

Defining and Measuring Payment Interoperability

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Preface

Today's digital economy requires a more innovative and inclusive approach to defining payment interoperability.



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The COVID-19 pandemic has further accelerated efforts to digitalize trade. In tandem, new digital means of payment aiming to reduce the known payment frictions, such as high cost, low speed or lack of convenience, are cropping up. Seen through a domestic lens, a thriving, competitive range of digital payment methods enables countries to build a more vibrant and future-ready economy, one that goes beyond reliance on face-to-face interactions. Seen through an international lens, it readies such countries to better connect to global trade, as trade and commerce increasingly go digital.

While the direction of travel is clear, today's payment systems are not yet fully optimized for global digital trade. For example, international transfers can take days and transfer costs and foreign exchange spreads can add up to 10% to the transaction value. Further, government identity databases and corporate registries in most countries are not digitally accessible, precluding the opportunity to reduce friction in customer identification. These frictions in turn contribute to many digital payment methods being closed loops – not interoperable with other payment methods.

It is no surprise therefore that the G20 identified the increasing interoperability of payments as a

key goal. To contribute to this goal, the World Economic Forum brought together leaders spanning the public and private sectors to focus on how to define and measure the different types of payment interoperability. While numerous technical definitions of interoperability already exist, they only represent part of the broader payment ecosystem. In today's digital economy, it is necessary to take a more innovative and inclusive approach in defining interoperability and to bring in different perspectives from users (both consumers and businesses) and policy-makers. As a result, the interoperability metrics in this report aim to measure a combination of inputs and outputs across payment systems on three aspects: technical, regulatory and usage.

Ultimately, a globally interoperable payment system should be accessible, affordable and reliable. While the insights offered in this report are wide-ranging and diverse given the complexity of the topic, we hope that they will contribute to these objectives, stimulate further debate, advance progress on standardization, and promote more public and private collaboration, including through technology exploration – each geared towards furthering payments fully optimized for global digital trade.

Executive summary

The definition of payment interoperability needs to encompass three elements: technical, regulatory and usage interoperability.

According to PayPal's Borderless Commerce Report, worldwide e-commerce is expected to grow 14.3% in 2021, with a 28% increase in new online shoppers.¹ Based on Visa's latest *Global Merchant E-commerce Study*, 66% of e-commerce companies are selling products across borders, with cross-border sales accounting for around one-third (31%) of their revenue on average.² Even though 87% of merchants believe their biggest growth potential lies with international online sales expansion, owners of small businesses expressed their reluctance to take actions to expand into new markets.³ Lacking interoperable payment solutions suitable for international trade is preventing merchants, especially small and medium-sized enterprises (SMEs), from tapping into international markets:

- According to a survey conducted by Visa, only half of the merchants have a payment processing infrastructure that is suitable for cross-border payments.⁴
- Close to 40% of merchants consider accepting and processing foreign transactions an obstacle in achieving their growth potential through selling abroad online.⁵
- Based on a survey conducted by PayPal, while 18% of global merchants said that having to accept new, local payment methods is preventing them from selling their products and services in more markets, 40% of online shoppers say they are likely to abandon a purchase if their preferred method of payment isn't available.⁶

In view of this mismatch between the tremendous opportunities presented by international trade and the inadequacy of an efficient and user-friendly global payment system, the G20 has set

concrete goals and roadmaps aimed at enhancing cross-border payments as a top priority. One of its focus areas is to commit to a joint public and private sector vision to enhance cross-border payments. The World Economic Forum has convened senior business leaders, policy-makers, members of academia, international organizations and civil society to co-create a common definition of payment interoperability with quantitative measurements as one of the first steps in achieving a common vision of the future of payments.

To capture the full spectrum of enabling factors for an efficient payment system suitable for international trade and the digital economy, the definition of payment interoperability needs to encompass three elements: technical interoperability, regulatory interoperability and usage interoperability. Measurements proposed for each element are based on the latest payment technology developments and lessons learned from existing interoperability policies.

To make the best out of the definition and measurements proposed, countries need to:

- *Provide a framework for intra-agency collaboration* so payment policies are not functioning in silos;
- *Enhance public and private sector collaboration* to ensure the collection of accurate data for the measurements and the design of new innovation with interoperability in mind; and
- *Establish a comprehensive national interoperability policy* to ensure the integration of the three elements of interoperability in the design of a future-proof and trade-friendly payment system.

Introduction

The definition of and quantitative metrics for payment interoperability should be user-centric and forward-looking.

“ According to an estimate by the United Nations Conference on Trade and Development (UNCTAD), the global value of e-commerce reached almost \$26 trillion in 2018, accounting for 30% of GDP.

E-commerce, including business-to-business (B2B), business-to-consumer (B2C) and trade in digital services, plays a significant role in the digital economy.⁷ According to an estimate by the United Nations Conference on Trade and Development (UNCTAD), the global value of e-commerce reached almost \$26 trillion in 2018, accounting for 30% of GDP.⁸ With the onset of the global COVID-19 pandemic, e-commerce has become a lifeline for consumers to safely access essential goods for merchants to keep business open. A survey by Worldpay in 12 countries shows that 55% of online shoppers have purchased from another country in the last 12 months.⁹ The rise in e-commerce is expected to continue even after the pandemic ends, with many behaviours and habits formed during the lockdowns remaining sticky.¹⁰ It is important for both businesses and governments to leverage e-commerce as a tool to catalyse economic recovery. Building an interoperable global payment system can reduce friction in e-commerce by reducing fixed costs, enabling economies of scale, and providing more consumer choice as well as greater competition.

Many countries, international organizations and businesses have recognized the lack of interoperability as a major obstacle in building an efficient global payment system.¹¹ Varied technical standards, laws and regulations spanning countries have increased the costs of building an interoperable system at a global level. Meanwhile, with the increased access to the internet and the adoption of smartphones, new types of payment methods have been invented to broaden access to digital payments. Currently, for example, almost 15,000 cryptocurrencies – including pilots – have launched, opening up new payment channels.¹²

With the development of e-commerce and digital forms of money, the pattern of online transactions is expected to shift from high-value and low-frequency to low-value and high-frequency. Even nano (less than a cent) payment markets are on the radar as companies experiment in digital payment markets. Certain innovations have seized large market shares in some countries while others are yet to be tested for the promises they set out to deliver. The emergence of increased innovation in the payment ecosystem has added additional complexity to the issue of interoperability.

While there is no dispute as to the importance of interoperability, there is limited consensus on the definition of interoperability for payments. Even though there are some well-established metrics for domestic payment interoperability, there is limited literature when it comes to measuring the interoperability among the latest payment system innovations. To solve this issue, it is necessary to clearly identify its parameters and implement a methodology to measure its size.

This report provides a definition of and quantitative metrics for payment interoperability that is user-centric and forward-looking. The definition and metrics are the product of a multistakeholder process of public-private collaboration. The goal of the report is to provide: 1) a tool for policy-makers to measure how interoperable a country's payment ecosystem is and to identify and assess areas of improvement in their payment ecosystems; 2) some transparency for private companies and international organizations in evaluating the effectiveness of a country's payment systems; and 3) a framework for the public and private sectors to work together to continue improving the existing payment system for more inclusive trade and more seamless innovation in electronic, digital and crypto payment instruments.

Defining and measuring interoperability

It is necessary to broaden traditional definitions of interoperability by taking into account the perspectives of consumers and e-commerce businesses.

2.1 Existing literature on measuring interoperability

Various standard-setting organizations have provided different definitions for payment interoperability. Some examples are listed in Table 1 below.

TABLE 1 Various definitions of payment interoperability

Name of organization	Definition of interoperability
World Bank	Interoperability means a “situation in which payment instruments belonging to a given scheme may be used in platforms developed by other schemes, including in different countries. Interoperability requires technical compatibility between systems but can only take effect where commercial agreements have been concluded between the schemes concerned.” ¹³
Bank for International Settlements (BIS)	“Broadly speaking, interoperable payment systems enable the seamless interaction of two or more proprietary acceptance and processing platforms , and possibly even of different payment products , thereby promoting competition, reducing fixed costs, enabling economies of scale that help in ensuring the financial viability of the service, and at the same time enhancing convenience for users of payment services. The consequences of low interoperability are overlapping or limited coverage, sunken investment costs and inefficiency.” ¹⁴
ASEAN Working Committee of Payment and Settlement Systems (ASEAN WCPSS)	“ Interoperability - enables financial products and services belonging to a particular scheme or business model to be used or interoperated between other schemes or business models usually of another institution in another jurisdiction . While interoperability oftentimes requires technical compatibility between systems , it can only take effect once commercial/business interconnectivity agreements have been completed.” ¹⁵

TABLE 1 Various definitions of payment interoperability (continued)

Name of organization	Definition of interoperability
Consultative Group to Assist the Poor (CGAP)	<p>“Interoperability refers to the ability of different systems to work together. In the context of digital payments, interoperable services allow customers to transact beyond their own network.”¹⁶</p> <p>“[T]hree ways interoperability in payments systems can be achieved: (i) through simple scheme interoperability, (ii) by connecting networks through network interoperability, or (iii) by creating a business environment that enables parallel system interoperability to occur. Scheme interoperability is a feature of open-loop payments systems, or ‘schemes,’ which consumers and businesses access through their relationships with their banks. Network interoperability exists when one payment scheme negotiates an exchange agreement with another scheme. Parallel system interoperability allows the merchant or agent accepting payment from a consumer to participate in multiple schemes.”¹⁷</p>
Alliance for Financial Inclusion	<p>Interoperability refers to the “seamless flow of payments from and through multiple accounts held by consumers arising from transactions from different service providers, enhances user experience, promotes product development to meet user needs, increase convenience, relatively reduces costs and several other benefits.”¹⁸</p>
Global Partnership for Financial Inclusion	<p>Interoperability can be defined as “the ability of users to access payment services from different providers and for agents to offer services from these providers” in order to “[ensure] user access and [enable] the network effect of a shared platform.”¹⁹</p>
European Central Bank	<p>Interoperability refers to “the set of arrangements/ procedures that allows participants in different systems to conduct and settle payments or securities transactions across systems while continuing to operate only in their own respective systems.”²⁰</p>
<p>These definitions focus on the technical aspects of interoperability. While technical requirements are important, they are only part of the broader interoperability objective. This white paper proposes a different way to define interoperability that is based on the user experiences from the perspectives of both consumers and businesses of e-commerce. An interoperable global payment system for an e-commerce user means:</p> <ul style="list-style-type: none"> – Accessibility: fast, low-cost ways to obtain a payment method that, once obtained, can be used for multiple if not all purposes – Easy operation: using a payment method is intuitive and does not require a lot of training – Speed: unlike existing traditional payments, which can take up to 2 to 5 business days to complete, an interoperable payment method should be able to be made quickly and potentially in real-time 	
<ul style="list-style-type: none"> – Affordability: cross-border payments can be expensive for small and medium-sized enterprises (SMEs); low-cost payments may be expected to be the norm in the digital economy; the G20 has been working on setting targets to bring down such costs²¹ – Seamless transactions: it does not matter what kind of payment method a consumer chooses or what kind of payment method a merchant accepts; however, a transaction can be made without any technical or conventional interruption – Reliability: once a payment is made, the settlement between the sender and receiver will take place within a reasonable period of time, if not instantly – Security and privacy: user data is protected against fraud and the use of data is done with user consent 	

2.2 Assessing interoperability through three lenses

To achieve these objectives, a definition of payment interoperability needs to include three aspects of interoperability, as discussed in more detail below.

Technical interoperability: most of the existing discussions on payment interoperability focus on technical or system interoperability. Technical interoperability measures the ability to build seamless connections across different payment methods or closed networks.

Technical interoperability

Driving technical interoperability can help reduce frictions created by closed-loop systems and the various payment methods (e.g. mobile money, card, bank transfer) that are not compatible, which can decrease costs and provide better services. There are multiple ways to drive technical interoperability in different degrees of collaboration within the private sector and between public and private sectors.

Payment integrators as a solution

Many private companies feature payment integrator concepts that offer customers a one-stop-shop interface for multiple payment method acceptance. The main benefits of payment integration for companies are:

1. It streamlines the operations saving time for reconciliation;
2. It reduces costs and errors;
3. It provides a better customer experience;
4. It increases cash flow.

A good example is the provision of virtual point of sale (VPOS) services that enable a number of integrated payment methods, including credit and debit cards for merchants, without relying on one acquirer.

Developing a common standard

There have been various initiatives to adopt industry standards within a particular type of payment method. A hugely successful example involving the enablement of tech interoperability is the Society for

Regulatory interoperability: the ability to connect payment systems within a jurisdiction or “across different jurisdictions governed by differing regulatory requirements in order to ensure that transactions are conducted in a lawful manner.”²²

Usage interoperability: the ability for different demographic groups to participate in the digital economy and to transact across different geographies at low cost, leading to inclusion without any discrimination.

Worldwide Interbank Financial Telecommunication (SWIFT) network. The SWIFT network enables financial institutions worldwide to send and receive information about financial transactions in a secure, standardized and reliable environment. Since its inception in 1973, the SWIFT network has grown to link more than 11,000 financial institutions across more than 200 countries and territories. SWIFT has succeeded by developing common standards, robust and secure operating systems and procedures, as well as developing transparent and predictable rules for liability.

Since SWIFT's emergence, different types of payment methods powered by novel types of technology have emerged. There is a need to drive the adoption of global standards within each type of payment method, such as QR code standards or Global System for Mobile Communications (GSM) standards. In practice, it is extremely difficult to create an entirely new system such as the SWIFT network. First, huge investments are required over extended periods of time to create a minimum viable product (without even considering profitability). Second, relevant stakeholders often have competing interests, which makes it more challenging to create the conditions of trust and opportunities for mutual gain needed to spearhead large-scale initiatives. Third, leadership is required to move ambitious projects forward and agreeing on who should lead is often very challenging when multiple stakeholders are involved. Fourth, technological change moves very quickly (and can render entire systems out of date in short order), while the effort to drive consensus takes time. Despite these difficulties, both the public and private sectors have been working, sometimes together, to push for standardization at various levels.

“ There are multiple ways to drive technical interoperability through different degrees of collaboration within the private sector and between the public and private sectors.

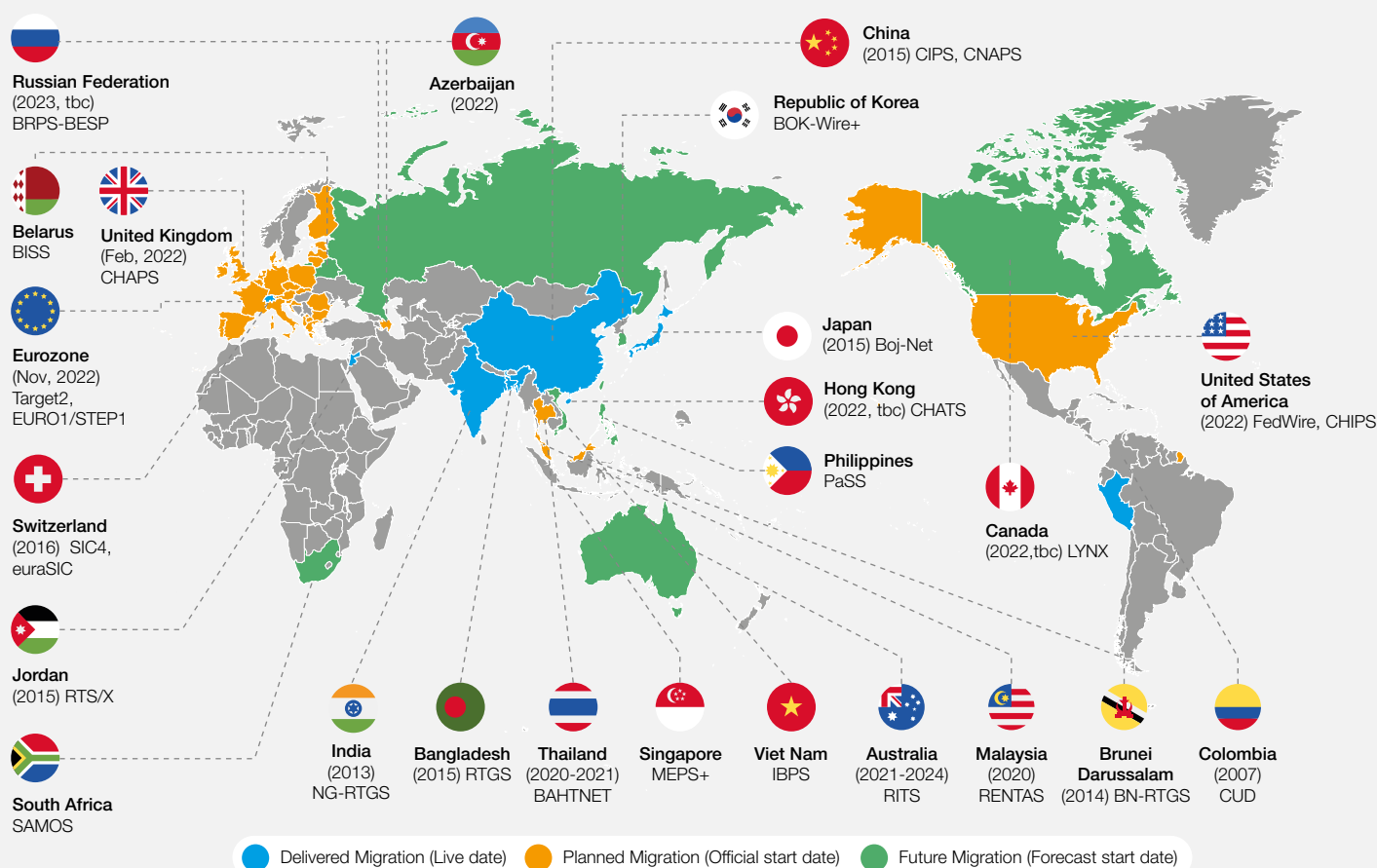
ISO 20022 standard migration

From the global payment market infrastructure perspective, the ISO 20022 standard creates more opportunities for greater interoperability and harmonization between payment systems, improving operational resilience and reducing market fragmentation and single points of failure. This standard enables economies of scale and scope of payment systems, facilitates automation and straight-through-processing to reduce the costs, time and risks associated with financial transaction renewals of high-value payment systems, the development of new instant payment systems and the interoperability of low-value brownfield systems.

The standard creates rich data opportunities to enhance data quality and financial crime compliance. Many global open banking projects are using ISO 20022 data components to assure a high level of reuse throughout the financial services ecosystem.

Countries like China, India, Japan, Singapore, Thailand and the Philippines lead the way in the adoption of ISO 20022 for payments. The European Central Bank, Bank of England, Clearing House, Federal Reserve and SWIFT have developed migration plans for ISO 20022 standard application. Other central banks and payment system operators are also committed to migrating to this standard. Many securities repositories and other clearing systems are also adopting ISO 20022.

FIGURE 1 Overview of high-value payment systems around the world and migration state



Source: Compact, Overview of high-value payment systems around the world and migration state, [Image], <https://www.compact.nl/en/articles/the-industry-challenge-towards-iso-20022-as-a-global-payments-standard/>

The launch of the Cross-border Payment System linkage between Singapore's PayNow and Thailand's PromptPay will be the first of many such cases.²³ A centralized approach to testing these ISO 20022 messages will ensure greater levels of interoperability and accuracy when developing cross-border networks. Nearly all of the new instant payment systems are based on ISO 20022, with slight variations. For example, the Central Bank of the Republic of Azerbaijan launched the

Instant Payment System (IPS) in real mode in 2020 with the aim of ensuring the opportunity of full completion of mutual transactions conducted between individuals, businesses and state agencies in the country in the regime 24 hours a day, 7 days a week, every day of the year within 5-10 seconds. IPS is also based on ISO 20022. The whole National Payment Systems of Azerbaijan will migrate to the ISO 20022 standard in 2022.



As a pioneer in digital payments, e-money has dominated China's mobile payment scene. For a long period of time, Weixin Pay, a payment service built into Tencent's social communication app Weixin, and Alipay, an e-wallet company grown out of Alibaba, have operated as semi-closed loop systems with their own QR code standards. In recent years, the People's Bank of China has pushed for public and private sector collaborations for a more open ecosystem across different payment methods. Weixin Pay is currently cooperating with multiple banks and institutions to promote a more comprehensive payment interconnection. In addition, Weixin Pay and UnionPay Cloud QuickPass, which is owned by one of the largest card networks in China, have created a comprehensive interoperability mechanism with various in-depth payment and service interconnection scenarios. Starting from September 2021, UnionPay Cloud QuickPass app users can scan Weixin Pay QR codes to make offline payments. Weixin Pay users can do the same with UnionPay Cloud QuickPass QR codes. As more payment service providers in China expand their collaborative approach to QR codes, there is expected to be a shift from previously incompatible technical standards between different payment services to a more open and mutually compatible payment services framework, thereby increasing convenience for consumers.



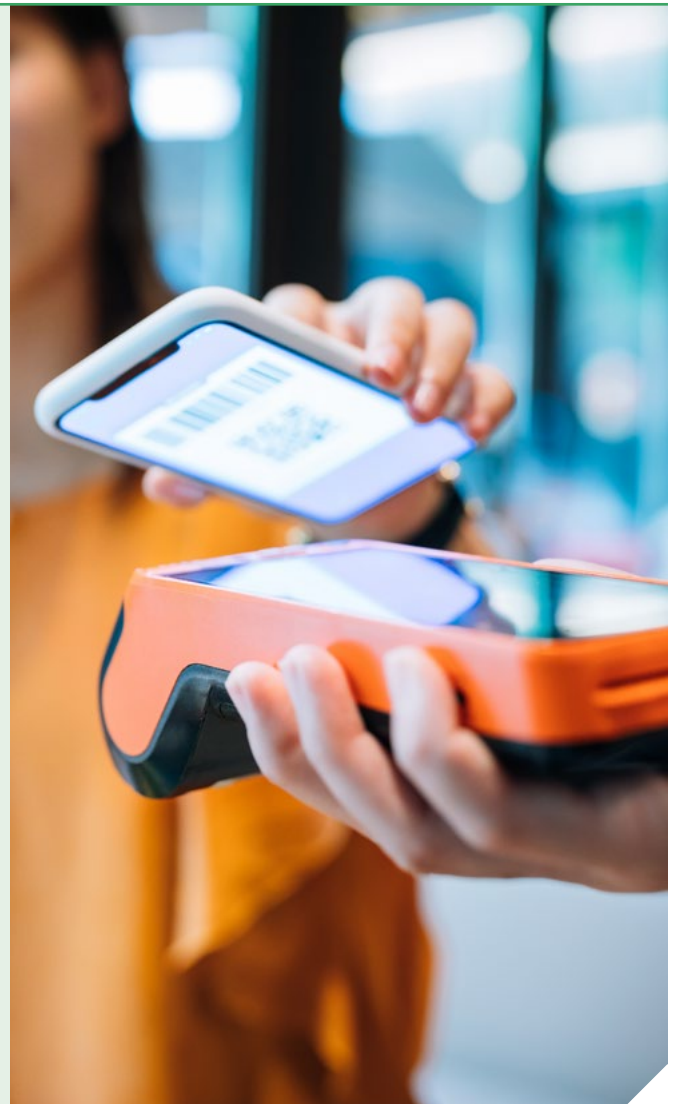
CASE STUDY 2 | QR code standardization in ASEAN



QR codes have a strong presence in Association of Southeast Asian Nations (ASEAN) countries. Scan-to-pay transactions within China have grown 15-fold between 2019 and 2022, hitting 9.6 trillion yuan (\$1.5 trillion) in the fourth quarter of 2019 alone.²⁴ Regardless of the current economic downturn, the COVID-19 pandemic has only intensified the QR code market, increasing transaction activity over the first quarter of 2020 by 26% compared to the same period the year prior. As QR codes across ASEAN have become more ubiquitous, the adoption of an interoperability approach is timely.

The ASEAN Bankers Association (ABA) has led an effort to create an interoperable QR code. The main objective is to provide low-cost and convenient cross-border payments across ASEAN to further facilitate retail consumer business transactions through tourism and trade. There is potential to harmonize the use of national QR payment codes through the adoption of standards developed by EMVCo, ISO20022, open loop, and other standards and technologies to enhance interoperability. Thus far, ASEAN countries have adopted a bilateral approach for which national QR payment schemes are "operationally ready" for cross-border payments. These countries include Malaysia, Thailand and Singapore. Other countries will certainly follow. The long-term goal is a hub and spoke approach. This collaboration is part of the ASEAN Payment Connectivity initiative, which promotes financial integration in the region through efficiency, reduced costs and improved user experience for cross-border payments.

In other emerging markets the technology is left open. For example, in Azerbaijan, QR code payment is available via an instant payment system (IPS) and payment channels integrated into the IPS. QR code payments via IPS offer several benefits. In particular, perceived ease of use and high-level security are the two factors that most strongly influence the intention to accept the use of QR code payment services among users.

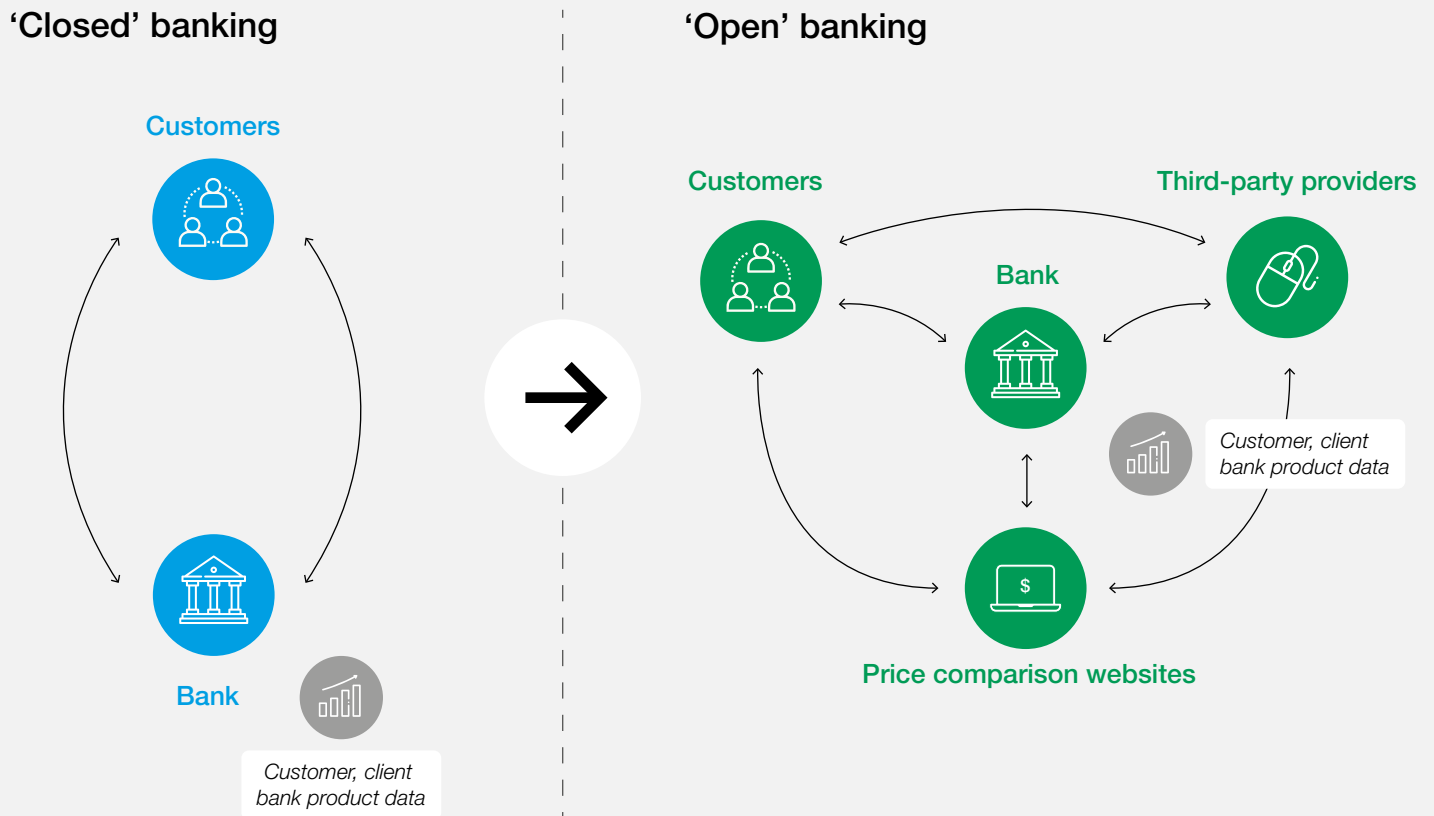


Open banking

Open banking is another way to ensure technical interoperability. Open banking enables authorized third-party providers (TPPs), including fintechs and other types of service providers, to access customer data and financial services of banks and

other financial institutions subject to customer consent in an automated fashion. Open banking is usually established via application programming interfaces (APIs) other methods such as file transfer. Contrary to conventional “closed” banking, TPPs gather and process customer data within the context of customer consent (Figure 2).

FIGURE 2 Closed banking vs open banking



Source: Deloitte analysis, <https://www2.deloitte.com/content/dam/Deloitte/cz/Documents/financial-services/cz-open-banking-and-psd2.pdf>

By reducing data barriers within the financial services industry, TPPs may offer customers the chance to perform financial transactions faster (even instantly), at lower costs and tailored to customer needs (e.g. simply, seamlessly, pick and integrated services). Meanwhile, financial institutions may also benefit from open banking by focusing on their core businesses and enabling the provision of their front-end services through TPPs that are highly innovative and competitive. TPPs may create new customer-friendly products and value-added services in a more efficient way so that the use,

quality and variety of financial services improve in every respect.

Open banking implementations vary in terms of their approaches: some have emerged from direct regulatory requirements (such as in the European Union, United Kingdom, Mexico, Brazil, India, Turkey or Australia), while some have taken the form of facilitation via guidance and market coordination (India, Japan, South Korea, Hong Kong, Malaysia, Singapore) while others still have been industry-led (USA, New Zealand).^{25,26}



The Central Bank of the Republic of Turkey (the CBRT) has started to develop specified technical and operational requirements for open banking.

In April 2020, the CBRT took majority ownership of the Banking Card Center (BKM), which was founded as a partnership between 13 public and private Turkish banks. The CBRT made this move to foster a private-public partnership in the payments domain and use the capacity and experience of BKM in the implementation of overlay

payment services (e.g. proxy addressing and national QR codes, etc.) and open banking APIs.

In May 2020, an open banking task force, which is composed of members from the CBRT and the BKM, was established. The task force conducted an extensive analysis of country examples, design choices and implementation strategies for open banking and decided on the roles that the CBRT and BKM would play in setting up the open banking system.

Entities	Roles
CBRT	<ul style="list-style-type: none"> – Issue regulations to specify the operational and technical principles for open banking implementation – Issue API standards and guidelines jointly with BKM, which include the technical and operational requirements for open banking implementation
BKM	<ul style="list-style-type: none"> – Issue the API standards and guidelines jointly with CBRT, which include the technical and operational requirements for open banking implementation – Create and run an open banking platform based on the technical and operational requirements, which connects participating members – banks or fintech firms – to the banking networks through a shared platform – Onboard and certify the payment service providers (PSPs) and act as a central registration entity

In accordance with the framework, an industry working group with representatives from banks, payment and e-money institutions, fintechs and sector associations was formed to govern the implementation process in a collaborative manner.



Developing and connecting retail instant payment systems

Several governments have developed instant payment systems.²⁷ Some systems connect all players in an ecosystem, from ATMs to mobile payments, such as in India. Meanwhile, other countries have enabled cross-border connections for instant payments, such as Singapore and

Thailand.²⁸ Singapore and India are focused on linking their PayNow payment service and the Unified Payments Interface (UPI) by July 2022.²⁹ Simultaneously, BIS Innovation Hub Singapore Centre conducted the Nexus Project,³⁰ which proposes a model for linking multiple national payment systems. These varied efforts will help boost payment interoperability locally and globally in the near future.

CASE STUDY 4

India Stack: A comprehensive approach to an interoperable payment system



India has developed a digital infrastructure made up of interconnected systems called **India Stack**^{31,32} which simplifies complex processes such as identifying account owners and routing payments. India Stack aims to promote financial inclusion and increase competition within financial services. It provides a platform for operationalizing user-authorized data portability and interoperability across the economy.

India Stack comprises four layers: (i) presence-less layer – digital identity system (Aadhaar & eKYC); (ii) cash-less layer – an interoperable payment interface (UPI); (iii) paperless layer – digitalization of documentation and verification (eSign and DigiLocker); and (iv) consent layer – a modern privacy sharing network.

The main components of India Stack that ensure interoperability are a universal digital ID platform (Aadhaar), which includes biometric information, and an instant retail payment system based on open APIs (UPI), a common QR code and an unstructured supplementary service data (USSD) code.

The Aadhaar platform allows its ID holders to authorize a bank to obtain an electronic verification of their identity, which provides an electronic substitute for the Know Your Customer (KYC) procedure required for any bank onboarding process.

The UPI, a system developed by the National Payments Corporation of India (NPCI) through public and private sector collaboration, allows individuals to access their bank accounts from registered apps such as mobile wallets to make transactions to any other bank. This system has been repeatedly tested, with the UPI recording 2.73 billion transactions in March 2021 alone. At the same time, the Reserve Bank of India has recently issued a circular asking all licensed prepaid payment instruments (PPIs) or mobile wallets such as PhonePe, Paytm and Amazon Pay to become fully interoperable via card network for card-based PPIs and through the UPI for e-wallets.



Interoperability in the age of digital currency

The rise of digital currencies³³ has added a new level of complexity to the payment ecosystem. As digital currencies continue to evolve, interoperability may be an issue. Interoperability across several distributed ledger technology (DLT) platforms, such as Ethereum, Hyperledger Fabric, Corda and Quorum, is increasingly in demand. Achieving seamless cross-chain interoperability is sought after as more firms rely on this technology. A common set of DLT standards and a focus on interoperability and scalability are essential for the survival and mass adoption of these technologies. There are blockchain networks

that offer interoperability solutions, including Polkadot, Cosmos and Harmony, yet their propositions could benefit from refinement.

Private sector actors have proposed solutions to allow interoperability between digital currencies and existing payment solutions. For example, Visa, MasterCard and PayPal have all enabled payments using cryptocurrencies. Governments are also actively working on how to integrate their own digital currencies into existing platforms. With central banks still finalizing their stance on cryptocurrencies, more certainty in this domain is expected in the coming year.



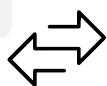
Bank of England's Platform Model is included as one of the design principles articulated in its "Discussion Paper on Central Bank Digital Currencies (CBDC)",³⁴ which emphasizes the need for CBDC payments to be interoperable across different payment providers within and across countries. The framework proposed by the Bank of England involves the provision of a core ledger that is accompanied by an API to allow third-party payment interface providers (TPPs) to build overlay services that facilitate payments using core ledger liquidity. These TPPs could facilitate payments by initiating transfers of funds across the core ledger or by obtaining control of pooled funds and making customer payments as on-us transfers. Interoperability across TPPs would be key to meeting the United Kingdom's Open Banking Directive and the European Union's Second Payment Services Directive.



Central bank core ledger

A fast, highly secure and resilient platform that provides relatively simple payments functionality (the core ledger).

API



API access

Allows private sector payment interface providers to connect to the core ledger. Blocks unauthorized access – only regulated entities can connect.



Payment interface providers

Authorized and regulated firms providing user-friendly interfaces between the user and the ledger. Many also provide additional payment services that are not built into the core ledger as overlay services.



Users

Register with payment interface provider(s) to access CBDC.

Source: "Central Bank Digital Currency Opportunities, challenges and design", Bank of England Discussion Paper, March 2020, <https://www.bankofengland.co.uk/-/media/boe/files/paper/2020/central-bank-digital-currency-opportunities-challenges-and-design.pdf>.



Innovations in domestic retail payment systems have enabled near real-time clearing and settlement payments within a country's borders. Most of these domestic digital payment systems are also available 24 hours a day, 7 days a week, every day of the year and charge merchants less than 1% per transaction. In contrast, cross-border payments are slow, expensive and opaque. For example, research providing the backdrop to project Inthanon-LionRock found that the average cost for a Thai bank to execute a cross-border payment to Hong Kong is 7.5 times that for a domestic payment.³⁵ Cross-border payments can also take days to complete as they make their way through a chain of intermediary banks and payment service facilities.

This issue has found its way to the top of policy-makers' agendas – the G20 declared it a priority in 2020.³⁶ Against this backdrop, central banks have also been experimenting with central bank digital currencies (CBDC) for cross-border payments. Many experiments are underpinned by distributed ledger technologies, as they offer the promise of making cross-border payments faster, cheaper and safer.

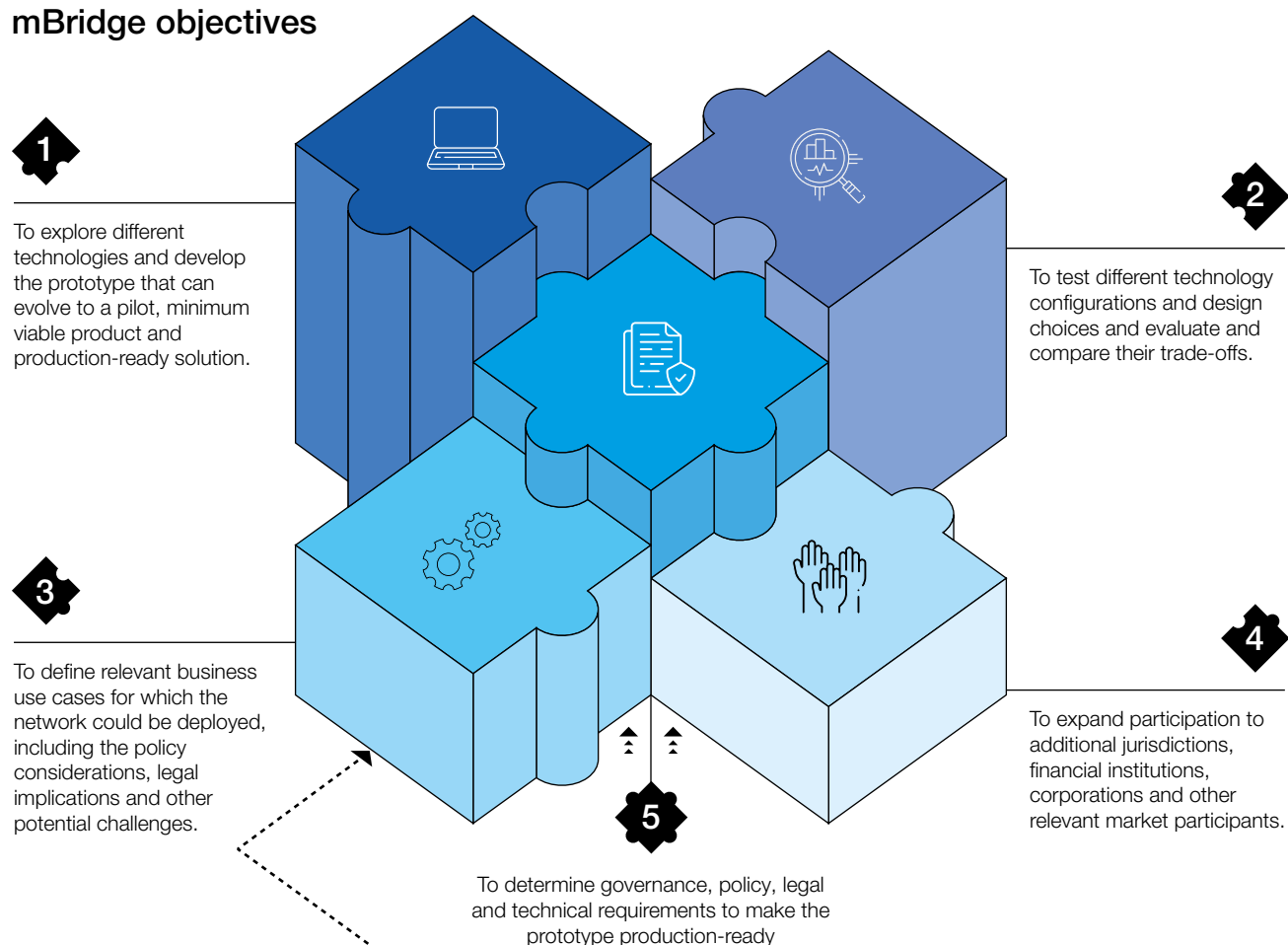
Project mBridge, an extension project of the earlier Inthanon-LionRock project, a wholesale CBDC co-creation project involving the Hong Kong Innovation Hub of BIS, the Hong Kong Monetary Authority, the Bank of Thailand, the Digital Currency Institute of the People's Bank of China and the Central Bank of the United Arab Emirates, explores the creation of a scalable and extensible platform for cross-border payments, with fast 24/7/365 settlement using DLT.

Interoperability is inherent to the design, in that the mBridge is a shared network that provides connectivity to financial market participants across jurisdictions and interfaces with respective domestic payment networks. The central bank of each jurisdiction has the sole authority to issue and redeem CBDC in their currency within the network.

If successful, an efficient, low-cost, compliant and scalable multi-currency, multi-jurisdiction arrangement can provide a network of direct central bank collaboration with lower transaction costs and faster settlement speeds.



mBridge objectives



Inthanon-LionRock objectives

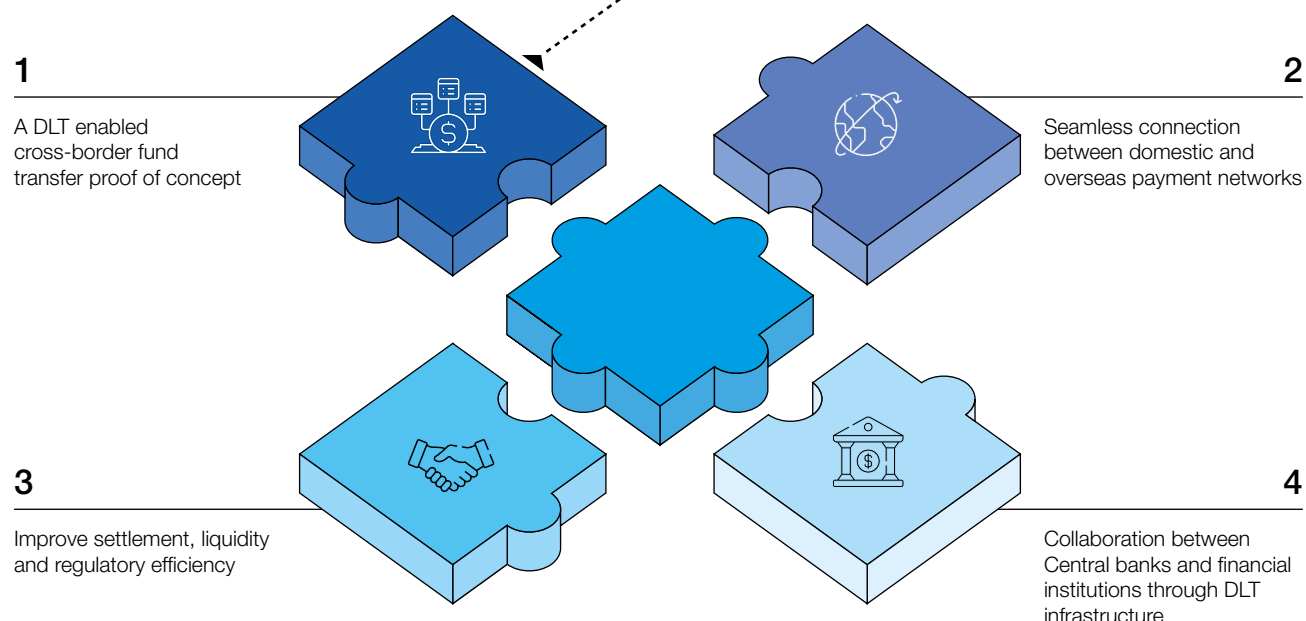
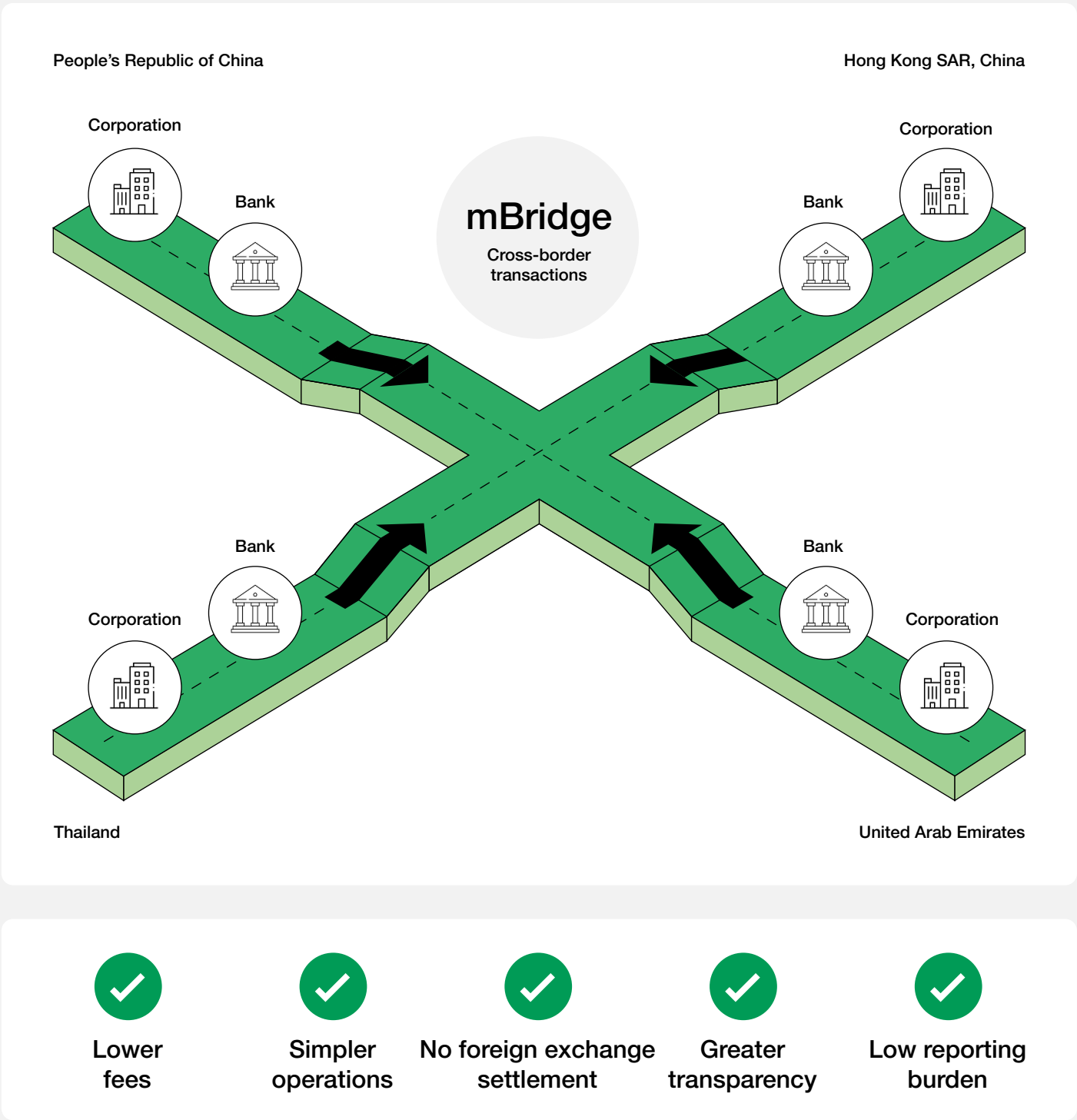


FIGURE 5 | mBridge cross-border transactions



Source: BIS Innovation Hub, *mBridge Cross-Border Transactions*, [Image], https://www.bis.org/publ/brochure_mbridge.pdf

Central banks and payment policy-makers may use the following matrix to assess how interoperable their payments systems are from a technical standpoint.

TABLE 2 Domestic context matrix

Domestic context

Measurement	How/where to obtain the data
The amount in circulation by each type of money (cash, bank money, e-money, cryptocurrency, etc.) within a country in base year 0 and over subsequent years	
Number of accounts/users registered for each type of payment method (cards, e-wallets, bank accounts, digital currency wallets, etc).	Survey PSPs
Fees charged to consumers or merchants associated with each type of payment method <ul style="list-style-type: none"> – In bulk vs small amount Immediately available for withdrawal vs other speed	<ul style="list-style-type: none"> – Visit service provider websites – Visit of physical outlets – Survey PSPs
Average number of payment methods per user and why they choose a particular type of payment method	Survey users
End-to-end costs involved in exchanging one type of money (for example, cash) for another type of currency (for example, cryptocurrency) <ul style="list-style-type: none"> – On-ramp/off-ramp fees: such as ATM fees; wallet top-up fees; interchange fees, etc. – Costs in reaching out to/finding on-ramp/off-ramp channels: travel cost to find a bank that can open up an account or an agent to top-up mobile money 	Survey users
Average end-to-end speed for money transmission for each type of payment method (in bulk vs small amount)	<ul style="list-style-type: none"> – Visit service provider websites – Visit physical outlets – Survey PSPs or users

TABLE 2 Domestic context matrix (continued)

Domestic context

Measurement	How/where to obtain the data
<p>Transparency</p> <ul style="list-style-type: none"> – Users' ability to track the movement of money – Disclosure of data being shared with counterparties and third parties in the money movement processes – Fee disclosure: fee breakdowns (implicit and explicit fees charged for each type of activity and by various parties involved in money movement) 	<ul style="list-style-type: none"> – Visit service provider websites – Visit physical outlets – Survey PSPs or users
<p>Average integration costs between one payment system with the other payment system</p> <ul style="list-style-type: none"> – Absolute cost – Costs as percentage of operational costs to reach a majority of market participants 	<ul style="list-style-type: none"> – Survey PSPs, merchants or payment service integrators
<ul style="list-style-type: none"> – Value and volume processed through each type of payment method 	Survey PSPs
<ul style="list-style-type: none"> – Whether there is a unique identifier across different payment methods for accounts/transactions 	Survey PSPs
<ul style="list-style-type: none"> – Transaction failure rates 	<ul style="list-style-type: none"> – Survey PSPs

TABLE 3 Cross-border context matrix

Cross-border context

Measurement	How/where to obtain the data
Foreign exchange controls	<ul style="list-style-type: none"> – Central bank
<ul style="list-style-type: none"> – Number of foreign currencies available through exchanges 	<ul style="list-style-type: none"> – Central bank – Visit service provider websites – Visit physical outlets – Survey PSPs or users
<ul style="list-style-type: none"> – Number of exchanges supporting currency exchange with major trading partner currencies 	<ul style="list-style-type: none"> – Visit service provider websites – Visit physical outlets – Survey PSPs or users
<p>End-to-end costs involved in exchanging domestic currency for major trading partner currencies</p> <ul style="list-style-type: none"> – Foreign exchange fees – Costs in reaching out to/finding those exchanges 	<ul style="list-style-type: none"> – Visit service provider websites – Visit physical outlets – Survey PSPs or users
Number of correspondent banks required to move money to a major trading partner's country	Survey PSPs
<p>End-to-end costs involved with cross-border transactions (wire transfer; remittance; etc.)</p> <ul style="list-style-type: none"> – Fees (including transfer fees and foreign exchange fees): in bulk vs small amount – Costs in reaching out to/finding places for the exchange 	<ul style="list-style-type: none"> – Visit service provider websites – Visit physical outlets – Survey PSPs or users
Number of shared standards with PSPs in major trading partner countries	Survey PSPs
Frequency of system messaging errors and of rejected transactions	Survey PSPs

“ Several benefits emanate from technical interoperability but there are also drawbacks that should be recognized and mitigated to the greatest extent possible.

Limitations of technical interoperability

Several benefits emanate from technical interoperability but there are also drawbacks that should be recognized and mitigated to the greatest extent possible.

Interoperability enables innovation and generativity by opening the system to new institutions, products and services; but those new actors can simultaneously lead to heightened cybersecurity risks. A system is often only secure as its weakest link. Depending on the design of an open architecture, a breach of one service provider could have systemic cybersecurity implications. Moreover, if a vulnerability is discovered in open-source code, there could be systemic issues as every actor in the ecosystem relies on this same code. Patches may be more difficult to issue in an open system both because its code development requires consensus that can be slow and also due to the necessity of varied actors implementing the patch for it to be effective.

Open architecture, if properly designed, however, can be beneficial from a cybersecurity perspective. Any member of the system can more easily discover vulnerabilities and mitigate them, hopefully before any harm occurs. Systems can leverage tokenization to ensure that hand-offs and authorization can occur between different actors without revealing sensitive information and therefore lowering systemic risks. Interoperable systems can also agree on a set of core developers who

are able to implement solutions more quickly and effectively than a consensus-based model. Finally, open-source software can leverage high-quality cybersecurity standards and use them to ensure only entities that are dedicated to cybersecurity are able to access the system.

A poorly designed interoperable system can likewise lead to challenges of privacy protection. Tokenization can be a helpful tool in reducing the likelihood that private information would be shared. Tokenization can also be used when data is at rest or in transit. An open architecture can mandate a rule on tokenization of data in order to protect privacy and maintain openness. Moreover, robust privacy policies by entities that are part of an ecosystem can also help to reduce the risk of harm to privacy in an open system.

Finally, it is worth noting that while open systems are generally beneficial for competition, there can be competition concerns in open systems as well. If a particular entity dominates the usage of an open architecture marketplace and then leverages that dominance to offer linked downstream products, then serious competition concerns could arise.

Cybersecurity, privacy, adapting to changes, and competition concerns also exist in closed systems. And, while they are unique concerns in interoperable systems, those concerns can be mitigated with thoughtful design and continuous systems-level review.

Regulatory interoperability

The payment system is the bedrock of the financial system. It is important to financial stability for them to work smoothly, with a direct impact on everyone's daily life and livelihoods. To reach the objectives set out for payment interoperability, it is crucial to achieve regulatory interoperability. From a domestic perspective, regulatory interoperability is key to ensuring payment interoperability across different types of payment methods. From a cross-border perspective, regulatory interoperability relies on the ability to drive regulatory convergence. Despite its importance, regulatory interoperability has historically been the slowest and most challenging to advance for a variety of reasons: first, domestic legislative processes are often complex and lengthy; second, differences across political systems, culture and stages of economic development often lead to differences in policy objectives and regulations across countries; and third, there is a lack of qualitative and quantitative measurement covering regulatory interoperability, making it hard to understand existing gaps and measure progress in filling them.

Domestic regulatory interoperability

At a domestic level, achieving regulatory interoperability requires that each player be able

to connect with each other to provide a seamless and affordable service to end-users in an ecosystem with a wide range of players. While bilateral or multilateral collaborations among private parties can help improve interoperability by creating a network among themselves, laws and regulations can also play an important role by:

- Making payment interoperability a policy goal or mandate
- Providing assurance to all payment players who meet regulatory obligations that they will be offered equal access to such network
- Setting standards for joining such network.

In its Payment Services Act 2019, the Monetary Authority of Singapore (MAS) has made ensuring interoperability between payment accounts and systems part of its mandate.³⁷ In the interests of the public, the MAS may direct a PSP to be a participant in the payments system and a PSP that operates a payment system to adopt a common standard.

“ Given the multiple disciplines involved in setting regulations for payments, ranging from data flow to consumer protection, it is important to ensure consistency. Creating an international body dedicated to payments could be a solution.

The other important role laws and regulations can play in ensuring regulatory interoperability is to provide equal opportunities to different payment players by:

- Preventing abuse of monopoly power
- Applying the principle of “same risk same regulation” across different payment methods to level the playfield.

Cross-border regulatory interoperability

The lack of international laws and an international supervisory body overseeing the global payments system is a significant challenge for payment interoperability. The G20 has made coordinating regulatory, supervisory and oversight frameworks one of its five focus areas in the Financial Stability Board (FSB) roadmap for enhancing cross-border payments.³⁸ The roadmap aims to improve confidence between financial institutions and between jurisdictions by promoting more consistent application of anti-money laundering/combating the financing of terrorism (AML/CFT) standards, facilitating cross-border data flows and information sharing, fostering improved digital identity frameworks and shared customer due diligence infrastructures and, in specific cases, identifying low-risk “safe payment corridors”³⁹ enhancing cross-border payments.⁴⁰

A good example of regulatory convergence is the work the Financial Action Task Force (FATF) has done on AML/CFT by developing cutting-edge guidelines and best practices. However, not every country is a member of FATF, while each member has discretion on how and when to implement the FATF’s recommendations that has resulted in limited global regulatory consistency. Further, FATF adopts a risk-based approach to AML/CFT, which was designed to provide public and private sector actors with greater flexibility in determining the most effective way to identify and address money laundering/terrorist financing risks. In practice, such an approach implies that financial institutions and regulatory authorities are not required to implement the same measures for AML/CFT. Thus, while regulatory convergence was achieved to a degree (e.g. through consensus on FATF’s more than 40 recommendations), the fact remains that AML/CFT measures can and do vary from jurisdiction to jurisdiction and bank to bank. The flexibility in adapting and interpreting AML/CFT regulations has contributed to less consistency and clarity for transactions across banks. From an interoperability perspective, more should be done to define common

standards and procedures that need to be strictly implemented. The United Nations Commission on International Trade Law (UNCITRAL) provides a good example of how regulatory interoperability can be achieved. By drafting and publishing model laws and legal guides, UNCITRAL is able to help drive regulatory convergence for areas including electronic signatures, e-commerce and international credit transfers.

Although difficult to negotiate and requiring years (often decades) to finalize, international agreements can radically transform cross-border relations and drive convergence. For example, the Revised EU Payment Services Directive (PSD2) took several years to negotiate but when it was finally passed, it became one of the most consequential regulatory developments in decades, creating one of the largest integrated payment markets in the world. Singapore is a champion in terms of using international agreements to help drive interoperability by entering into bilateral fintech cooperation agreements and digital trade agreements with New Zealand and Chile and subsequently with Australia. For example, the Digital Economy Partnership Agreement (DEPA) between Chile, New Zealand and Singapore is the first international agreement that includes commitments to improve digital payment interoperability.

In a world where payments are expected to be borderless, it is not hard to envision the creation of one international body that is dedicated to coordinating with various countries and international organizations with respect to payment regulations. At present, there are many international or intragovernmental organizations, such as the Financial Stability Board, BIS, the Committee on Payments and Market Infrastructures, the International Monetary Fund (IMF) and FATF, that have been working on setting regulatory standards and guidelines to drive regulatory harmonization and convergence for different elements of payments. Some of the cross-border payment issues relate to trade barriers with respect to market access to financial services and restrictions of cross-border data flow. The emergence of stablecoins also creates additional layers of regulatory convergence complexity given legal uncertainty of the rights and obligations of the parties involved in a stablecoin ecosystem and the potential spillover across borders.⁴¹ Given the multiple disciplines involved in setting regulations for payments, ranging from data flow to consumer protection, it is important to ensure consistency. Therefore, creating an international body dedicated to payments could be a solution.



BOX 1 | Challenges and opportunities ahead: Identity and the issue of de-risking

The issue of identity is intricately tied to the interoperability of a global payment system. Institutional participants in global payment systems are required by law to verify the identity of all relevant and related parties for any given transaction. If Bank A's customer is Jane Doe and she wants to engage in a cross-border transaction, it would be ideal for correspondent Bank B (and all other relevant participating financial institutions) to be able to rely on the fact that Bank A knows exactly who Jane Doe is. In practice, all participating financial institutions will conduct their own verification of Jane Doe's identity based on the AML requirements they are subject to, which could vary from country to country. Further, what Jane Doe's identification is comprised of or how it is structured in Jane Doe's country could also add complexity to the process. It often requires human intervention across time zones to deal with the inconsistencies between the identification structure of the originating country and the AML requirements of the originating country and the AML requirements of the receiving country, which results in delays or rejection of transactions.

Much of the challenge facing corporate digital identity and individual digital identity are intrinsically interlinked. Individual identity is often more challenging than corporate identity as it includes personal data. Data protection and privacy are sensitive topics and their standards vary significantly across jurisdictions, which makes it difficult to share individual identity for cross-border payments and for cross-sectoral uses within a jurisdiction. While forming an indispensable underpinning of smooth cross-border payments, current corporate identification approaches lack harmonized standards, methods or technologies. Corporate registries are national or state-based and differ in the amount of information obtained, verified and shared.

At present, due to existing technological and regulatory limitations (e.g. information silos, unreliable and fragmented ID standards across

jurisdictions, etc.), most financial transactions require relevant parties (e.g. a customer) to self-report certain material information related to their identity, which is inevitably prone to errors, omissions or fraudulent misrepresentations. In terms of objective information, financial institutions use a patchwork of solutions, starting with government-issued IDs (e.g. passport, driver's license, etc.) and utility bills. In terms of validating the necessary information, financial institutions typically rely on expensive third-party data providers (e.g. biometrics, adverse media, sanctions list, etc.) that aren't always available/accessible to all stakeholders. The result is an imperfect system mired in unreliable and/or highly fragmented information, which greatly increases the cost of transacting and persistently creates information asymmetry problems that criminals regularly exploit. To gauge just how big a problem this is, consider de-risking, which represents a systemic risk to the global financial system that disproportionately affects developing nations and hinders financial inclusion and interoperability.

The global payment system would benefit from a type of passport regime where when a person verifies their identity according to one country's legal standards it will be considered up to the legal and regulatory standards of another country. For individual identity, the increasing use of biometric information can help provide more finality in terms of identification verification. However, in the event of a biometric breach or fabrication, remediation may be very difficult if not impossible.⁴² There is also a high potential for false positives and false negatives, as people look different each day and according to the situation.⁴³ For corporate identity, legal entity identifiers (LEI), if more broadly adopted, could provide a useful common identifier and thereby an important starting point for corporate identity harmonization. The path to a global system for identification is not an easy one, given that it would touch upon issues of privacy protection, cross-border data flow and cybersecurity.

Regulatory interoperability is inherently difficult to measure in a quantitative manner, particularly when viewed from a cross-border perspective.

The matrix below provides a combined means of leveraging technical data and regulatory review to provide an assessment of the status of a country's regulatory interoperability.

TABLE 4 Measuring domestic regulatory interoperability

Domestic

Measurement	How/where to obtain the data
Average number of agreements among payment service providers	Survey of PSPs
Whether relevant regulators have set interoperability as their mandate/goal	Review of laws and regulations
If there is a national switch, percentage of payment service providers that are connected to the national switch	Data from national switch operator
If there is a national switch, whether relevant regulators have the legal authority to order payment service providers to join the switch	Review of laws and regulations
Whether relevant regulators have the legal authority to require a payment service provider to adopt certain standards to ensure interoperability	Review of laws and regulations
Is the principle of "same risk same regulation" applied across different types of payment methods, such as: <ul style="list-style-type: none"> – KYC process – Customer fund requirement – Capitalization – Licensing 	Review of laws and regulations

TABLE 5 | Measuring cross-border regulatory interoperability

Cross-border

Measurement	How/where to obtain the data
Back-office compliance cost in establishing/maintaining a connection with a major trading partner	Survey PSPs
Number of international agreements entered into that include provisions on payments	Review of international agreements and trade obligations
Degree of compatibility on what is categorized as high risk, medium risk and low risk with respect to KYC with major trading partners	<ul style="list-style-type: none"> – Review of laws and regulations – Survey PSPs
Level of acceptance of technology in existing laws and regulations <ul style="list-style-type: none"> – E-signature: Is e-signature acknowledged? – E-document: Is digital document accepted to comply with AML/CFT rules? – E-KYC: Is e-KYC accepted as a way to comply with AML/CFT rules? – Biometrics: Is biometric data accepted as a way to comply with AML/CFT rules? 	Review of laws and regulations
Data localization requirements	Review of laws and regulations
Whether the country has endorsed and adopted global standards	Review laws and regulations and public policies
Whether there are restrictions resulting from different applicable laws and regulations, mainly to tax, foreign exchange and capital controls that would obstruct interoperability	Review laws and regulations and trade obligations



Usage interoperability

Diverse payment methods are being adopted at varied scales across dissimilar demographics. Digital payments have a higher adoption rate among people who are young, tech-savvy, educated and affluent, and who tend to live in cities, while cash remains predominant for people in rural areas or low-income populations, as well as those who avoid the formal financial system. Measuring usage interoperability could help provide more granular details of a country's financial and digital inclusion and identify potential further barriers.

Most payment service providers are required to obtain some level of identification information from

the users along with other documents in order to open an account for payment processing. Whether or not a person has the required documentation is crucial to their integration into the formal financial system. Stringent authentication requirements may create more friction for people to access financial services. While biometric information may be used to provide identification, robust consumer protection, data privacy and cybersecurity standards are needed to ensure transactions are secure. Leveraging biometric information also requires laws and regulations to acknowledge such information will satisfy KYC or AML requirements.

BOX 2

Individual digital identity

A robust, inclusive and interoperable identity system is fundamental to an interoperable payment system at both domestic and global levels. Both the public and private sectors have come up with

various solutions to build a digital identity system for individuals, each with their own pros and cons. Table 6 sets forth a broad range of offerings for a digital ID with varying levels of interoperability.⁴⁴

TABLE 6 The range of offerings for a digital ID

Type	Characteristics	Example*	Level of interoperability
Private digital ID systems	<ul style="list-style-type: none"> – Every private party governs its own infrastructure – Required to access its own service offerings 	Tech companies offering a wide range of digital services	Interoperability limited to services offered by one company and/or its affiliates
Private collaborative governance	<ul style="list-style-type: none"> – Market-driven collaboration where private parties govern together – Little government involvement 	The company allows customers of Germany's savings and cooperative banks to use their online banking details as a digital ID for other services	Interoperability limited to the specific closed network the ID system is designed for
Private collaborative governance + public governance	<ul style="list-style-type: none"> – Market-driven collaboration where private parties participate together – Government sets guiding principles 	<p>A consortium of banks in Sweden developed the BankID solution, which allows users to authenticate themselves for payments and government services</p> <p>A consortium of banks and telecommunications companies developed ItsMe in Belgium, which allows users to authenticate themselves for online banking and payments, and private sector and government services⁴⁵</p>	Interoperability limited to participating public and private services and often limited to a specific type of services
Public-private governance	<ul style="list-style-type: none"> – A common governance framework developed by public and private sectors 	FranceConnect allows individuals to use credentials with existing service providers for a wide range of private and public services	Interoperability limited to participating public and private services
Government-led	Public body is mandated to set up the governance, which is often enforced and based on a regulatory framework	The Kenyan Huduma Namba digital identification system was set up following to an executive order. It creates and manages a central master population database of individual identity for access to public services.	Potential to reach the broadest interoperability at the domestic level

*Examples are not exhaustive.

Table 7 provides some elements to leverage to understand where a country stands when it comes to usage interoperability.

TABLE 7 Elements to leverage to understand usage interoperability

Measurement	How/where to obtain the data
<ul style="list-style-type: none"> – Public sector adoption of digital payments – Number of government agencies that accept digital forms of payment – National plan for digitization 	National government
Penetration rate of different types of payment methods across different demographics <ul style="list-style-type: none"> – Age – Gender – Income level – Rural vs urban 	Survey of population
% of population with eligible identification to open up an account for payments <ul style="list-style-type: none"> – conventional vs digital – Age – Gender – Income level – Rural vs urban 	Survey of population
Total cost of obtaining/time to obtain individual/company identification <ul style="list-style-type: none"> – Payment to government administration or third party – Cost of the trip to a place where identification service is offered 	Survey of users
Total cost/time of opening an account with a particular payment method	Survey of users

Recommendations

Coordination in policies and innovations that enhance payment interoperability are needed to drive economic growth and inclusion.

“ Building an interpretable payment system is not an easy task. There are three key elements: national policy, intra-agency collaboration, and public and private sector cooperation.

As more and more commercial activities are becoming digital, enhancing payment interoperability is crucial for a country's economic growth and job creation. Building an interoperable payment system is not an easy task. There are three key steps.

1. *Establish a comprehensive national interoperability policy*

Achieving payment interoperability requires cooperation across different agencies, between the public and private sectors and with international standard-setting bodies. For a country to tackle payment interoperability, it needs to establish a comprehensive national interoperability policy that incorporates feedback from various relevant agencies, private sector actors and international standard-setting bodies. It requires setting clear goals and objectives that can be measured along the way.

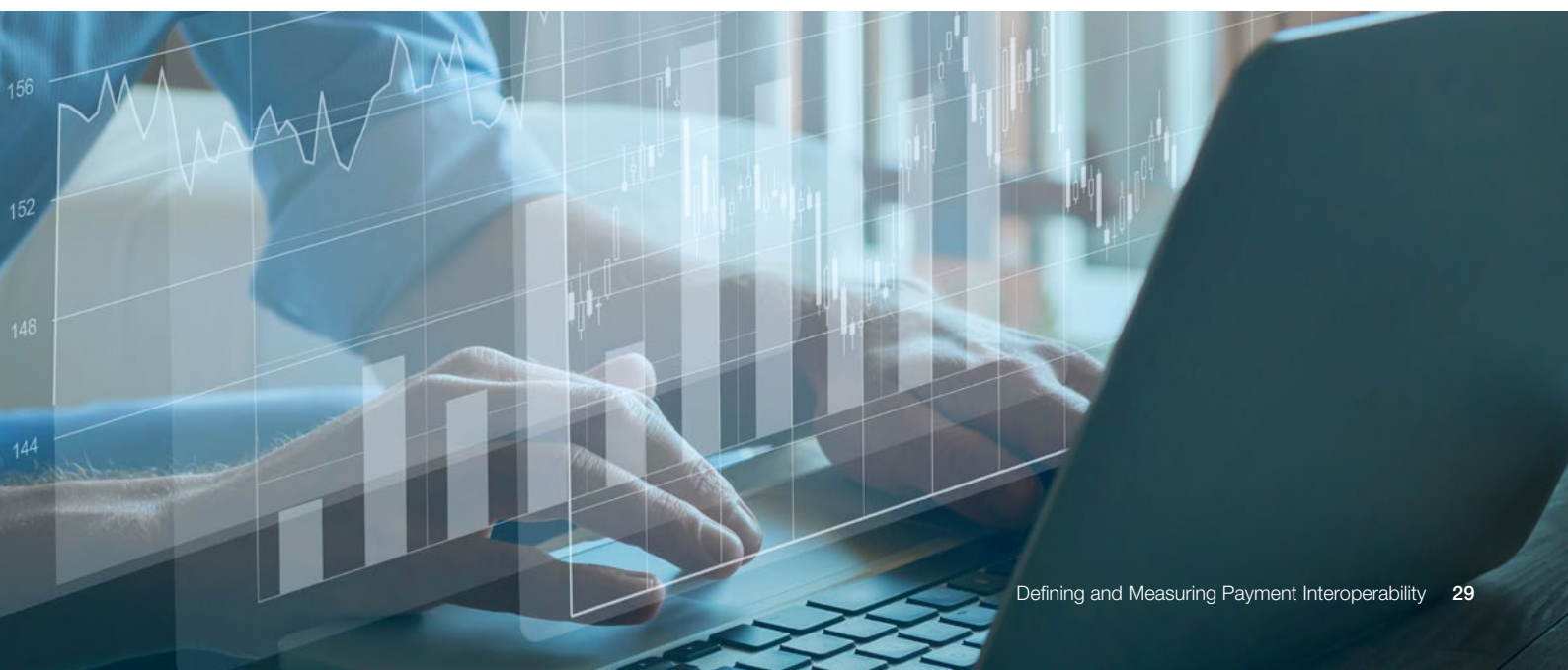
2. *Provide a framework for intra-agency collaboration*

Digital payments do not operate in silos. The development of digital payments requires basic infrastructure services, such as the provision of electricity, telecommunication and internet services, as well as the identification of and a broad agent network to convert cash into a digital format. Achieving payment interoperability, in particular usage interoperability, requires collaboration between policy-makers.

In order to achieve cross-border interoperability for people to benefit from international trade, policy-makers need to work with trade officials to reduce trade barriers for international payment service providers, to ensure free secure data flow with a commitment to the adoption of global standards. Recent trade agreements focusing on digital trade, such as the Digital Economy Agreement between Australia and Singapore and the Digital Economy Partnership Agreement between Singapore, Chile and New Zealand, have set good examples in terms of affirming commitments to international standards and working together towards payment interoperability.

3. *Enhance public and private sector collaboration*

The private sector plays an important role in achieving payment interoperability. Firms propose creative solutions and advance technological innovation to improve payment efficiency and inclusion. They also possess valuable data and insights into user behaviours that will further drive engagement. Many of the measurements indicated in this report require input from the private sector. It is important for policy-makers to reach an agreement with private sector actors in terms of the definition, the goal and measures of payment system interoperability. Further, public and private sector collaboration should not solely be limited to big players in the market. It is important to incorporate feedback and concerns from SMEs.



Conclusion

Preferred methods of payment are increasingly shaped by how people live: as digital economic engagement becomes ubiquitous, payment services must evolve to support commercial activities that are becoming increasingly international. Advancements in technology bring greater competition to the payment industry, which helps introduce novel and better services. Developing payment policies that will facilitate international digital trade while reducing frictions

caused by a lack of interoperability is a major issue facing policy-makers. It is necessary to achieve consensus on the definition and measurements in this space, building upon existing payment interoperability conversations. The aim is to contribute to the existing dialogue by providing a framework for discussions and a starting point to design measurable policy tools to advance payment interoperability.

Contributors

This paper is a combined effort based on numerous interviews, discussions, workshops and research. The opinions expressed herein do not necessarily reflect the views of the individuals

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Endnotes

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