Modernising payment systems: International comparison

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› Executive summary

BankservAfrica and the Payments Association of South Africa have asked Lipis Advisors and IQbusiness to review the path toward modernisation in countries that share key attributes. Familiarity with the challenges and successes faced by others can help contribute to a richer, more developed structure and framework for payments modernisation in South Africa.

International comparison of LVPI modernisation

Phase 1A focuses on a comparative analysis of modernisation in 10 geographies. The document is broken into 6 key sections:

1. **Comparative data**
   This section gauges how South Africa compares to other countries on a macroeconomic level and in relation to payment habits.
2. **Goals of modernisation**
   This section deals with key objectives, types of goals, and the means of accomplishing those goals. Modernisation goals were analysed in detailed case studies across the countries in scope.
3. **Process of modernisation**
   This section focuses on the modernisation process, which is defined by goal setting, consultation, and process management. Best practices for managing modernisation projects are also discussed.
4. **Functional comparison of payment systems**
   Countries in scope were scored according to lean vs. rich and centralised vs. decentralised functionality to yield comparisons that show system evolution and the role of core vs. market led functionality.
5. **Payment system design**
   Feature based changes were viewed in accordance with regulatory or technical trends, and specific goals associated with regulatory and feature based changes.
6. **Lessons learned for South Africa**
   Finally, this document focuses on the key insights from modernisation efforta around the world and how these methods, goals, and changes can be applied to South Africa.

Key insights

Goals

The goals of modernisation must be clear from the outset. These vary according to the needs in the local market.

- Goals with a strong connection to the payments system are relatively easy to achieve. Goals with a weaker connection to payments infrastructure, such as increasing financial inclusion or promoting economic growth require multiple interventions over longer periods of time. Even then, results are not guaranteed.
- More complicated goals require more complicated interventions, with multiple levers and a coordinated approach among industry, government, and associations.

Process

Factors that are present in successful modernisation initiatives around the world include:

- Inclusive representation
- Proper level of seniority in governance bodies
- Empowered decision-makers

While successful governance can take many forms, unsuccessful governance is likely to not include one or more of the features above.

Functional improvements

A range of core design features can serve policy and business goals of the payment system, including settlement, posting, access methods, data standards, mobile payments, and value-added services such as proxy databases, direct debit mandate management, and others.

International comparison of LVPI modernisation

Background

The **International Comparison—1A** is the first document in a three part series prepared for BankservAfrica and PASA. The international comparison covers payment systems in 10 countries. The subsequent documents include **South Africa: future state demands and pressures —1B**, which details the current situation for payments in South Africa and (through a series of stakeholder interviews) what gaps need to be met to establish a path toward modernisation. Phase 1 concludes with **Strategic Options—1C**, which brings together the goals and best practices defined in 1A with the stakeholder objectives and learnings from 1B and outlines the most likely modernisation possibilities for South Africa moving forward. The combination of all 3 documents, **Phase 1**, is a key step in outlining the modernisation process and development projects for South Africa. It is meant to serve as a set of foundational documents for further dialogue and decisioning related to LVPI modernisation in South Africa.
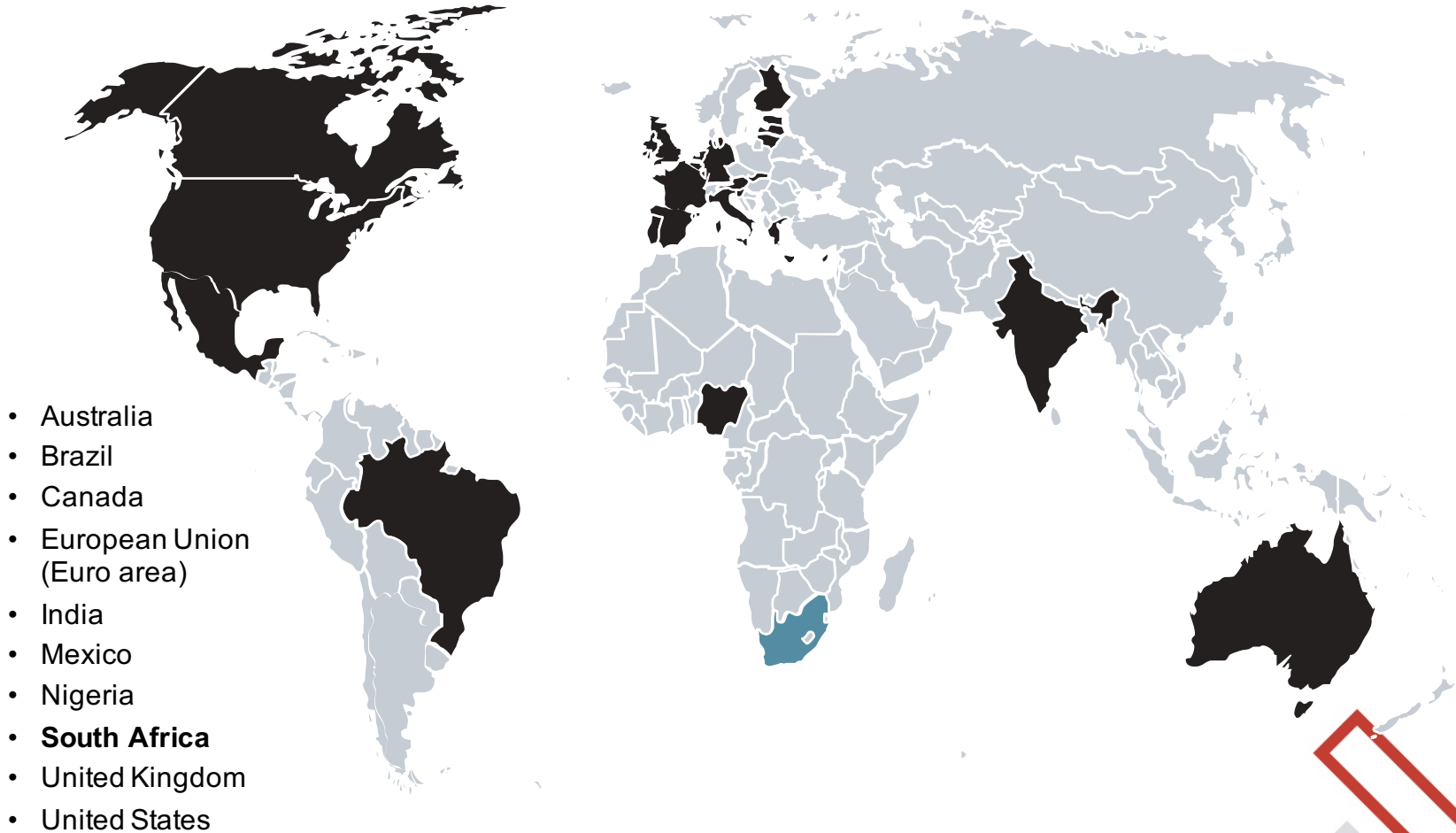
Key objectives

The purpose of the international comparison is to broaden awareness of global modernisation practices, benefits, pressures, and constraints. The options and choices available in other countries will help South African stakeholders to design an informed strategy for the future payments landscape.

Focus topics

Goals of payment modernisation	10 distinct modernisation goals were identified among the 10 countries in scope. These goals fall along two spectrums: policy-driven versus commercial, and rule-based versus technical changes. Policy and rule-based changes are typically guided by regulators, whereas commercial and technical changes are often market based. While some goals, such as financial inclusion, are more complex and require a range of simultaneous approaches, others, such as market integration, lend themselves to more targeted changes. The outcome of technical modernisation, public policy initiatives, and blended initiatives are often changes related to payment system features. Examples include changes in posting & settlement speeds, data standard, and the development of mobile-based services.
Process of payment modernisation	There are 3 key pillars to undergoing a modernisation process: clearly articulating goals, undergoing consultation with industry stakeholders to further develop those goals and form a plan of action, and agreeing on an organisation to manage the change process. While goal setting, at a high level, is often the first step, early support from industry players is key to create a realistic implementation plan. In the majority of countries in scope, regulation was essential to achieving modernisation. Leading the modernisation process is as important as defining the project itself. Management typically resides with the central bank or an existing industry organisation. When industry organisations either do not exist or are not fit for purpose, stakeholders can establish a new organisation to coordinate views and implementation plans.
Lessons learned for South Africa	Relating the successes and failures in other markets to the goals and process of modernisation in South Africa is a complex task. Success depends on the local objectives and pre-determined metrics on whether goals were met. Defining success in South Africa depends on a thorough understanding of the goals, needs, and demands of stakeholders in the market. To this end, the research covers these topics in depth in section 1B, South Africa future state demands and pressures.

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Countries in scope

Comparing South Africa to 9 other markets

- Australia
- Brazil
- Canada
- European Union (Euro area)
- India
- Mexico
- Nigeria
- **South Africa**
- United Kingdom
- United States

Criteria for country selection

For the international comparison, countries were selected in which the legislative, consumer, and/or technological environment has bearing on the South African landscape, and where we believed analysis would add value to the modernisation efforts in South Africa. The preliminary criteria applied included non-cash payment usage, the existence of advanced payment system functionality, recent/current modernisation programmes, and attempts to deal with social and economic issues similar to those in South Africa.

Countries were chosen according to their **degree of electronic payment usage**, payment usage in general, and available payment systems.

- **Payment habits:** The relative usage of electronic payment instruments (in this case credit transfers, real-time credits, direct debits, and cards) as well as cash usage can also be characterised as the payment habits of that country.
- **Payment systems:** The type of payment systems available. Systems of focus for this report include ACH systems (similar to EFT in South Africa) and real-time payment systems (similar to RTC).
- **Comparability:** Effort was made to focus on countries that share trends, features, and issues with South Africa and those countries with growing volumes and adoption of real-time payment systems.

Countries with **similar macro-economic profiles and/or similar demographic trends** was another key criteria for selection.

- **Bank account penetration:** Financial inclusion is a major issue facing South Africa. Our research focused on geographies with high bank account penetration (Australia, Canada, SEPA, the UK and the US) where access to basic banking services is not an issue as well as countries with low bank account penetration (India, Mexico, and Nigeria) where public policy goals are often aimed at bringing more of the population into the banking system and economic activity into the formal economy.
- **Financial Inclusion:** Special attention was given to countries where promoting financial inclusion was a key goal of payment system modernisation. On a related note, the role that rural communities play in a given country, and the difficulty of bringing these communities into the formal economy was key to selection.

In order to aid South Africa in its modernisation agenda, it was essential to choose countries where **modernisation has been fully or partially achieved**. Focusing on best practices and modernisation outcomes played a major role in country selection.

- **Successful modernisation:** In some cases it is clear whether modernisation has been successful but oftentimes success depends on the local objectives and must be measured by whether goals were met to a degree, as opposed to fully met. In countries with ongoing modernisation processes, interim goals and progress metrics were examined.
- **Innovation in market:** Modernisation is often associated with market innovation. The development of new systems, products, and services often result from modernisation. Given technological advances and the proliferation of payment access channels, we have attempted to capture innovative solutions wherever possible.

The omission of Kenya

At first glance, Kenya seems like an obvious point of comparison to South Africa. It is an African country that is undergoing rapid modernisation and has developed innovative methods to promote financial inclusion. However, **in many relevant categories, Kenya fails to match our selection criteria**. Kenya has a far higher unbanked population when compared to South Africa. In general, banking and other formal financial infrastructures are less pervasive and not as well developed. Kenya's economic structure is also very different from South Africa due to its heavy reliance on agriculture. Finally, the most prominent example of modernisation success in Kenya is the proliferation of the M-Pesa mobile payments application, which is not a formal financial infrastructure backed by a central bank guarantee. Attempts to introduce M-Pesa to South Africa had limited success.

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Areas of focus

Scope was determined by the PASA/BankservAfrica project RFP and was finalised at the project kick-off meeting. The following in-scope research elements represent payment system specific features that are publically available or achievable through executive interviews. These research elements were chosen to create a like-for-like comparison of countries covered and to ensure that a broad definition of modernisation was included.

In scope	Out of scope
Quantitative research (background information)	**System types not covered**

In scope

Quantitative research (background information)

- Macroeconomic data
- Payment system data
  - › Transaction volumes and values
  - › Data standards
  - › Payment systems covered
- Low-value bulk (ACH)
- Low-value real-time

Qualitative research

- Goals of modernisation
  - › Policy driven
  - › Technical requirements
  - › Data standards
- Regulatory and commercial landscape
- Noteworthy non-traditional PSPs
- Financial inclusion / economic development plans
- Governance of modernisation efforts

Out of scope

System types not covered

- Cards
- ATM / Cash
- RTGS / high-value
- Cheques

Payment system pricing

- Difficult to collect due to commercial sensitivities

Exhaustive listing of non-bank PSPs in each market

- Due to quick expansion of the number of non-bank PSPs in some markets and their focus on niche areas, only non-bank PSPs with relevance to payments modernisation efforts will be explored

Lipis Advisors

IQbusiness

BankservAfrica

PASA

Methodology

A broad range of methods were used to ensure thorough, cohesive results
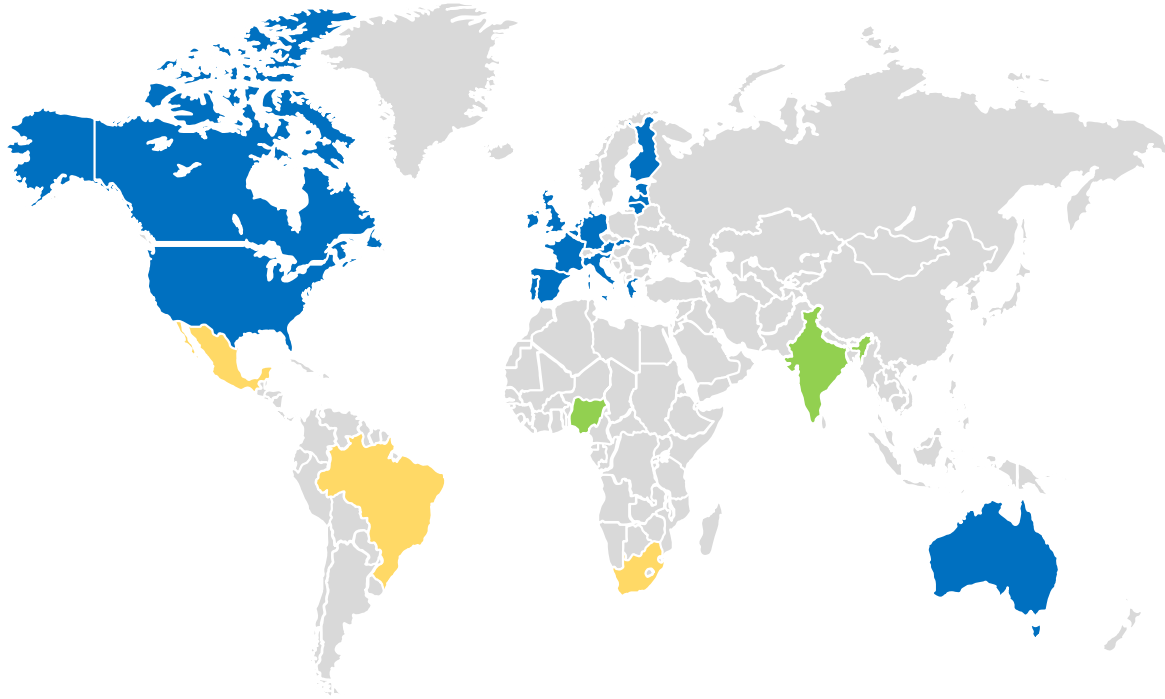
Research database	Lipis Advisors utilised our proprietary database, which is continually updated, and which represents the most comprehensive analysis of global retail payment systems available. To date, we cover 78 clearing and settlement systems (including LV bulk, high-value/RTGS, and low-value real-time) in over 50 geographies and across more than 50 attributes related to system volumes, ownership and operator structures, settlement methods, posting features, pricing models and cost structures, legal and regulatory issues, innovative products and services, and an analysis of the forces driving change in each system examined. Additional desk research was conducted on an ad hoc basis.
Executive interviews	Our executive interview methodology was crafted to provide depth and insight into payment system operations, trends, and user demands in South Africa and abroad. Executive interviews rely on Lipis Advisors' global network and each interview centres on interaction and exchange between executives and experienced senior consultants who thoroughly understand payment systems. Prior to the interviews, a detailed interview guide was developed and shared with PASA and BSVA. Interviewees were carefully selected to ensure a consistent sample, avoiding the challenges associated with selecting subjects from different stakeholder groups.
Payment system scorecard	The Lipis Advisors Payment System Scorecard is a key aspect of our global payment system comparisons. Built on years of development and testing, the Scorecard overcomes the inherent challenge associated with complicated cross-country payment system comparisons. The standardised definitions, attributes, and categories allow for effective description and classification, enabling relevant comparisons across payment systems. The framework includes a multi-step process to capture the appropriate payment system modernisation attributes and apply these to each system in scope to create the respective scorecards.
Incorporation of 1B elements	The South African context remains the guiding element of this report. To that end, our goal is to extract the maximum value for South Africa from examples of payment system modernisation in other geographies. Lipis Advisors also worked closely with the IQbusiness team to compare how other countries have dealt with similar issues covered in Phase 1B interviews to identify the most relevant lessons from other markets for South Africa.

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South Africa middle of the pack in GDP per capita

Higher GDP per capita correlates with higher electronic payment usage

Country	Pop. size in mil (2015)	GDP per capita in USD (2015)	Real GDP growth (2014-15)
Australia	23.8	54,669.82	2.3%
Brazil	207.8	11,159.23	-3.9%
Canada	35.9	49,957.05	1.1%
Euro area	339.0	32,913.82	3.6%
India	1,311.1	1,805.58	7.6%
Mexico	127.0	9,517.31	2.6%
Nigeria	182.2	2,548.17	2.7%
South Africa	54.8	7,601.51	1.3%
UK	65.0	41,048.88	2.3%
USA	321.2	51,522.53	2.4%

Source: World Bank

High — GDP per capita > USD 30k

Middle — USD 30k > GDP per capita > USD 10k

Low — GDP per capita < USD 15k

South Africa falls in the mid-range for GDP per capita and GDP growth, with Brazil and Mexico the most similar markets. Undergoing payment system modernisation is often tied to the goal of economic development, and GDP per capita is a key metric for measuring this. Higher GDP per capita is closely linked to high bank account penetration (which translates to greater financial inclusion) and a broader base of economic activity and productivity. High GDP per capita is also closely correlated with higher use of electronic payment instruments. For a more detailed look at electronic payment usage in countries in scope, please see pages 15 and 16.

Concentrated markets ease stakeholder consensus

Both concentrated and fragmented banking markets use regulation to implement modernisation elements
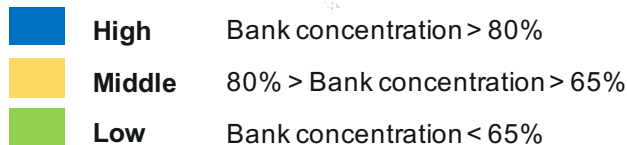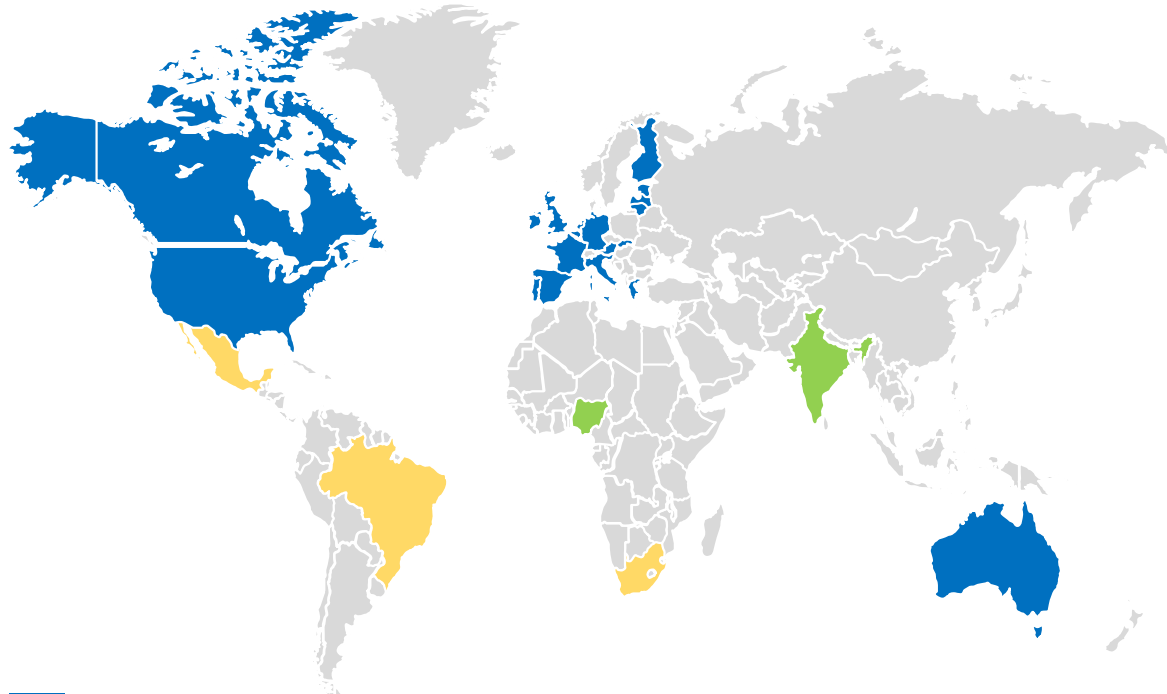
Banking concentration (CR$_5$ 2014)	
Australia	90.5%
Brazil	73.5%
Canada	84.2%
Euro area	nav
India	39.5%
Mexico	71.7%
Nigeria	60.5%
South Africa	99.3%
UK	76.7%
USA	47.0%

Source: World Bank

High	Bank concentration > 80%
Middle	80% > Bank concentration > 65%
Low	Bank concentration < 65%

Banking concentration, which measures the share of assets held by the 5 largest banks, can be an important factor in the modernisation process. Countries with concentrated banking sectors, like Australia, Canada and South Africa, may find it easier to bring stakeholders together to reach consensus on a common vision due to the fact that fewer players are needed to form a critical mass of support. More fragmented markets such as the US, have to undergo a more complicated process to gain agreement on industry efforts. Regardless of how concentrated or fragmented a country's banking sector is, regulation is often needed to spur or implement elements of payments modernisation. For a more detailed look at the role of regulation in payments modernisation, please see page 48.

South African account penetration has risen dramatically

South African efforts to improve account reachability are central in driving the current modernisation process
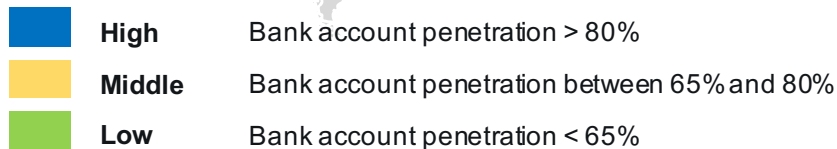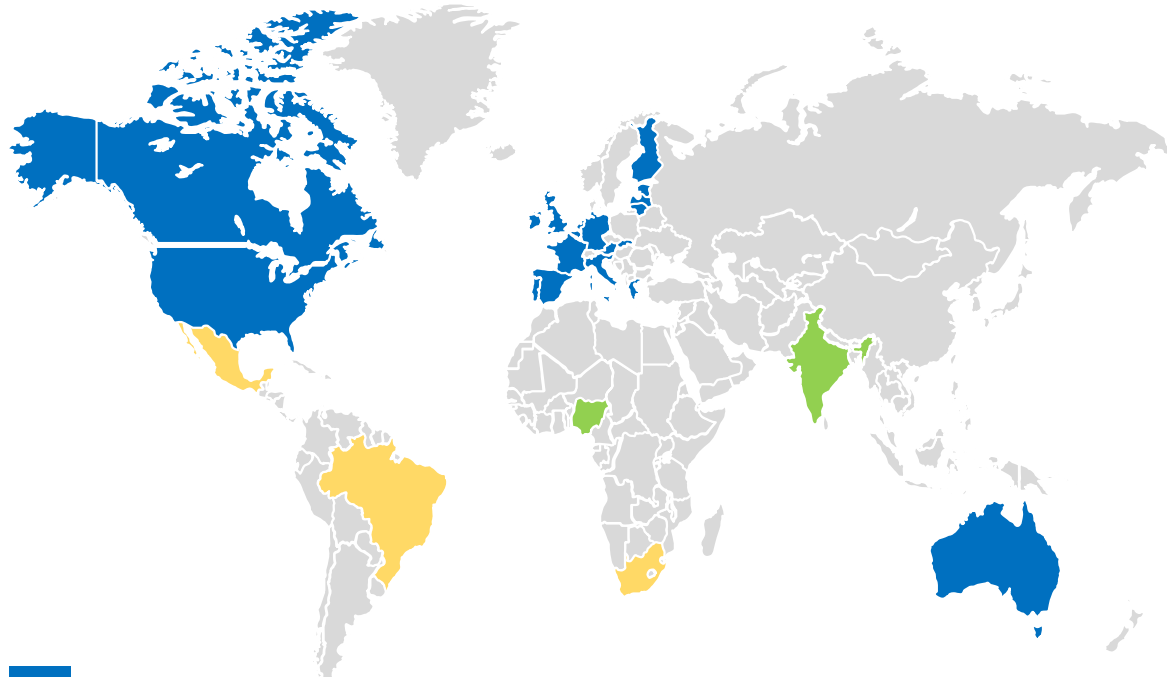
Bank account penetration (2014)	
Australia	99.1%
Brazil	55.9%
Canada	95.8%
Euro area	94.7%
India	35.2%
Mexico	27.4%
Nigeria	29.7%
South Africa	77.0%
UK	97.2%
USA	88.0%

Source: World Bank

High   Bank account penetration > 80%

Middle   Bank account penetration between 65% and 80%

Low   Bank account penetration < 65%

South Africa's bank account penetration has risen dramatically over the past decade. As of 2016, 77% of all adults have a bank account. However, if SASSA (South African Social Security Agency) card holders are excluded, that number falls to 58% of adults. Despite the number of accounts being issued, evidence suggests that many are seldom used. Although financial inclusion is on the rise, many South Africans are still untrusting of bank accounts. South African efforts to improve account reachability are central in driving the current modernisation process and lessons can be drawn from geographies with high bank account penetration— Australia, Canada, SEPA, the UK and the US—where access to basic banking services is not an issue. In countries with low bank account penetration—India, Mexico, and Nigeria— public policy goals are often aimed at bringing more economic activity into the formal economy and increasing financial inclusion.

Income inequality in South Africa among highest globally

Vast discrepancies in wealth distribution must be addressed if any payments modernisation effort is to succeed
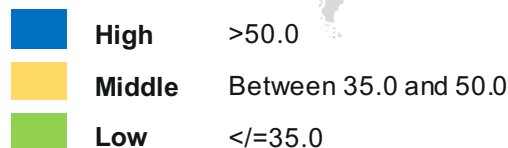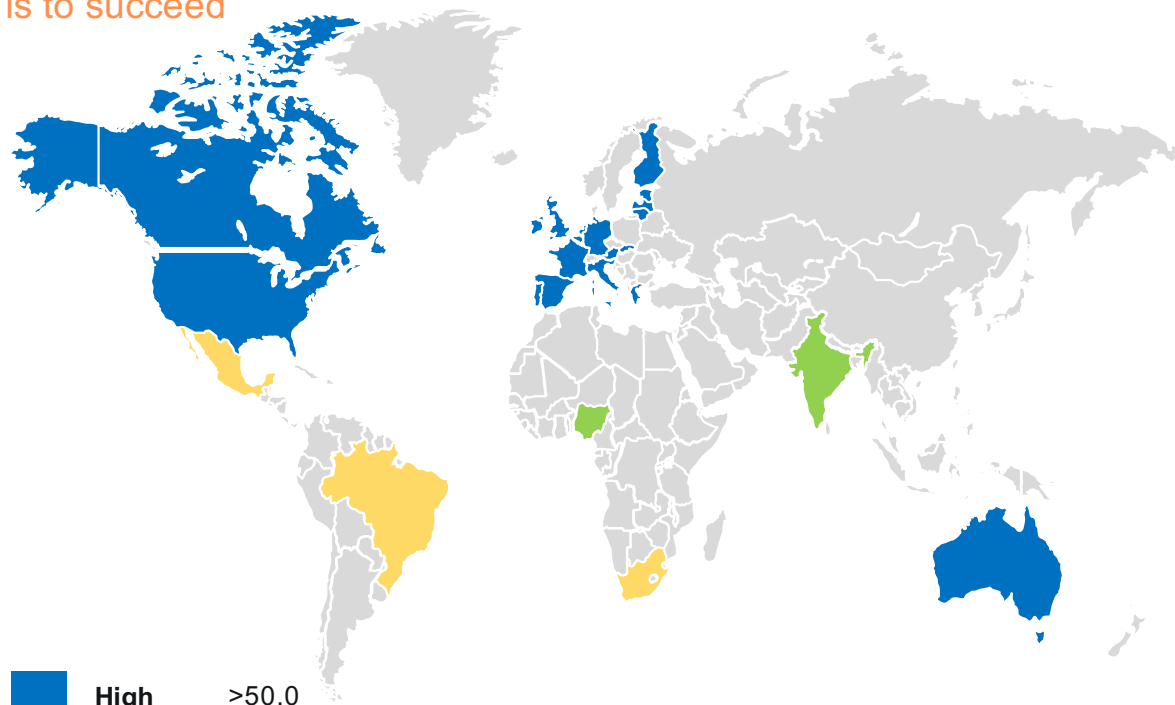
Gini Coefficient scores	
Australia (2010)	34.9
Brazil (2014)	51.5
Canada (2010)	33.7
Euro area	nav
India (2011)	35.1
Mexico (2014)	48.2
Nigeria (2009)	43.0
South Africa (2011)	63.4
UK (2012)	32.6
USA (2013)	41.1

Source: World Bank

High   >50.0

Middle Between 35.0 and 50.0

Low   </=35.0

The Gini Coefficient is the most commonly used measure of income inequality. The coefficient varies between 0, which reflects complete equality, and 1, which indicates complete inequality. South Africa, at 63.4, has the highest level of income inequality of all the countries in scope and one of the highest in the world. It is trailed by Brazil (51.5), and Mexico (48.2). Income inequality in South Africa is widely recognised as a key political, social, and financial challenge. Modernisation efforts will have to take into account the vast discrepancies in South African wealth distribution if they are to be successful for a meaningful percentage of the population. Please note that there was no available data on a SEPA-wide Gini Coefficient, but that most Euro area countries have Gini Coefficients below 40.

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Electronic payment use in South Africa is comparatively low

Despite higher non-cash usage than less advanced economies, SA still lags behind most developed markets

Non-cash payment volumes per capita by method, most recent year
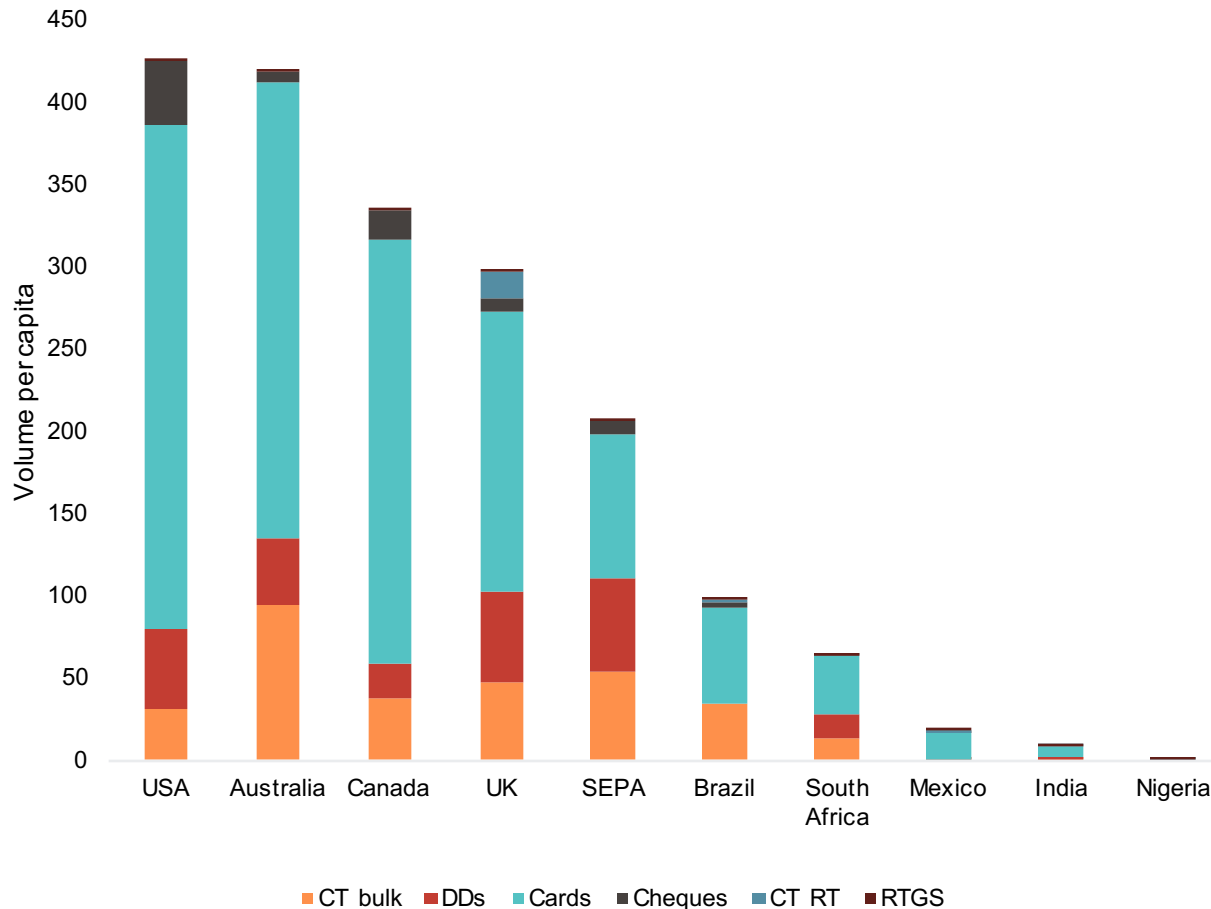
This chart demonstrates how different payment methods are used in the various countries in this study. Cards are the dominant non-cash payment type in every country, but there are substantial differences in non-card volumes.

- Usage of traditional EFT products (CTs and DDs) differs substantially between countries. This can be due to a combination of lack of infrastructures and cultural habits (e.g. skepticism of DDs in some markets).
- Prominence of cheques is also noticeably different, the USA's high cheque usage rate, for example, stands out dramatically. Cheque usage is decreasing rapidly around the world, even in the US, suggesting a widespread move to electronic payment instruments.
- South Africa shares similar per capita usage rates for CTs with Brazil, but still lags behind usage rates in advanced economies.
- South Africa finds itself between countries with very low electronic payment usage (Mexico, India, and Nigeria) and high usage countries such as the UK, Canada, and Australia.

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South Africans prefer bulk payments to RT

SA real-time volumes among lowest in the world, bulk CT and DD usage middle of the pack

CT bulk and RT volumes per capita, most recent year
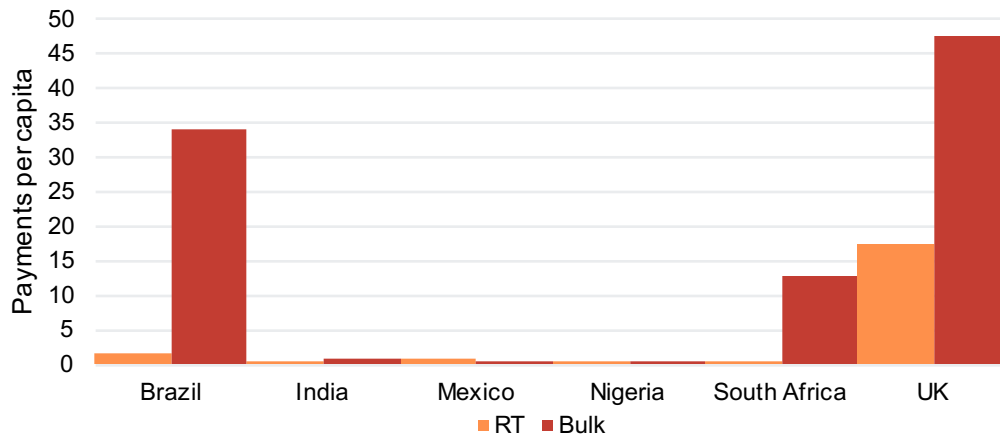
*Note: Australia, Canada, SEPA, and the USA do not have live real-time systems.

DD volumes per capita, most recent year
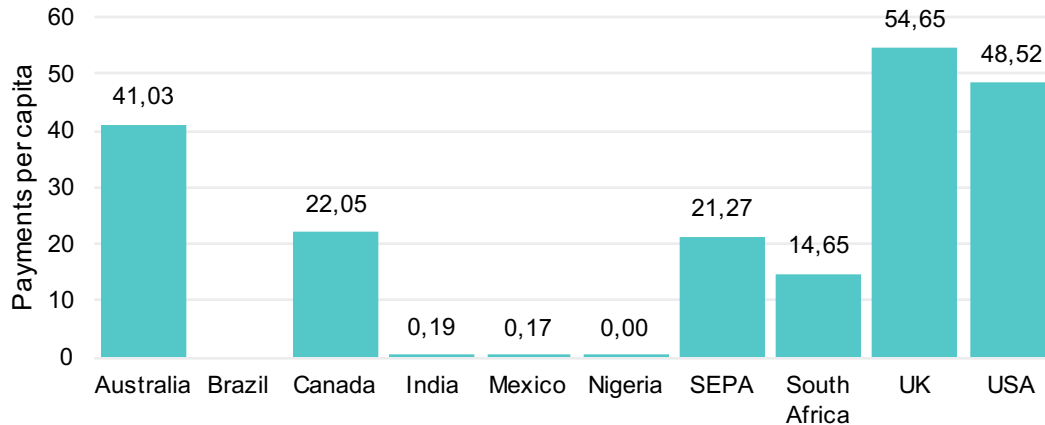
*Note: Brazil lacks a DD instrument.

The UK clearly leads the countries in scope regarding both bulk credit transfers (CT) and real-time CT per capita usage rates; it is also the only country with significant usage of its real-time system. If the UK is removed, Brazil is the only other country that has a per capita real-time usage rate of greater than 1, which emphasises how much room South Africa, India, Mexico, and Nigeria have to grow. It should be noted that RT figures for India, Nigeria, and South Africa are included, but are too small to be seen given the scale of the graph.

For direct debit (DD) usage, it is clear that developed economies have significantly higher usage rates than developing countries, with South Africa being the only developing country with significant DD usage rates. Interestingly, the UK is the only country that has a real-time system and significant usage rates of bulk CTs, real-time CTs, and DDs. This is not likely to change in the next 2-3 years, as the SEPA and US real-time systems, which are currently in development, are expected to take several years before real-time CT usage is significant. **Given that South Africans are heavy users of bulk CT and DD instruments, there is no reason to believe that, given the right conditions, existing and new payment volumes could begin to flow into the real-time system.**

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Decreasing RT values suggest evolving use cases

High volume systems typically see considerable B2B volumes

RT average transaction values, 2010-2015
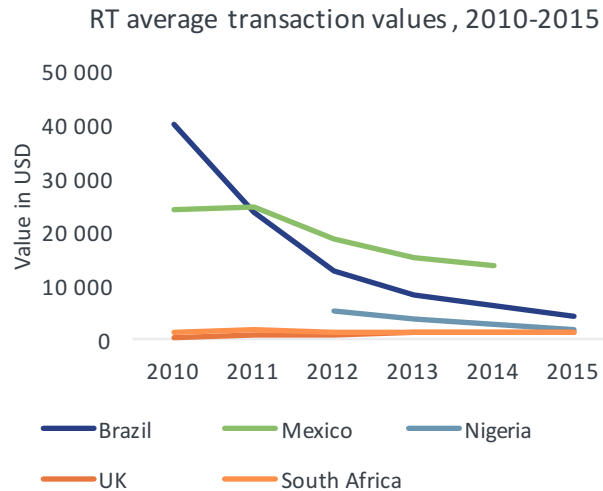
Country	Avg. transaction value, 2015, USD	Volume 2010 mil	Volume 2015 mil
Australia	nap	nap	nap
Brazil	4,569.75	86.4	296.5
Canada	nap	nap	nap
Euro area	nap	nap	nap
India	nav	nav	162.74
Mexico	13,731.42	41.43	131.12
Nigeria	1,815.22	nap	70.65
South Africa	1,400.02	3.07	12.36
UK	1,344.74	425.7	1135
USA	nap	nap	nap

Annual transaction volume for RT 2010 and 2015
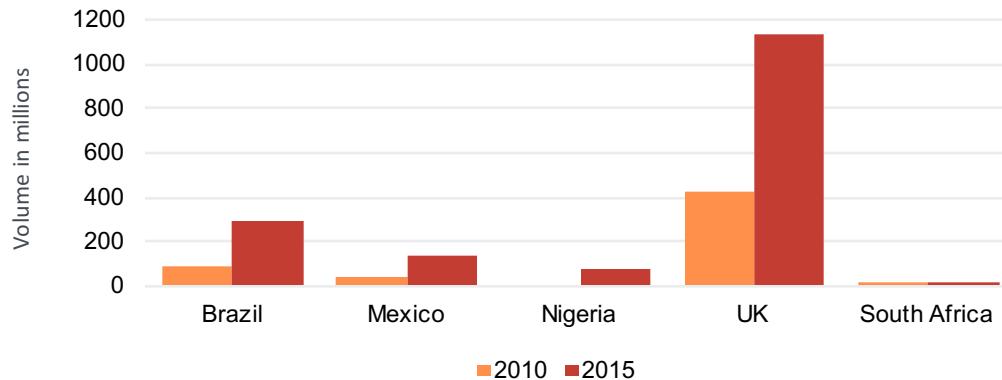
Note: India was excluded from charts due to lack of information. Nigeria went live in 2012, so only 2015 volume is depicted.

The line graph on the left shows **that as real-time adoption increases, average transaction value typically decreases.** Notable examples include Brazil, Mexico, and Nigeria.

This phenomenon shows that as a system is used more often, the range of payments it is used for can also expand, which drives down the average transaction value. This is especially true for systems that are geared towards consumer-initiated payments (both P2P and C2B).

Countries like Brazil and Mexico, however, process more business-initiated payments, which explains the very high initial average transaction values. The UK is an interesting counter-example: as Faster Payments has matured, its average transaction value has increased from just under USD 600 in 2010 to USD 1,350 by 2015. This points to increasing use by businesses.

As for transaction volumes, the overall trend is an increase in volume over time. It is also clear that certain systems have far higher adoption rates than others. **All countries with high adoption rates such as Brazil, Mexico, and the UK, partly owe RT volume growth to an increase in B2B payments (opposed to relying solely on P2P payments).** In South Africa, initial volume was extremely low. While volume has risen over the 5 year period, it remains quite low at 13.36 million transactions annually. RTC has not flourished due to a number of challenges: posting time is not mandated and therefore not uniform, not all banks are using the system which leads to a lack of ubiquity, and finally, the pricing of RTC is high, which has led to limited use among businesses that see it as a value added service rather than a system in its own right and one that competes with an efficient EFT Bulk Payments System.

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The 3 pillars of the modernisation process

Identifying goals, levers, features and how they interact in payment systems

Goals

Goals are the overarching purpose or objective that will be reached by implementing changes and processes. Modernisation goals are driven either by public policy, collective commercial interest or a combination.

Goals tend to be broader than levers or features and represent a larger purpose or ambition toward which an endeavour is directed. For example, financial inclusion is a key goal of South Africa's modernisation efforts. The goal of financial inclusion entails a panoply of economic, social and political issues, ranging from increasing employment to educating people about the financial systems available to them. Similarly, the means to reach this goal are require a variety of levers and features.

Although goals are ideally long-term in nature, some payment communities articulate medium or even short-term goals. Some goals and aim to address specific issues in society or in the financial system, such as increase financial stability. Others, like increasing flexibility and adaptability, are intermediate in nature and serve greater goals such responding to customer demands. In certain contexts, some goals act as levers for other goals.

Levers

Levers are initiatives to augment or amend a payment system. Levers, like the goals they serve, can be policy or commercially based as well as broad or narrow.

Depending on the context, the same lever can serve both policy and commercial goals. For example, the introduction of a real-time pull payment serves various commercial goals, including; improving efficiency, reducing cost, fraud reduction, and responding to consumer demands. It also serves the policy goals of promoting financial inclusion, competition and innovation. Unlike features, which are narrowed down to a specific result, levers tend to be numerous in their deployment and often work together to promote change. It takes many levers to reach a goal and their effectiveness is not always easy to measure.

Features

Features are technical or rule-based changes that alter the attributes of the payment system and result from one or more levers.

For example, if ISO 20022 is the lever then increased remittance data is one of the features that results from it. Similarly, if 'respond to customer demands and competitive pressures' is the goal and the implementation of a real-time payment system is one lever that is being pulled, then immediate P2P payments is one of the resulting features.

Goals, types of change, and levers of modernisation

The graphic below categorises the levers of modernisation in the countries in scope among 12 goals. The goals are arrayed based on whether they are chiefly **policy-driven** or **commercial** in nature and the changes closer to the centre are chiefly **rule-based** and those closer to the periphery are chiefly **technical changes**.

Change can be complicated
The pursuit of some goals, such as promoting competition and innovation and financial inclusion, has seen multiple approaches. Some goals, such as market integration and interoperability are pursued with more targeted changes.

Policy goals suggests rule change
The cluster of dots near the centre on the right and near the periphery on the left suggests that policy goals tend to be pursued through rule changes and commercial goals through technical changes. While not always the case, there is a correlation between the changes made for each approach.

Goals, types of change, and levers of modernisation

Changes in South Africa have tended to be more technical than regulatory

Goals of modernisation

Commercial goals
- Interoperate with other payment systems
- Respond to customer demands or competitive pressures
- Improve security & reduce fraud
- Improve efficiency & reduce cost
- Increase flexibility & adaptability

Policy goals
- Improve market & regional intergration
- Increase financial inclusion
- Promote competition & innovation
- Promote economic growth
- Increase financial system stability

Technical changes — Rule changes — Technical changes

Levers
- Revise settlement method
- Inclusive governance
- Displace cash
- Expansion of participants
- Broaden access to non-banks
- Require APIs
- Transparency requirements
- Pricing regulation
- Retire legacy systems or instruments
- Real-time payments
- National bill payment system
- Proxy database
- ISO 20022
- RT pull payments / RFP instrument
- Acceleration of bulk clearing / settlement
- Link legacy systems and alternatives for the underbanked

Recent modernisation initiatives

10 modernisation goals identified in key markets around the world

10 distinct modernisation goals were identified among the 10 countries in scope. Goals fall along two spectrums—**policy-driven versus commercial and rule-based versus technical**.

On the one hand, the goals themselves can be described along a spectrum from those that are in the common commercial interest and those that are in the public interest. Strong, well articulated common commercial interests are a key driver of change, and must be balanced carefully. Benefits must be accrued proportionately for initiatives of this nature to succeed. Public policy interests are pursued when benefits are unbalanced or when those who receive the benefit (the populace) are not empowered to affect change directly.

On the other hand, the difference between technical and rule change refers to whether the changes need to be made to the technology or to the rules that govern its use.

The outcome of technical modernisation, policy initiatives, and blended goals are often changes using payment system levers to amend or add features. Examples include changes in posting and settlement speeds, data standards, and mobile-based services.

Technical modernisation

Speed: Increasing the speed of settlement and posting is a common goal. Often these are related to the implementation of a real-time system but in the case of the USA, the addition of multiple settlement windows for the legacy EFT system was a major update.
Standards: There has been a pronounced global trend toward ISO 20022 implementation to increase remittance data, offer more flexibility for corporate customers, and enable interoperability between systems. Modernisation in Canada is led by migration to ISO 20022.
Access: Broadening payment system access to include non-banks and corporates is seen as a way to promote innovation and competition by allowing theses players to offer payment services directly without going through a bank or relying on a closed-loop system.

Public policy initiatives

Promote economic growth: Modernisation developments, such as demonetisation and cash reduction in India, are a means to promote economic growth.
Increasing financial stability and resilience: Australia's NPP system is planning to move to continuous settlement in order to decreases risk by relying on prefunded accounts. Broadening system access to a greater number of participants can also reduce risk by ensuring it is not concentrated among a few banks.
Improve market integration: SEPA is a primary example of market integration. SEPA's goal was to create a common payment market for EU countries. Today, all Euro-denominated CTs and DDs are processed via common rules, and a scheme for SEPA real-time payments will follow in late 2017.

Blended initiatives

NPP Australia: The Reserve Bank of Australia laid out a vision for the payment system in 2012 and allowed the industry to develop responses, which included the idea of building a real-time system. The RBA's push was not a mandate, but did spur the industry to action.
Faster Payments UK: Although the system itself was mandated, many of the products and services have been commercially driven. VocaLink has recently developed mobile payment products for P2P and POS transactions that run on the Faster Payments infrastructure.

Goals of payment system modernisation

Goal	Description	Benefits	Example levers
Increase financial stability and resilience	Enhance the ability of the financial system to withstand internal and external shocks.	Increase stability of financial system	Revise settlement method; broaden access to non-banks; increase participants
Economic growth	Grow economy and increase income for population	Improved standard of living for population	Implement real-time payments; introduce proxy database
Promote competition and innovation	Encourage the entry of new providers and the development of new services	Increased user choice, improved services, lower cost	Broaden access to non-banks; pricing regulation; require APIs
Financial inclusion	Offer formal financial services to a greater portion of the population and encourage their usage	Improved standard of living for population	National bill payment system; expansion of participants; link legacy systems and alternatives for underbanked; displace cash
Improve market & regional integration	Integrate and expand the domestic payments market or link it with regional trading partners	Reduce friction for domestic payments processing and/or cross-border trade	Require ISO 20022; inclusive governance
Increase flexibility and adaptability	Increase ability of the payment system to deal with the changing needs of society	Lower cost, improved services, increased innovation	Inclusive governance, require APIs, require ISO 20022
Interoperability with other systems	Ensure that payment services can reach all providers and users with uniform services	Increase usefulness and usage	National bill payment system; require ISO 20022
Respond to customer demands / competitive pressures	Encourage the development of services that more completely serve modern customer needs	Increase usefulness and usage	Implement real-time payments; introduce proxy database
Security / fraud reduction	Increase security for users, decrease incidence of fraud	Lower cost, crime reduction	Transparency requirements; displace cash
Efficiency / cost reduction	Develop services that allow financial institutions and users to reduce the end-to-end cost of a transaction	Lower costs for providers and users	Introduce ISO 20022; broaden access to non-banks; retire legacy systems or instruments; displace cash

Example: levers of modernisation

Levers	Description	Goals served	Benefits
Real-time payments	Account to account credit transfer in which funds are posted to the beneficiary's account and confirmed by the sending bank within seconds	Respond to customer demands or competitive pressures	Faster access to funds, enhanced liquidity management, prefunding of participant bank accounts eliminates settlement risk.
ISO 20022	A flexible XML-based standard which features message sets for a range of financial service areas beyond payments	Respond to customer demand; promote competition and innovation; improve efficiency and reduce cost	Increased remittance data, wider variety of tech solutions, interoperability with other payment systems.
Proxy database	Database of alternative account identifiers held centrally by payment infrastructure to enable transfers without the need for bank account information	Improve efficiency and reduce cost; improve security and reduce fraud	Facilitates users in making payments, reduces complexity, eliminates security and trust issues around giving out bank account info.
RT pull payments/ Request for payment	A real-time payment in which the beneficiary initiates the transaction rather than the sending party	Respond to customer demand; promote competition and innovation	Increases utility of real-time payments, enables multiple use cases including RT POS, competes with cards and direct debits.
Expansion of participants	Opening participation to a payment system, either through direct or indirect membership	Improve efficiency and reduce cost; improve security and reduce fraud	Opening participation helps eliminate security risks by spreading the burden to a wider number of participants, and allows non-banks and corporates to use the payment system more cheaply and efficiently.
Acceleration of clearing/ settlement	The addition of settlement windows to accelerate payments processing in low-value systems	Improve efficiency and reduce cost; respond to customer demand	Accelerated clearing allows for faster posting to users and accelerated settlement reduces settlement risk. They are often linked.

Example: features of modernisation

Feature	Description	Goals served	Example levers	Benefits
Expansion of operating hours	Lengthening the time payments can be submitted to and processed by the settlement system.	Improve efficiency and reduce cost; respond to customer demand	Implement real-time payment system; accelerated clearing and settlement.	Banks and users are able to complete transitions outside of traditional business hours.
Third-party and corporate access	Extending the right to access a payment system to third-parties and corporates	Respond to customer demand; promote competition and innovation	Expansion of participants; broaden access for non-banks; require APIs	Corporates have more control and potentially lower costs.
Extended remittance data	Data standards that carry an extended amount of remittance data in structured text fields.	Improve efficiency and reduce cost; respond to customer demand	Implement ISO 20022	Provides more information for corporates and enables automated reconciliation.
Automated account switching	Account holders register for centrally stored virtual account number to automatically move funds from old to new account.	Improve efficiency and reduce cost; respond to customer demand and promote competition	Institute transparency requirements	Customers are not hindered by complex processes in order to move to a new bank. Banks can compete to win customers.
RT POS	The use of a real-time credit transfer at the point of sale	Respond to customer demand; promote competition and innovation	Implement real-time payments	RT POS is potentially a lower-cost option than cards and allows more user control than slower CTs.
Centralised mobile app	An app that can be used interoperably, regardless of an individual's bank	Improve efficiency and reduce cost; improve security and reduce fraud; demonetisation	Develop proxy database; implement real-time payments	A centralised mobile app lowers the barrier for users to make electronic payments and creates a safer, more secure environment than individual banks or MNOs.

Overview of major modernisation goal and levers

Looking across the specific goals and levers it becomes clear that there are two major groupings.

Highlighted in the larger of the two red circles are the **goals related to policy, which require a broader set of levers to be implemented**.

The smaller circle is focused on **commercial goals. These goals are reached through a more narrow, select number of levers** being implemented.

The range of goals that define payments modernisation are **often a mix of broader policy goals & narrower commercial goals**.

Deciding when a goal is reached is difficult because the potential levers to implement are constantly evolving as new technology and innovation becomes available.

Rules changes / levers ←————————————→ Technical changes / levers

Goal group	Goal	Inclusive governance	Displace cash	Expansion of participants	Broaden access to non-banks	Require APIs	Transparency requirements	Pricing regulation	**Retire payment systems / instruments**	Real-time payments	Nat'l bill payment system	Proxy database	ISO 20022	RT pull payments / RFP instrument	Acceleration of bulk clearing / settlement	Link legacy systems & alternatives for the underbanked
Policy goals	Increase financial stability & resilience		EU, UK	BRA, EU, UK												EU, UK, AUS, USA, BRA, CAN
	Economic growth	BRA, NGA, MEX, IND, UK		MEX, NGA						BRA, **ZAF**		IND, NGA				BRA, MEX, NGA
	Promote comp and innovation	AUS, USA		EU, UK, NGA, MEX	AUS, EU, UK, BRA, MEX, NGA	EU, UK	UK, EU	EU				UK	UK, CAN	IND		
	Financial inclusion	BRA, IND, MEX		NGA, MEX	MEX, NGA			IND		MEX, IND, NGA	IND, BRA	IND, NGA	IND			BRA, MEX, NGA
	Market integration							EU	EU			EU				
Commercial goals	Flexibility & adaptability	AUS, UK, EU, USA	EU, UK	EU, UK, AUS	EU, UK				AUS, EU	AUS, USA		AUS, EU, USA, CAN		USA		BRA, MEX, NGA
	Interoperability with other systems										NGA, IND	CAN, ZAF, IND, AUS, UK, USA				BRA, MEX, NGA
	Respond to customer demands / competitive pressures								AUS	AUS, EU, UK, USA, (CAN)	USA	CAN	USA		AUS, USA, CAN	BRA, MEX, NGA
	Security / fraud reduction	BRA, IND, MEX			EU				USA, ZAF		AUS, IND, BRA	NGA, IND, USA	USA			
	Efficiency / cost reduction	USA	EU		EU				AUS, BRA, IND, USA	AUS, IND, BRA		CAN, ZAF, IND, AUS, UK, USA	USA			

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Interoperability: case studies

Nigerian proxy database to improve interoperability

One of the key issues in promoting mobile payments in Nigeria is the lack of interoperability between systems and banks. Intra-bank mobile payments currently dominate the market—the volume of electronic payments initiated via mobile are three times higher than online—and it has been a challenge to open up these closed-loop schemes due to perceived competitive advantage among the banks.

To alleviate this issue, the national payment system operator, NIBSS, has developed inter-scheme switching specifically for mobile money operators with the aim of enabling more interoperable mobile payment usage. However, uptake of the scheme is low; only 6 of 22 registered MMOs are active.

To improve the situation, NIBSS is investing in mobile payment functionality in rural communities via social payment programs to increase trust in mobile payments and in NIBSS as an operator.

Result: To date uptake is low, but community outreach and longevity could increase adoption.

UK regulator suggests a single data standard

The UK's Payment System Regulator (PSR) has been critical of the lack of competition in the provision of payment system infrastructure in the UK. In addition to requiring competitive tenders infrastructure provision, the PSR is also requiring UK payment schemes to adopt common international messaging standards, instead of the mix of proprietary and international standards currently in use. This is intended to facilitate competition at an infrastructure level and also to ease market entry for payment services providers. One presumes that ISO 20022 will be the common standard of choice.

Result: Inconclusive. The PSR states that users users should start seeing the benefits of these remedies from 2020.

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Financial inclusion & economic growth: case studies

India's Aadhaar number

There have been a number of developments in India to promote financial inclusion, including the introduction of the Aadhaar Enabled Payment System (AEPS) which was aimed at increasing financial inclusion, particularly among India's rural population. Aadhar numbers are also used with the Rupay card, which is handed out by Agent Business Correspondents (ABCs) throughout India. These cards, along with the Aadhaar identifier, allow Indians in rural areas to receive government payments.

Result: As a next phase, AEPS is working to become interoperable with other payment systems.

Mexico's P2P mobile

The evolution of SPEI, Mexico's dual high-value RTGS and low-value real-time credit transfer system, has been a key means to modernising Mexican payment services. SPEI modernisation was specifically aimed at providing a mobile-based credit transfer option to the underbanked population. Unlike other real-time systems, which aim to capture different use cases and higher values, the mobile P2P application in SPEI was consciously developed to serve a limited set of needs and has a value-limit threshold of roughly 8,000 MXN which is roughly 500 USD.

Result: SPEI improvements are specifically aimed at increasing electronic P2P payments, although usage rates remain low.

Brazil's committee to promote inclusion

The Banco Central do Brazil (BCB) participated in a committee to identify how payments can influence financial inclusion. The committee issued a set of recommendations in its April 2016 report including the need for an "extensive network of access points" for financial services, especially better access to mobile services.

Result: Despite the potential of mobile payments to spur financial inclusion in Brazil, there are very few concrete developments in this space. This may change due to plans by the BCB to create an innovation sandbox which would specifically target financial inclusion.

Nigeria's national payment schemes

Nationally developed social payment schemes are a potential solution to reduce cash use and enable financial inclusion, and the government is seen as essential driver of those goals, but the road to acceptance is arduous. The national system operator in Nigeria, NIBSS, for example, partnered with rural agencies to distribute NIBSS services but there is still a need to develop trust and gradual acceptance of these mobile-based services. Despite these challenges, financial inclusion remains a major priority for NIBSS going forward and there goal is to bring 80% of informal economic activity into the formal economy.

Result: Bank account penetration rates are rising but much work is left to be done.

Future demands & competitive pressures: case studies

UK promotes competition

UK regulators are active in bringing up issues aimed at increasing competition and end user outcomes and inviting industry consultation on proposed future recommendations for payment systems. In recent years, consultation on payment system development has expanded to include new players such as fintechs and consumer and business groups. Change implementation is left to industry bodies to determine.

Recently, the UK has added The Payment Systems Regulator (PSR), which regulates 8 high- and low-value UK payment systems with the goal of promoting innovation and competition. The PSR's Payments Strategy Forum ensures broad representation of industry players, including fintechs and challenger banks.

The UK is seen as a leader in the development of community APIs. An Open Banking Working Group convened in 2014 to how data sharing using open APIs could affect consumer outcomes and banking competition.

Result: The UK actively regulates payment systems to ensure competition and end users outcomes. The EU and the UK are both actively pursuing community-wide open APIs. This may have a significant influence on further development of APIs throughout Europe.

US customer demand

Many of the Fed's identified goals are aimed at future proofing the payment system. Goals include:

- Reducing end-to-end cost of payment transactions
- Accelerating adoption of B2B electronic payments
- Developing technologies and rules that foster greater interoperability (P2P, C2B and B2B payment directories).

The Clearing House, a private national payments operator in the US, is building a real-time system specifically to facilitate business led payment streams. They believe corporates expect the speed and convenience of real-time and demand is only growing.

Result: The Federal Reserve has released 10 recommendations to support the development of a faster payments system. The Clearing House is launching a pilot version of their real-time system later this year. 19 other proposals for RT solutions have been evaluated. Additional solutions are likely in the next 1-3 years.

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Improve integration & economic efficiency: case studies

SEPA market integration

The Single Euro Payments Area (SEPA) replaced national payment schemes in favour of an integrated payments market with the intention of eliminating barriers to intra-EU trade and lowering costs for consumers and corporates. SEPA schemes also replaced various national data standards with ISO 20022, which was chosen for its modern functionality and political neutrality.

The goals of SEPA have been aligned with economic efficiency from the outset and have led to several clear strategies:
- Introduction of pan-European payment schemes
- Establishment of pan-European infrastructures
- Elimination of national schemes for CTs and DDs
- Encouragement of cross-border mergers among infrastructure providers

Result: The latest goal has been the addition of a real-time payment scheme, known as SCTinst, which will go live at the end of this year.

Canada's technical modernisation

Canada's modernisation efforts have been focused on migration to ISO 20022 to improve payments reconcilaition for corporates. The limited amount of remittance data in the current system presents challenges for businesses related to reconciliation.

- Added efficiencies related to international use of ISO 20022 was a secondary driver, particularly for multinationals in Canada, which see ISO 20022 as increasing the ease of doing business in Canada.

Additional goals of the modernisation project include developing a new platform for the high-value system (LVTS) to ensure stability as the speed and size of payment messages grows, additional clearing windows in ACSS, and an updated rules framework for high- and low-value payments.

Modernisation of retail payment systems is aimed at increasing efficiency and speed, while changes to LVTS focus on system stability and risk management.

Result: Inconclusive, Canada's modernisation process is in its early stages.

Australia's system renewal

Australia's modernisation has largely been focused on introducing functionality that goes beyond that of the low-value bilateral bulk Direct Entry system, which was considered old and technologically unsuitable to meet future demand. The RBA provided the impetus to introduce modern systems such as NPP, which use ISO 20022 for messaging.

Banks came to the conclusion that, although the RBA did not mandate the introduction of real-time payments, it would be prudent to implement a real-time system to meet the RBA's defined goals and increase their competitive advantage. In this way, the compliance requirement was turned into a business opportunity.

Result: NPP, which was developed by SWIFT, is scheduled to go live end of 2017. The Direct Entry system is expected to be phased out.

Increase financial stability and resilience: case studies

Continuous real-time settlement in Australia

Australia's NPP was designed to eliminate settlement risk through continuous real-time gross settlement of all NPP payments. The Fast Settlement Service (FSS) module, which belongs to the high-value system RITS, is intended to expand RTGS service with 24/7 operations and by guaranteeing irrevocability of real-time payment messages. Gross settlement aids the NPP in offering security, speed, and stability for real-time payments. Features include:

- 24/7/365 real-time gross settlement with no 'cut off' times

- Faster funds availability

- Elimination of settlement risk for real-time payments

Result: NPP, which was developed by SWIFT, is scheduled to go live end of 2017.

UK modifies settlement risk procedures

Changes were made to settlement risk procedures in both Bacs and FPS in October 2015. Settlement was previously guaranteed via a loss-sharing agreement under a "survivor's pay" model. The new arrangement requires participants to pre-fund settlement obligations. The changes were aimed at improving risk management and stability as well as opening access.

Result: Bacs and FPS moved to full pre-funding of net settlement obligations. This method replaced the loss-sharing agreement that had previously been in place.

Brazil's modernisation in the 2000s

The roots of payment system modernisation efforts go back to the domestic financial crisis experienced by Brazil in the late 1990s. The BCB was convinced of the need to mitigate systemic risks to the financial system, and payment system reform was a key pillar.

- Initially, the main goal of modernisation was to mitigate financial risk. The development of Brazil's RTGS system followed in 2002.

- High inflation in Brazil throughout the 1980s and 90s was a driver for implementing same-day funds settlement. Real-time payments was a natural outgrowth of this need to reduce liquidity risk.

- STR and SITRAF were both introduced in 2002 to meet these goals.

Result: Brazil's payment system is one of the most advanced in the developing world and contributes to the stability of the Brazilian financial system.

Promotion of competition and innovation & flexibility and adaptability: case studies

UK's PSR

The UK's Payment Systems Regulator (PSR) was established in April 2015 to improve competition and innovation in payment systems with the goal of promoting end user interests. The PSR's regulatory mandate includes the ability to:

- Set payment system rules & standards
- Require operators and PSPs to open or provide access to systems
- Amend fees and charging agreements
- Limit anti-competitive behavior together with Competition & Markets Authority (CMA)

Opening access is a key goal in the UK. In response to the PSR's concerns, the Faster Payments system has expanded indirect access to non-bank bank users.

In 2014, HM Treasury commissioned a report exploring how data sharing using open APIs could affect consumer outcomes and banking competition. The report led to the establishment of the Open Banking Working Group (OBWG) in 2015 to determine functional requirements and recommendations for implementing community wide open APIs.

Result: Inconclusive, awaiting further mandates from PSR

EU broadens access

Through a succession of regulations and directives, the EC has doggedly pursued the goal of opening up the payment system to non-banks. In the 2000s, the EC began to isolate payment services from banking services by creating separate regulatory regimes for e-money issuers and payment issuers, and it also forced greater transparency for pricing and timing of payment services.

In the last decade, the EC has sharpened transparency requirements in the PSD2 and created an obligation for banks to facilitate access to their customer's accounts via APIs.

The ECB has also played a key role by establishing the European Retail Payments Board (ERPB), which has much broader composition than its predecessor, the SEPA Council. The ERPB's objective is to help foster the development of an integrated, innovative and competitive market for retail payments in euro in the European Union. It includes organisations representing consumers, corporates, retailers, internet retailers, public administrations, financial institutions, non-bank payment services providers, central banks, and the EC as an observer.

Result: Inconclusive, awaiting implementation of PSD2

Australia's lean infrastructure

Australia's real-time NPP system was developed intentionally to be lean in terms of services offered. The NPP will enable additional overlay services to be developed that run on the infrastructure. The first overlay service is the initial convenience service, which will enable consumers and businesses to easily send or receive real-time payments using a mobile phone number or email address. NPP system providers believe that the overlay services layer is where competition and innovation in payments will occur and provides the flexibility and adaptability to address rapid changes in user needs.

Creating a clear separation between products and infrastructure is linked to other competition and innovation based goals for NPP, including opening access to the NPP platform.

On a governance level, Australia has promoted innovation by being intentionally inclusive in its real-time system development, broadening stakeholder groups to include non-bank actors such as PayPal and encouraging innovation from fintechs.

Result: Development of the NPP is complete and the system launches later this year.

Security & price regulation: case studies

US secure payments task force

The Secure Payments Task Force—In addition to the Faster Payments Task Force, the Federal Reserve has also implemented a Secure Payments Task Force as part of its Payments Improvement initiative, which is actively discussing policy work to ensure fraud reduction with a focus on security priorities and standards.

Results: The Secure Payments Task Force work is ongoing, the Fed has released 10 recommendations for the development of a faster payment system, including some aimed at security and fraud reduction.

India's pricing regulation

The National Payments Corporation of India (NPCI) is requiring banks not to charge for transactions made through the Unified Payments Interface (UPI) and the real-time payment system IMPS. Banks customarily do not charge for these payments but NPCI wants to formalise the agreement. These efforts are in service of the promotion of digital payments in the wake of the 2016 demonetisation project.

Result: No formal agreement has been reached.

Brazil's secure system operator

CIP—Payment system reform in Brazil was spearheaded by the central bank in 2000. A key issue was mitigating financial risk by creating a real-time online payment system, particularly for high-value payments and securities payments, which were affected by the crisis. When Brazil's SITRAF real-time system was introduced in 2002, the retail payment systems operator, CIP, was introduced along side it. CIP is closely supported by the central bank and its primary job is to ensure the security of retail payment systems.

Result: In cooperation with the central bank, CIP continues to improve payment system security.

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› Increasing efficiency: ISO 20022 case studies

ISO 20022 is seen as the "default future choice" for UK payment systems, although no existing payment system has announced plans to migrate to the standard. Payments UK plays a lead role in promoting the use of ISO 20022 in the UK and the UK payments community is in agreement that any new services/infrastructures will use ISO 20022. Any legacy systems that require major overhauls may adopt the standard as well.

Result: The standard is currently only used in the Current Account Switch Service and the Cash ISO Transfer Service. However, Faster Payments has mapped ISO 8583 messages to ISO 20022 as a first step toward eventual adoption of the standard.

The RBA laid out 3 main goals for payment system modernisation in the 2008 LVP Roadmap—all of which were related to technical developments. Goals include:

- Instituting a central switch
- Speeding up settlement cycles
- Working toward ISO 20022 migration

The real-time New Payments Platform (NPP) is based on ISO 20022 and is due to go live in late 2017.

Result: ISO 20022 is the planned standard for the NPP real-time system, which launches later this year.

Technological developments are fast moving in the US and are occurring across multiple infrastructure providers.
The Federal Reserve has outlined a number of technical goals in its 2015 Strategies for Improving the U.S. Payment System, including accelerating payments, migrating to ISO 20022, and creating a proxy database to enable mobile payments.
NACHA, the US ACH rule-maker, is working on their Same Day ACH role-out plan. Currently, a mandatory settlement-window was added for credit transfers and direct debits will soon be added. They are also planning to introduce ISO 20022 on a voluntary basis.

The Clearing House, which currently operates ACH, high-value, and cheque clearing systems is developing an ISO 20022-based real-time system which will be in pilot phase at the end of 2017.
Result: Aside from The Clearing House's RT system, ISO 20022 will be introduced on a voluntary basis for ACH.

The adoption of ISO 20022 is a key element of modernisation. The focus has shifted from adopting a globally recognised data standard, to providing a flexible message standard to enable innovation and efficient response to future needs.
The ISO 20022 initiative was launched in 2009 by the PASA EPC Strategy Forum. In 2014, The Modernisation of Payments (MoP) Project identified its strategic objective to "Modernise all electronic funds payments systems by establishing a common standards platform based on ISO 20022 methodology and standards."
Results: In July of 2017, DebiCheck became the first South African payment system to use the ISO 20022 message format. A decision on migrating other systems such as EFT or RTC to ISO 20022 has not yet been made.

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The process of modernisation

The process of modernisation is defined by goal setting, consultation, and clear management

Goals
- Goal setting, at a high level, is often the first step in a modernisation process.
- Early support from industry players is key to creating more detailed goals and a realistic implementation plan.
- Goals and early plans are often shared via vision documents or stakeholder meetings.

Regulation
- In the majority of countries in scope, a regulatory mandate was essential to modernisation.
- The vast majority of modernisation projects have either been fully mandated, or pushed partially by regulators.
- Commercial opportunities are often insufficient to justify extensive modernisation without public policy benefits.

Process management
- The modernisation process is commonly led by the central bank, government entities, or payment associations.
- Central bank-managed processes offer centralised decision making but can pursue goals at the expense of market consensus.
- Processes led by existing industry associations have the advantage of already being a forum for stakeholders to discuss changes and determine implementation plans but are not always open to new players.

Best practices
- Although each process is defined by its own nuances and individual environment, there are factors that are present in successful modernisation initiatives around the world:
  - Inclusive representation, with a full range of stakeholders represented.
  - Proper level of seniority in governance bodies
  - Empowered decision-makers

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› Guided by goals

Clearly articulating the goals of payment system modernisation must take place at the outset of the project to ensure success. Clear goals are vital for guiding the process of change, the technical implementation of new systems or features, and any new laws or regulations needed.

Who sets goals?

Specific goals of modernisation derive from high-level objectives (e.g. consumer protection, risk mgmt). System modernisation goals are often linked to these overarching ambitions (e.g. RT payments can meet consumer needs and enable innovation).

- 60% of markets in scope saw the central bank establish initial goals for payments modernisation. These goals were articulated in vision documents (India, Nigeria) or through industry consultations (Australia, USA).
- Other markets saw modernisation goals established by government entities (Euro area, UK) or payment associations (Canada).
- **SARB is expected to publish the Vision 2025 in late 2017.**

Who articulates the details?

Regardless of which entity sets strategic goals at the outset, there is always a need for industry players to articulate the details of the goals and work towards an implementation plan.

- Nigerian banks work with NIBSS to develop and implement solutions to meet goals set by the CBN.
- The 17-member Steering Committee of the (300+ member) Faster Payments Task Force in the US includes representatives from large and small banks, system operators, retailers, and fintechs.
- Payments Canada sponsored in-depth research to determine the needs of system participants and users (e.g. corporates) to inform the detailed modernisation plan.

How does the industry respond?

After initial goals are shared with the payments community, there are a number of ways in which industry stakeholders are invited to respond in order to achieve a more detailed plan for implementation and a roadmap to actually meet the goals.

- Payments Canada organised industry workshops and employed consultants to do detailed industry surveys around industry needs. This research informed PC's more detailed modernisation roadmap published in 2016.
- After publishing its "Strategies" document, the Federal Reserve organised the Faster Payments Task Force (FPTF) to assist in implementation. The FPTF established Effectiveness Criteria to evaluate proposed solutions in the market.

A key takeaway for goal setting is to keep in mind that you are building a payment system for the economy you want, not the economy you have. Keeping that vision in mind will enable stakeholders to stay focused on the future and not get bogged down in present issues.

Role of regulation: Mandate vs. market

South Africa is firmly in the mainstream with modernisation projects pursued as a result of regulation
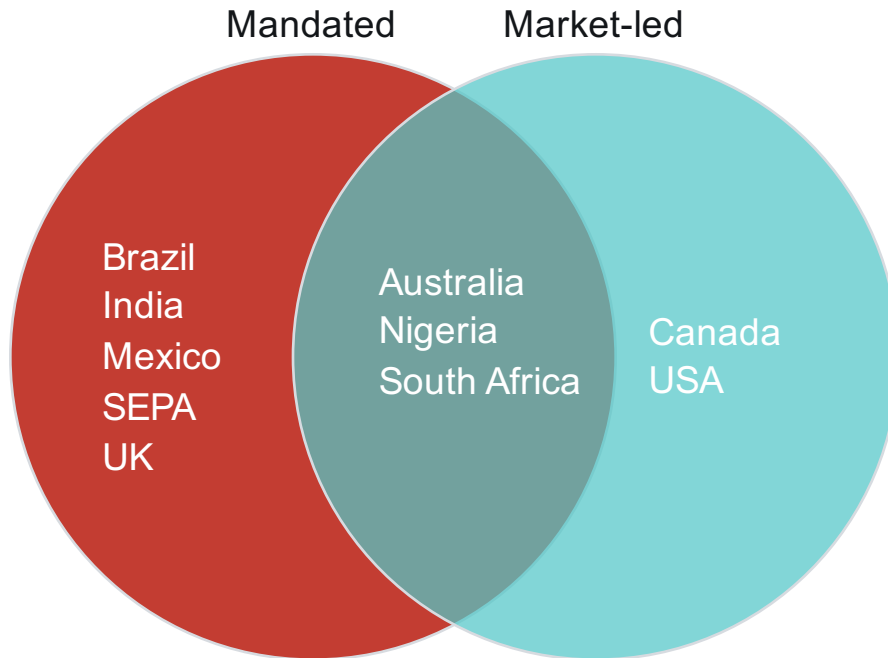
Mandated   Market-led

Brazil
India
Mexico
SEPA
UK

Australia
Nigeria
South Africa

Canada
USA

The vast majority of modernisation projects have either been fully mandated, or pushed partially by regulators. The commercial opportunities are often insufficient to justify extensive modernisation without public policy benefits.

The importance of regulation in payments modernisation cannot be overstated. Only 2 of the 10 countries in scope are pursuing payments modernisation with no regulatory mandate.

- Market dynamics are decisive. Countries such as Brazil, Mexico, and the UK feature more active regulators in financial services than a market such as the United States. In Nigeria, the CB prefers to set high-level goals and allow the industry to determine implementation.

Even in countries that see strong regulatory mandates, regulators always collaborate with commercial entities to implement change.

- Regulators can set the goals and even timelines of modernisation, but must rely on industry players to determine technical specifications, effects on business processes, etc. to ensure timely and effective modernisation.

The existence of a regulatory mandate does not affect the actual goals of modernisation efforts. The implementation of real-time systems can be mandated (India), market-led (US), or mixed (Nigeria), just as the adoption of ISO 20022 can be mandated (SEPA), market-led (Canada), or mixed (Australia).

Managing the process: Leaders and followers

All markets have to decide whether existing organisations are up to the task

Central bank-managed processes tend to occur in markets where the central bank plays a prominent role as LVPS operator.

- The Bank of Mexico owns and operates the SPEI system for high- and low-value payments, and has actively pushed for changes to pricing, availability, and services.
- The Reserve Bank of India manages changes in payment systems by setting goals and directly reaching out to banks to inform modernisation.

Advantages
- Centralised decision-making
- Inclusion of smaller players

Disadvantages
- Focus on regulatory priorities over market concerns

Existing industry associations have the advantage of already being a forum for stakeholders to discuss changes and determine implementation plans.

- Payments Canada plays a vital role as industry association and payment system operator, and is the main coordinator of modernisation efforts.
- Payments UK (and its predecessor organisations) played a vital role in harmonising industry efforts for RT payments and account switching.
- PASA has continued to play a primary role in modernisation efforts in South Africa.

Advantages
- Leverage existing organisation and structures
- Experience in system evolution

Disadvantages
- Potential to limit participation from new players (e.g. fintechs)

When industry organisations either do not exist or are not fit for purpose, stakeholders can establish a new organisation to coordinate views and implementation plans.

- The Australian Payments Council (APC) was developed as a new association to drive industry change with Australia's move to real-time payments.
- A regulator or central bank can play a prominent role in establishing new organisations that bring together stakeholders in industry-led initiatives (e.g. the Faster Payments Task Force in the US and the EU's Euro Retail Payments Board).

Advantages
- Ensure wide representation tailored for purposes of modernisation

Disadvantages
- Organisational issues in building a new institution; lack of experience in modernisation efforts

Industry utilities typically manage change

South Africa mirrors other countries with a bank-owned entity for operations and an industry utility for rulemaking

Non-profit industry utilities are the most common governance arrangement for LVPI system operation and rulemaking.

- Industry utilities set the rules for over 80% of low-value systems in scope (EFT and real-time). Central banks and other government entities set rules in remaining systems.
    - Commercial entities play no role in setting rules for any of the systems in scope.
- System operation sees more diversity of governance, although **industry utilities still operate over 2/3 of systems in scope**.
    - Remaining systems are split evenly between commercial entities and central banks, which combined make up just under 1/3 of LVPIs examined here.

The most common change of governance arrangements made as a result of payments modernisation is **moving the operation of a payment system away from the central bank**.

- The Central Bank of Brazil and the Reserve Bank of India both pushed for the establishment of industry utilities to operate both low-value bulk and real-time systems as part of their modernisation projects.

Rule-making by a central bank/government entity is rare. Brazil is the only country that has a central bank set rules for a system operated by a separate entity. Commercial entities play a limited role in system operation, and do not set rules for any system in scope.

- Only the UK and Euro area feature commercial system operators. The Euro area also sees a number of industry utilities operating systems across the continent.

Governance of system operators

- Industry utility
- Commercial
- Central bank / government entity

16% | 16%
68%
n=19
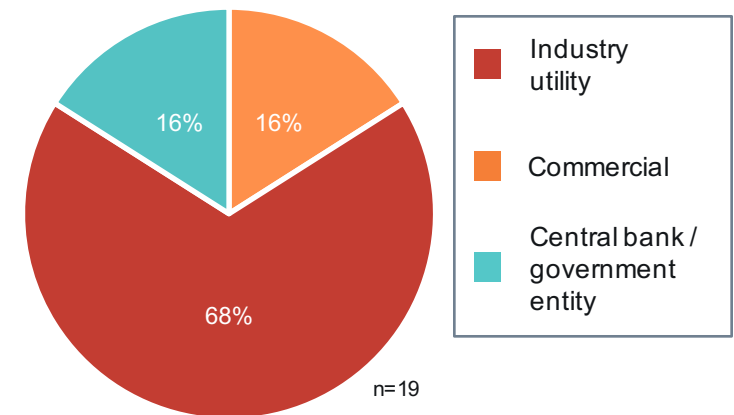
Governance of system rule-makers

19%
81%
n=16*
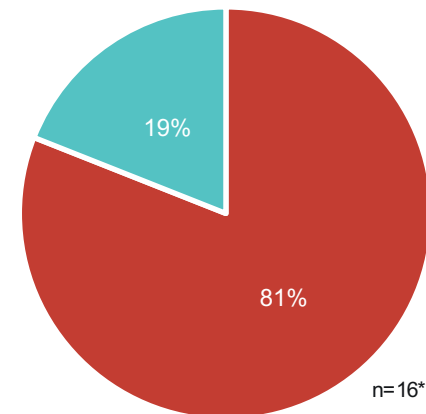
Note: Operator is defined as an organisation that clears transactions within a payment system. Rule-maker is defined as an organisation that sets the rules and technical standards of the payment scheme according to which payments must be cleared and settled. * There are fewer rule-makers than operators because SEPA features a single rule-maker covering a multitude of system operators.

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Best practices in modernisation process

Elements of successful governance

Assessing whether or not a modernisation program was successful from a governance perspective is difficult. Most of the metrics used to define "success" are self-imposed, and it can be hard to pinpoint the effect that governance itself has on the success of a modernisation program separate from other aspects such as access, commercial incentives, etc.

Nevertheless, it is possible to outline factors that are present in successful modernisation initiatives around the world:

- Inclusive representation
- Proper level of seniority in governance bodies
- Empowered decision-makers

While successful governance can take many forms, unsuccessful governance is likely to not include one or more of the features above.

PASA's EPC Stakeholder Forum focusses on current and future initiatives related to the promotion of innovation, access & competition, improving efficiencies, increasing payment system integrity, and minimising strategic risks. Governance is inclusive of a wide variety of payment system stakeholders.

Inclusive representation

- The inclusion of smaller financial institutions and new players such as fintechs is often seen as vital in meeting the needs of modern users. Bringing these perspectives into industry consultations and implementation meetings is thus necessary.
- The Euro Retail Payments Board (ERPB) is chaired by the European Central Bank and features a diverse mix of representation from the supply side (banks, payment institutions, etc.) and the demand side of the market (consumer groups, retailers, etc.).

Level of seniority in governance bodies

- Having the proper level of seniority in industry consultations and roadmap discussions ensures that industry representatives have a holistic view of business processes and allows for quicker decision-making.
- The NPP Steering Committee featured senior representatives from Australian banks, non-bank PSPs, and system operators. Steering committee membership required a higher level of seniority than other governance bodies such as APCA, which was more focused on operational aspects than strategic considerations.

Empowered governance bodies

- An inclusive consultation and decision-making process is necessary to ensure that a wide range of views is heard in industry modernisation efforts. However, reaching consensus across diverse participants is often impossible, and the body governing the modernisation process must be empowered to make decisions to avoid inertia and maintain clarity of purpose.
- The European Payments Council receives suggestions for improvements to the SEPA payment schemes. Following debate and articulation of the details of the changes it then votes on whether to implement changes or not. Approved changes are then binding on all scheme members.

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Overview of functional comparison

The functionality scorecard

Based on the profiles of the low-value systems of the 10 countries within scope, Lipis Advisors identified 8 broad categories of functionality at an infrastructure level. Categories include:
- Access
- Degree of participation
- Data standard
- Speed of settlement
- Speed of posting
- Payment instruments included
- Mobile payment functionality
- Centralised value-added services

These 8 categories were evaluated and scored across 32 attributes (4 per category) and the final result is an individualised profile of the highest degree of payments functionality in the infrastructures within that country.

It is important to note that a payment system with a richer set of attributes is not necessarily a "better" system. It is merely a reflection of how centralised functionality is in that system. Payment systems evolve to meet the needs of their communities and lean systems are often intentional. Leaner systems often see banks providing the services offered centrally in richly functional payment systems.

Scorecards for individual markets are included in the profile appendix.
The evaluation was based on desk research and information gathered from interviews. Score cards were then calculated to yield a numerical value within that country. These functional composites were then charted across a lean to rich spectrum.

The resulting depiction gives a composite view of centralised functionality across all countries covered.

Benefits of functional comparison

While the spectrum of functionality is not meant to be interpreted as an indication of quality, or of what is available broadly in the market, it does shed light on how systems evolve and which countries are relatively rich or lean in terms of their functionality.

In terms of modernisation, the chart on page 44 depicts the feature changes resulting from goals pursued in a given country.
Looking at the distance between current functionality and planned functionality powerfully depicts the impact these changes will have on the overall capability of that payment system.

The chart also reveals which countries are functionally similar to each other which can lead surprising result. For example, India and the UK are among the most feature rich systems, while Australia, Canada and the US are functionally leaner than Mexico and Nigeria. This points to the fact that the need for payment system modernisation effects all countries, no matter how developed their economies may be.

South Africa falls roughly at the mid point of the functional spectrum. Based on current plans for adopting ISO 20022, they will move slightly toward the richer end but this is subject to change as developments take shape.

Functional comparison

Lean ← **Functionality** → Rich

Functions

Function	Description
Access	Who is allowed to access the systems? Direct participants only? Indirect participants? Third parties? Widespread access to corporate customers?
Participating institutions	Who actually chooses or is required to participate in the systems? Is it a voluntary minority or majority of banks? Are all banks required to participate? Is it open to more than banks?
Data standard	Which data standard(s) are used to carry messages within the systems? A proprietary standard? A SWIFT MT based standard? A proprietary XML based standard? ISO 20022?
Speed of posting	What is the quickest speed at which payments are posted to the beneficiary's account after initiation?
Speed of settlement	How frequently do the systems settle?
Payment instruments	What types of payments are processed by the systems? Credits only? Debits? Real-time credits? Request for payment? RT DD?
Mobile payments	What mobile payment services are available from the payment systems? Are they closed loop non-bank systems? Are they closed-loop but open to banks? Are they centralised?
Centralised VAS	What sorts of centralised value-added services are offered by the systems? None? Forward dated payments? A proxy database? Centralised POS services? E-commerce?

Functional comparison of low-value infrastructures

All modernisation efforts lead to an increase in centralised system functionality
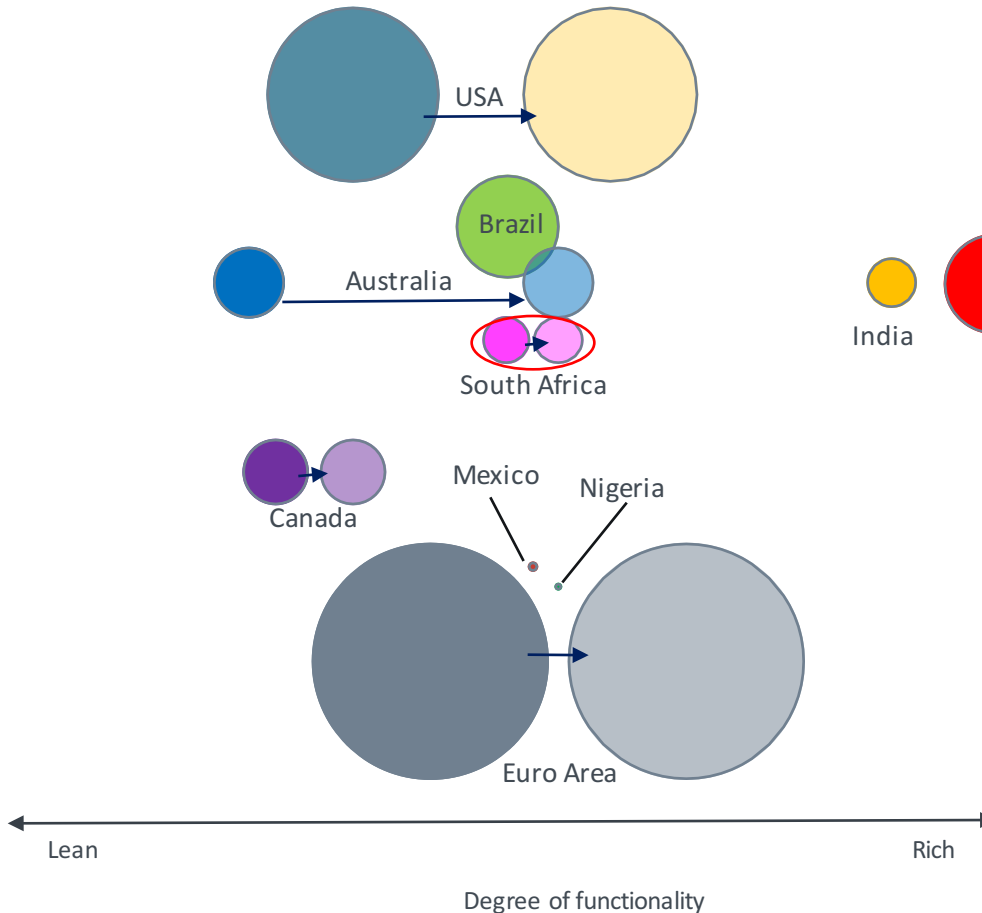
Country scores are based on the degree of functionality in the low-value system infrastructures. The following page looks more broadly at functionality offered outside the core infrastructure.

Systems with plans for modernisation have been scored twice, once according to current functionality and again, based on the planned functionality.

Countries with more developed plans, such as Australia, SEPA, and the USA, show a more dramatic increase in functionality than those that have only begun the process (i.e. Canada & South Africa).

Countries with leaner functionality are featured on the left of the chart while countries with richer functionality are depicted on the right side. The most functionally lean country is Australia, in its current form while the UK has the richest degree of functionality. India's functionality is also extremely rich despite low usage rates.

South Africa falls roughly at the mid point of functionality and based on its current plans for adopting ISO 20022, they will move slightly toward the richer end of the spectrum.

Leanness and richness are not an indication of quality. Intentionally lean systems, though less common, do exist. The primary example is New Zealand, which has chosen not to implement a real-time system and keeps the infrastructure of their bulk system very lean, allowing banks to offer value added services. Australia's NPP was also built to be intentionally lean, acting as a basic switch to encourage innovation and competition outside of the infrastructure. Despite these examples, no modernisation effort has led to a decrease in functionality.

USA

Brazil

Australia

South Africa

India

UK

Mexico   Nigeria

Canada

Euro Area

Lean ← → Rich

Degree of functionality

Note: circle size indicates combined market volume for bulk CT, DD, and real-time payments (if applicable)

› Functionality and centralisation

While the functionality spectrum allows us to analyse the relative richness or leanness of a country's offerings at an infrastructure level, it does not reveal the whole story. To the end user, the centralisation of service provision into a core infrastructure is not important. It only matters whether it is easily and widely accessible. This matrix depicts richness and leanness along with centralisation and decentralisation to reveal how payment services are delivered. A rich and centralised system, like the UK, may provide the same service level to the end user as a rich and decentralised system, like that in the US. One utilizes a central infrastructure to deliver these services while the other relies on competition and interoperability between players. As long as those services are widely accessible, the experience of the end user is equivalent. **Payment system operators and service providers must look at perceived market needs and strike a balance between competition and centralisation. Based on the sample here, more developed economies tend to have decentralised infrastructures, and developing economies tend to centralise. The UK is a clear outlier, and its regulator has recently called for increased competition by decentralsing payment infrastructure provision.**

Matrix (Indicative):
- Rich and decentralised: EU, USA, Australia
- Rich and centralised: UK, India, South Africa, Nigeria
- Lean and decentralised: Canada
- Lean and centralised: Brazil, Mexico

Axes: Rich / Lean (vertical), Decentralised / Centralised (horizontal)
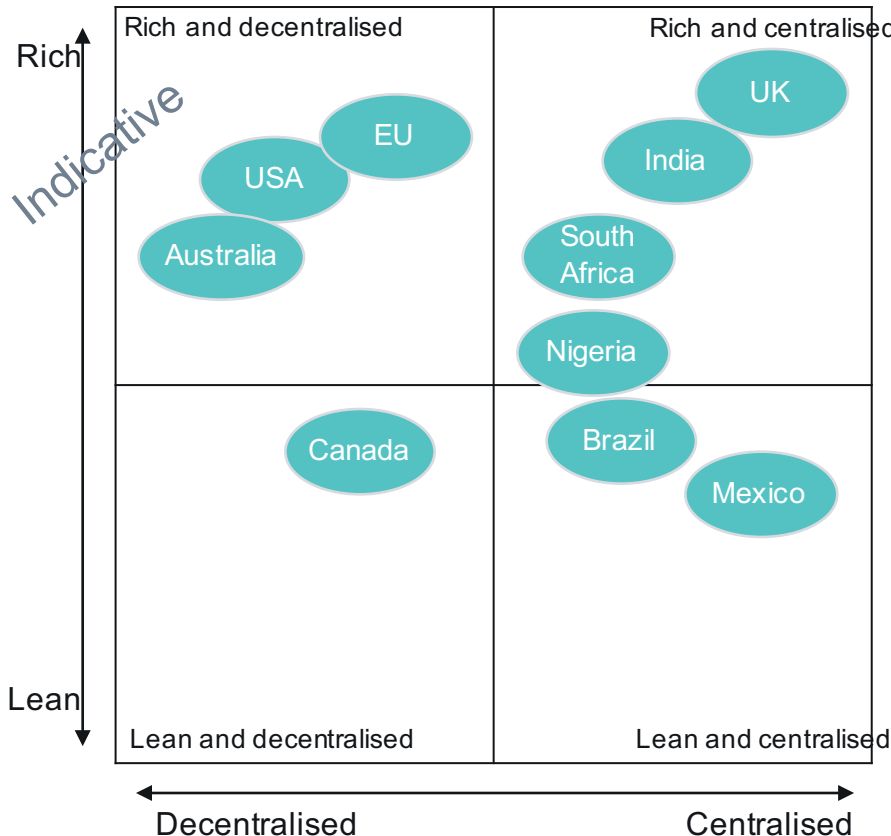
Rich & centralised: In these systems, both core and end user functionality are rich. The UK is a paramount example. Due to the concentration of products and services via VocaLink, end users are able to switch accounts, make mobile real-time push and pull payments, and enjoy direct debit mandate mgmt with relative ease. However, there is growing concern that centralisation of services in the UK is diminishing competition and innovation. The UK regulator, PSR, is focusing on promoting competition and is taking steps to decentralise operations in the UK.

Lean & centralised: In these systems, the core is not particularly rich and offerings are not widely available through market channels. In all three cases (BRA, MEX, NGA) the central bank plays a prominent role in setting the payment system agenda. While the central banks are largely responsible for the more innovative system features, their agenda can inhibit competition. Participant banks are forced to comply with regulation and less focused on adding customer value.

Rich & decentralised: In systems with a lean core and rich end user functionality, market competition, increased choice, and flexibility play a key role. The USA is a prime example of a richly decentralised market-led economy. The lack of ubiquitous core services in the US may lead to issues with the developing real-time system. If RT functionality is not widely available, lack of access and ubiquity could inhibit adoption.

Lean & decentralised: In systems with lean functionality at both an infrastructure and market level, the need for development is most apparent. Canada identified functionality priorities for modernisation and is progressing a plan involving new system development, migration to ISO 20022, and encouraging innovation.

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Tailoring payment system design

Advantages and disadvantages of technical design decisions

The following section provides a range of features that can be enhanced or altered during a modernisation process. All of these features serve policy and business goals of the payment system:

- Settlement
- Posting
- Access methods
- Data standards
- Mobile payments
- Value-added services (e.g. proxy databases, DD mandate management, etc.)

The conclusion to this section features a functional comparison of systems in scope. Based on the profiles of the low-value systems of the 10 countries within scope, Lipis Advisors established **8 broad categories of functionality**. These functional composites were then charted across a lean to rich spectrum. The resulting depiction gives a comparative view of functionality across all countries covered.

Speed: Settlement & posting play very different roles

Settlement speed

AUS-Direct Entry (EFT)
IND-NEFT(EFT)
SEPA-STEP2 (EFT)
NGA-NIP (RT)
NGA-NEFT (EFT)
UK-FPS (RT)
USA-NACHA (EFT)

IND-NECS (EFT)
CAN-ACSS (EFT)
ZAF-EFT (EFT)
UK-Bacs (EFT)
USA-NACHA (EFT)

IND-IMPS(RT)
ZAF-RTC (RT)

AUS-NPP (RT)
MEX-SPEI (RT)

BRA-SITRAF(RT)

BRA-SILOC (EFT)

Seconds	Minutes	Hours	Next day

Posting speed

AUS-NPP (RT)
IND-IMPS (RT)
MEX-SPEI (RT)
ZAF-EFT (EFT)
UK-FPS (RT)

BRA-SITRAF(RT)
NGA-NIP (RT)
ZAF-RTC (RT)

BRA-SILOC (EFT)

AUS-Direct Entry (EFT)
IND-NEFT(EFT)
NGA-NEFT (EFT)
SEPA-STEP2 (EFT)
USA-NACHA (EFT)

IND-NECS (EFT)
CAN-ACSS (EFT)
ZAF-EFT (EFT)
UK-Bacs (EFT)

Country	Posting in RT system	Settlement in RT	Posting in EFT	Settlement in EFT
Australia	Immediate	Continuous	Next-day	Next-day
Brazil	30 sec. up to 1minute	Within minutes	Up to an hour	Hours, up to next-day
Canada	nap	nap	Next-day	Next-day
EU	nap	nap	hours	hours
India	Immediate	Within minutes	Hours, up to next day	Hours, up to next day
Mexico	Within 30 seconds	Continuous	Next-day	Daily
Nigeria	Up to 30 minutes	Twice daily	Daily	Twice daily
South Africa	Within minutes	Within minutes	Next- day	Next-day
UK	Within 30 seconds	Multiple times daily	Next-day or later	Next-day or later
US	nap	nap	Up to banks	Twice daily

The speed of posting is linked to the user's experience and to potential use cases while the speed of settlement is primarily driven by risk tolerance and liquidity pressures felt by banks, system operators, and regulators.

In real-time systems, it is common
to settle within hours even though posting to the creditor's account occurs within seconds. This model does not detract from the experience of the user while allowing banks and processors to use liquidity more efficiently.

It is unusual for a system to settle within minutes. Most systems that speed up settlement in one or more systems either settle every few hours or go the extra step and opt for RT settlement.

Real-time systems with posting times longer than 30 seconds are generally considered too slow to support a P2P use case. This has been an issue with RTC.

Due to liquidity efficiency and management of settlement risk, the majority of bulk systems post and settle within hours or on a next-day basis.

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> Accessing payments systems

In most markets, banks provide main access to payments infrastructures

Clearing house-centric model
UK
Corporate customers — Clearing house(s) — Banks

Network-centric model
Minority of SEPA ACHs
Corporate customers — Network communications operator / Clearing house(s) — Banks

Bank-centric model
Brazil, majoirty of SEPA ACHs, India, Mexico, Nigeria, South Africa, USA
Corporate customers — Banks — Clearing house(s) — Banks — Corporate customers

Bilateral network model
Australia, Canada
Corporate customers — Banks — Bilateral exchange — Banks — Indirect clearing banks / Corporate customers

Technical access is a key element of every payment system. The majority of systems in scope limit direct technical participation to bank participants (known here as the bank-centric model). Australia and Canada have no clearing house and all clearing is done bilaterally. The UK, along with other highly developed countries that are not in scope, allows direct access by corporates to the clearing house, while in Belgium and Italy, there is a network operator that connects participants to the system. Expanding the number and type of participants who can access a payment system is a policy decision that has been linked to a number of modernisation goals:

- **Settlement risk management**—In both the EU and the UK, broadening access is a key method to limit the concentration of settlement risk amongst a small number of financial institutions.
- **Promote competition and innovation**—Broader access is also seen as a means to promote competition and innovation in the EU & UK. Mexico and Nigeria are also supportive of broader access in this respect.
- **Financial inclusion**—In Mexico & Nigeria, there are policies to limit cash and bring third parties into the formal payment system. Broadening access to non-bank participants is one method being explored.

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ISO 20022 enables automation, efficiency & interoperability

Country	Current standard	Planned standard	Systems covered
Australia	Proprietary	ISO 20022	All
Brazil	Proprietary	ISO 20022	All
Canada	Proprietary	ISO 20022	All
EU	ISO 20022	N/A	All
India	Mix of SWIFT MT based and ISO 20022	ISO 20022	All
Mexico	Proprietary	N/A	N/A
Nigeria	Mix of proprietary and IS0 8583	N/A	N/A
South Africa	Proprietary / ISO 8583	ISO 20022	All
UK	Standard 18 ISO 8583	ISO 20022	Account switching
US	NACHA	ISO 20022	RT, optional for others

ISO 20022 is considered the gold standard for new payment systems. All systems in scope that were built in the past 5 years have adopted ISO 20022 and all systems in development will be based on ISO 20022. The impact of the global trend toward ISO 20022 is not fully realised but it is already creating efficiency and interoperability in domestic and regional markets. Eventual interoperability with other international systems that use the standard is also emerging as a major benefit. Both the transfer and reconciliation of cross currency payments could be eased by the common use of the standard.

ISO 20022 has a number of advantages over legacy data standards: it is a Highly flexible standard based on the XML computing language and features Message sets for a range of financial service areas beyond payments. **But the ability to send extensive remittance data with ISO 20022 payment messages, which can enable automated reconciliation, is often the benefit with the most pressing business justification.** The use of ISO 20022 for real-time payment systems should enable business use cases that could drive volume into the system and bring value to multiple stakeholders.

Many legacy data standards can only accommodate limited data in payment Messages. These standards were typically developed decades ago when the Cost of sending and receiving rich messages was much higher than today. At a time when the cost of bandwidth is miniscule and new technologies enable The instant exchange of larger messages, many markets are actively looking To increase the amount of remittance data held in payment messages. Rich data is particularly useful for corporate payments, as businesses often Have to deal with slow, expensive, and error-prone reconciliation processes That involve the manual matching of multiple messages.

Currently, the focus of ISO 20022 implementation is the modernisation of domestic and/or regional markets. However, in the long term, **ISO 20022 has the potential to unite multiple markets on one data standard, therefore enabling cross-border interoperability for payment exchange.**

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Mobile payments and value-added services

Mobile — Funds transferred and received via mobile phone utilising central infrastructure.

Online — The service allows customers to buy goods online using a credit transfer. The payment process utilises the customer's web-banking platform.

A value-added service (VAS) is a service offered by a central payments infrastructure that goes beyond basic clearing and settlement. VAS can be related to core services, i.e. those related to credit transfers, direct debits, and account switching or a peripheral service , i.e. those associated with other channels, such as mobile payments and point of sale transactions. Core and peripheral services can help achieve modernisation goals.

The role that the central infrastructure providers and rule makers play in facilitating access to these channels varies among the countries in scope. Some offer no VAS, others offer a proxy database only, others offer advanced direct debit mandate management and keep a central database with alternative account identifiers to enable easy account switching.

To encourage development and adoption, it is essential that all banks take part, whether by regulatory mandate or stakeholder buy in.

Mobile related	CT and DD related
▪ Proxy database: Systems that offer mobile-based payments often ease interoperability by offering a proxy database (eg. Mexico, UK). The database allows customers to enter an alternative identifier to their bank account number and centralises use of mobile CTs in a database. ▪ RT POS: Currently, the ability to make a real-time payment at the point of sale is not a widespread phenomenon. Key examples include Denmark and Sweden. However, it is a use case being explored by live RT systems and those in development. RT POS has the potential to compete with card and cash-based transactions and could benefit both customers and merchants. Some markets such as the US envision the request for payment (RfP) instrument as a crucial enabler of RT POS payments. An RfP is a receiver-initiated request for payment that must be authorised by the sender.	▪ E-commerce payment solutions: A real-time guarantee of a deferred EFT payment. Examples include iDEAL in the Netherlands, Giropay in Germany, and the EBA's MyBank service. The US and Nigeria also offer similar services. Many other systems offer this service unbranded by embedding it into the credit transfer flow. ▪ Direct debit mandate management: Some systems aid in the reduction of direct debit returns by requiring the transmission of mandate information so that the debtor's bank is aware of all outstanding mandates. The EPC's SEPA schemes require DD originators to transmit mandate information. In Nigeria, NIBSS operates a centralised platform for paper-based DD mandates. ▪ Bank account switching: In the UK, Bacs provides a service to automatically transfer all payment arrangements to a customers' chosen bank & closes the existing account.

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Lessons learned for South Africa

Relating the successes and failures to the goals and process of modernisation in South Africa. Success depends on the local objectives and must be measured by whether goals were met.

Examples of success

- Strong leadership from an industry association or regulator (all)
- Integration and creation of interoperability (EU)
- Modernisation process and timing (Australia)
- Proxy databases promoting ease of use (India, UK)
- Accelerating payments (UK, India)
- Reducing risk (Australia, EU, UK)
- Inclusiveness of process (Australia, EU, USA)
- Creation of a new infrastructure (Brazil, EU, India)

Examples of lack of success

- Expensive pricing (Brazil Sitraf, SA RTC)
- Lack of adoption (Nigeria mobile wallet clearing, Brazil Sitraf, India, Migration to SEPA, SA RTC)
- Financial inclusion (India demonetisation)
- Ineffective governance

Defining success in South Africa depends on a through understanding of the goals, needs, and demands of stakeholders in the market. To this end, the research covers these topics in depth in section 1B, South Africa Future State, Demands and Pressures.

Goals

Policy goals are most often set by regulators or governments. Local goals are always specific to the environment, but successful goals are often linked to political, social, or economic challenges. These factors in South Africa – and the industry's views on how to solve for them – are discussed more thoroughly in the Phase 1B document.

Technical and rule changes

The functions, features, and rules added or modified during a modernisation cycle serve the goals. It is therefore imperative that the proposed changes have a clear relationship to at least one goal.

Successful governance

Factors that are present in successful modernisation initiatives around the world:

- Inclusive representation
- Proper level of seniority in governance bodies
- Empowered decision-makers

While successful governance can take many forms, unsuccessful governance is likely to not include one or more of the features above.

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> Terms & definitions

ACSS

Automated Clearing and Settlement Service, Canada's low-value EFT system

Account Switching Services

Rules or technologies to assist customers in switching account balances, direct debit authorisations, and standing orders from one bank to another.

Account-masking services

Systems that allow receivers of payments, typically corporates, to register for a virtual account number that can be associated with any account. By changing the account in the background, one effectively switches accounts.

AEPS

Aadhaar-Enabled Payment System, India's payment system to promote financial inclusion

AFT

Automated Funds Transfer. Canada's low-value module for credit transfers and direct debits

APCA

Australian Payments Clearing Association

B2B

Business-to-business

B2C

Business-to-customer

Bank account penetration

Percentage of adults with an account at a financial institution.

Bacs

UK system for low-value bulk payments

Banking concentration (CR⁵)

Measurement of assets held by the 5 largest banks

BBPS

Bharat Bill Payment System, India's national bill payment system

BECS

Bulk Electronic Clearing System, Australia's

Bulk payment

Credit transfers or direct debits submitted in files. A single file can contain hundreds or thousands of individual payments.

BVN

Bank Verification Number, used in Nigeria

CASS

Current Account Switch Service, UK service which allows consumers and small businesses to automatically transfer all payment orders when switching banks

CC

Competition Commission, UK policy body

CCEN

Mexico's commercial low-value EFT system

CIP

Câmara Interbancária de Pagamentos, payment system operator owned by Brazilian banks

Clearing House

An organisation that operates the technical infrastructure for processing payments, performing at least one of the following functions: acting as a hub for exchanging payment files, sorting them for distribution, or calculating settlement totals.

Credit transfer (CT)

A payment originated by a debtor and "pushed" to a creditor.

Direct debit (DD)

A payment originated by a creditor and "pulled" from a debtor. Known as a Debit Order in South Africa.

Direct debit mandate

A legal authorisation for an originator to debit a debtor's account using a direct debit.

Direct debit mandate management

A system for managing direct debit mandates, possibly including transmission, storage, and checking DD transactions for valid mandates.

Direct participants

Institutions that settle on their own behalf in the payment system.

EC

European Commission

ECB

European Central Bank

EFT

Electronic Funds Transfer, system that processes credit transfers and debit orders in South Africa.

EPC

European Payments Council

Terms & definitions

EPN

Electronic Payments Network, privately owned low-value EFT system in the US operated by The Clearing House

ERPB

European Retail Payments Board

Euro area

Member states of the European Union whose currency is the euro

FCA

Financial Conduct Authority, UK policy body

FedACH

The low-value EFT payments system in the US operated by the Federal Reserve

Financial Inclusion

A development that improves the range, quality, and availability of financial services and products focusing on the unserved, under-served, and financially excluded. Principles of financial inclusion include: access, affordability, appropriateness, usage, quality, consumer financial education, innovation and diversification, and simplicity.

FPS

Faster Payment Service, the UK's real-time system

FPTF

Faster Payments Task Force, US payments task-force.

FSS

Fast Settlement Service, Australia's settlement system for the New Payments Platform

G2P

Government to Person payments

Gini coefficient

The Gini Coefficient is the most commonly used measure
of inequality. The coefficient varies between 0, which reflects complete equality, and 1, which indicates
complete inequality.

IMPS

Immediate Payment Service, India's real-time system

Indirect participants

Number of banks addressable in the system that settle through other banks.

Interoperability

Agreements between clearing houses that allow payments to be delivered to banks that are outside of its circle of participants.

ISO 20022

XML-based data standard commonly used in payment systems

KYC

Know Your Customer

Lean system

Payment system with limited features and functionality

LVTS

Large Value Transfer System, High-value system in Canada.

NACH

National Automated Clearing House, India's system for low-value EFT credit and debit transactions

NACHA

National Automated Clearing House Association, rule-maker for US EFT payments

NACS

Nigeria Automated Clearing System, for the clearing of EFT and bulk paper-based payments.

NCS

Nigerian Central Switch for debit/ATM cards

NEFT

National Electronic Funds Transfer, India's system for low-value electronic funds transfers. Also the name of Nigeria's low-value system.

NFIS

National Financial Inclusion Strategy, aims to increase access to financial services to Mexico's unbanked population.

NIBSS

Nigeria Inter-Bank Settlement System Plc

NIP

NIBSS Instant payment, Nigerian real-time system

NPCI

National Payments Corporation of India

NPP

New Payments Platform, Australia's real-time system (in development)

OFT

Office of Fair Trading, UK organisation to promote payment policies

> Terms & definitions

PASA

Payments Association of South Africa

PC

Payments Canada, industry association and operator for Canada's high- and low-value electronic payment systems

P2P

Person-to-person payment

PSAC

Payment System Advisory Council, Indian council to promote payment policy

PSD

Payment Services Directive, the legal foundation for SEPA

PSR

Payment System Regulator, UK regulator focused on payment systems

Payment system

The totality of the set of rules for clearing payments, settling payments, and the technical infrastructure for processing them.

Payment scheme

A set of rules, technical standards, and implementation guidelines for processing payments uniformly within a given community.

Proxy database

Database of alternative account identifiers held centrally by payment infrastructure to enable transfers without the need for bank account information, typically a mobile phone number or email address.

RCH

Regional Clearing House of South Africa, operated by BSVA to serve the SADC region

RTC

Real Time Clearing, South Africa's real-time system

Real-time payment

Account to account credit transfer in which funds are posted to the beneficiary's account and confirmed by the sending bank within seconds.

Real-time posting

Funds are posted to a beneficiary's account within seconds of payment initiation

Real-time settlement

Real-time settlement accomplishes settlement within a
few seconds after a payment is initiated. It can occur independently of when a payment is posted.

Remittance data

Amount of information the data standard carries in addition to the fields required to post the payment.

Rich system

Rich systems display a greater number of features and often centralisation of functionality.

Rule-making body

An organisation that sets the rules and technical standards of the payment scheme according to which payments must be cleared and settled.

SADC

Southern African Development Community

SAMOS

South African Multiple Option Settlement, South Africa's high-value system

SARB

South African Reserve Bank

SEPA

Single Euro Payment Area

Settlement frequency

The frequency with which the system settles and outputs data.

Settlement method

Systems settle transactions multilaterally or bilaterally, in net or gross amounts. Funds are transferred on accounts held at a central bank (in rare instances, settlement occurs at a commercial bank).

SPEI

A hybrid system used for both high- and low-value payments in Mexico operate by the Bank of Mexico.

TCH

The Clearing House, US payment operator of both a high and low-value system.

UPI

Unified Payment Interface, India's service which enables end users to send or receive money using smartphones via the real-time system using a proxy ID.

Value-added services

Additional services provided by a system operator, sometimes closely related to clearing (e.g., routing table maintenance), community services (e.g., e-invoicing), or services customised to banks.

Contents

- Executive summary and introduction
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- Goals of payments modernisation
    - Payments modernisation case studies
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- Payment system design
- Lessons for South Africa
- Glossary
- **Payment system profiles**

Australia

› Australia

Payment modernisation profile

Australia's modernisation plans centre around the development of the NPP (New Payments Platform) a real-time system designed to be intentionally lean. Additionally, the NPP eliminates settlement risk through continuous real-time gross settlement of payments. Aside from faster funds availability, ISO 20022 based remittance data and continuous settlement, all additional features will be included as overlays, which are optional services for banks to include and potentially offer themselves.

Overlay services may also be provided by organisations other than banks, and the NPP committee expects that offering overlay services will lead to wider competition and innovation within the Australian financial community.

The impetus for the NPP and the modernisation of the Australian payment system, was due to a combination of regulatory pressure and wide recognition of its commercial necessity. The Reserve Bank of Australia laid out high-level requirements they considered intractable and left it to payments stakeholders (largely banks) to design the features and the system itself. The process began in earnest in 2012 and will reach a major milestone when the NPP goes live at the end of 2017.

Australia's payment systems are notable for how decentralised they are. Australia lacks a traditional clearing house for low-value bulk payments and its rule-making structure is also decentralised with multiple rule-making bodies playing a role. Both the low-value bulk system (BECS) and the soon to launch low-value real-time system (NPP) will run on a bilateral basis.

The Australian payments ecosystem is undergoing major changes with the development of the New Payments Platform (NPP), a low-value real-time system which will launch at the end of 2017. The high-value system, RITS, which is run by the Reserve Bank of Australia, has also established the Fast Settlement Service (FSS), to run alongside RITS for the settlement of low-value payments.

Australia's banking environment is defined by the "Big Four" (ANZ, Commonwealth, NAB, and Westpac). These banks play a major role in steering the direction of payments in Australia including the development of the NPP, which was not mandated by Australia's regulatory bodies.

Australia

Payment system and economic data

Payments data		
System operator		LV Bulk: None/ bilateral RT: SWIFT
System rule-maker		LV bulk: APCA RT: NPP Australia Ltd.
Credit transfers (2015, millions)		2245.27
Direct debits (2015, millions)		976.58
ATM (2015, millions)		700.81
High value (2015, millions)		11.19
Cards (2015, millions)		6588.87
Real-time payments (2015, millions)		nap

Economic data		
Population (2015, millions)		23.80
GDP (2014, USD billions)		888.80
Bank concentration ratio (CR_5)		90.5
Gini coefficient (World Bank, 2010)		34.9
Bank account penetration		99.10%
Corruption perception ranking (Transparency International)		13

Non-cash payment transaction volume in Australia. 2010-2015
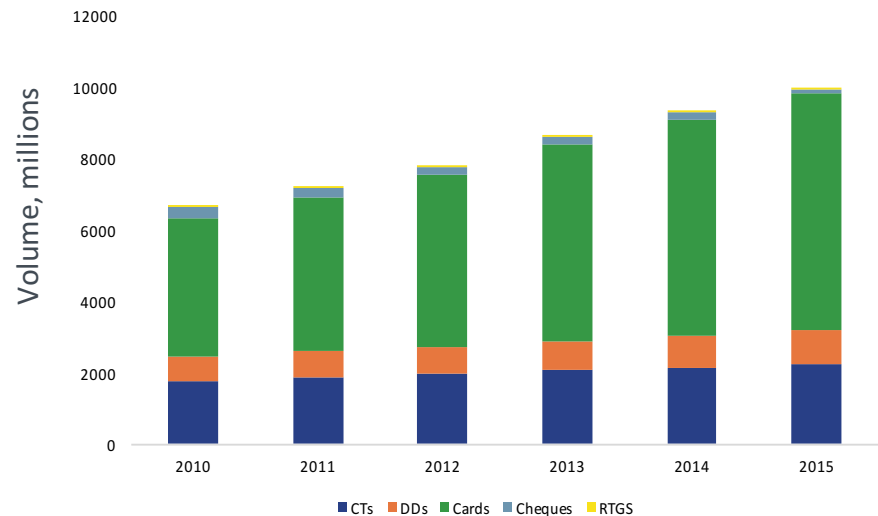
Australia is a very card-centred market. Cards far exceed all other payment types in terms of absolute volume and growth. Credit transfers do show some growth, and are the clear preference in terms of ACH based electronic payments. Direct debits are largely static, while cheques are the only payment type that is visibly being phased out. By 2013, cheques had nearly disappeared from the market.

› Australia

Recent modernisation efforts

Goals of modernisation

The RBA laid out 3 main goals for payment system modernisation in the 2008 LVP Roadmap. Developments included:

- Instituting a central switch
- Speeding up settlement cycles
- Working toward ISO 20022 migration

By 2012, access became a key goal of payment system modernisation efforts as well. The RBA wanted the updated system to be open to non-banks and the previous system of bilateral clearing made this difficult. The multilateral nature of NPP lessened the complexity of providing gateways to facilitate settlement messages to indirect participants.

The 2012 modernisation efforts necessitated the inclusion of non banks in the governance structure.

As an industry centered association, APCA was inclusive of a variety of players on the NPP steering committee, including banks of varying sizes, PayPal and major retailers. This structure allowed the goals of the larger industry to take precedence over the promotion of narrow interests.

Additional goals of the modernisation efforts tackled issues with rural ATMs which extracted high fees from users with no alternatives.

Process of modernisation

Modernisation plans in Australia began in earnest in 2007 and were focused around the low-value bulk Direct Entry system, which was considered old, inflexible and costly. In spite of the clear goals laid out in the 2008 LVP Roadmap, banks were reluctant. It took 4 years before changes began to take shape.

Part of this hesitance was due to the unique bilateral clearing system in Australia, favored by banks. Banks were concerned that a central switch would diminish their control.

The RBA released a 2012 report, Innovation in the Payment System, with a more forceful tone toward modernisation. Banks were given 6 months from the release of the report to achieve development goals. At that point, the RBA would engage in strategic reviews with bank members. The 2012 report also included a description of the system the RBA wanted to build if banks did not develop a plan within 6 months. Banks came to the conclusion that, although the RBA report did not specify real-time, it would be prudent to implement a real-time system. In this way, the compliance requirement was turned into a business opportunity.

A real-time payments committee was formed which later became the NPP steering committee, led by APCA. The committee put forward a proposal which was narrowly approved by the Payment Systems Board. The NPP system is due to go live end of 2017.

› Australia

Key modernisation elements

Technology change and innovation

Improvements in technology, which include mobile and digital adoption are shaping the payments landscape in Australia. The real-time NPP system was developed to ensure the payments community had the technology to keep up with customer preferences and business goals. These updates are focused on:

- Response to disruptive payment processes
- Speed and simplicity of non-cash payments
- Proxy addressing service
- Open access platform
- Request to pay functionality
- Separation between products and infrastructure

Security and stability

The architecture of the NPP was built with the future in mind. Rather than reuse legacy platforms and build on top of them, the design of the NPP was focused on building a secure system for the long run. To that end, the NPP is intentionally a new infrastructure that is not built on top of legacy infrastructure.

Stakeholders also agreed that stricter security controls associated with data traceability and payments fraud were necessary for continuous real-time settlement.

ISO 20022 driven by increased remittance data

One of the primary goals of the Reserve Bank of Australia is the inclusion of more remittance data as well as other information can be embedded into payment messages or links to externally hosted documents. The RBA believes that more complete remittance information is essential to payments.

At the moment, only the NPP and its settlement component in the RITS high-value system were designed with the ISO 20022 data standard. Wider ISO adoption is probable for other Australian systems, but there are no current plans to move to ISO 20022.

Continuous real-time settlement

The NPP was designed to eliminate settlement risk through continuous real-time gross settlement of payments. The Fast Settlement Service (FSS) module, which belongs to the high-value system RITS, is intended to expand RTGS service and create value for low-value RT by guaranteeing irrevocability of payment messages. Gross settlement aids the NPP in offering the most secure, fast and simple RT system possible. Features include:

- Real-time central bank settlement
- Faster funds availability
- 24/7/365 real-time gross settlement with no 'cut off' times

Australia payment system scorecard

Richest functionality available in market

	Lean ← Functionality → Rich			
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instrument	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Functions

Denotes current functional level

Denotes planned implementation of functionality

64

› Australia

Payment system details

Bulk Electronic Clearing System (BECS)	New Payments Platform (NPP)
• BECS exchanges all payments bilaterally, there is no central multilateral infrastructure. • BECS is open to both direct and indirect participants. • BECS settles and posts multiple times daily, exact timings are agreed between banks. • BECS uses a proprietary data standard which allows tens of characters. Non-payment messages are not possible. • BECS offers community based value-added services; both account switching and for corporates, an account masking number issued by BPAY. • The system features six daily settlements (10:45, 13:45, 16:45, 19:15, 21:15, and 09:00 on D+1) with cut-off times normally occurring 45 minutes before settlement	• Still in development; due to go live in late 2017 • System will be run and owned by NPP Australia limited. • Transaction value will be unlimited. • System will process on a continuous bilateral gross cycle. • Settlement will occur before output and posting, but posting will also be immediate. • Settlement hours will occur between 07:30 and 22:00 (7 days a week). • The NPP will use the ISO 20022 data standard. • Only a core service will be provided. All overlay services will run independently.

Reserve Bank Information and Transfer System (RITS)

- RITS is an RTGS system used for high-value payments and the settlement of retail payment systems.
- Participants access RITS via the RIB proprietary network or through HVCS, an APCA managed closed SWIFT user group. RITS is generally open from 09:15 to 16:30 (Certain banks submit between 16:30 to 18:30 (and to 20:30 in summer).
- Settlement takes place via accounts held at the RBA. Having this account is a prerequisite for participation.

Brazil

Brazil

Payment modernisation profile

Regulation was the key modernisation driver in Brazil and major developments—such as the implementation of new payment systems, the appointment of a payment system operator, and the centralisation of regulatory oversight for the financial sector—stem from the financial crisis of the late 90's. By 2006, all measures had been put in place and at that point the role of the central bank shifted from driving reform to fostering stakeholder inclusion and innovation.

A cornerstone of the modernisation efforts was the development of a real-time system to handle both high and low-value payments. Initially banks were sceptical of the value real-time provided but have evolved to take a more strategic view of the opportunities that RT payments represent. It is now seen as necessary for any further developments to be successful.

Developments have also been focused on increasing access to payment systems to non banks, which is seen as a way to potentially spur competition and innovation in Brazilian payment systems. In 2013, direct access to settlement accounts were opened to authorised non-bank payment providers but results have been mixed. Very few non-banks have applied for direct access to settlement accounts.

DESCRIPTION

Brazil's payment landscape is diverse and balance issues of financial inclusion with corporate demand. The payment systems in Brazil rely heavily on involvement from the Banco Central do Brasil (BCB), the Brazilian central bank. The BCB operates and sets the rules for Brazil's RTGS system, STR, which is a traditional role for a central bank to play. However, the BCB is also the rule maker for the low-value bulk and low-value real-time systems, SILOC and SITRAF. The low-value bulk and low-value real-time systems are operated by CIP (Câmara Interbancária de Pagamentos), a company owned by Brazilian banks. Unlike most countries covered in this report, Brazil does not have an interbank system for direct debits. Brazilians are historically skeptical of giving third parties access to their bank accounts.

CIP and the BCB work together to continuously modernise and improve payment systems in Brazil. The most important prospective development led by CIP and the BCB is the migration of the entire payments industry to ISO 20022. Currently, Brazil's payment systems use a mix of proprietary XML-based data standards. Interestingly, the BCB sets rules for low-value payment systems such as Siloc and Sitraf in addition to the STR high-value system. No timetable for ISO 20022 migration has been established.

› Brazil

Payment system and economic data

<table>
<tbody>
<tr><td rowspan="9">Payments data</td><td>System operator</td><td>LV Bulk: CIP
RT: CIP</td></tr>
<tr><td>System rule-maker</td><td>LV bulk: Banco Central do Brasil
RT: Banco Central do Brasil</td></tr>
<tr><td>Credit transfers (2015, millions)</td><td>7042.10</td></tr>
<tr><td>Direct debits (2015, millions)</td><td>nap</td></tr>
<tr><td>ATM (2015, millions)</td><td>4614.48</td></tr>
<tr><td>High value (2015, millions)</td><td>41.81</td></tr>
<tr><td>Cards (2015, millions)</td><td>12120.94</td></tr>
<tr><td>Real-time payments</td><td>296.56</td></tr>
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</table>

<table>
<tbody>
<tr><td rowspan="6">Economic data</td><td>Population (2015, millions)</td><td>207.85</td></tr>
<tr><td>GDP (2014, USD billions)</td><td>1211.87</td></tr>
<tr><td>Bank concentration ratio (CR_5)</td><td>73.5</td></tr>
<tr><td>Gini coefficient (World Bank, 2014)</td><td>51.5</td></tr>
<tr><td>Bank account penetration</td><td>55.90%</td></tr>
<tr><td>Corruption perception ranking (Transparency International)</td><td>79</td></tr>
</tbody>
</table>

Non-cash payment transaction volume in Brazil, 2010-2015
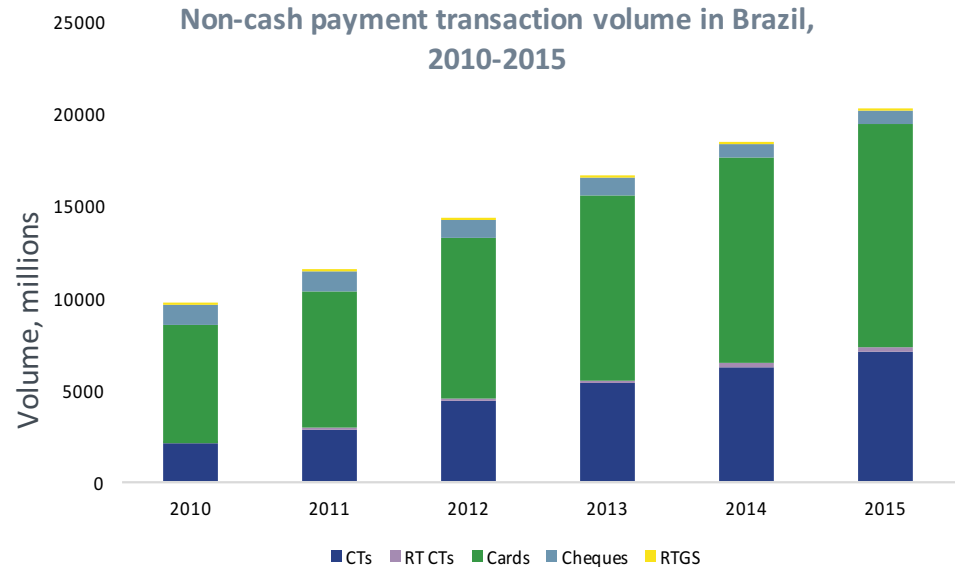
Card payments have made up the majority of non-cash payments in Brazil at least since 2010, but the volume of credit transfers has risen rapidly in the same timespan. One possible reason for the growth of credit transfers is the widespread use of the "boleto de pagamento," a standardised bar code invoicing and bill payment system processed via the SILOC system. Boletos are extremely popular among Brazilian businesses, mostly in the B2C and B2B space. Cheque payments have remained steady over time and have not been cannibalised by electronic payment systems. Real-time payments have grown steadily since 2010, but still make up a small overall share of non-cash payment volumes. There is no interbank system for direct debits in Brazil.

› Brazil

Recent modernisation efforts

Goals of modernisation

The roots of payment system modernisation efforts go back to the domestic financial crisis experienced by Brazil in the late 1990s. The BCB was convinced of the need to mitigate systemic risks to the financial system, and payment system reform was a key pillar.

- Initially, the main goal of modernisation was to mitigate financial risk. The development of Brazil's RTGS system followed in 2002.
- High inflation in Brazil throughout the 1980s and 90s was a driver for implementing same-day funds settlement. Real-time payments was a natural outgrowth of this need to reduce liquidity risk.
- STR and SITRAF were both introduced in 2002 to meet these goals.

The focus of modernisation efforts has developed over time. By 2005/06, the BCB began looking more at increasing competition and innovation in payment systems.

- Interoperability and access to payment systems is seen as a key enabler of increased competition and innovation.
- Law 12,865 of 2013 gave the BCB the authority to regulate all payment schemes and operators, including card payments and non-bank payment providers, which were not formerly under the BCB's regulatory purview.
- Non-bank payment providers now have legal access to settlement accounts, although uptake has been minimal.

Financial inclusion has only been an ancillary focus of payments modernisation in Brazil.

Process of modernisation

Initial reforms of Brazilian payment systems began in the late 1990s and were pushed by the central bank (BCB). The Finance Ministry offered additional external push, but efforts were led by the BCB.

- The BCB defined the initial phase of modernisation (implementation of RTGS and low-value RT systems) and mandated these changes to the industry without negotiation
- The BCB has since moved away from mandating change, preferring consultation with banks instead
- CIP, the central bank run payment processor, was established to operate low-value electronic systems in line with BIS principles
- CIP now plays a key role in further modernisation efforts by convening various industry stakeholders to discuss issues and implement change.
- The Brazilian Federation of Banks provides further forums to discuss issues among banks.

Commercial banks were resistant to modernisation at first as they had trouble seeing the benefits of real-time payments, but had little choice due to regulatory mandate.

- Banks began to take a more strategic view of opportunities presented by RT payments 4-5 years after implementation.
- The six largest banks have the most influence within the banking sector. Consensus with these institutions is seen as necessary for any further change efforts to be successful.

❯ Brazil

Real-time payments the initial modernisation focus

The implementation of a real-time payment system was seen as a key feature of the BCB's initial modernisation efforts.

- As with the implementation of the RTGS system, the initial goal was to mitigate financial risk by offering a fast and efficient electronic payment option for Brazilian banks to process payments.

- The BCB mandated the development of SITRAF, which went live in 2002.

- Initially, the development of RT was seen as a compliance burden by Brazilian banks. Over time, they have focused more on improving customer propositions using RT.

- Starting in 2007, many Brazilian banks made major internal IT investments to enable increased RT volumes for their customers.

Inclusion of all payment streams under BCB regulatory umbrella

In 2013, the BCB passed a new regulation that brought all payment schemes and payment providers under the BCB's regulatory oversight. The main goal of this legislation has been to spur innovation in the Brazilian payments market.

- Prior to this, the BCB did not have the legal authority to regulate card payments or non-bank payment providers.

- All payment scheme owners and payment institutions must now be approved by the BCB.

- So far, no non-bank payment providers have applied for authorisation as a payment institution from the BCB.

No fixed plans for move to ISO 20022

The BCB has pushed for greater standardisation in financial messaging, and has done a lot of work educating Brazilian banks on the potential benefits that ISO 20022 can bring to the market.

- CIP has played a prominent role in encouraging adoption of ISO 20022. However, Brazil currently has a robust, XML-based proprietary data standard with rich remittance data, so it has been difficult to reach a consensus for migration.

- Standardisation in messaging and interoperability between payment systems are expected to ease B2B payments and reduce operational complexity for Brazilian banks, as well as enable international interoperability going forward.

- There is no formal timetable for ISO 20022 adoption at this time.

Direct settlement access for non-banks

Increasing access to payment systems is seen as a way to encourage competition and innovation in Brazilian payment systems.

- The 2013 BCB regulation opened direct access to settlement accounts to authorised non-bank payment providers.

- The results of this development have been mixed. Very few non-banks have applied for direct access to settlement accounts.
  - Most non-banks prefer to access payment systems indirectly through a financial institution due to the IT complexity and increased liquidity burden of direct access to settlement accounts.

› Brazil

Key modernisation efforts

Inflation and 1990s financial crisis

The financial crisis of the 1990's had many lasting effects on the Brazilian payment system, many of which are still being felt today in terms of policy direction and customer habits.

The crisis began with an inflation problem in the mid 90's. In order to limit inflation, the government put a plan in place to peg the Real to the US Dollar, which led to overvaluation of the Real and ultimately to intolerable stresses for Brazil's currency system.

The resulting payment system reform was spearheaded by the BCB in 2000. A key issue was mitigating financial risk by creating a real-time online payment system, particularly for large value payments and securities payments, which were affected by the crisis. Prior to 2002, payments were cleared as cheque payments and large value payments were settled intra-day.

Brazilian banks pushed back but the Finance Ministry provided the necessary regulatory support to the central bank and pushed the project through with help from the Brazilian Federation of Banks. The central bank set out requirements and with only a year for implementation, the real-time system went live in April of 2002.

Financial inclusion and mobile payments

The BCB has taken part in a BIS/World Bank task force looking at how payments can influence financial inclusion. The committee issued a set of recommendations in its April 2016 report, "Payment aspects of financial inclusion."

- One of the key recommendations is the need for an "extensive network of access points" for financial services. Mobile payments are seen as a key element here.
- The BCB has determined that the supply of mobile payment services in Brazil is inadequate to meet financial inclusion needs.
- Some payment instruments are seen as potentially risky or not viable, in particular credit cards and debit cards. Prepaid cards may be an attractive option in this space.
  - Interoperability between prepaid cards and legacy systems (such as SITRAF) will be key to ensuring uniform service levels across the country.

Despite the potential of mobile payments to spur financial inclusion in Brazil, there are very few concrete developments in this space. This may change due to plans by the BCB to create an innovation sandbox which would specifically target financial inclusion.

Brazil payment system scorecard

Richest functionality available in market

	Lean ← Functionality → Rich			
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instrument	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Functions

Denotes current functional level

Denotes planned implementation of functionality

Brazil

Payment system details

SILOC	SITRAF
• Access to SILOC is open to direct participants only. • Settlement and posting occur multiple times daily. • SILOC uses a proprietary data standard which allows for thousands of characters. However, the entire payments eco system is migrating to ISO 20022. • SILOC offers community based value-added services. SILOC has the ability to warehouse payment messages for up to 3 days in advance. CIP also offers so-called "boletos de pagamento," which provide standardised bar codes for invoicing and bill payments. • There are no non-payment messages that run through SILOC. • SILOC processes payments from 06:30 to 17:30, five days a week. • Rules for SILOC are set by the BCB. • SILOC does not process direct debits; interbank direct debits are not available in the Brazilian market.	• Access to SITRAF is open to direct participants only. • Settlement happens continuously throughout the day using a hybrid settlement method that nets matching transaction pairs against each other in five minute windows throughout the day. • The system itself does not provide confirmation to the sender. Banks must offer that service directly. • SITRAF currently uses a proprietary XML based standard but is moving to ISO 20022. • SITRAF allows payments to be forward dated, a rare value-added service for real-time systems. • SITRAF processes payments from 06:30 to 17:30, five days a week. • Rules for SITRAF are set by the BCB. • SITRAF has a transaction value limit of BRL 1,000,000 (approx. USD 325,100).

STR

- STR is a bilateral-gross continuous settlement system used for RTGS payments. STR also settles Brazil's retail systems.
- Non-bank participants can access the STR system, which is open to all financial institutions, although they must have a settlement account in order to participate in settlement and have direct access.
- STR allows payments to be forward dated, a rare value-added service for RTGS systems.
- STR uses a SWIFT based data standard which allows up to 1 MB of data. It will migrate to ISO 20022 along with the other systems.

Canada

› Canada

Payment modernisation profile

Canada is currently in the process of an industry-wide modernisation project aimed at high- and low-value payments.

- The aim of the modernisation initiative is to increase speed, flexibility, efficiency, and security while enabling future innovation to increase competitiveness in Canada.

Payments Canada has played the lead role in bringing industry stakeholders together, developing a vision for modernisation, and creating a roadmap for modernisation.

- The development of a new high-value payments platform is seen as crucial to enabling further innovation in the market, particularly as the speed of retail payments increases.
- Migration to ISO 20022 is another vital element in modernisation. ISO 20022 can increase efficiency for high- and low-value payment streams and can help improve the reconciliation process for Canadian businesses (by enabling richer data and automated reconciliation).
- Real-time payments is also needed, but the timing of this move remains unclear. PC is currently designing functional requirements for a real-time system, but no official decision has yet been made on the development of a real-time payment system.

Payments Canada (PC) operates the high- and low-value payment systems in Canada. PC is a bank-owned industry association that owns

and operates the Large Value Transfer System (LVTS) for high-value payments and the Automated Clearing Settlement System (ACSS), which features the Automated Funds Transfer (AFT) module for low-value batch credits and debits. In addition to high-value payments, LVTS is used for multilateral net settlement of retail payment systems. LVTS is a high-value netting system; unlike most other countries, Canada does not have a high-value RTGS system. Participation in LVTS or ACSS requires a bank to become a member of Payments Canada and all banks are required to be members.

Canada is currently in the process of a large scale payments modernisation project aimed at both high- and low-value payment systems.

The two driving forces behind the modernisation project are the need for enhanced data and interoperability and a desire for faster payment options. ISO 20022 is seen as an important component of modern payment systems, as the standard allows for automated reconciliation, richer data with payments, interoperability (both domestically between retail and high-value systems and operational interoperability for corporates with businesses in other markets that use ISO 20022), and faster speed of payments (eventually including the introduction of real-time payments). Changes to the high-value LVTS system are the first priority in this effort, which will also include functional changes to ACSS and modernisation of rules and legal frameworks for payment systems to further contain risk and boost efficiency.

Canada

Payment system and economic data

Payments data

System operator	LV Bulk: Payments Canada
System rule-maker	LV bulk: Payments Canada
Credit transfers (2015, millions)	1317.64
Direct debits (2015, millions)	791.26
ATM (2015, millions)	682.76
High value (2015, millions)	7.92
Cards (2015, millions)	9241.87
Real-time payments (2015, millions)	nap

Economic data

Population (2015, millions)	35.88
GDP (2014, USD billions)	1359.73
Bank concentration ratio (CR_5)	84.2
Gini coefficient (World Bank, 2010)	33.7
Bank account penetration	95.80%
Corruption perception ranking (Transparency International)	9

Non-cash payment transaction volume in Canada, 2010-2015
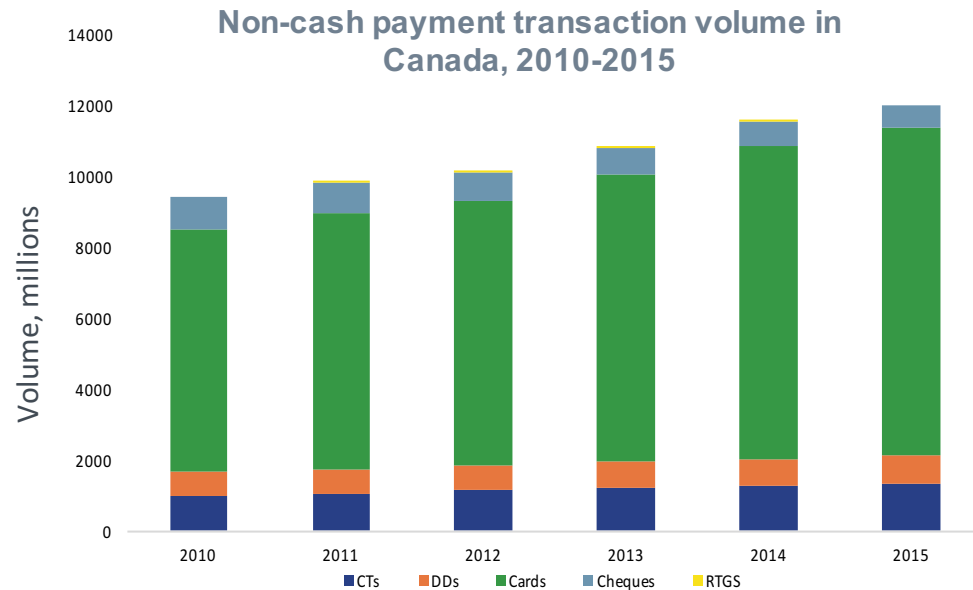
Non-cash payment volumes in Canada have seen moderate growth since 2010, and the proportionate use of different non-cash instruments has remained stable. Card payments dominate non-cash volumes and have grown faster than the use of other non-cash instruments over the past five years. Low-value bulk credits and debits see light growth but have largely remained steady. The use of cheques also remains stable, particularly among small businesses.

› Canada

Recent modernisation efforts

Goals of modernisation

Payments Canada's modernisation efforts have mainly been driven by two key factors:

- General desire to accelerate payments in the aim of boosting efficiency and closing functionality gap to other markets
- Need for richer data in payment messages (particularly among the business community)

The two initiating forces behind the modernisation project were end users and government entities. These groups looked at outcomes in other markets and examined the gaps in Canadian payment systems, which spurred further discussion on modernisation.

The need for richer data has been the biggest driver of migration to ISO 20022. The limited amount of remittance data in ACSS today presents challenges for businesses related to reconciliation.

- Added efficiencies related to international use of ISO 20022 was a secondary driver, particularly for multinationals in Canada, which see ISO 20022 as increasing the ease of doing business in Canada.

Additional goals of the modernisation project include developing a new platform for LVTS to ensure stability as the speed and size of payment messages grows, additional clearing windows in ACSS, and an updated rules framework for high- and low-value payments.

Modernisation of retail payment systems is aimed at increasing efficiency and speed, while changes to LVTS focus on system stability and risk management.

Process of modernisation

Payments Canada is at the centre of the modernisation process.

- Modernisation process began in 2012 when industry stakeholders (particularly end users) started looking to payment system functionality in other markets and examining the gaps in Canada.
- The first phase of the project culminated in the publication of a vision document by PC in early 2016 that details the case for payment systems modernisation and the key features of modernisation.
  - PC organised a series of workshops in 2013/14 and employed consultants in 2015 to survey Canadian stakeholders and inform the vision document.
- PC worked together with banks and other stakeholders to develop an industry roadmap published in December 2016.

The government has played an important role in outlining desired features, but has not mandated change through regulation.

- Regulators such as the Bank of Canada have been careful not to play a direct role in influencing the direction of the modernisation project too much. Should PC fail to meet its public policy objectives of promoting efficiency, a regulator could step in.

Organisations such as Finpay (committee within the Canadian Department of Finance) and PC Stakeholder Advisory Council have contributed to industry discussions on modernisation and have provided valuable forums for stakeholder collaboration.

› Canada

Key modernisation elements

New core platform for LVTS

The changes currently underway in retail payment systems necessitate a transformation of LVTS. Replacing LVTS with a new platform is the first priority in the modernisation programme.

- The Bank of Canada requires that LVTS meet the PFMIs without a central bank guarantee. BoC currently guarantees settlement.
- Adoption of ISO 20022 in LVTS to ensure automated exchange, STP, and automated reconciliation for Canadian businesses.
- A more flexible architecture is envisioned that will enable the future addition of new system interfaces, enhanced liquidity management, and extended operating hours.
- Banks may be required to hold additional collateral at the Bank of Canada.

Real-time payments an eventual need in the market

The need for a real-time system is widely recognised in Canada. However, an official decision on the development of a RT system has not yet been made, and RT is not an immediate priority.

- PC is in the process of designing functional requirements and assessment criteria for a RT system. No date has been announced for the completion of this task.
- Any RT payment system in Canada would use ISO 20022.
- A RT payment system is also seen as an important platform for innovation, and could facilitate offerings from non-bank PSPs in the future.

ISO 20022 driven by data and interoperability

The adoption of ISO 20022 is a key element of the modernisation project. The need for rich remittance data was originally the biggest driver toward ISO 20022.

- ISO 20022 will be used in both high- and low-value systems.
- Canadian businesses face challenges with reconciliation using legacy payment standard, which only has 34 characters of data. The Canadian implementation of ISO 20022 will feature 140 characters and additional optional fields for more extensive data.
    - A common standard for low-value and high-value systems is seen as a key step toward greater efficiency in payments.
- Many Canadian businesses with an international presence see further opportunities for efficiency with increased usage of ISO 20022 in Canada and abroad.
    - Payments Canada believes that the adoption of ISO 20022 may make Canada an attractive location for new businesses.

Functional enhancements to AFT batch payments

The introduction of real-time payments does not preclude improvements to AFT batch credits and debits. In addition to the adoption of ISO 20022, the ACSS system will introduce additional exchange windows for batch payments.

- Third window in 2017 with funds availability within 2 hours.
- Eventual funds availability within 1 hour within a few years.

› Canada

Modernisation efforts to have wide-ranging effects on payments ecosystem

Five major changes involved in modernisation project

Payments Canada's December 2016 "Industry roadmap & high-level plan" lays out five core elements of modernisation:

- New core clearing and settlement system for LVTS and ACSS
- Development of a real-time clearing rail
- Enhancements to AFT stream, incl. ISO 20022 and additional clearing windows
- Accommodation of new regulatory requirements in ACSS
- Rules framework modernisation

Changes to LVTS are being pursued as the first priority in this effort, including the introduction of a backwards-compatible ISO 20022 standard, a Settlement Optimisation Engine to enable settlement of higher volumes of payments, and liquidity savings mechanisms. PC will continue to operate the system.

Enhancements to the AFT batch payment stream within ACSS will follow and will include increased clearing windows to increase speed in the system.

Establishing buy-in from Canadian banks

Canadian banks were initially sceptical of the investments needed for a large-scale modernisation project, but have gradually adopted a more strategic approach focused on how to best implement and develop new systems and functionality.

- Interestingly, some banks have expressed a preference for a regulatory mandate to make it easier to obtain internal funding.

Canada payment system scorecard

Richest functionality available in market

Lean ← Functionality → Rich				
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Denotes current functional level

Denotes planned implementation of functionality

› Canada

Payment system details

Automated Clearing Settlement System (ACSS)

ACSS is a low-value system used for the processing of batch paper and electronic payment messages. Exchange of ACSS payments is done on a bilateral basis between banks, with multilateral net settlement occurring in LVTS.

- The Automated Funds Transfer module is used for batch electronic credits and debits.
- Settlement of ACSS payments is calculated at the end of the business day and settlement is executed on D+1.
- ACSS has 12 direct participants ("direct clearers"). Indirect participants submit payments via a direct member bank.
- All participants (both direct and indirect) must be members of Payments Canada.
- ACSS uses proprietary data formats: CPA Standard 005 and 015.
- The system has a transaction value limit of CAD 25 million.
- Payments Canada offers a rule set for account switching, but otherwise does not offer VAS in ACSS.

Large Value Transfer System (LVTS)

LVTS is a high-value netting system owned and operated by Payments Canada.

- Despite being a multilateral net system, all LVTS payments are legally final and irrevocable upon processing.
- Indirect participants access LVTS via direct participants.
- All participants (both direct and indirect) must be members of Payments Canada.
- Messaging in LVTS is done using SWIFT standards (MT 103 and MT 205).
- Bank of Canada manages collateral held by system participants and executes settlement at the end of day.
- In the case of a participant default, the Bank of Canada would extend funds to enable the participant to settle their final net debit position.

Euro Area

> Euro Area

Payment modernisation profile

Since the introduction of the Euro in 1999, The European Union has pursued the integration of Europe's previously national payment systems into a single market, known as the Single Euro Payment Area, (SEPA). After the completion of migration to the SEPA schemes in 2014, attention turned toward other goals such as increasing competition, promoting innovation, facilitating the digital economy and increasing inclusiveness of governance.

The latest goal has been the addition of a real-time payment scheme, known as SCT[inst], which will go live at the end of this year. However, it is unlikely that all SEPA payment processors will have implemented the infrastructure to support that scheme. The SCT[inst] scheme will be launched later this year.

In 2018, the second installation of the Payment Services Directive, PSD2 goes into effect. Key objectives for the PSD2 include sharpened transparency requirements and an obligation for banks to facilitate access to their customer's accounts via APIs.

DESCRIPTION

This profile covers the rules around low value payments shared by the 19 countries that comprise SEPA and the Euro area. The European Commission was the primary driver behind the advent of SEPA, but more recent changes have been driven by the European Central Bank (ECB) and the Euro Retail Payments Board (ERPB), an industry body that it convenes.

The European Payments Council (EPC) defines the schemes for the Single Euro Payments Area (SEPA). Currently there are SEPA schemes for credit transfers (SEPA Credit Transfer or SCT), consumer direct debits (SDD Core), B2B direct debits (SDD B2B). In November of 2017, the EPC-defined scheme for real-time payments, SEPA[inst] will go live.

Under the umbrella of SEPA and the EPC schemes, there are 23 separate and only partially interoperable clearing houses clear and facilitate settlement of payments. The largest of these are EBA Clearing (pan-European), STET (France and Belgium), EquensWorldline (Netherlands, Germany, Italy), and Iberpay (Spain).

High-value payments are cleared and settled via the ECB's TARGET2, an RTGS system, or EBA Clearing's EURO1/STEP1, a high-value netting system.

Euro Area

Payment system and economic data

<div class="payments-data">

Payments data

System operator	LV Bulk: Various
System rule-maker	LV bulk: EPC
Credit transfers (2015, millions)	18215.70
Direct debits (2015, millions)	19122.85
ATM (2015, millions)	nav
High value (2015, millions)	88.59
Cards (2015, millions)	29617.52
Real-time payments (2015, millions)	nap

</div>

Non-cash payment transaction volume in SEPA, 2011-2015

Economic data

Population (2015, millions)	338.98
GDP (2014, USD billions)	11157.52
Bank concentration ratio (CR_5)	nav
Gini coefficient (World Bank, 2012)	nap
Bank account penetration	94.73%
Corruption perception ranking (Transparency International)	24
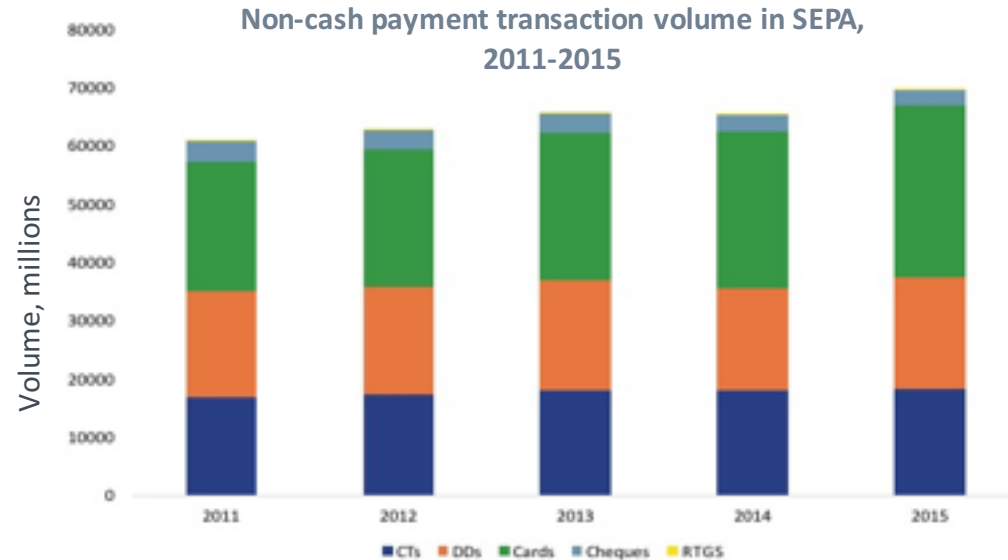
Payment habits in the Euro area are markedly different than those in other countries covered. What makes the Euro area so exceptional is the near card level usage of credit transfers and direct debits. What is not interpretable from the chart is the level of use on a country by country basis. For example, Germany is a very high direct debit user while in France, that usage is much lower. This is also true of cheque usage, which appears relatively high, but is only common in France and the UK. National habits aside, the establishment and mandatory adherence to SEPA schemes set the tone for payment usage. The inclusion of scheme rules for SEPA instant will undoubtedly change the composition of payment usage when it is launched in 2017.

› Euro Area

Recent modernisation efforts

Goals of modernisation

Since the introduction of the Euro in 1999, The European Union has pursued the integration of Europe's previously national payment systems into a single market, known as the Single Euro Payment Area, (SEPA). Initially, the goals were chiefly political in nature:

- Integration of payment markets into a single market
- Elimination of barriers to intra-EU trade
- Lower cost for European consumers and corporates

These goals led to several clear strategies:

- Introduction of pan-European payment schemes
- Establishment of pan-European infrastructures
- Elimination of national schemes
- Encouragement of cross-border mergers among infrastructure providers

After the completion of migration to the SEPA schemes in 2014, attention turned toward other goals:

- Increasing competition
- Promoting innovation
- Facilitating the digital economy
- Increasing inclusiveness of governance

The latest goal has been the addition of a real-time payment scheme, known as SCT^{inst}, which will go live at the end of this year. However, it is unlikely that all SEPA payment processors will have implemented the infrastructure to support that scheme.

Process of modernisation

The process of modernisation in the EU has included three types of organisations over the past 15-20 years, although the relative strengths of their influence have changed over time:

European Commission, whose directorate general for internal market was a key enabler of SEPA. Key regulatory and legal actions included:

- Pricing regulation to force the industry to develop a pan-European infrastructure
- Creating a single legal framework for payments in the EU
- Opening access to the payment system for non-banks.
- Forcing the migration of payments to SEPA schemes
- Decreasing barriers to competition by compelling the use of APIs

Industry initiatives:

- European Payments Council—sets rules for SEPA schemes
- Berlin Group—sets interoperability standards for card schemes
- EACHA—ACH association which sets interoperability guidelines for European payment processors.

European Central Bank, which operates the RTGS system known as TARGET2, in which all SEPA payments eventually settle. The ECB also acts as a risk regulator, policy maker, and convener of the ERPB (European Retail Payments Board). The objective of the ERPB is to contribute to and facilitate the further development of an integrated, innovative and competitive market in the Euro area.

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Modernisation process in the Euro Area

Timeline of events

- 2000 – EU governments, ECB, and European Commission (EC) lay out vision for SEPA.

- 2001 – EC issues regulation stipulating equal pricing for domestic and cross-border transactions in Euro within the EU, forcing banks to internalise the cost of cross border transactions and create the EPC.

- 2002 – EC publishes first draft of new legal framework for payments. Banking industry creates the European Payments Council.

- 2004 – EPC publishes SEPA roadmap 2004-2010, laying out the implementation steps for the 2000 vision.

- 2005-6 – Banks and CSMs develop technical solutions to implement SEPA schemes.

- 2007 – EU adopts the New Legal Framework, now called the Payment Services Directive (PSD). TARGET2, the single shared platform fro RTGS payments in Euro goes live.

- 2008 – EPC launches the SCT scheme. EU countries establish national SEPA migration committees and plans and the EU creates a forum to coordinate them.

- 2009 – EC Regulation mandates reachability of all banks by EPC schemes. Industry representatives call on the EU to set a mandatory migration deadline from national schemes to SEPA. EPC launches SDD scheme.

- 2010 – EC and ECB establish SEPA Council, composed of

major stakeholders, to foster consensus and achieve full integration. EC publishes first proposed deadline for migration.

- 2012 – EC adopts Regulation mandating the full migration to SEPA by February 1, 2014 in the Euro area.

- 2013 – ECB announces the creation of the Euro Retail Payments Board (ERPB), which replaces the SEPA Council. The ERPB is broader in scope and more inclusive in membership. (See below.)

- 2014 – EC extends SEPA migration deadlines by six months. By mid-year, the vast majority of payments are migrated. Attention turn to other initiatives, including safety of payments, and eCommerce payments, and instant payments.

- 2015 – ERPB calls for the creation of an instant payments scheme. The revised PSD (PSD2) is adopted, broadening access by non-banks and requiring financial institutions to implement APIs to facilitate access to account information and transaction initiation.

- 2016 – EPC publishes SCT instant payments scheme

- 2017 – SCT^{inst} scheme goes live.

- 2018 – PSD2 goes into effect

Modernisation process in the Euro Area

Roles of banks, corporates, and payment processors

Banks and corporates	CSMs and payment processors
• Banks played little role in setting the political goals for SEPA. The goals were set largely by the European Commission. In the early 2000s, the ECB was still in its formative stages, but has come to play a leading role in setting policy in the 2010s. • Bankers often cited rough data that only 2% of transactions were cross-border, and that SEPA required them to change 98% of transactions to accommodate the 2%. • Banks were coerced into establishing the EPC, creating the SEPA schemes, and migrating to SEPA. They did not see a business case. The functionality of domestic payment systems within the Euro area varied widely and for some countries, SEPA was a step backward. The banking communities in these countries resisted SEPA, and constantly argued for exceptions, grandfather clauses, etc. • Similar developments and attitudes can now be seen in many countries with regard to SCTinst, although some countries are embracing these. • Corporate customers also saw little business in migrating to SEPA, and the vast majority of actual migration happened within the 6 months before the legal deadline.	• Most of the 20+ national clearing houses considered the political goals of SEPA as challenges to their historic positions. EBA Clearing was commonly seen by them as a threat to their market share. • Several CSMs saw SEPA as an opportunity for expansion into a larger market. A few succeeded (EBA Clearing, Equens, STET). Others failed (VocaLink). Others stuck to their national patches. • CSMs were not included in the EPC. The schemes were developed in large part without their involvement. Most CSMs were mutually-owned utilities, and were told by their bank owners what to do. • Most SEPA CSMs now clear national transactions and send cross-border transactions to EBA Clearing. EBA Clearing effectively acts as a national CSM for Ireland, Finland, substantial portions of Germany and Italy, and Luxembourg. The national CSMs also developed an alternative method for clearing cross-border payments among themselves (now known as the European Clearing Cooperative) to avoid EBA Clearing, but usage of this channel to date has been low. • The clearing landscape has evolved substantially in Europe since the introduction of SEPA. M&A activity has increased, outsourcing has become more commonplace, and there is rudimentary competition for banks' volumes.

› Euro Area

Key modernisation elements

Market integration

The SEPA payment schemes replaced national payment schemes. They also replaced legacy data standards with ISO 20022 which was chosen for its modernity and political neutrality.

During the course of modernisation, pan-European and multinational infrastructures for low-value payments arose, whether new infrastructures, such as EBA Clearing's STEP2, or the result of mergers and acquisitions, such as Equens, or contract awards, such as STET.

Today all Euro area financial institutions are reachable using a single set of schemes and via multiple clearing paths.

Increasing competition and broader stakeholder consultation

Through a succession of regulations and directives, the EC has doggedly pursued the goal of opening up the payment system to non-banks. In the 2000s, the EC began to isolate payment services from banking services by creating separate regulatory regimes for e-money issuers and payment institutions, and it also forced greater transparency for pricing and timing of payment services.

In the last decade, the EC has sharpened transparency requirements in the PSD2 and created an obligation for banks to facilitate access to their customer's accounts via APIs.

The composition of the European Retail Payments Board, ERPB, is much broader than its predecessor, the SEPA Council. It includes organisations representing consumers, corporates, retailers, internet retailers, public administrations, financial institutions, non-bank payment services providers, central banks, and the EC as an observer.

Increasing convenience and speed

A number of countries within the EU have developed national schemes for facilitating online payments via SCT, (e.g, iDeal in the Netherlands or Giropay in Germany). The consumer is directed from the internet retailer's website to their own bank, where they initiate a payment. The banks then send confirmation of payment to the retailer, who ships the goods.

The speed of payments has also increased substantially. Prior to SEPA, many countries only had one clearing cycle per day for low-value payments. All SEPA countries now have multiple cycles available to them. Speed will increase further with the launch of instant payments, which are due to be introduced in the Euro area in 2017.

What did not work

The political nature of SEPA meant that there was no business case for most stakeholders, and the EU was unable to articulate a compelling reason for banks and corporates to migrate. Consequently, SEPA was seen as a compliance issue and required regulation and legislation to force its completion. The instant payment scheme threatens to follow a similar pattern.

Despite the PSD and PSD2, there are few Payment Institutions in most countries. Opening up the market has not unleashed unbridled innovation and competition.

The SEPA schemes limited remittance data to 140 characters for reasons of backward compatibility, despite ISO 20022's ability to carry virtually unlimited data. This has reduced ISO 20022's value to many key corporate users.

Euro Area payment system scorecard

Richest functionality available in market

Lean ← Functionality → Rich

Functions

Functions	Lean				
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Denotes current functional level

Denotes planned implementation of functionality

› Euro Area

Payment system details

SEPA SCT/SDD	SEPA SCTinst

SEPA SCT/SDD

- SEPA rules stipulate:
  - Posting must take place no later than D+1;
  - All payments must settle at TARGET2, although scheme rules do not stipulate how frequently settlement must occur.
  - All payments messaging must use the ISO 20022 data standard.
  - Return period for SCTs is 3 days (13 months for fraud). For technical reasons, SDD's must be returned within 5 days for consumers (2 for corporates). No-questions asked refunds must be returned within 8 weeks, and unauthorised can be returned up to 13 months.
- SCT and SDD rules do not mandate the use of a particular infrastructure to process SEPA payments. Legacy national infrastructures (e.g. Equens, STET, Iberpay, etc.) process instruments along with EBA Clearing's STEP2, which is currently the only pan-European ACH.
- As of August 2016, there are 22 total CSMs (clearing and settlement mechanisms) that are compliant with SEPA rules.

SEPA SCTinst

- The SCT[inst] scheme will cover Euro-denominated instant payments in SEPA countries. Scheme rules do not stipulate which payment instrument is used, which ACH is used to clear the payment, and how frequent settlement must occur.
- The scheme will cover initiation and messaging layers, but does not specify clearing and settlement arrangements, which are left to scheme participants to decide.
- SEPA instant scheme rules stipulate:
  - 24/7/365 availability
  - Use of ISO 20022 for messaging
  - Immediate or close-to-immediate interbank clearing.
  - Funds availability to the beneficiary within seconds of initiation (including both positive and negative confirmation messages in the interbank space and mandatory negative confirmation messages between the PSP and the sender).
- The EPC has suggested setting a maximum value per transaction at the scheme level, but will allow individual PSPs to agree to higher limits on a bi- or

2TARGET2

TARGET2 is an RTGS system owned and operated by the Eurosystem, which is composed of Euro Area national central banks and the ECB. TARGET2 processes high-value Euro-denominated payments and is the settlement system for all Euro Area retail payment systems. TARGET2 migrated the decentralised TARGET system, a predecessor to TARGET2, onto a single technical platform, which offers harmonised pricing and service levels and extended operating hours as well as new functionality, such as intraday liquidity pooling.

TARGET2 is open from 7:00–18:00 CET, with a cut-off time of 17:00 CET for customer payments. TARGET2 also features a night-time settlement window that is available from 19:30–7:00 CET. This night-time window facilitates the settlement of different ancillary systems. TARGET2 features six different settlement procedures that can be used by ancillary systems for settlement. Two of the procedures are for real-time settlement, with the other four facilitating batch settlement.

India

> India

Payment modernisation profile

India's modernisation process has picked up considerable speed over the last 2 years and has been focused around one major player, the Reserve Bank of India. RBI, in addition to laying out a Vision 2018 document for the future of India's payment systems, also convened the Board for Regulation and Supervision of Payment and Settlement Systems (BPSS), which has acted as the main body for regulating and supervising payment systems in India. RBI is aided by the National Payments Corporation of India (NPCI) which operates various systems, including the National Financial Switch, and oversees the consolidation and integration of various retail payment systems.

There have been multiple modernisation efforts undertaken, all of which share common goals, namely financial inclusion, driving out cash, and enhancement of electronic systems. Key efforts include:

- Formal demonetisation and the removal of INR notes
- Development of the IMPS real-time system
- ISO 20022 adoption in the RTGS system
- Introduction of the Aadhaar Enabled Payment System (AEPS)
- Introduction of the Bharat Bill Payment System (BBPS)
- Development of the Watal Committee on Digital Payments as part of Ministry of Finance

DESCRIPTION

India is notable for having multiple retail payment systems and for the influential role the Reserve Bank of India (RBI) plays in the development and regulation of payment systems in India. The RBI operates the RTGS system and the NEFT system for low-value electronic funds transfers. RBI also plays a collaborative role along with the Indian Banks' Association (IBA) in the establishment of the National Payments Corporation of India (NPCI). NPCI operates various retail payment systems and the country's card and ATM switch with oversight from RBI. Among the systems NPCI operates are the National Automated Clearing House (NACH) for low-value bulk credit and debit transactions, as well as the Immediate Payment Service (IMPS) for real-time payments.

India's size, poverty, and large rural population has been a focus of much payment system policy. The RBI has recognised the need for financial services to reach Indians without easy access to a bank branch and financial inclusion is a major goal of the RBI in particular. India has been a largely cash-based society (and almost 2/3 of non-cash payments are paper-based instruments) but the RBI has pushed for an increase in electronic payments and is aggressively removing cash. One of the key goals behind the development of the low-value real-time system, IMPS, is to provide India's rural communities access to 24/7 payment service, with the hope of easing the barrier between formal banking and India's unbanked population.

› India

Payment system and economic data

<table>
<tr><td rowspan="9">Payments data</td></tr>
<tr><td>System operator</td><td>LV Bulk: Reserve Bank of India
RT: National Payments Corporation of India</td></tr>
<tr><td>System rule-maker</td><td>LV bulk: Reserve Bank of India
RT: Reserve Bank of India</td></tr>
<tr><td>Credit transfers (2015, millions)</td><td>1219.34</td></tr>
<tr><td>Direct debits (2015, millions)</td><td>249.21</td></tr>
<tr><td>ATM (2015, millions)</td><td>7742.13</td></tr>
<tr><td>High value (2015, millions)</td><td>97.27</td></tr>
<tr><td>Cards (2015, millions)</td><td>9545.80</td></tr>
<tr><td>Real-time payments (2015, millions)</td><td>162.74</td></tr>
</table>

<table>
<tr><td rowspan="6">Economic data</td></tr>
<tr><td>Population (2015, millions)</td><td>1311.05</td></tr>
<tr><td>GDP (2014, USD billions)</td><td>1598.32</td></tr>
<tr><td>Bank concentration ratio (CR$_5$)</td><td>39.5</td></tr>
<tr><td>Gini coefficient (World Bank, 2014)</td><td>35.1</td></tr>
<tr><td>Bank account penetration</td><td>35.20%</td></tr>
<tr><td>Corruption perception ranking (Transparency International)</td><td>79</td></tr>
</table>

Non-cash payment transaction volume in India, 2011-2015
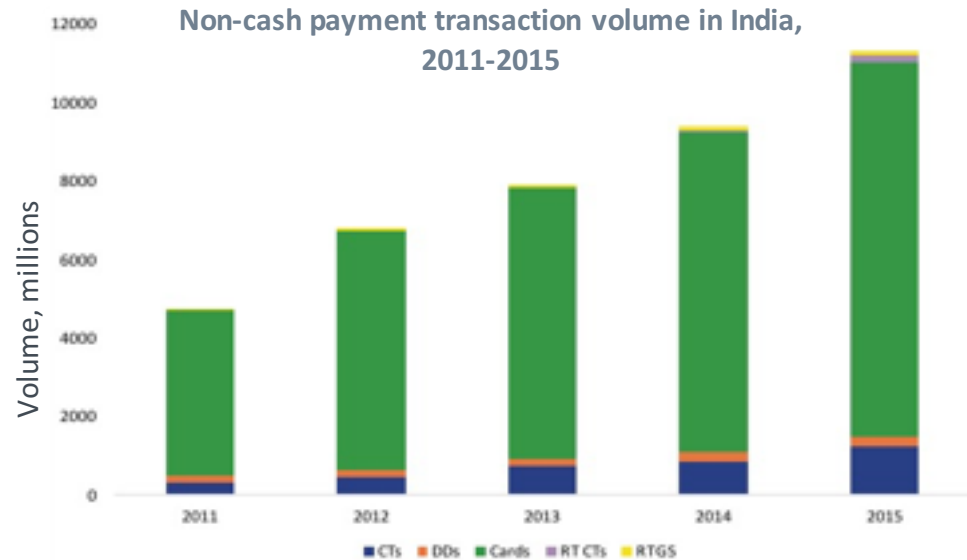
The overwhelming majority of electronic payments in India are card based. Card payments have been growing steadily since 2011, but the most dramatic growth can be seen in batch credit transfers which have more than tripled in volume from 2011 till 2015. This increase is largely due to government mandated demonitisation efforts.

› India

Goals of modernisation

The RBI's 2016 "Payment and Settlement Systems in India: Vision 2018" outlines the Reserve Bank's goals to help increase the use of electronic payments. The document takes a view of payment systems that revolves around the "five Cs":

- Coverage
- Convenience
- Confidence
- Convergence
- Cost

In addition to the goal of increasing electronic payments while decreasing cash and paper-based instruments, the RBI expects Vision 2018 to contribute to an increase in mobile and Aadhaar-initiated payments, which are payments made using a nationally developed proxy identifier, known as an Aadhaar number. The RBI also plans for significant growth in infrastructure to accept electronic payments.

The RBI claims to take a customer-centric approach to modernisation initiatives, prioritising end user needs. However, there has been resistance related to extreme demonetisation measures taken to remove cash and promote electronic payments.

Process of modernisation

The Reserve Bank of India (RBI) is the most important single player in the development of Indian payment systems.

- RBI often sets industry-wide principles (e.g. via Payment System Vision documents), but does not proscribe how these goals will be implemented. Instead, RBI allows banks to determine the best way to implement the industry vision.
- RBI tends to talk directly with commercial banks. It does not rely on other intermediaries such as NPCI.

The operation of various electronic payment systems in India has been consolidated under the National Payments Corporation of India (NPCI) in recent years.

- NPCI operates low-value bulk and real-time systems, as well as a domestic debit card scheme, national card switch, and various other services such as the Aadhaar Enabled Payment System.

Commercial and state-run banks implement the RBI's vision.

- The Indian Banks' Association (IBA) is an industry body that represents and advocates for banks. Recent issues have included the GST (goods and services tax) and demonitisation policies.

Non-bank PSPs and fintechs do not play a significant role in industry-wide modernisation efforts. This may change in the coming years, evidenced in part by the Watal Committee on digial payments (part of Ministry of Finance) recommending more open access to non-banks in payment systems and perhaps also a stake in NPCI.

India's central bank 2018 vision document

Four strategic initiatives detailed

Responsive regulatory framework

- New regulatory frameworks aim to support greater access to payment systems by applying a principle of "similar business, similar risk, similar rules" to payment system regulations, in contrast to a "one size fits all" approach.
- Establishment of Payment System Advisory Council (PSAC) with inclusive membership to provide insights about future developments and innovations to assist BPSS in forming new policies

Customer centricity

- Strengthening of demand for electronic payments by improving customer grievance redressal mechanisms, enhanced customer education, and addition of positive confirmation messages in RTGS

Robust infrastructure

- Continued improvement of payments infrastructure is key to supporting use of electronic payments.
- Review of NEFT to determine possible addition of new settlement cycles, feasibility of migration to ISO 20022
- Improved access to systems via acceptance infrastructure and implementation of Bharat Bill Payment System
- Enhanced safety and security through migration to EMV Chip and PIN for all new cards

Effective supervision

- Implementation of new oversight frameworks to ensure continued resilience of payment systems and strengthening of PSO reporting frameworks

› India

Key modernisation elements

Adoption of ISO 20022 in RTGS

In 2012, the RBI constituted an ISO 20022 working group made up of members from five banks, two payment system operators, and four RBI departments. This working group was tasked with identifying business requirements and technical feasibility of adoption. Main motivators of ISO 20022 adoption included:

- Efficiencies from use of standard in multiple business areas (including corporate-to-bank communication)
- Enablement of end-to-end automation of regulatory reporting and customer communication
- Reduced costs to banks, particularly from proactive adoption of standard
- Alignment with internationally recognised data standard.

RBI decided on a phased migration to ISO 20022 for RTGS infrastructure using transition services at the messaging level.

- A five-month pilot testing period was initiated with banks to foster readiness for full migration to and use of ISO 20022.

Further moves to ISO 20022 have been stipulated for the business-based credit transfer system, NEFT, but no final timetable has been decided.

Real-time payments aims to boost access to electronic payments

The Immediate Payment Service (IMPS) is a real-time system operated by NPCI, which leverages the National Financial Switch (NFS) for messaging.

- Introduction of IMPS was aimed at providing 24/7 access to electronic payments for India's rural population.
- System volumes have increased dramatically, from about 5.5 million annual transactions in 2013 to over 160 million in 2015.

In August 2016, NPCI introduced the Unified Payment Interface (UPI), which enables end users to send or receive money using smartphones via IMPS using a proxy such as an Aadhaar number or mobile phone number

- UPI also enables 24/7 RT merchant pull payments

Demonetisation scheme

The government's decision to demonetise all INR 500 and 1000 notes in November 2016 had a significant negative impact on the economy. The decision was aimed at reducing cash usage, particularly for illicit activities and tax evasion. However, the sudden nature of the announcement led to chaos: runs on bank ATMs, and violence. Nationwide strikes were also held to protest the move.

While electronic payment volumes have grown following demonetisation, many have criticised the abrupt nature of the move and have pointed to a negative impact on GDP as a direct result of the plan.

› India

Key modernisation elements

Aadhaar Enabled Payment System

The introduction of the Aadhaar Enabled Payment System (AEPS) was aimed at increasing financial inclusion, particularly among India's rural population. AEPS is operated by NPCI.

- AEPS uses the government-issued 12-digit Aadhaar number as a proxy to enable electronic remittances, including SMS-based mobile phone remittances.
- Aadhaar ID is a 12-digit identifier that uses biometric data (photograph, fingerprints, iris scans) along with demographic information to create a unique ID for all Indians. Aadhaar is managed by the Unique Identification Authority of India (UIDAI).
- Aadhaar is the world's largest biometric ID system with over 1.1 billion enrolled as of June 2017 (over 99% of Indians 18 or older).

In April 2017, the Indian government's Aadhaar Pay app went live.

- Aadhaar Pay enables merchants to send a pull payment notification to a customer using the Aadhaar Pay smartphone app.
- Customers do not need a mobile device to use Aadhaar Pay. The merchant's app contacts the customer's bank and uses fingerprint authentication to send the payment.
- NPCI has helped onboard banks to AEPS to enable Aadhaar Pay.
- Merchants pay a fixed rate of 0.25% of the transaction amount.

Concerns about the use of Aadhaar for payments remains. The Watal Committee's December 2016 report on digital payments estimates failure rates of up to 60% for Aadhaar payments.

Bharat Bill Payment System (BBPS)

BBPS is a national system aimed at increasing access to bill payment services for all Indians.

- BBPS provides security and reachability for bill payments by acting as a switch between various closed-loop bill payment services.
- Estimated 70% of bill payments made in cash or cheque due to the lack of a ubiquitous system.
- BBPS operates under a single brand operated by NPCI.
- Payments can be made via cash, cheque, or electronic transfer.

Watal Committee on digital payments

Committee on Digital Payments as part of Ministry of Finance

Review of Indian payment systems resulted in 13 recommendations

- Need for independent payments regulator separate from RBI (either new regulator or more independence for BPSS)
- Need for new eKYC procedures to enhance Aadhaar-based payments
- Give non-bank PSPs direct access to payment systems
- Upgrade RTGS and NEFT to operate 24/7/365
- Diversify ownership of NPCI to include more banks and non-banks
- Enable interoperability between bank and non-bank payment schemes

India payment system scorecard

Richest functionality available in market

	Lean ← Functionality → Rich			
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Functions

■ Denotes current functional level

◯ Denotes planned implementation of functionality

98

› India

Payment system details

National Electronic Funds Transfer (NEFT)	National Automated Clearing House (NACH)
• NEFT is available for business use & only processes credit transfers. • NEFT payments must be initiated at a bank branch. Currently 181 banks participate. • NEFT transactions are settled in multilateral net batches every hour (12x from 08:00-19:00 M-F, 6x from 08:00-13:00 on Saturdays), with posting mandated within 2 hours of settlement. • NEFT payments are free to receive, and pricing to the sending party is regulated by the RBI between 3.7 and 37 US cents. • NEFT has no value added services. • NEFT uses a SWIFT based data standard.	• NACH is a low-value bulk system for electronic credits and debits operated by NPCI. • Both NACH credits and debits settle once daily in the RBI RTGS system. Posting for NACH transactions is also same-day. • The NACH system uses ISO 20022 for payments messaging. • NPCI maintains a direct debit mandate management system for NACH, as well as the Centralised Mandate Validation Service. The CMVS helps avoid erroneous or fraudulent direct debits from being sent or received by NACH participants.

Immediate Payments Service (IMPS)

- IMPS offers real-time credit transfers via bank branch, ATM, online, or by mobile phone.
- Users can send or receive IMPS payments using various identification numbers such as a Mobile Money Identifier (MMID), IFS (an 11-digit number found in a user's cheque book), or an Aadhaar number (a 12-digit government-issued ID aimed at rural populations and the unbanked). IMPS also enables C2B merchant payments via both push and pull messages at the point of sale.
- IMPS is open to all registered banks in India. Approved non-banks can become indirect participants.

Mexico

› Mexico

Payment modernisation profile

Mexico's modernisation has been largely focused on the rural unbanked population. The Banco de México is the key initiator of development projects to promote economic growth and financial inclusion. Projects have covered a wide area of the financial sector. Notable initiatives include:

- The launch of SPEI, a real-time credit transfer system aimed at promoting mobile P2P payments.
- The 2014 Financial Reform, which amended existing laws and introduced new legislation with the aim of promoting economic growth through financial services.
- The 2016 National Financial Inclusion Strategy, (NFIS), which aims to increase access to financial services to Mexico's unbanked population and improved existing services.
- Directo a México, a collaboration between the US Federal Reserve and Banco de México, which allows FedACH to process remittance payments to Mexico.

In contrast to the efforts that have characterised the central bank and development banks in Mexico, the commercial banking community has remained largely static. There is a privately held, bank owned ACH operator, Cecoban, which processes direct debits and batch credit transfers for corporates in the CCEN system.

DESCRIPTION

The Banco de México, Mexico's central bank, owns and operates the SPEI system for high-value and low-value real-time credit transfers. Unlike in many other payment systems, SPEI is both an RTGS system and a low-value real-time system, which uses a multilateral netting algorithm to differentiate between high and low value payments. The Banco de México, has been active in promoting innovation in electronic payments in recent years and SPEI was designed specifically to promote low-value mobile payments in order to promote financial inclusion and lower cash usage. Mexico's SPEI system has undergone several evolutions over the past few years, including a move towards 24/7 operability and a plan to make all SPEI payments under MXN 8,000 (approximately USD 500) available on a 24/7 basis.

Mexico also has a bulk low-value system for credit transfers and direct debits called CCEN, which is privately owned by Cecoban. While SPEI only processes credit transfers, CCEN processes both credit transfers and direct debits on a deferred net basis. This system is primarily used by corporate customers. CCEN volumes have fallen consistently in recent years, with most transactions moving to SPEI.

Mexico's neighboring position to the United States along with the size of the diaspora in the United States, has prompted a number of collaborations between Mexican and American payments entities. For example, the US Federal Reserve in partnership with the Banco de México offer a service called Directo a México, which allows FedACH to process remittance payments to Mexico.

Mexico

Payment system and economic data

Payments data		
System operator	LV Bulk: CECOBAN RT: Banco de México	
System rule-maker	LV bulk: CECOBAN RT: Banco de México	
Credit transfers (2015, millions)	62.10	
Direct debits (2015, millions)	21.01	
ATM (2015, millions)	1588.85	
High value (2015, millions)	262.90	
Cards (2015, millions)	1933.57	
Real-time payments (2015, millions)	108.87	

Economic data		
Population (2015, millions)	127.02	
GDP (2014, USD billions)	1068.52	
Bank concentration ratio (CR_5)	71.7	
Gini coefficient (World Bank, 2014)	48.2	
Bank account penetration	44%	
Corruption perception ranking (Transparency International)	123	

Non-cash payment transaction volume in Mexico, 2010-2014
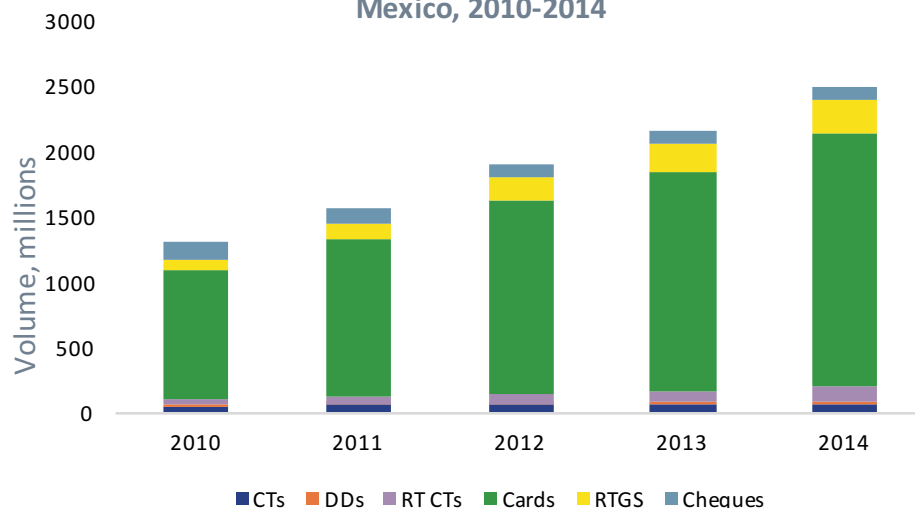
The overwhelming majority of electronic payments in Mexico are card based. Card payments have been growing steadily since 2010, but the most dramatic growth can be seen in RTGS payments and real-time credit transfers, which show a much higher growth rate than batch credit transfers over the same period. Cheques represent the only payment type that is declining in volume.

Mexico

Recent modernisation efforts

Goals of modernisation

Modernisation efforts in Mexican payment systems are largely aimed at improving services for end users, promoting economic development, and increasing innovation.

The evolution of SPEI, Mexico's low-value real-time credit transfer system, has been a key means to modernising Mexican payment services. SPEI was specifically aimed at providing a mobile-based credit transfer option to the underbanked population. Unlike other real-time systems, which aim to capture different use cases and higher values, SPEI was consciously developed to serve a limited set of needs and has a value-limit threshold of roughly 8,000 MXN (500 USD).

- The Banco de México (BoM) has continuously lowered pricing in SPEI and has mandated 24/7 availability for mobile payments and payments under MXN 8,000.

SPEI is slowly and steadily gaining traction in promoting electronic payments amongst the underbanked and rural populations. However, there has been a lack of focus on other banking customers. For example, corporate treasurers, who were unhappy with the payment services offered in SPEI's predecessor, SPEUA, and resisted the move to SPEI but BoM mandated the change. Some corporates have found improvements in SPEI but the pricing for higher value payments and payments at specific points in the day is a point of contention.

Process of modernisation

- The Bank of Mexico (BoM) is the biggest promotor of modernisation efforts in Mexican payment systems.
- The BoM owns and operates SPEI, and has been active in improving the system through both functional and regulatory changes.
- Unlike many real-time system development projects, which require costly improvements to commercial banks and back-office processing, SPEI's development did not require much investment.
  - This is largely due to the fact that it is run over the same platform as the high-value system, which had already been implemented.
  - Banks did need to enable straight through processing internally, but further upgrades have been unnecessary to date.
- The BoM has relied on the Mexican Banks Association (ABM), an industry trade body that represents commercial bank interests.
- The ABM is called upon to bring together responses to industry consultations.
- On a high level, the Ministry of Finance has played a role in overseeing the financial welfare of Mexico.
- Their efforts are largely focused on promoting economic development and they have convened the National Financial Inclusion Strategy, with assistance from the World Bank.

> Mexico

Key modernisation elements

Innovative hybrid system for high- and low-value payments

SPEI is a hybrid system used for both high- and low-value payments. High-value payments settle in RTGS mode, while low-value payments settle using a hybrid bi- and multilateral settlement algorithm

- SPEI was initially only open during extended businesses hours, but BoM has since mandated 24/7 availability for some transactions.
- All mobile payments and transactions under MYXN 8,000 are 24/7.
  - SPEI has no value limit for mobile payments, but banks can set transaction value limits on their own customers
- BoM also pushed banks to post payments faster to ensure uniform service levels for all end users

BoM has been active in lowering pricing in SPEI.

- SPEI fees were initially computed on a cost recovery basis. As volumes have grown, BoM has adjusted transaction pricing on multiple occasions.
- SPEI remitting banks pay MXN 3.9 cents per transaction (ZAR 2.8 cents), while receiving banks pay nothing. System regulations prohibit charging end users to receive a SPEI payment.

Banks were initially reluctant to invest in SPEI, but industry concerns about payment services led BoM to develop SPEI and push banks to join. Banks now see SPEI as enabling improved services to their customers, as evidenced by strong volume growth.

The low-value mode in SPEI is aimed at promoting electronic P2P payments.

- C2B use cases for SPEI still unclear, but BoM sees potential.

Hybrid netting algorithm for real-time settlement

Low-value SPEI payments are settled using a combination of bilateral gross and multilateral net settlement. Mobile payments settle in RTGS mode within 5 seconds while other online payments settle by netting multilateral obligations in 30 second cycles.

- Using a hybrid of bi- and multilateral settlement controls risk in system while optimising liquidity management for participants.
- The MXN 8,000 value limit for 24/7 payment operations helped assuage some banks' concerns about RT liquidity management.

No plans for ISO 20022 migration

There are no current plans to migrate any existing payment systems to ISO 20022.

- Industry also has no new systems in development, and there are no indications that ISO 20022 would be used in a new payments infrastructure.

Mobile payments

The desire for interoperable mobile payments between banks was a key driver of the addition of low-value payments in SPEI.

- Despite low bank account penetration (44%), mobile phone penetration is almost 90%, almost 2/3 being smartphones.
- SPEI has been modernised to enable interoperability between mobile payment schemes in Mexico.
  - Banks must provide 24/7 access to mobile payments via SPEI.

› Mexico

Key modernisation elements

2014 comprehensive financial reform

The 2014 Financial Reform amended existing laws and introduced new legislation with the aim of promoting economic growth through financial services

The reform focused on four areas:

- Encouraging competition in financial services
- Strengthening legal framework to mandate and improve capacity for development banks to expand access to credit
- Giving authorities more systematic evaluation of commercial bank credit to channel it more efficiently
- Ensuring stability and soundness of financial system, e.g. by incorporating Basel III capital reserve requirements into law

Significant results of the reform include:

- Tiered KYC arrangements with flexible requirements for lower risk accounts in an effort to remove regulatory barriers to account access while continuing to ensure financial stability
- Move from cash to debit cards for 6.5 million beneficiaries of Prospera cash transfer program
- Allowing commercial banks to hold non-bank assets on their balance sheets

Development banks are seen as key in enabling access to financial services for the unbanked. The Financial Reform strengthens their ability to provide access to credit to individuals and municipalities, particularly in rural areas.

National Financial Inclusion Strategy (NFIS)

The NFIS, which is overseen by the Ministry of Finance, was launched by the President of Mexico in June 2016 after a three-year delay.

- NFIS based on results of 2013 Mexican Financial Capability Survey conducted by World Bank
- NFIS aims to increase access to financial services to Mexico's unbanked population and improved existing services

NFIS features a six-pillared plan

- Financial education
- Technological innovation to promote digital and mobile payments
- Expansion of financial infrastructure to underserved areas
- Increased access to financial services for the un- and underbanked
- Consumer protection
- Analysis of data to measure progress on financial inclusion.

Key elements of NFIS

- Opening up legal and regulatory environment to include 35 million people using payments and savings mechanisms outside of formal sector
- Digitising government to person (G2P) payments (grants or salaries) to reach 6 million people currently receiving these payments in cash
- Partnerships with entities such as retail chains to extend financial services to underserved areas via agent banking

Mexico payment system scorecard

Richest functionality available in market

Functions		Lean ← Functionality → Rich		
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

■ Denotes current functional level   ◯ Denotes planned implementation of functionality

› Mexico

Payment system details

SPEI	CCEN
• Mexico's SPEI system processes both high-value and low-value real-time payments. • SPEI is a hybrid system, which settles transactions using a combination of bilateral gross and multilateral net settlement methods. • The system is open for submission of high-value payments between 19:00 (D-1) and 17:35 (D), and settles payments on a bilateral gross basis. • High-value payments settle in gross on a continuous real time basis. High-value transactions are posted in under a minute, typically within 30 seconds. • SPEI is open to direct bank participants only. • The system uses a proprietary data standard. • Low-value payments are restricted to real-time credit transfers and cannot exceed a value limit of MXN 8,000 (about USD 500) • Low-value transactions can be initiated via mobile, internet banking or through a physical bank. • Banks are responsible for creating and maintaining their own databases regarding mobile phone numbers for mobile payments. • There are currently no plans to expand SPEI's product.	• CCEN, operated by Cecoban, processes low-value bulk payments. • CCEN processes checks as well as credit transfers and direct debits on a multilateral net basis. • Only direct participants can access the CCEN system. • Input to CCEN takes place between 17:30 and 20:30. Processing begins at 20:30. • Settlement occurs once daily via SPEI (the RTGS system) on D+1. • Transactions post shortly after settlement. • CCEN uses a proprietary data standard.

Nigeria

Payment modernisation profile

Significant modernisation of payment systems in last 5 years:
- Development of NIP real-time payment system
- Introduction of Bank Verification Number
- Disbursal of social payments via NIBSS platforms
- Separate clearing window to enable interoperability between closed loop offerings from mobile money operators

Upcoming modernisation efforts include:
- Establishment of proxy database using BVNs to enable interoperability in mobile payments
- Expansion of access to payment systems for non-bank PSPs

Financial inclusion is a major public policy priority that has had a significant indirect impact on payment systems.

NIBSS drives changes in payment systems.
- The Central Bank of Nigeria sets principles for payment system development, but prefers market-based solutions.
- NIBSS' main goals in payment systems is to improve transaction efficiency and reduce costs for banks.

Nigeria is one of the few countries in the world that sees higher volumes for real-time payments than for low-value bulk payments.

Operation of retail payment systems is centralised at NIBSS (Nigeria Inter-Bank Settlement System Plc). NIBSS is an industry utility, with 95% ownership by Nigerian commercial banks and 5% by the Central Bank of Nigeria. NIBSS operates two main services: the Nigerian Central Switch (NCS) and the Nigeria Automated Clearing System (NACS). NCS is a debit/ATM card switch and is also used for NIBSS Instant Payment (NIP), a low-value real-time system. NACS is used for the clearing of bulk electronic and paper-based payments, including the NIBSS Electronic Fund Transfer (NEFT) system for low-value credits and debits. NIBSS services are offered by all banks in Nigeria.

Nigerian payment systems have undergone significant changes over the past 5 years. Many of these changes have been aimed at fulfilling public policy goals such as economic development and financial inclusion. The implementation of these changes has been driven by NIBSS, which coordinates with commercial banks to help meet principles or desired outcomes published by the CBN. The CBN tends to prefer market-based solutions via NIBSS as opposed to mandating change to banks. Recent modernisation efforts include the implementation of the NIP real-time system, the establishment of the Bank Verification Number (BVN), and the development of a separate clearing window by NIBSS to enable interoperability between closed-loop mobile wallet schemes offered by non-banks. NIBSS has also been involved in an electronic social payment scheme designed to reduce the use of cash among Nigeria's rural population, with the hopes of developing trust in payment systems and boosting financial inclusion.

Nigeria

Payment system and economic data

Payments data	
System operator	LV Bulk: NIBSS RT: NIBSS
System rule-maker	LV bulk: NIBSS RT: NIBSS
Credit transfers (2015, millions)	28.95
Direct debits (2015, millions)	0.25
ATM (2015, millions)	433.59
High value (2015, millions)	nav
Cards (2015, millions)	33.72
Real-time payments (2015, millions)	70.65

Economic data	
Population (2015, millions)	182.20
GDP (2014, USD billions)	194.88
Bank concentration ratio (CR$_5$)	60.5
Gini coefficient (World Bank, 2009)	43.0
Bank account penetration	29.70%
Corruption perception ranking (Transparency International)	136

Non-cash payment transaction volume in Nigeria, 2010-2015

Y-axis: Volume, millions (0 to 160)

Legend: ■ CTs ■ DDs ■ RT CTs ■ Cards ■ Cheques ■ RTGS

Note: 2014-2015 RTGS volumes unavailable.
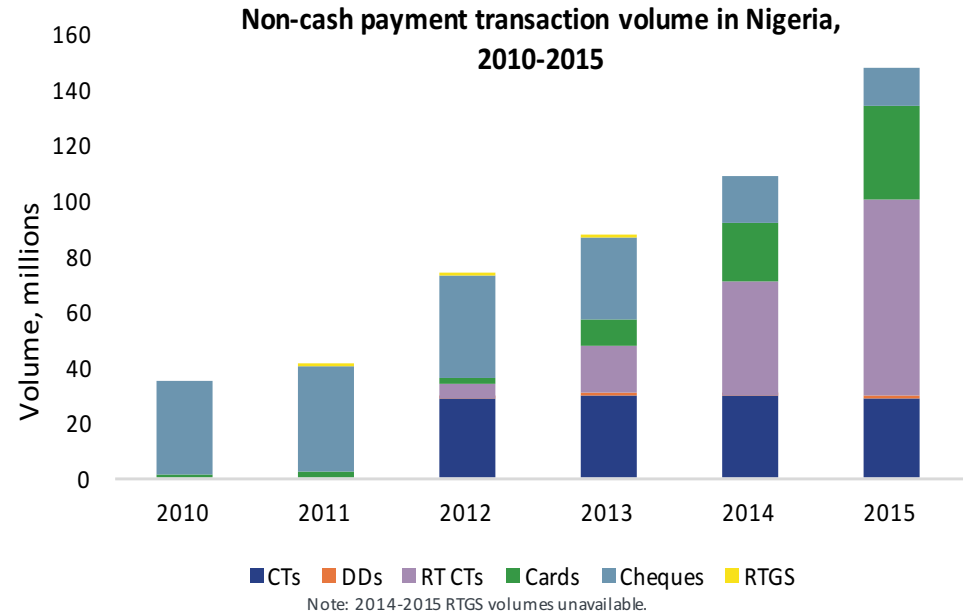
Electronic payment volumes have increased significantly since 2012 while cheque payments have declined steadily. The biggest increase in electronic payments have come from the real-time NIP system. Since its introduction in 2012, system volumes have grown by a factor of 15, and has seen triple-digit growth each year. Low-value bulk and card payments have also seen impressive growth since 2012, due in part to limits on cash withdrawals mandated by CBN. Direct debit volumes are miniscule, with only 250,000 total in 2015.

› Nigeria

Recent modernisation efforts

Goals of modernisation

Modernisation of payment systems often a result of larger public policy goals of economic development and financial inclusion

- Introduction of NIP, BVN, mobile payment schemes all aimed at formalising economy and financial inclusion

Market has embraced many of the innovations that have come about as a result of wider modernisation efforts

- NIP the most widely used electronic payment system by volume
- RT volume more than doubled from 2015 to 2016
- Indirect participants and direct participant banks offer uniform service levels to end users. Indirect banks connect directly to NIP infrastructure via aggregators

NIBSS aims to bring 80% of informal economic activity into formal economy in coming years

- Encouraging non-traditional FIs by enabling access to infrastructure, with eventual goal of direct access to NIBSS infrastructure

ISO 20022 is not a priority in Nigerian payment systems.

- There are no current plans to migrate any payment systems to ISO 20022.
- With most modernisation efforts aimed at financial inclusion, added value from ISO 20022 (e.g. rich remittance data) not a pressing need.

Process of modernisation

CBN oversees payment systems and establishes modernisation principles

- Publishes principles or desired outcomes, but leaves development and implementation to NIBSS and banks
- Prefers market-based solutions, not regulatory mandates for payment systems

Government programmes aimed at economic development and financial inclusion often have indirect effects on payment systems.

- Nigerian government's Social Investment Programmes include conditional cash transfers (CCTs), all of which are disbursed using NIBSS infrastructure.
- NIBSS takes part in government committees to collaborate on social programmes.
- NIBSS has partnered with rural shops and agencies to develop electronic payment acceptance terminals and mobile payments functionality with the goal of developing trust in electronic and mobile payments, thereby reducing cash usage.

NIBSS provides central infrastructure

- Main purpose is to improve transaction efficiency and lower cost for banks, enabling them to compete on services
- NIBSS also provides a forum for banks to collaborate and develop market-based solutions.

› Nigeria

Key modernisation elements

Real-time payments now mainstream

Since introduction of system in 2012, RT now the most used electronic payment system in Nigeria.

- Volume potential is even higher due to lack of ubiquitous mobile payment scheme.
- NIBSS infrastructure provides economies of scale by reducing costs for banks, enabling competition on services.

Introduction of BVN could further boost RT adoption by enabling access to financial services and linking to proxies.

RT volume exceeded low-value bulk volume within 2 years

- Platform for innovation, further improvements in mobile payment interoperability are expected to further spur system uptake.

Bank Verification Number important to payments modernisation

A single ID number used to link to a customer's bank account(s)

Launched by CBN in partnership with Nigerian banks in 2014 with the goal of increasing security of financial transactions and fraud reduction.

- Enables real-time authorisation of transactions using biometrics
- All consumers and businesses must have a BVN to open a bank account.

NIBSS now developing a proxy database using BVNs

- Important step toward interoperability in mobile payments

Over 29 million BVN enrollments as of May 2017

Mobile payments lack interoperability

Intra-bank mobile payments dominate, challenge to open up intra-bank schemes due to perceived competitive advantage

Development of NIBSS-managed proxy database using BVNs could be a huge enabler of mobile payment usage

- Volume of electronic payments initiated via mobile three times higher than online

NIBSS provides inter-scheme switching for mobile money operators

- Uptake of scheme is low; only 6 of 22 registered MMOs active
- NIBSS investing in mobile payment functionality in rural communities via social payment program to increase trust in mobile payments.

Non-bank payment providers increasing impact

Seen as important stakeholder in push for financial inclusion

Non-bank PSPs have had difficulty building capacity in underbanked rural areas

- Many smaller institutions cannot afford high costs of developing services; need to "piggyback" off community or bank infrastructure

Telcos have agreed to reduce network fees for mobile payment services

- Cannot directly provide payment services as MMOs

NIBSS interested in expanding access to infrastructure to non-banks

- Hope to begin consultation on expanded access in late 2017

› Nigeria

Financial Inclusion: Technology is "the easy part" of modernisation

Financial inclusion initiatives, for the most part, have seen limited success in Nigeria. This is partly due to the high cost of providing financial services in rural areas. Rural provision is a key challenge for banks and efforts by non-banks are stalling. Other efforts have met similar issues. Mobile wallet providers, for example, due not focus services on rural areas. Even if reaching these populations were a non-issue, technology does not solve the problem. Technology is the "easy part" of driving modernisation, achieving industry consensus on collaborative efforts is the hard part. To that end, there is still work to be done in articulating how competitive advantage can be enhanced by industry efforts.

On the banking side of financial inclusion, there is still a consensus that not enough incentive is provided for banks to target rural communities. Some work is being done to enable smaller FIs to leverage open standards and infrastructure to provide targeted services. Key among these efforts is the Level One Project of the Bill and Melinda Gates Foundation.

Nationally developed social payment schemes are a potential solution to reduce cash use and enable financial inclusion, and the government is seen as essential driver of those goals, but the road to acceptance is arduous. The national ACH in Nigeria, NIBSS, for example, partnered with rural agencies to distribute NIBSS services but there is still a need to develop trust and gradual acceptance of these mobile-based services. Despite these challenges, financial inclusion remains a major priority for NIBSS going forward and there goal is to bring 80% of informal economic activity into formal economy by 2025.

Nigeria payment system scorecard

Richest functionality available in market

Lean ← **Functionality** → **Rich**

Functions				
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Denotes current functional level

Denotes planned implementation of functionality

› Nigeria

Payment system details

NIBSS Electronic Fund Transfer (NEFT)	NIBSS Instant Payment (NIP)

• Indirect participants can access NEFT directly via licensed aggregators.
• NEFT transactions are settled on a deferred net basis twice daily, with funds posted on D.
• Value-added services in NEFT include the Central Mandate Management System for DD mandates, a fundsweeping service for customers with multiple bank accounts, and the BVN service to enable multiple bank accounts to be linked to a single identifier.
• NEFT is open for bank submissions during normal business hours only (08:30-16:30 M-F).
• NIBSS performs fraud pattern checks and reports suspicious transactions to banks.
   • Only 1 Nigerian bank allows NIBSS to intervene in case of suspected fraud, all other banks intervene manually.
	• Indirect participants can access NIP directly via licensed aggregators.
	• All Nigerian banks participate in NIP.
	• NIP transactions are settled on a deferred net basis twice daily
	• Confirmation of NIP transactions to senders is not mandated in scheme rules; some banks offer immediate confirmation, most banks confirm within 30 minutes of initiation.
	• NIP runs on ISO 8583.
	• NIBSS does not offer additional value-added services with NIP (such as a proxy database).
	   • NIBSS currently developing a proxy database using BVN to enhance interoperability of mobile payments.

CBN Interbank Fund Transfer (CIFT)

CIFT is an RTGS system used for high-value payments and settlement of retail payment systems such as NEFT and NIP. It is owned and operated by the Central Bank of Nigeria.

• Messaging is based on SWIFT MT standards.
• CIFT features an intraday liquidity mechanism used to guarantee settlement in case any bank cannot immediately meet its settlement obligations at the designated time.
• The system is available during normal business hours from 08:00-17:00 M-F.

South Africa

> South Africa

Payment modernisation profile

- South Africa's payment systems are among the most sophisticated in all of Africa.

- The modernisation of payments in South Africa is underway with the first payment instrument– DebiCheck (authenticated early debit orders) – running on the ISO 20022 message standard from July 2017.

- The move towards ISO 20022 started in 2009 with the mapping of the existing 180-byte standard to the relevant ISO 20022 pacs message structures, however the focus on the implementation of DebiCheck largely derailed other modernisation efforts.

- A research project involving a broad range of stakeholders is underway to determine the goals for the modernisation of the Low Value Payments Infrastructure (LVPI).

DESCRIPTION

South Africa's payment systems are among the most sophisticated in all of Africa. The high-value system, SAMOS (South African Multiple Option Settlement), is owned and operated by the South African Reserve Bank (SARB). SARB acts as the main regulatory body for payment systems in the country. The low-value bulk system, EFT (Electronic Funds Transfer), is operated by BankservAfrica Ltd. BankservAfrica also runs the low-value real-time system, RTC (Real Time Clearing). Rules for the EFT and RTC systems are provided by the Payments Association of South Africa (PASA).

Payments in South Africa are currently undergoing a major transition. Initiatives aimed at modernising payment systems include a movement towards the ISO 20022 data standard as well as the implementation of a direct debit electronic mandate management system (DebiCheck).

The cross-regional Southern African Development Community (SADC) is also driving change in the region. SADC countries have developed a common infrastructure for high-value payments and are currently developing a system for intra-region low-value payments.
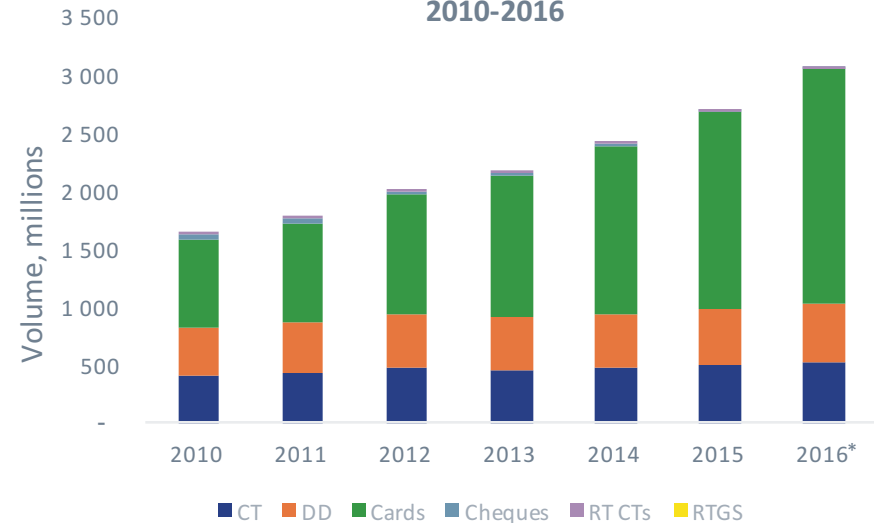
South Africa

Payment system and economic data

Payments data		
System operator		LV Bulk: BankservAfrica RT: BankservAfrica
System rule-maker		LV bulk: PASA RT: PASA
Credit transfers (2016, millions)		8,460
Direct debits (2016, millions)		887
ATM (2016, millions)		181
High value (2016, millions)		123,167
Cards (2016, millions)		783
Cheques (2016, millions)		139
Real-time payments (2016, millions)		255

Economic data		
Population (2015, millions)		55.4
GDP (2014, USD billions)		328.76
Bank concentration ratio (CR$_5$)		99.3
Gini coefficient (World Bank, 2011)		63.4
Bank account penetration		77%
Corruption perception ranking (Transparency International)		64

Non-cash payment transaction volume in South Africa, 2010-2016

Note: RTGS in 2016 is an estimate.

Card transaction volumes continue to increase, however as a percentage of total retail values, card remains constant at 7%. EFT credits make up the bulk of the retail values at 79%.

South Africa implemented one of the first RTC systems in the world in 2006, and while use is increasing, overall adoption has been low.

The use of cheques has been declining and currently makes up about 1% of non-cash transactions.

> South Africa

Recent modernisation efforts

Goals of modernisation

- To date, modernisation has primarily focused on the migration to the ISO 20022 message standard for EFT payments.

  - Authenticated Collections (now DebiCheck), the first South African payment instrument using the ISO 20022 message format, has been implemented to reduce debit order abuse in the early collection window. DebiCheck centres around the creation of an electronic mandate which the consumer must authenticate with their paying bank before the debit orders may be processed to their accounts.

- There has been no overriding modernisation programme with defined goals to guide its implementation, however this will be addressed by the following:

  - A research project, which has included discussions with representatives of all stakeholder groups in the payment ecosystem, has recently been conducted to create a foundational document which will be used to create consensus regarding modernisation of the LVPI in SA.

  - SARB's Vision 2025 document will be issued shortly which will contain the reserve bank's goals for payments modernisation.

Process of modernisation

- Since the 2009 ISO 20022 initiative by the PASA EPC (Electronic, Paper and Cheque) Strategy Forum, two work groups were established: Business and Technical. By 2013, most effort were focused on mapping the existing 180-byte standard to the relevant ISO 20022 pacs message structures. The business principles and requirements were defined and clarified.

- In 2013 the PASA Council conditionally endorsed the strategic intent and direction to move to a new messaging standard.

- The Modernisation of Payments (MoP) Project was initiated during August 2014 with the strategic objective to "Modernise all electronic funds payments systems by establishing a common standards platform based on ISO 20022 methodology and standards"

- From 2011-2013 the SARB reviewed the Early Collections environment and instructed PASA to initiate a project to address authentication of mandates for debit transactions by accountholders. The modernisation project was stopped in favour of the Authenticated Collections (AC) project, which was tasked to develop its solution on the ISO 20022 message standard.

  - An AC Work Group and an AC steering committee were formed.

  - The initial implementation deadline was June 2015 but has been pushed back more than once. It will pilot in July 2017.

- The AC project is one of the largest interbank payment projects in SA to date, and has largely absorbed the focus and resources of the payments ecosystem for the past two years. The industry pilot began on 3 July 2017.

- The modernisation project was restarted in November 2016 and the research project currently being conducted regarding the modernisation of the LVPI is underway.

› South Africa

Key modernisation elements

ISO 20022 Implementation

- The adoption of ISO 20022 is a key element of modernisation. Focus has shifted from merely adopting a new best practice message standard, to one of providing a flexible message standard platform that enables innovation and efficient response to future needs.

- Principles for ISO 20022 adoption:

  - Meet regulatory mandates and guidelines in the shortest possible time with the lowest possible demand on resources and financial impact

  - Must facilitate more effective risk management

  - Must enhance the ability of all stakeholders to reach certainty in terms of their individual level of compliance with regulatory and business requirements.

  - Must allow faster adopters of innovation to go to market when they are ready, & not need to wait for the slower adopters

  - Must be aligned with international best practice standards & must allow for integration with regional initiatives

  - Must promote accessibility & allow for independent innovation & easier end-to-end interoperability over time

  - Must enhance the operational efficiency & effectiveness of participants.

Payments modernisation

A number of efforts are underway to further modernisation efforts in South Africa:

- The Modernisation of Payments project is ongoing.
- Research is being conducted to deliver a comparison of modernisation efforts in other countries to gather lessons learned and a broad range of stakeholders are being interviewed to determine their views on the goals of modernisation for SA.
- The SARB will be releasing the Vision 2025 document to the industry which will detail its goals for payments modernisation.

DebiCheck

- DebiCheck was implemented in an industry pilot from 3 July in 2017 and is the first built on the ISO 20022 message standard. The ramp up phase will begin in February 2018 and the existing early debit orders (EDOs – i.e. NAEDO and AEDO) will be phased out by October 2019.

- DebiCheck aims to reduce debit order abuse in South Africa by allowing consumers to electronically confirm their electronic mandates with their banks.

SADC Regional Cross Border Payments

- Cross border payments in the SADC region High value payments for the common monetary area (CMA) countries was implemented in 2013. BankservAfrica also runs a regional clearing house (RCH) for low value payments.

South Africa payment system scorecard

Richest functionality available in market

	Lean ←――― Functionality ―――→ Rich			
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating instituitions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralized VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Functions

☐ Denotes current functional level

◯ Denotes planned implementation of functionality

› South Africa

Payment system details

EFT (Electronic Funds Transfer)

- Both direct and indirect participants are able to access the EFT system.
- Settlement occurs on a D or D+1 basis.
- Posting in EFT varies from bank to bank.
- EFT uses the ISO 8583 data standard. The system will shift to ISO 20022 in the future.
- EFT allows payments up to 30 days in advance.
- BankservAfrica is implementing a management system for direct debit mandates (DebiCheck).
- EFT processes CTs and DDs.
- Processing is available 24 hours, 6 days a week.

RTC (Real-Time Clearing)

- Access to RTC is open to direct and indirect participants
- The system settles multiple times daily.
- Confirmation to sender happens on a next day or same day basis.
- RTC uses a proprietary ISO 8583 data standard. The system will shift to ISO 20022 in the future.
- There are no value-added services in RTC.
- A majority of banks participate in RTC.
- RTC processes CTs only.
- RTC is a dedicated system and processes 24/7/365.

SAMOS (South African Multiple Option Settlement)

- SAMOS allows indirect participants to settle through direct sponsors.
- SAMOS is open on a 24-hour basis, 6 days a week.
- SAMOS settles high-value one-off transactions and acts as a settlement system for retail payment systems, including the EFT & RTC.
- Settlement takes place on a bilateral gross basis with posting occurring in real time after settlement.

United Kingdom

› United Kingdom

Payment modernisation profile

Modernisation in the UK has been a continuous process since the late 90's. Over the course of the last 2 decades, key goals have focused on fostering competition and innovation at every level of the industry. Recently, this directive has been focused on the consolidation of infrastructure and payment system operators in the UK.

The launch of FPS (Faster Payments Service) in 2008 was seen as a major promotion of modernisation goals and on a global level, the design and implementation of FPS has been a model for many real-time systems that followed.

Consumer choice and banking transparency is a major element of the UK's modernisation plan. There are a number of initiatives directed at providing more and clearer choices for customers. Key among these developments is The Current Account Switch Service (CASS) which allows consumers and small businesses to automatically transfer all payment orders when switching banks.

Other current initiatives include migration to ISO 20022, which is seen as the "default future choice" for UK payment systems, although no existing payment system has announced plans to migrate to the standard.

DESCRIPTION

Payment systems in the UK are characterised by advanced, centralised functionality. Electronic payment usage exceeds cash usage in the UK and is a competitive field for both banks and infrastructure providers. A notable element of the UK payments system is the degree of centralisation at an infrastructure level. The payment system operator, VocaLink, provides services for the low-value bulk and low-value real-time systems, and also operates the country's ATM network, LINK. The high value system is owned and operated by CHAPS.

Regulatory bodies have been very active in the UK. Recent developments include the establishment of the Payment Systems Regulator, a new regulatory body that investigates how ownership and access effect overall competition and innovation within UK payment systems. The PSR has proposed the adoption of an international data standard for Bacs (low-value bulk), Faster Payments (real-time), and LINK (ATM switch), as well as the separation of LINK from VocaLink, and the potential divestment by banks of their interests in VocaLink, which is jointly owned by UK banks and which runs much of the country's payments infrastructure.
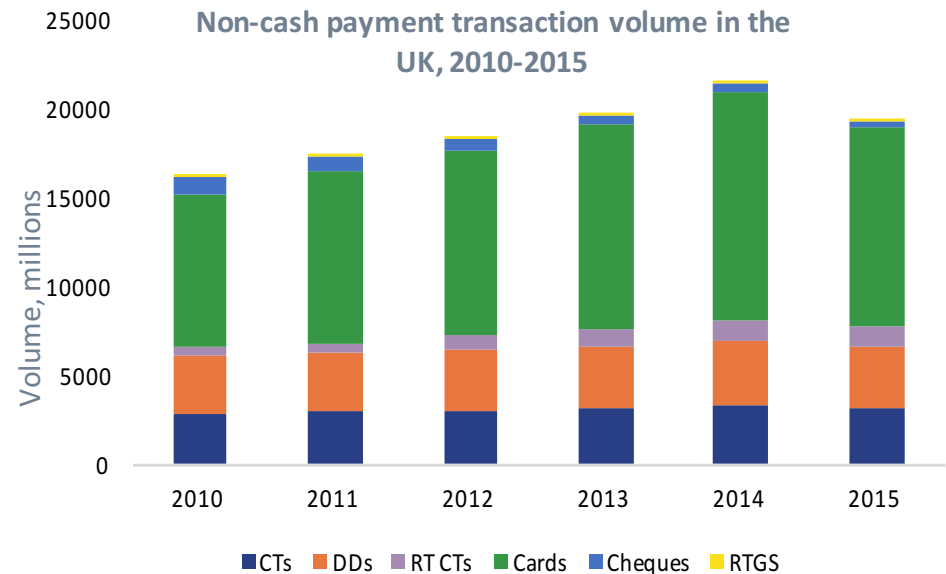
Other major developments include raising the transaction value limit for Faster Payments to accommodate more B2B and B2C payments.

United Kingdom

Payment system and economic data

Payments data	
System operator	LV Bulk: Bacs RT: Faster Payments
System rule-maker	LV bulk: VocaLink RT: VocaLink
Credit transfers (2015, millions)	3088.55
Direct debits (2015, millions)	3549.95
ATM (2015, millions)	2830.0
High value (2015, millions)	34.49
Cards (2015, millions)	11076.0
Real-time payments (2015, millions)	1135.23

Economic data	
Population (2015, millions)	64.96
GDP (2014, USD billions)	2676.51
Bank concentration ratio (CR_5)	76.7
Gini coefficient (World Bank, 2012)	32.6
Bank account penetration	97.20%
Corruption perception ranking (Transparency International)	10

Non-cash payment transaction volume in the UK, 2010-2015

Volume, millions

Legend: CTs, DDs, RT CTs, Cards, Cheques, RTGS

Electronic payment volumes have remained relatively steady and though cards represent the payment type with the highest volume, direct debits and credit transfers are clearly popular payment options. FPS (real-time) volumes show the most growth over the period in consideration, though that growth has levelled off over the past 2 to 3 years. Cheque volumes have fallen significantly and account for a very small number of payments in 2015. They are expected to shrink to a negligible amount over the next 5-10 years.

› United Kingdom

Recent modernisation efforts

Goals of modernisation

- The 1998 Cruickshank report on competition in UK retail banking expressed concern about high concentration in retail banking. The report identified problems with price transparency and difficulty comparing products in the banking sector.

- Several years after the report, the OFT (Office of Fair Trading) and the CC (Competition Commission) identified goals for payment modernisation:
  - Speeding up the payment system
  - Transparency
  - Ease of account switching

- The 2008 launch of Faster Payments was driven by the OFT's pressure on the retail banking community to develop new domestic payments capability.

- At the same time FPS was launched, the EU's Payment Services Directive took effect. It opened the payment services market to non-banks and created transparency requirements for UK banks.

- Recently, UK payment modernisation has identified 3 objectives:
  - Boosting innovation
  - Stimulating competition among system operators and PSPs
  - Promoting the interests of consumers and businesses

- In April 2015, the Payment Systems Regulator (PSR) was established with a mandate to promote these objectives.

Process of modernisation

UK regulators are active in bringing up issues aimed at increasing competition and end user outcomes and inviting industry consultation on proposed future recommendations for payment systems. In recent years, consultation on payment system development has expanded to include new players such as fintechs and consumer and business groups.

- The implementation of changes is left to industry bodies to determine.

The Payment Systems Regulator (PSR) regulates 8 high- and low-value UK payment systems with the goal of promoting innovation and competition.

- The PSR's Payments Strategy Forum ensures broad representation of industry players, including fintechs and challenger banks.

Payments UK is an independent industry body that that is separate from all scheme companies.

- Its predecessor organisation (the Payments Council) acted as a forum for building consensus around necessary changes.

- Payments UK represents the UK banking industry in EU negotiations to align domestic regulation with EU directives.

- The development of payment schemes and services is done by mutually-owned companies, one for each scheme. The PSR has recently floated the idea of consolidating the scheme companies.

The Bank of England plays a background role in payment system regulation and mainly provides oversight for systemically important UK payment systems.

› United Kingdom

Key modernisation elements

Establishment of the Payment Systems Regulator

The Payment Systems Regulator (PSR) was established in April 2015 to improve competition and innovation in payment systems with the goal of promoting end user interests.

- The PSR is an independent subsidiary of the Financial Conduct Authority (FCA), which regulates over 56,000 financial services firms in the UK.
- The PSR regulates 8 payment systems, including RTGS, low-value bulk, ACH, cheque, ATM and card schemes.

The PSR's regulatory mandate includes the ability to:

- Set rules and standards for payment systems
- Require operators and PSPs to open or provide access to systems
- Amend fees and charging agreements
- Limit anti-competitive behavior together with Competition & Markets Authority (CMA)

The PSR conducted two market reviews exploring access to payment systems and ownership and competitiveness of infrastructure provision.

- A PSR review into ownership of payments infrastructures determined that there was no "effective competition" in the provision of infrastructure for systems operated by VocaLink (Bacs, LINK, and FPS). The PSR recommended that the four largest VL shareholders (big four banks) divest their interests in the company.
- In July 2017, MasterCard acquired VocaLink. Despite initial concerns, the CMA approved the GBP 700 million deal in April 2017.

Open Banking Working Group

In 2014, HM Treasury commissioned a report exploring how data sharing using open APIs could affect consumer outcomes and banking competition.

- The report determined that greater access to data could benefit competition.
- Jan 2015: HM Treasury invites industry response to recommendations in 2014 report.
- Sept 2015: Open Banking Working Group (OBWG) established by HM Treasury to determine functional requirements and recommendations for implementation.

OBWG members include banks, fintechs, technology professionals, and consumer and business groups.

- Functional issues discussed in WG include costing, timeline for implementation, data protection, and authorisation.

Upon the OBWG's recommendations to HM Treasury, timeline for implementation of Open API standard was set for 2019.

Payments UK convenes a PSD2 stakeholder group to ensure that UK industry efforts in open banking are aligned with EU directives such as the PSD2.

The UK is generally seen as a leader in the development of community APIs. While the OBWG's work is now seen as a way to comply with the EU's PSD2 directive, the UK is the only major European market that is actively pursuing community-wide open APIs. This may have a significant influence on further development of APIs throughout Europe.

United Kingdom

Payment system details

ISO 20022	Current Account Switch Service
Payments UK plays a lead role in promoting the use of ISO 20022 in the UK. The standard is currently only used in the Current Account Switch Service and the Cash ISO Transfer Service. There is wide agreement in the market that ISO is the new de facto global standard.	The Current Account Switch Service (CASS) went live in September 2013 with the goal of spurring competition and supporting the entry of new players into retail banking. The service allows consumers and small businesses to automatically transfer all payment orders when switching banks.

ISO 20022 column:
- Payments UK represents the industry on the ISO 20022 Real-Time Payments Group (RTPG) which facilitates use in global RT systems.
- The Faster Payments scheme has mapped ISO 8583 messages to ISO 20022 as a first step toward eventual adoption of the standard.

Although ISO 20022 is seen as the "default future choice" for UK payment systems, no existing payment systems has announced plans to migrate to the standard.

- The UK payments community is in agreement that any new services/infrastructures will use ISO 20022. Any legacy systems that require major overhauls may adopt the standard as well.

Current Account Switch Service column:
- CASS is owned and managed by Bacs.
- CASS uses ISO 20022 for messaging.
- In 2016, just over 1 million CASS switches were made. More than 95% of of switches were made by consumers, with the rest made by small businesses and charities.
- It is unclear whether or not CASS has positively affected competition and the entry of new players in banking and payment services. Low overall CASS volumes suggest that the service has had little effect so far.
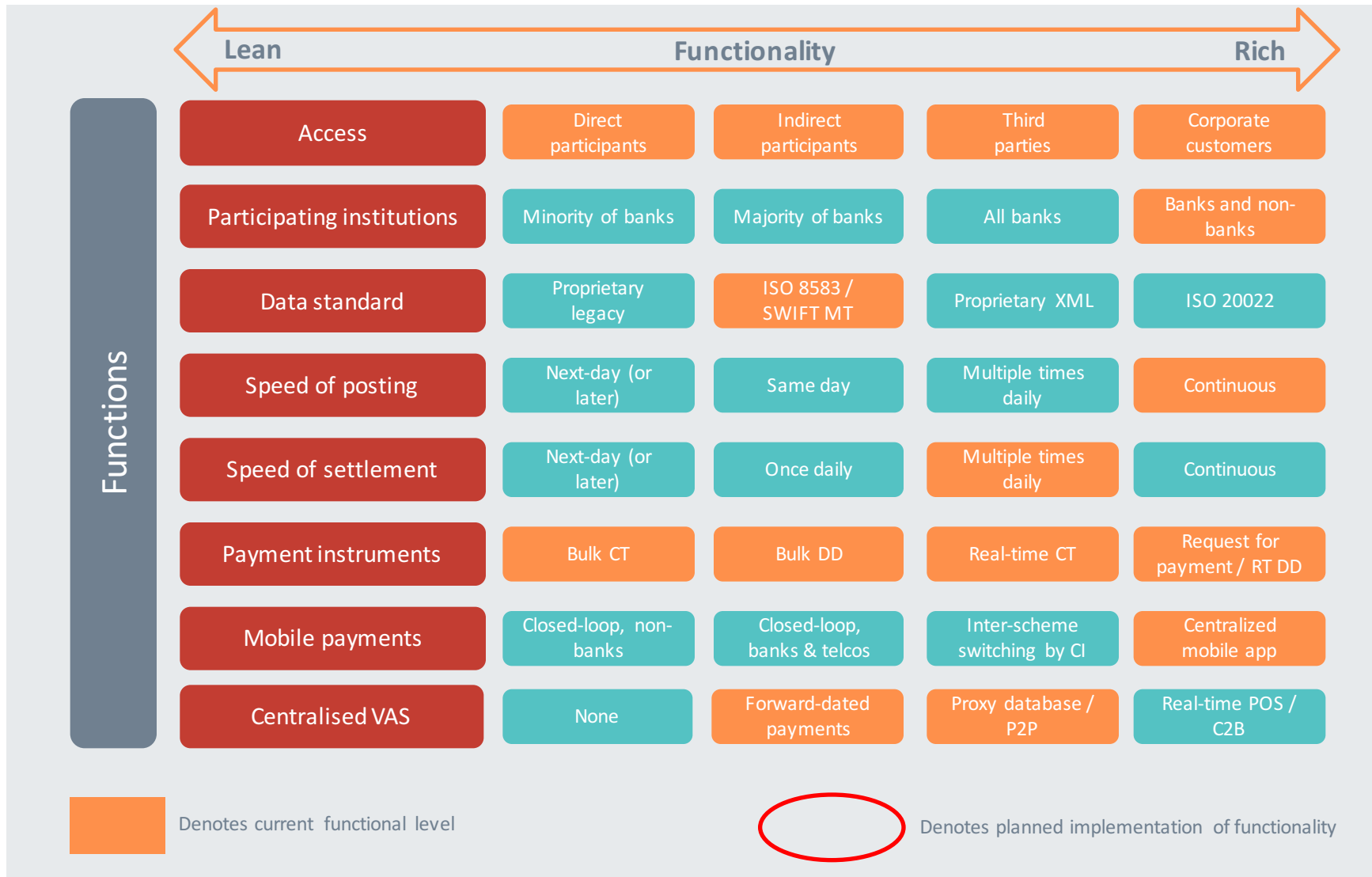
Development of Faster Payments

FPS was developed under regulatory pressure. The Office of Fair Trade (OFT) complained about the speed of payments under the (erroneous) impression that the 3-day cycle in Bacs resulted in 2 days of float to banks. OFT tasked APACS/Payments Council to develop a faster payments service, although they did not specify real-time, design features, or data standards. Drivers of development and implementation included consumer protection, and a need for modernisation, specifically the facillitation of the digital economy.

Under leadership of the Payments Council in 2006, the industry considered several possible operating models, eventually deciding on a new real-time system despite the fact that it required more investment and general overhaul.

Banks had the RT system plan approved by OFT, and implementation took 2 years. To move banks along, UK regulators used coercion (i.e. the threat of regulation) rather than mandate change. Similar tactics were used down the road in Australia to incite development of the NPP. Since it's launch in 2008, FPS has added functionality related to P2P payments: Paym and MPOS: Pay by Bank.

United Kingdom payment system scorecard

Richest functionality available in market

Lean ← Functionality → Rich

Functions				
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	ISO 20022
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	Real-time CT	Request for payment / RT DD
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Denotes current functional level

Denotes planned implementation of functionality

› United Kingdom

Payment system details

BACS	Faster Payments
• Bacs processes low-value bulk credit transfers and direct debits.	• Faster Payments offers single immediate payments, forward-dated payments and standing orders.
• The system is operated by VocaLink. Bacs Payment Schemes Ltd. sets the rules.	• The system is operated by VocaLink. Rules are set by Faster Payments Scheme Ltd.
• It is open for submission 24 hours a day with a cut-off time of 22:30 on D for settlement on D+2. Posting occurs on D+2.	• The system is open for submission 24/7 and settles 3 times per day on a multilateral net basis via the Bank of England's RTGS system.
• Bacs is open to Individuals, who send payments via their bank. Most corporates submit payments directly to the infrastructure.	• Posting typically occurs within 15 seconds and no later than 2 hours
• Bacs features numerous value-added services, such as account switching and non-payment messaging.	• Faster Payments is open to direct participants, indirect participants and corporate clients and third parties are granted direct input/output capabilities.
• Bacs also warehouses payment orders up to 70 days in advance of the settlement date.	• Faster Payments uses the ISO 8583 data standard.
• Bacs uses a proprietary data standard which allows 18 characters.	

CHAPS

- The CHAPS system processes high-value transactions and settles via shadow accounts held at the Bank of England. Ultimate settlement of these transactions, as well as settlement of retail-payments, occurs in the BOE's RTGS.
- Settlement is continuous during operating hours (06:00-18:00). Participants can choose to settle payments immediately or within 8 minutes.
- Direct participation is limited to financial institutions. Indirect participant banks and corporate clients can only access the system via direct bank agents.
- CHAPS uses the SWIFT MT data standard for messaging.

United States

› United States

Payment modernisation profile

Modernisation is still developing at a rapid pace in the United States. There are many players contributing to these developments but the most prominent are:

- The Federal Reserve, which has convened a Faster Payments Task Force (FPTF) to bring diverse stakeholders together and evaluate bids from potential processors hoping to run the US real-time system;
- The Clearing House (TCH) a bank owned payment system operator that has independently begun development of an interbank real-time payment system and are slated to go live with a pilot phase at the end of this year;
- NACHA, the payment system rule-maker in the US that has mandated a same-day settlement window for all financial institutions for credit transfers (direct debits will migrate in September of this year).

The USA is also considering migration to ISO 20022 in all of its current and developing systems. The choice to migrate was based around providing businesses with richer remittance data. No concrete date has been set for the migration, but there is a NACHA stakeholders working group dedicated to exploring this issue.

DESCRIPTION

The United States is the largest payment market in the world, featuring multiple operators for both high-value and low-value bulk systems, and many third party payment providers. The Federal Reserve (Fed) oversees US payment systems and acts as one of two major system operators for both low- and high-value payments. The Fed runs FedACH for low-value bulk credit and debit payments and Fedwire, a high-value RTGS system, along with cheque clearing services. The National Settlement Service (NSS) is a service within Fedwire for multilateral net settlement of retail and other payment systems.

The Clearing House (TCH) is a private payment system operator owned by 24 banks. TCH operates CHIPS, a high-value netting system and EPN for low-value bulk credits and debits, as well as cheque clearing. Both FedACH and EPN operate under rules set by the National Automated Clearing House Association (NACHA), a national payments association whose membership represents over 11,000 US financial institutions. FedACH and EPN do have some flexibility to determine certain aspects of low-value bulk processing, e.g. on processing hours, settlement times, and the warehousing of payment orders. NACHA introduced a mandatory Same-Day ACH cycle to the bulk system in 2016. The added cycle speeds up clearing and settlement of credit transfers and direct debits from a D+1 to D basis.

TCH is developing a real-time payment system, due to go live in 2017. The Fed is simultaneously convening the Faster Payments Task Force (FPTF) to help steer the direction of US real-time systems. The FPTF evaluated 19 proposals for real-time systems and released 10 recommendations for moving forward with faster payment development.

United States

Payment system and economic data

Payments data

System operator	LV bulk: Federal Reserve LV bulk: The Clearing House
System rule-maker	LV bulk: Federal Reserve LV bulk: The Clearing House
Credit transfers (2015, millions)	8330.90
Direct debits (2015, millions)	10982.20
ATM (2015, millions)	nav
High value (2015, millions)	253.20
Cards (2015, millions)	90113.0
Real-time payments (2015, millions)	nap

Economic data

Population (2015, millions)	321.19
GDP (2014, USD billions)	14796.64
Bank concentration ratio (CR_5)	47.0
Gini coefficient (World Bank, 2013)	41.1
Bank account penetration	88.0%
Corruption perception ranking (Transparency International)	18

Non-cash volume trends in the USA, 2010-2015

Legend: CTs, DDs, Cards, Cheques, RTGS
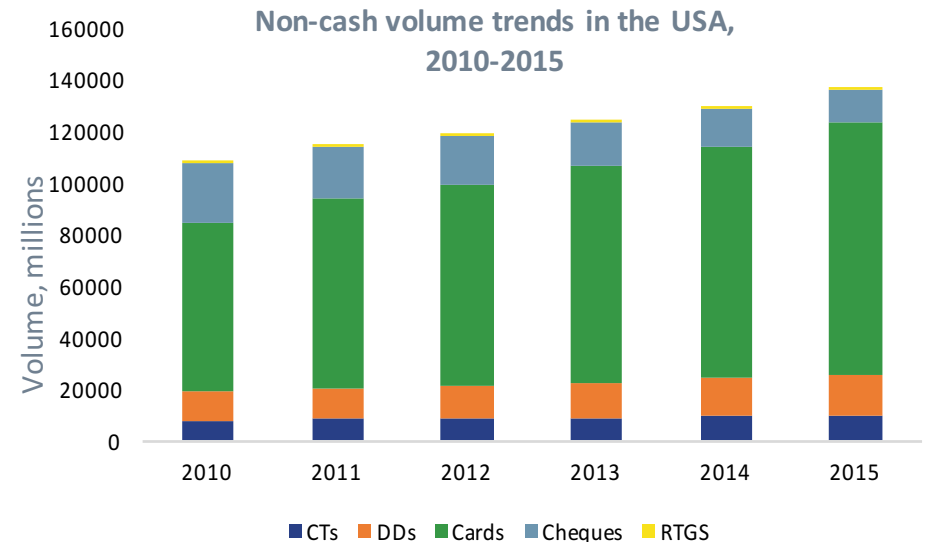
With total non-cash annual volumes of approximately 140 billion payments, the USA is the largest payment market in the world. Like most advanced economies, cards dominate POS payments. Cheques are still frequently used for C2B and B2B payments, but are diminishing. There are still more than 10 billion cheques cleared annually in the USA.

CT and DD volume has grown steadily in recent years and the US is developing a low-value real-time system, due to go live in late 2017.

United States

Goals of modernisation: The Federal Reserve issued a document, *Strategies for Improving the U.S. Payment System*, in which it lays out 5 desired outcomes for payments modernisation in the USA:

Speed and security

- Ensure a ubiquitous, safe, faster electronic solution(s) for making a broad variety of business and personal payments
- Ensure safety, security and resiliency of the payment system and high public confidence
- Expand the Federal Reserve's suite of anti-fraud and risk-management services
- Make improvements to Fed's payment fraud data, conduct payment security research to inform industry and policy decisions, and share results with payment stakeholders
- Work to reduce fraud risk

International & collaboration

- Develop better choices for sending and receiving convenient, cost- effective and timely cross-border payments.
- Implement ISO 20022
- Ensure payment system improvements are collectively identified and embraced by a broad array of payment participants.
- Develop stakeholder forum, task force and ensure the Fed's support of appropriate stakeholder initiatives.
- Stakeholder involvement is a key component of any ongoing developments within the US payment system.

Efficiency

- Reduce the average end-to-end (societal) costs of payment transactions and enable innovative payment services
- Achieve greater end-to-end efficiency for domestic and cross-border payments
- Develop an implementation strategy for the application of the ISO 20022 standard to U.S. payment transactions
- Accelerate adoption of secure electronic business-to-business (B2B) payments
- Develop technologies and rules that foster greater interoperability for person-to-person (P2P), person-to-business (P2B) and small business B2B payment directories
- Expand the operating hours and other capabilities of the National Settlement Service and accelerate interbank settlement for check payments

FPTF's final report details insights from 19 proposals. Goals & recommendations include:
- Establish a faster payments governance framework
- Recommend and establish faster payments rules, standards, and baseline requirements that support broad adoption; safety, integrity, and trust; and interoperability
- Assess the payments regulatory landscape and recommend changes to the regulatory framework
- Establish an inclusive directory work group to identify and recommend a directory design for solutions to interoperate in the faster payments system

- Enhance Federal Reserve settlement mechanisms to support the faster payments system
- Explore and assess the need for Federal Reserve operational role(s) in faster payments
- Recommend, develop, and implement methods for fraud detection, reporting, and information sharing in faster payments
- Develop cross-solution education and advocacy programs aimed at awareness and adoption
- Conduct research and analysis to address gaps in cross-border functionality and interoperability
- Continue research on emerging technologies

› United States

Process of modernisation: The Federal Reserve

From the outset, the Fed's strategy has been as inclusive as possible. The Federal Reserve does not plan to provide services. They are averse to direct regulation and view payments as a profit-making business, not a public utility. Instead, the Fed has taken an oversight role to identify modernisation goals, collaboratively develop strategies to forward those goals, and, in relation to real-time payments specifically, to support stakeholder efforts to implement faster payments capabilities.

2013:

- Fed's issues a consultation paper on payment system improvement

2014

- Federal Reserve sponsored primary market research on end-user preferences
- Study commissioned by Fed to identify which types of domestic payments had unmet needs for speed.

2015:

- Fed issues strategies statement released, included a multi-year plan to execute strategies outlined in the paper.
- Faster Payments Task Force (FPTF) established to identify effective approaches for implementing safe, ubiquitous, faster payment capabilities. Since then, the task force has established Faster Payments Effectiveness Criteria, designed and completed a process by which faster payment solution proposals were assessed, and begun exploring challenges and opportunities the industry may face in the course of implementing faster payments capabilities in the United States.
- The Secure Payments Task Force (SPTF) established to advise the Federal Reserve on payment security matters, coordinate with the Faster Payments Task Force and determine payment security priorities for future action.

2016:

- The Task Force solicited and received 22 faster payments solution proposal submissions from task force participants which were reviewed by the Qualified Independent Assessment Team (QIAT). Of the 22 proposals received, 19 voluntarily progressed.
- Challenges and Opportunities Work Group established to analyze issues or barriers that may inhibit payments evolution.
- Federal Reserve Payments Study published
- Finalised and published part one of a two part final report, *The U.S. Path to Faster Payments.*

2017:

- Examine policy issues associated with a possible multi-provider environment, such as the framework for establishing rules
- Published part 2 of The U.S. Path to Faster Payments, an in-depth report covering the assessment of faster payments solution proposals, challenges and opportunities for achieving faster payments in the United States, and the task force's recommendations and suggestions for industry action.

› United States

Key modernisation elements

Development of RTP by The Clearing House

- The Clearing House already operates ACH, high-value, and cheque clearing systems. Development of an ISO-based RTP began in 2015
- Only financial institutions can participate. Currently, TCH has 25 (mostly large) member banks signed on for participation in RTP.
- TCH has announced partnerships with major processors and outsourcers to provide access for smaller banks.
- At the end of 2017, the first banks will go live in a pilot phase but the true launch date is expected to occur in 2018 and development of ubiquity will take several years.
- TCH is focusing on specific use cases (e.g, requests for payment) in its initial phase to reflect emphasis on business-initiated payments, including C2B.

NACHA Same Day ACH

- NACHA is working on Phase 2 of their Same Day ACH role-out plan. Phase 1 introduced the rule set and laid out 2 specific settlement-windows that would be mandatory, for receipt and posting of files, for all financial institutions to comply with by September of 2016.
- Phase 2 went live with credit transfers in September of 2016 and Phase 3 will go live with direct debits in September of 2017.
- NACHA is also working on migration to ISO 20022 in the ACH. At this point, there is a dedicated working group on the subject and the next steps include defining an optional migration date.

Federal Reserve facilitated Task Forces

- In January 2015, the Federal Reserve issued a document, *Strategies for Improving the U.S. Payment System*.
- This report led to the creation of two task forces:
  - The Faster Payments Task Force
  - The Secure Payments Task Force
- In the 2 years since these task forces were formed, the Fed has been working with stakeholders to support a number of initiatives, including the evaluation of bids from payment processors eager to run the proposed US real-time system, and policy work to ensure fraud reduction with a focus and security priorities and standards.

Fintech and card networks

Alternative closed loop real-time systems have been present in the USA for decades and are largely focused on P2P payments. Offerings include:

- PayPal and Venmo—both have longstanding reputations in the P2P space. PayPal is also prevalent in the ecommerce space.
- Zelle—recently launched third-party based P2P transfer system that is linked to US bank accounts.
- Visa Direct and MasterCard Send—card based P2P systems that offer rewards to users.
- Ripple and Token—fintech companies focused on utilising decentalised platforms and digital ledger technology to aid in the transfer of payments.

United States payment system scorecard

Richest functionality available in market

	Lean	Functionality			Rich
Access	Direct participants	Indirect participants	Third parties	Corporate customers
Participating institutions	Minority of banks	Majority of banks	All banks	Banks and non-banks
Data standard	Proprietary legacy	ISO 8583 / SWIFT MT	Proprietary XML	**ISO 20022**
Speed of posting	Next-day (or later)	Same day	Multiple times daily	Continuous
Speed of settlement	Next-day (or later)	Once daily	Multiple times daily	Continuous
Payment instruments	Bulk CT	Bulk DD	**Real-time CT**	**Request for payment / RT DD**
Mobile payments	Closed-loop, non-banks	Closed-loop, banks & telcos	Inter-scheme switching by CI	Centralized mobile app
Centralised VAS	None	Forward-dated payments	Proxy database / P2P	Real-time POS / C2B

Denotes current functional level

Denotes planned implementation of functionality

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Low-value payment system details

FedACH	EPN
• FedACH is owned and operated by the Federal Reserve and processes low-value bulk credits and debits.	• EPN is owned and operated by The Clearing House (TCH) and processes low-value bulk credits and debits.
• Direct participation in FedACH is open to all US financial institutions.	• The 24 TCH member banks use EPN for low-value bulk payment processing, although these member banks also send and receive payments via FedACH to ensure connectivity to non-TCH banks.
• FedACH calculates multilateral net positions for all system participants, with settlement occurring once daily at the NSS. Processing of FedACH transactions takes place 24/7.	• EPN participants must hold a settlement account at the Federal Reserve or have access to settlement at the Federal Reserve via a correspondent.
• Settlement of FedACH transactions occurs twice daily at 13:00 and 17:00 on D. The cut-off time for sending payments for each cycle is 10:30 and 14:45 respectively. FedACH sends settlement balance reports to each participant one hour before settlement (at 12:00 and 16:00), at which point participants have 45 minutes to ensure that their settlement accounts are properly funded (cut-off for settlement is at 12:45 and 16:45).	• Settlement of EPN transactions occurs twice daily at 13:00 and 17:00 on D. The cut-off time for sending payments for each cycle is 10:30 and 14:45 respectively. TCH sends settlement balance reports to each participant one hour before settlement (at 12:00 and 16:00), at which point participants have 45 minutes to ensure that their settlement accounts are properly funded (cut-off for settlement is at 12:45 and 16:45).
• FedACH members have access to community services defined by the rule maker, NACHA.	• In addition to these NACHA services, EPN offers services aimed at fraud detection

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High-value payment system details

Fedwire	CHIPS
• Fedwire is a high-value system owned and operated by the Federal Reserve	• CHIPS, owned and operated by The Clearing House (TCH), is the only privately run high-value payment system in the United States.
• Direct participation in Fedwire is open to any financial institution established in the United States. Many smaller Fis access the system via correspondents. There are approximately 7,300 direct participants in Fedwire.	• Access is restricted to bank participants only
• Fedwire is an RTGS system used for high-value payments and to settle obligations in various retail payment systems, including FedACH and EPN.	• While CHIPS payments are considered final and irrevocable upon processing, it is not an RTGS system. Instead, CHIPS uses a proprietary algorithm that utilises netting to achieve maximum liquidity efficiency.
• Processing and settlement of Fedwire payments occurs in real time, and the system is open from 21:00 on D-1 until 18:30 on D, Monday through Friday.	• All CHIPS payments are pre-funded by participants, and each participant has a net credit cap, which is used to help avoid too much liquidity building up among a few system participants.
• Multilateral net settlement of retail payment systems is done via the National Settlement Service (NSS), an automated service offered by the Fed. The NSS is open from 7:30 to 17:30, Monday through Friday. Fedwire messages are compliant with SWIFT MT message standards.	• Prior to the beginning of the processing day, CHIPS participants fund their CHIPS accounts at the Federal Reserve. The processing day begins at 21:00 (EST) on D-1 and ends at 17:00 on D. Following the end of processing at 17:00 on D, CHIPS participants can supplement their liquidity pool with additional funding. System participants then move any excess liquidity from their CHIPS account back to their Federal Reserve account.
• The Fed offers intraday overdrafts to Fedwire participants to manage risk in the system. Any participant that exceeds their net debit cap during the day can pledge collateral for an intraday overdraft from the Fed at zero cost, or can pay a fee for overdrafts in lieu of collateral. Fedwire monitors overdrafts and collateral obligations throughout the day.	• All CHIPS payments are cleared within seconds due to the system's proprietary algorithm that instantly finds bi- and multilateral offsets within the system. All payments are final and irrevocable upon processing.