried out under a decentralized structure in which there is no specific centralized bookkeeping entity.

For this reason, there is a great deal of room for the application of decentralized technologies such as blockchain and DLT. In fact, trade finance is a field in which many PoC and demonstration experiments are being conducted overseas[40].

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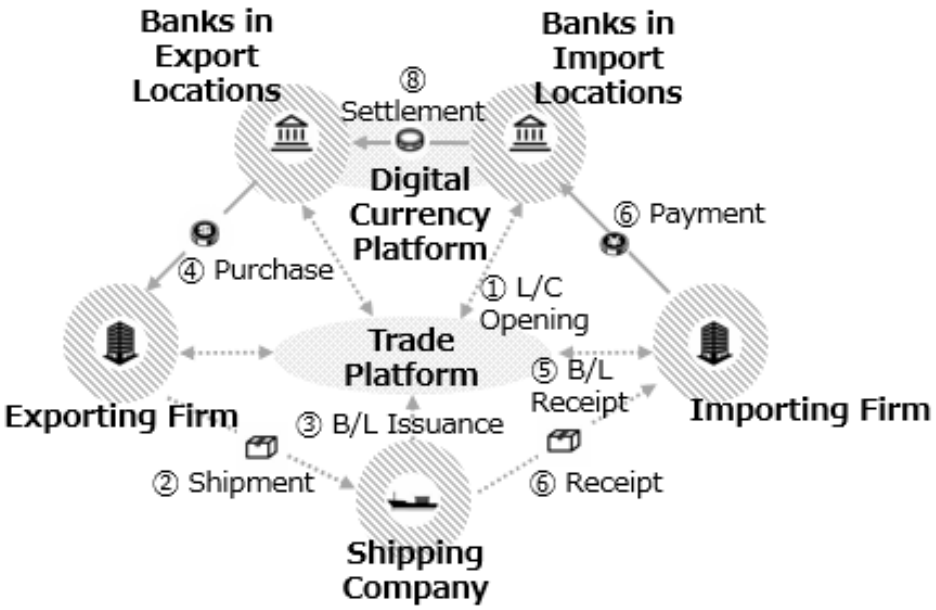
security token program.

[39] For example, if DVP between financial assets and funds can be done automatically, one by one, in real time, it could lead to discussions on what the role of the central clearing house (CCP) should be.

[40] Typical examples include "Project Ubin" in Singapore, "Project Lionrock" in Hong Kong, and "Project Inthanon" in Thailand.



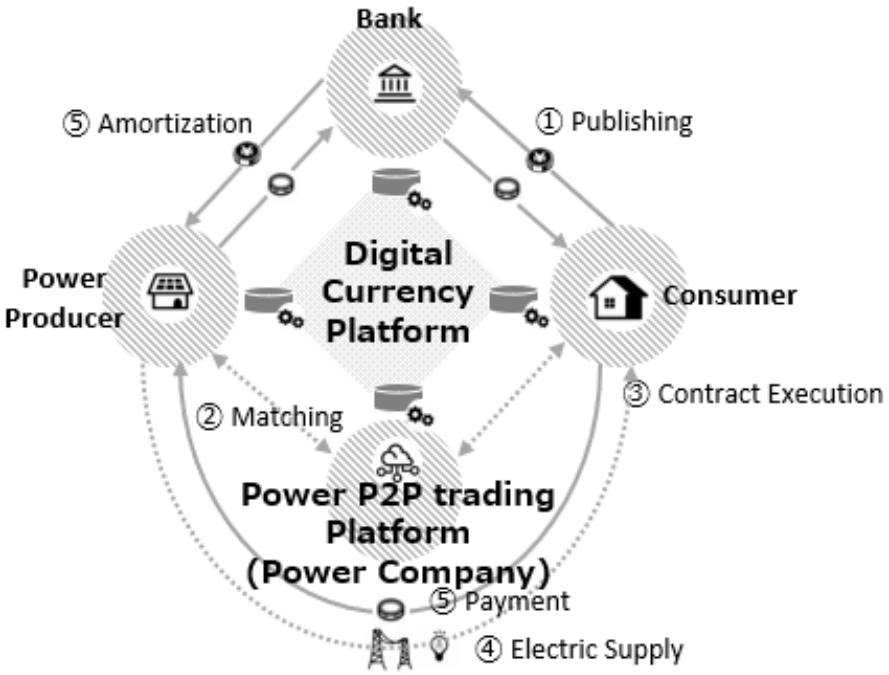
①The L/C is opened at the request of the importing company.
②Shipping by the exporting company
③B/L is issued
④Exporting bank purchases the B/L
⑤The importing company obtains the B/L through the bank.
⑥Importer makes payment
⑦Receives shipment
⑧Settlement is made in digital currency between the exporting and importing banks (exchange of legal tender and digital currency is conducted by each bank)

The PoC would aim to automatically make payments from importers to exporters in digital currency, triggered by the receipt of cargo. In addition, the issuance of bills of lading (B/L) and the opening of letters of credit (L/C) could be linked to the transaction and done automatically. The technical feasibility of cross-border payments in digital currencies will also be examined.

⑥ Use of Digital Currency in Electricity Trading

In recent years, electricity markets have been becoming more diversified, complex, and decentralized worldwide. In many countries, electricity supply markets have been liberalized, and many new suppliers, including private companies and small businesses, have entered the market. As a result, electricity pricing has become increasingly flexible and diverse, reflecting the balance between supply and demand.

In this context, there is a shift on the part of consumers from always purchasing electricity from a specific power company to purchasing electricity from multiple suppliers while comparing and weighing the prices at the time. Such changes in the market structure can have a variety of effects, including leveling of electricity demand, utilization of surplus supply capacity, and positive effects on the global environment through these changes. Enhancing the functioning of these electricity markets through the use of digital currencies will be beneficial to the economy and society in general.



① Issue a digital currency
② Matching generators and consumers
③ Power is transmitted from the generator to the consumer.
④ Contracts are executed.
⑤ Payment is made in digital currency
⑥ Generator writes off the digital currency

In the PoC, it is assumed that the supply of electricity will be linked to a digital currency, and that payments will be made in accordance with the consumption of electricity (e.g., transmission from the generator to the consumer). The content of the verification will include the identification of issues and the technical feasibility of using smart contracts to make payments triggered by the supply of electricity[41].

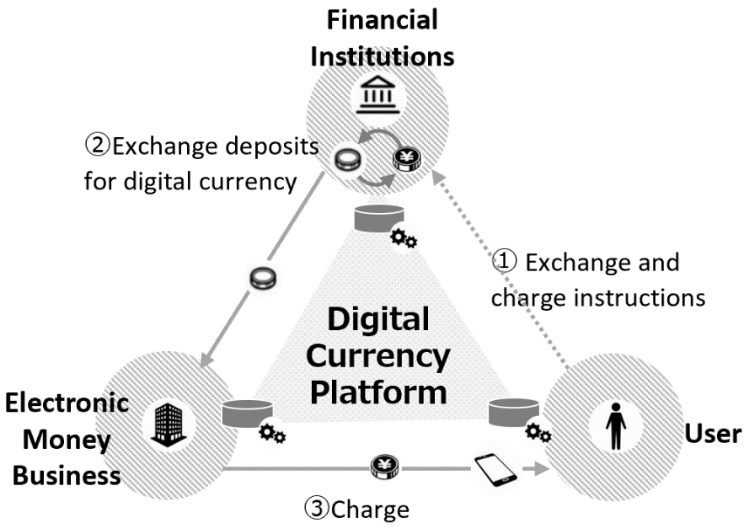
Furthermore, "dynamic pricing," in which prices fluctuate according to supply and demand, and discounts for stable consumers could be realized through digital currency. Furthermore, by allowing digital currencies to be used for payments to new suppliers,

[41] In decentralized electricity trading, there are two possible cases: (a) the trading platform buys electricity from power generators, and (b) the trading platform only matches suppliers and consumers.

the effect of encouraging new entrants into the electricity supply market can be anticipated.

⑦ Linking Electronic Money and Digital Currency

Since prepaid e-money can be dangerous if it is dropped or stolen, there is a limit to the amount that can be charged (20,000 yen for Suica). For this reason, e-money is mainly used for the settlement of small payments.



① Users instructed to exchange deposits for digital currency and to charge e-money
② Banks exchange deposits for digital currency
③ The e-money operator who receives the digital currency will increase the user's balance.

In recent years, services have emerged that allow users to recharge their e-money balance from their credit card when it falls below a certain amount. A further point of contention is whether it is possible to charge the balance from deposits to e-money

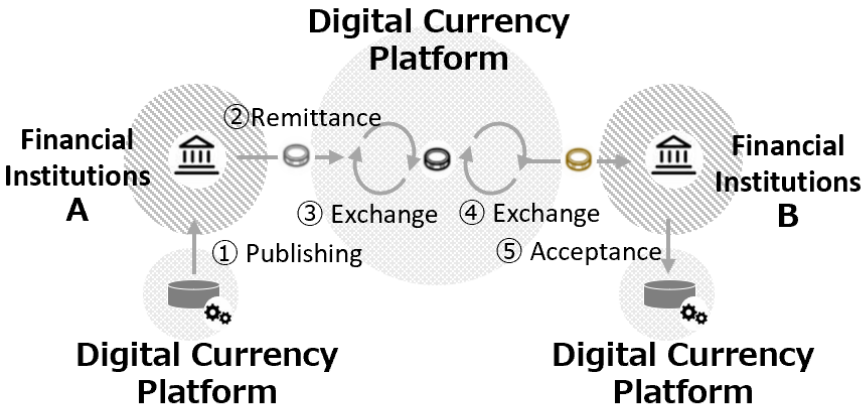
through digital currency, assuming sufficient security.

Specifically, a scheme in which a user's deposit is converted into digital currency at the user's instruction when the e-money balance drops or is insufficient, and the currency is paid to the e-money operator, in exchange for which the user's balance is charged to the e-money.

Furthermore, transactions in the reverse direction, such as converting the e-money balance into digital currency and then converting it into bank deposits, or converting the e-money balance into digital currency and then charging it to other e-money, are also possible.

⑧ Use of digital currency for interbank payments

If digital currencies issued by different issuers (e.g., banks) can be exchanged with each other, it is conceivable that multiple platforms based on digital currencies can be interoperable.



①A issues digital currency.
②Transfer A coins to the digital currency exchange PF.
③Convert to intermediate coins on the exchange PF
④Convert the intermediate coin into coin B
⑤ B receives coin B.
※Intermediate coin: Digital currency with only common area (value information)

In PoC, it is assumed that a two-layered digital currency with writing in the additional area will be converted into a digital currency with no writing in the additional area (intermediate coin) and exchanged between banks.

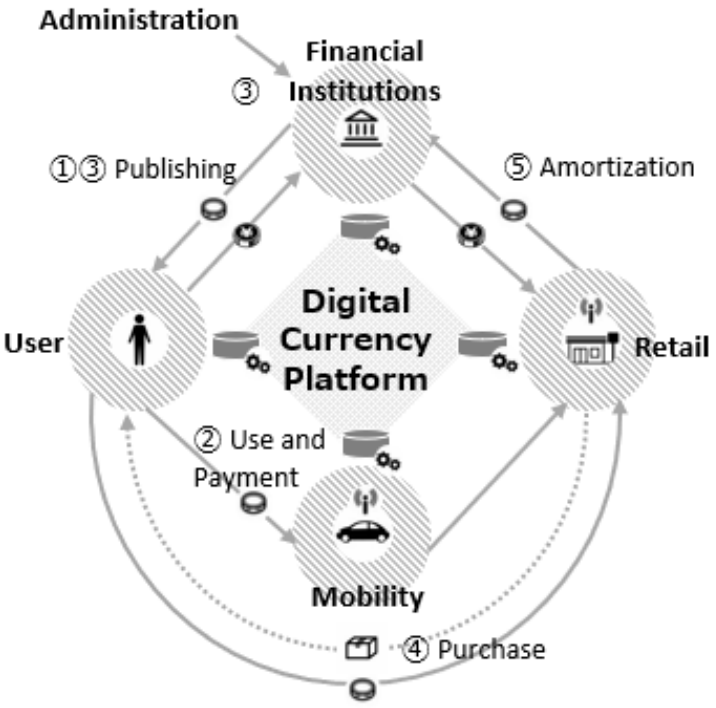
For example, when P2P money transfers are made between users of different platforms, this could be used as a trigger to activate the exchange of digital currency between banks as described above.

One point of economic debate is whether such a "bank-to-bank exchange of digital currency" scheme will generate advantages over the current interbank settlement. Another legal and institutional point of contention could be how to legally position the exchange of digital currency between banks. It will be necessary to deepen the study of these issues in parallel with PoC and demonstration experiments.

⑨ Use of digital currency for local currency

In recent years, "local currencies" that can be used within a specific region have been attracting attention from the perspective of regional development and revitalization of local consumption.

In addition to contributing to the promotion of consumption in the region by limiting the area of use, local currencies are expected to have the effect of providing people with incentives to promote the region by giving them points for purchasing products in the region or contributing to public services (e.g., taking out the trash according to the rules or volunteering). This can be expected to have an effect. By applying digital currency to this, it is possible that points and discounts can be given automatically according to the use of the currency, the area where it is used, and the user's behavior.

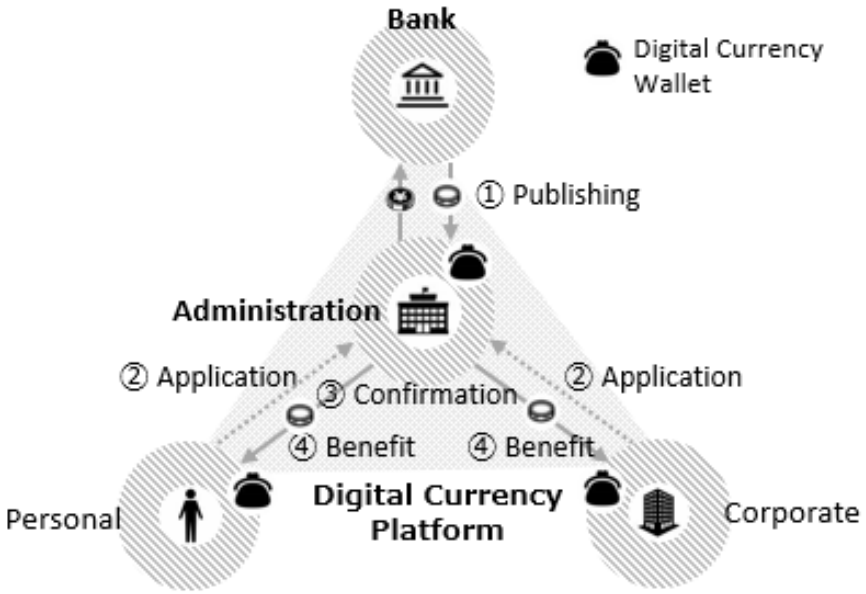


① Issue digital currency.
② Use services in the region. Smart contracts are executed at the time of use (e.g., discounts based on various conditions).
③ Issue additional digital currency based on residents' actions (e.g., contribution to the community).
④ Purchase products in the region.
Smart contracts are executed at the time of purchase.
⑤ Amortization of digital currency

The PoC is expected to verify the technical feasibility of limiting the use of the digital currency and the regions in which it can be used, as well as providing points and discounts for purchasing goods and other services in the region.

⑩ Use of digital currency in administrative work

Various payments, such as the delivery of various benefits, can be made between the government and citizens and businesses. Whether or not it is possible to improve the efficiency of these operations by using digital currency may also be an issue. For example, when an application for benefits from an individual or corporation is accepted and approved, it could trigger an automatic payment to the wallet of the citizen or corporation in digital currency[42].



① Government issues digital currency
② Individuals and corporations apply for benefits, etc.
③ Smart contract is executed and payment is processed automatically.
④ Digital currency will be delivered to personal/corporate wallets.

[42] The use case examples presented here are only examples discussed among the participants of this study group, and have not been discussed in any way with the administrative authorities.

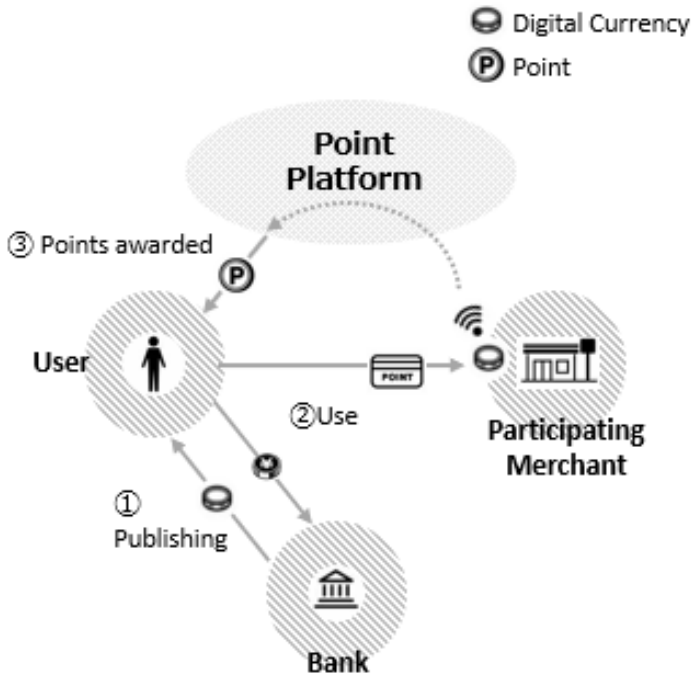
In PoC, a citizen or company that owns a digital currency "wallet" can apply for benefits, etc., and upon confirmation and approval of the application by the government, the wallet will be automatically paid in digital currency.

For this kind of use of digital currency to be safe and beneficial, and to prevent fraudulent payments, the wallet must be properly linked to the ID of the citizen or company, and KYC must be ensured.

A related issue is the extent to which information related to applications and screening should be made available on the platform in advance. For example, as a prerequisite for determining whether or not to pay corporate benefits, the extent to which relevant data (e.g., corporate financial data) should be made available on the platform could be an issue.

⑪ Use of digital currency for point services and economic zone revitalization

For example, when digital currency is used at stores that participate in loyalty point services, it is conceivable to realize a service in which points are automatically awarded to users through smart contracts, without the need to use loyalty cards.

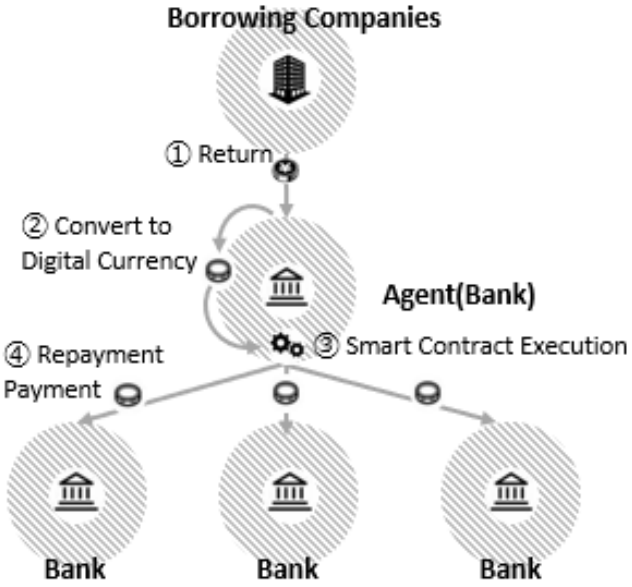


① Use digital currency in stores
② Smart contracts will be executed.
③ Points are automatically awarded in conjunction with Point platform.

Furthermore, in an economic sphere where multiple companies join the network of point services, it is conceivable to realize a service in which incentives such as general-purpose points are automatically granted when digital currency is used in one of the companies' stores.

⑫ Use of digital currency in finance

In a syndicated loan, the repayment from the borrowing company could be converted into digital currency by the agent bank, from which the principal and interest payments would be automatically distributed.



①Company repays (legal tender)
②The agent converts the repayment into digital currency.
③Smart contract is executed and payment is automatically made to each bank.
④Repayment is made to each bank in digital currency.

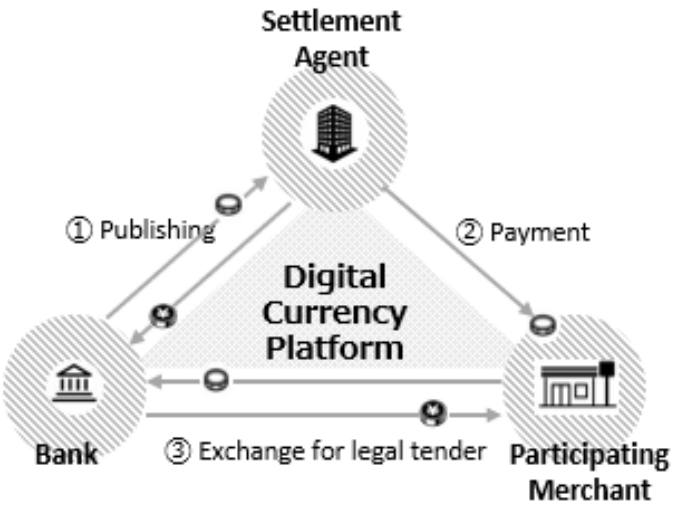
Furthermore, in the area of bank lending, through the use of digital currency, it may be possible to write the restrictions on the use of funds described in the "covenants" into the digital currency itself, or to trace the use of funds for lending through the digital currency. Another option would be to offer preferential lending rates to borrowers who accept such restrictions and monitoring. This could reduce the monitoring costs for banks.

In addition, banks may be able to use the transaction history and inventory information collected through the use of digital currency by borrowers for credit screening.

⑬ Use of digital currency for merchant payments by credit card companies

When a credit card is used at a store, the store sends a record of the transaction to the credit card company, which then makes a payment to the store, but there is a lag between the timing of the transaction and the timing of the payment to the merchant.

In this case, there is a lag between the timing of the transaction and the timing of the payment to the merchant. In this regard, if the information on credit card usage at the store is automatically sent to the credit card company and this triggers the automatic payment to the store in digital currency, it will shorten the time lag between the transaction and the payment to the store. In addition, the reduction in administrative costs could be passed on to the stores in the form of reduced fees.



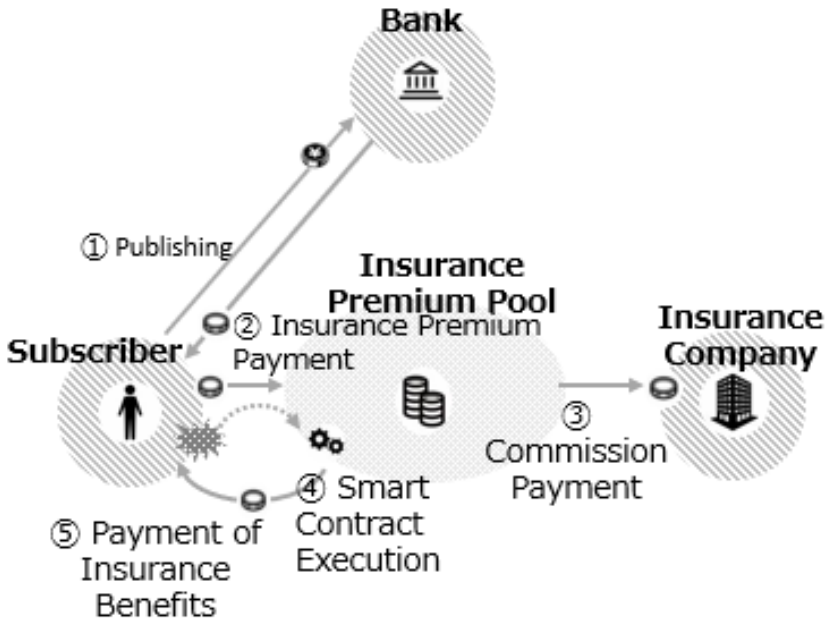
①Issue digital currency
②Payment providers make payments to merchants in digital currency (assuming more frequent payments compared to the current system)
③Merchants exchange digital currency for legal tender as needed.

Of course, for credit card companies, etc., accelerated payments will lead to an increase in their own liquidity costs, so how to share the costs associated with this among the parties involved may be a point of contention.

⑭ Use of digital currency in insurance operations

Insurance, as a "conditional payment obligation," is a transaction with many elements that can be described by smart contracts, including the structuring of the product, the receipt and payment of premiums, and the payment of premiums upon the occurrence of certain events. For this reason, the insurance sector is one of the areas where blockchain and smart contracts are being actively applied in many countries.

For example, a scheme in which a certain amount of digital currency is pooled based on insurance premiums, and when the occurrence of a certain event described in the insurance contract is confirmed, the insurance payment is automatically triggered.



① Issue digital currency
② Policyholders pay premiums in digital currency
③ Commission is paid from the premium pool to the insurance company.
④ Smart contracts are executed upon detection of triggers for claim payments such as accidents.
⑤ Claims are paid in digital currency.

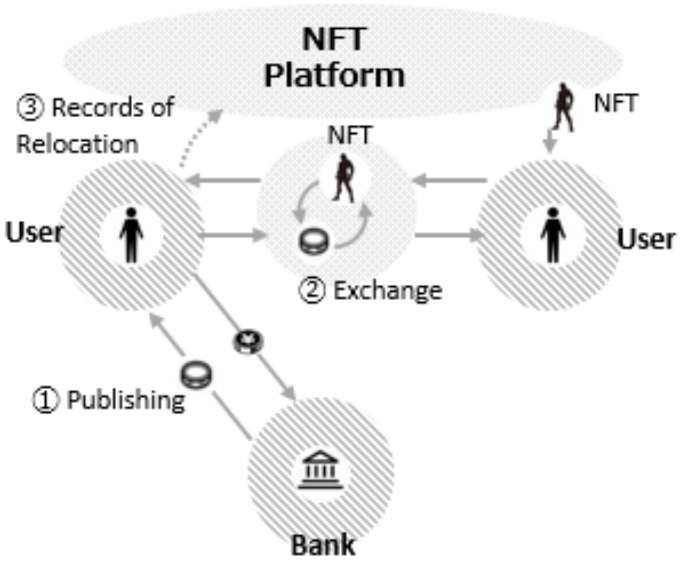
When insurance products offered by insurance companies are sold by agents, policyholders currently pay their premiums in cash, by bank transfer, credit card, or other means. In response, the agent often makes payment to the insurance company by bank transfer, etc. and receives the agent's commission from the insurance company. Such paperwork incurs costs for the insurance company and the agent, such as processing of paper forms and remittance. In this regard, the use of digital currency for settlements between agents and insurance companies could be a point of discussion to reduce administrative costs.

In addition, insurance products themselves could be digitalized to provide policyholders with incentives to reduce social losses (deadweight loss).

For example, wearable devices and sensors could be used to monitor policyholders' health management efforts and safe driving conditions, and premiums could be dynamically increased or decreased through smart contracts, which could be collected through digital currency. The use of smart contracts in this way could provide new added value to insurance by using digital technology to address the problem of "moral hazard," which has been regarded as a fundamental issue in insurance.

⑮ Use of digital currency for NFT (Non-Fungible Token) transactions

It is conceivable that transactions of Non-Fungible Token (NFT) such as game characters, art works, real estate, etc. recorded on the blockchain could be conducted by exchanging them with digital currencies.



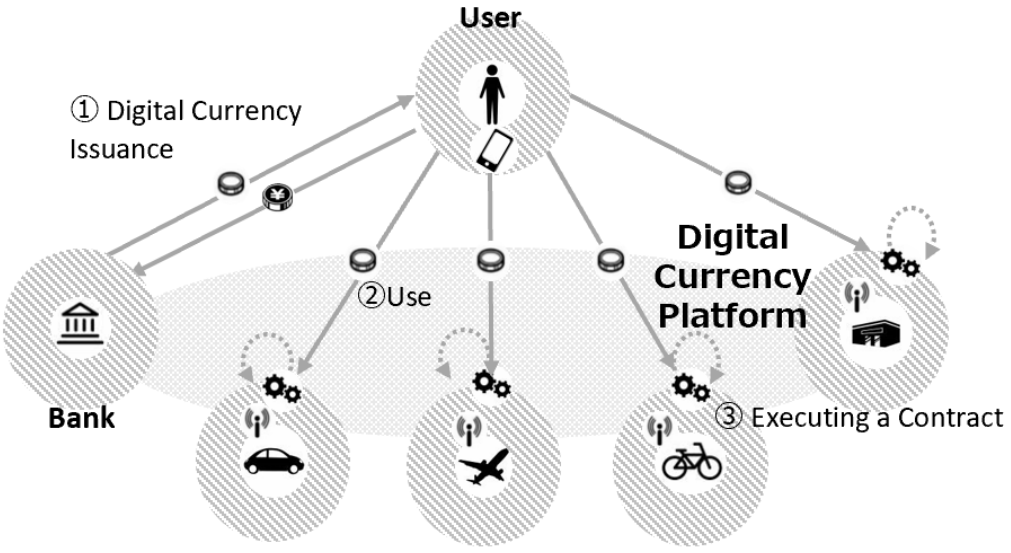
① Issue digital currency
② Simultaneous transfer of NFT (game characters, etc.) and digital currency
③ The transfer of tokens is recorded on the NFT blockchain.

If blockchain and DLT are applied to the assets to be traded, the application of these technologies on the payment and settlement side may have the effect of streamlining and improving efficiency. Particularly, it will be easy to envision the benefits of using digital currency for small transactions in virtual spaces, such as for game characters.

⑯ Use of digital currency for MaaS (Mobility as a Service)

MaaS, a service that provides efficient "transportation" by combining various means of transportation (public transportation, ride-sharing, rental bikes, etc.), is attracting worldwide attention.

In MaaS, it is necessary to provide various functions as a package, such as a function to continuously accumulate, analyze, and feedback data on transportation information, and a function to search for the most suitable transportation method. Payment in digital currency may also be incorporated in this package to make the service more efficient.



①Issue digital currency
②Users use the service and pay with digital currency
③Contract is executed.
(execute contract for discount, pay-as-you-go, etc.)

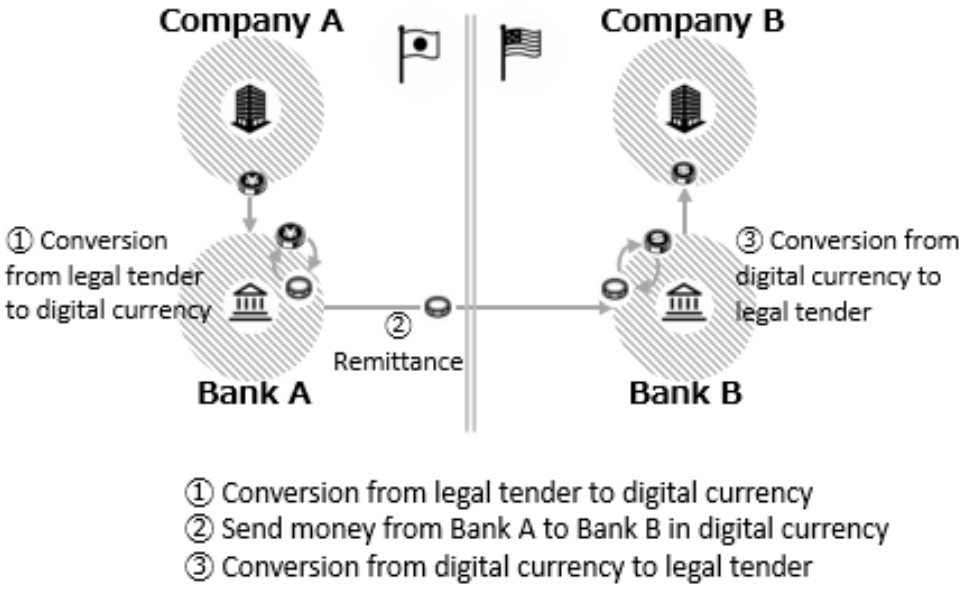
For example, by linking the use of transportation with digital currency payments, users will be able to automatically pay for the various modes of transportation they use

without any complications[43].

It is also conceivable that digital currency will be used to settle accounts between companies involved in the provision of MaaS services.

⑰ Use of digital currency for overseas remittance

Currently, there is a global trend for banks to reduce their overseas remittance networks due to the increasing compliance burden of money laundering regulations. In this context, the realization of inexpensive and rapid overseas remittance has become a major theme.



[43] As a method of paying MaaS usage fees, a fixed subscription system, such as a monthly subscription system, is also possible, and which method is preferable may depend on the type of user.

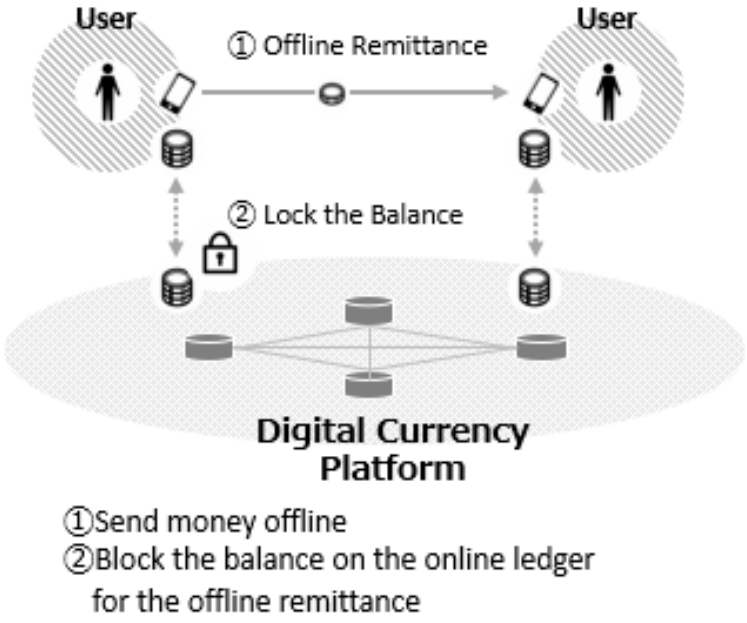
Instead of using correspondent banks that use the current correspondent remittance network, one possible point of discussion is whether it is possible to realize quick and inexpensive overseas remittances through a method in which the remittance amount is first exchanged into digital currency, sent across the border, and then exchanged for local currency at the receiving bank.

Similar services that use cryptographic assets as intermediaries are already available. The scope of the study group is "yen-denominated" digital currency, and if this is used, it will still be necessary to exchange the yen-denominated digital currency for the local currency in the destination country. Therefore, whether this scheme will be cheaper and faster than the current correspondent remittance scheme depends on whether the economic benefits of using blockchain DLT can be generated in areas other than the exchange between digital currency and local currency.

From this perspective, for example, it will be important to (a) synchronize payments with the processing of bills of lading and letters of credit in trade finance, and (b) use blockchain traceability to lower compliance costs for AML/CFT (anti-money laundering and anti-terrorist finance).

⑱ Offline small payments between smartphones

For digital currency to fulfill cash-like functions, it is desirable to be able to transfer money offline between individuals (P2P), for example, between smartphones owned by individuals, using NFC functions.



When such remittances are made offline, there will be a time lag before this remittance is reflected in the ledger online, and during this time, there will be a gap between the online ledger and the record of value on the terminal. This can cause money laundering problems and risks (e.g., someone who steals the phone can break through the security and send money online), so setting a limit on the amount of money that can be sent offline may be a viable option.

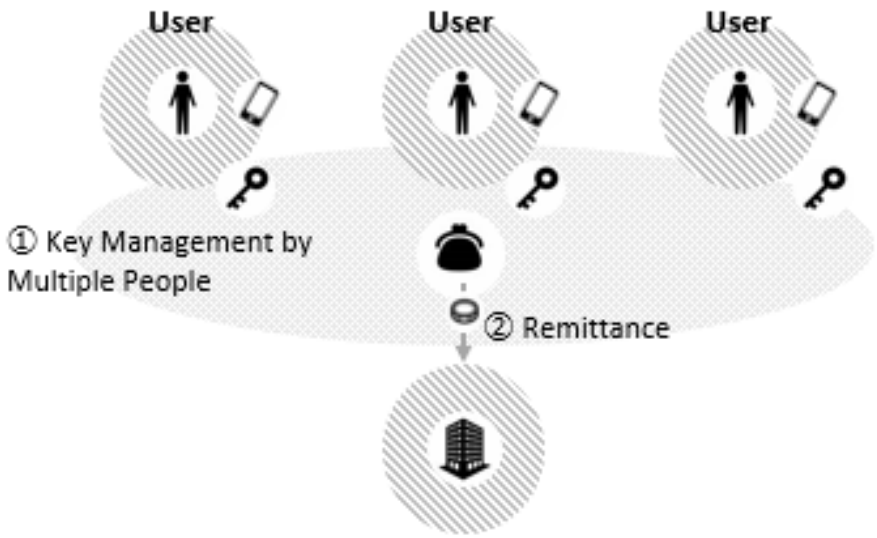
In addition, it is necessary to prevent duplicate remittances due to offline remittances, as online remittances are made even though only a smaller amount than the amount on the ledger can be remitted. Therefore, it is highly likely that it will be necessary to block the balance in the online ledger for the amount transferred to the terminal for offline remittance.

⑲ Use of digital currency for group cash management

There is also a possibility that digital currency will be used to manage funds in specific groups.

For example, when a group such as an alumni association, neighborhood association, or university club pools and manages membership fees, digital currency could be used to place restrictions on the use of the funds, or to manage multiple wallet keys and place restrictions such as "funds cannot be transferred without the approval of many members.

As an application of this concept, it is also possible to issue a digital currency exclusively for business trip expense reimbursement with limited usage.



①Keys are managed by multiple people.
②Remittance by majority approval

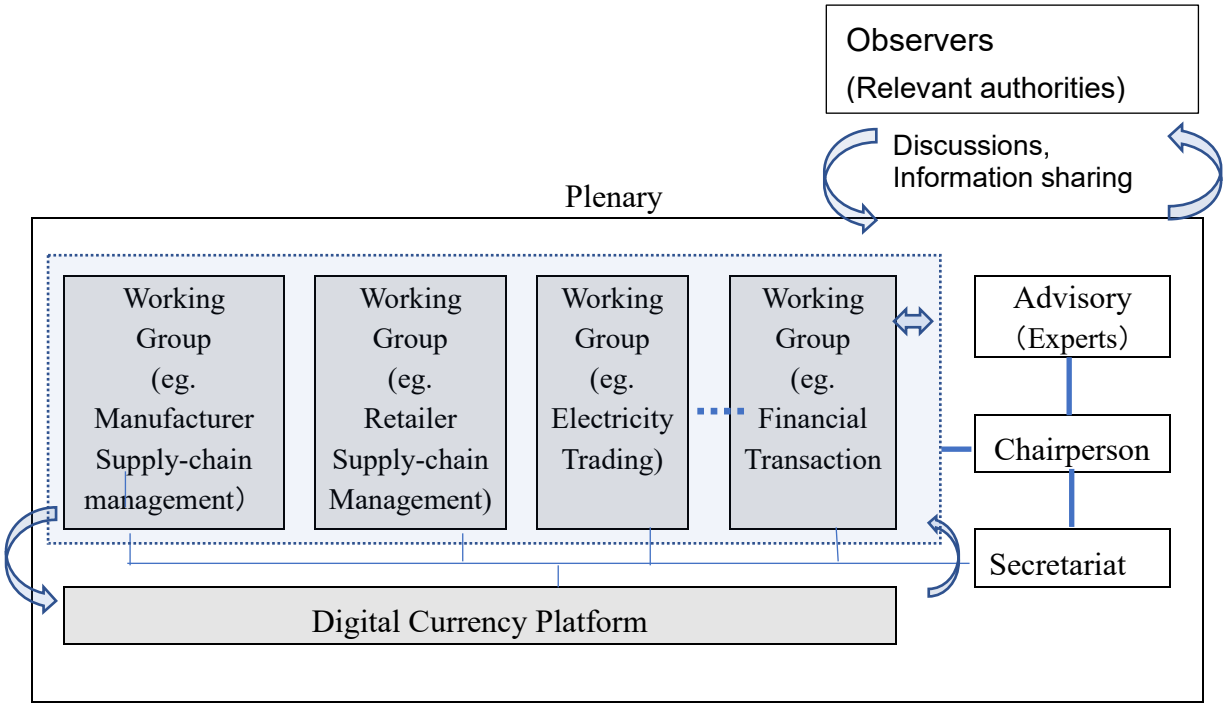
４．Conclusion

To link innovation in payment infrastructure through digital currencies to the DX of the Japanese economy and its development, it will be beneficial to go beyond simply "applying digital technology to payments" and to review the entire way economic activities are conducted, including practices and transactions. In other words, the ability to build an ecosystem that organically incorporates digital payment infrastructure will be key to advancing DX in the economy.

This study group has shown that there are many cases that digital currency, especially digital currency with a two-tiered structure, can be effective in solving problems. However, to link this to the DX of the Japanese economy and its development, it is necessary to expand this into concrete actions.

Based on this awareness of the issues, this study group will be reorganized into a "Digital Currency Forum" consisting of a plenary session and subcommittees for each use case. Then, we would like to develop the outcomes of the study group into various concrete initiatives.

（Digital Currency Forum）



- The subcommittee will not exhaustively examine the use cases presented in this report. The subcommittees will not exhaustively examine the use cases presented in this report. These are just examples, and while referring to them, the subcommittees will be set up to examine the use cases that have a high priority and for which companies have a strong desire to work first. Therefore, the number of subcommittees to be established is still in flux, and it is assumed that the number will increase in the future.
- The digital currency platform will proceed with the construction of a prototype in parallel with the deliberations of each subcommittee and through feedback with each subcommittee.
- The Advisory Committee will provide advice from a broad and professional perspective while sharing information with each subcommittee in implementing the new technology of digital currency as a social infrastructure.
- The general secretariat will provide administrative support for each subcommittee.

In addition to the members of this study group, we will invite companies that have not participated in the study group to participate in the Digital Currency Forum (several companies have already expressed their intention to participate). Under this structure, we intend to contribute to the DX of the Japanese economy through innovation in settlement, while gathering the power of the private sector.

Members of the Digital Currency Forum

- as of November 19, 2020 -

Members of the Study Group on Digital Currency Settlement Infrastructure	New Members
Hiromi Yamaoka, Director, Future Corporation (former head of the Payment and Settlement Systems Department, Bank of Japan) MUFG Bank, Ltd. Sumitomo Mitsui Banking Corporation Mizuho Bank, Ltd. Seven Bank, Ltd. (Seven & i Holdings Co., Ltd.) NTT Group East Japan Railway Company KDDI Corporation Internet Initiative Japan Inc. Mori Hamada & Matsumoto Accenture Japan Ltd. SIGMAXYZ Inc.	AEON Co., Ltd. ANA Group The Kansai Electric Power Company, Incorporated KYOCERA Corporation Kesennuma city JCB Co., Ltd SUMITOMO LIFE INSURANCE COMPANY SECOM CO., LTD. SOHGO SECURITY SERVICES CO., LTD. (ALSOK) Sony Bank Incorporated Sompo Holdings, Inc. DAIDO LIFE INSURANCE COMPANY Daiwa Securities Group Inc.

	Chubu Electric Power Co., Inc. TIS Inc. DENTSU INC. Tokio Marine & Nichido Fire Insurance Co., Ltd. Tokyo Financial Exchange Inc. Toppan Printing CO., LTD. Nomura Holdings, Inc. Hitachi, Ltd. FamilyMart Co., Ltd Mitsui Sumitomo Insurance Co., Ltd. Sumitomo Mitsui Trust Bank, Limited Mitsubishi UFJ Research and Consulting Co., Ltd JAPAN POST BANK Co., Ltd. Lawson, Inc.
Advisors	
Masakazu Masujima Partner, Mori Hamada & Matsumoto Tetsuya Inoue Chief Researcher, Nomura Research Institute, Ltd. Shuji Kobayakawa Professor, School of Political Science and Economics Meiji University Kenji Saito Professor, Graduate School of Business and Finance Waseda University	

Chikako Suzuki Certified public accountant
Observers
Financial Services Agency, Japan Ministry of Internal Affairs and Communications, Japan Ministry of Finance, Japan Ministry of Economy, Trade and Industry, Japan Bank of Japan

The Digital Currency Forum will promote specific initiatives, such as PoC, for innovations in settlement using digital currencies and the review of related practices and transactions. At the same time, a wide range of stakeholders will share information and exchange opinions at the forum. Through these activities, we intend to contribute to the improvement of Japan's payment infrastructure in an "open" and "agile" manner.

The promotion of innovation in this way will contribute to the improvement of the convenience of Japan's financial infrastructure as a whole and to the promotion of DX in the Japanese economy, which in turn will contribute to economic development. It will also contribute to both revitalizing the economy in the post-corona era and strengthening the robustness of the economy and society against infectious diseases.