



**PAYMENTS
CANADA**

DEVELOPING A VISION FOR THE CANADIAN PAYMENT ECOSYSTEM

APRIL 20, 2016

payments.ca

*A modern payment system is fast,
flexible and secure, promotes
innovation and strengthens
Canada's competitive position.*

Vision for Canada's Payments Ecosystem:

The safe and efficient operation of a national payments system is foundational to a well-functioning economy. The level of trust users have in the payments system and the efficiency of that system to circulate value in a secure manner, contributes to the robustness of that economy. As external drivers mount and exert added pressure on the system to continue to evolve, there is a critical need for the system to appropriately respond. Payments systems are meant to be dynamic and proactive to such changes and the changing behaviours of users in the broader economy, for which it serves. Therefore, through broad consultation, the VISION for modernizing Canada's payments system is to have **"a modern payments system that is fast, flexible and secure, promotes innovation and strengthens Canada's competitive position"**.

Payments Canada is the operating brand name of The Canadian Payments Association (CPA). For legal purposes we continue to use CPA (or the Association) in all information related to rules, by-laws, standards and various other instances such as this white paper.

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Highlights and key findings

1

A vision for the Canadian payments ecosystem:

"A modern payments system is fast, flexible and secure, promotes innovation and strengthens Canada's competitive position"

The CPA has facilitated the development of a vision for the Canadian payments ecosystem to provide key input to plans for modernizing core payments infrastructure

The Canadian Payments Association (CPA) is a public purpose corporation that owns and operates national core payments clearing and settlement infrastructure in Canada. The CPA is currently undertaking a multi-year project to modernize infrastructure to better support the long term effectiveness of the Canadian payments ecosystem. The first key deliverable in this project is the development of an industry vision that describes the features and functionality desired by industry stakeholders, financial institution participants and end users. The role of the CPA in the payments ecosystem and specific solutions to deliver the proposed features and functionality are important

future considerations for the CPA and its participants and stakeholders.

The vision reflects input gathered through user/stakeholder consultation with a broad array of participants. The vision also reflects learnings from countries around the globe that have upgraded core systems to better support payment needs and deliver additional value.

This vision will be used to guide CPA and industry initiatives to modernize core payments infrastructure including rules and standards, to ensure Canadians' on-going needs are met.

Meeting Canada's payment needs of today ... and tomorrow

The world we live in is being reshaped in ways unimaginable just a few short years ago. Evolving technologies are offering Canadians new ways to communicate, connect,

conduct commerce and manage their lives.

Consumers' and businesses' needs and expectations for payments are evolving – payment product and service providers need to support convenient, flexible, simple payment experiences while maintaining security and protecting end user information.

New players and technologies are entering the payments arena, both in Canada and around the globe. Some of the world's largest and most innovative companies are introducing payment products and services. Disruptive technologies have the potential to dramatically impact payments in ways not previously imagined.

Around the world, investments are being made in payments infrastructure to support data-rich payments that make funds available in less than a minute.

Canada's core payments systems are largely outdated and were not

2

Stakeholders have expressed needs and expectations for the future ecosystem

designed to support emerging needs for faster, data-rich payments, and regulatory change

Canada's core clearing and settlement payment systems lack flexibility and present challenges from a technology and operations perspective. They were not designed to support payment developments including near real time and data rich payments, and cannot readily accommodate anticipated regulatory changes. This is becoming more of an issue as the pace of change in the payments ecosystem accelerates.

Regulators in Canada have expressed their vision for payments systems that continue to effectively facilitate monetary policy implementation and financial system liquidity management, as well as support near real time payments, are efficient, open, secure, and respond to and protect the interests of end users.

At a minimum, investment will be required to ensure that core clearing and settlement systems continue to meet evolving regulatory requirements to ensure safety

and soundness. At the same time, investment in payments infrastructure should be made to support evolving needs and innovation across the ecosystem.

End user needs and expectations are evolving. Payment experiences need to keep up

Creation of the vision has provided the opportunity for users and industry stakeholders to describe their needs via a "use case" structure, and indicate where needs are largely being met, and where there are perceived gaps and opportunities.

End users are seeking 'instant' and 'always on' experiences, and have expressed a clear desire for near real-time, data-rich payments. End users also desire the ability to route payments using publicly available information, receive notifications that describe payment status, and be able to initiate and receive payments 24/7/365.

More options to make funds available to recipients in near real-time:

The global payment industry commonly refers to 'real time' payments as payments that are available 24/7/365 and that

clear and deliver available funds in less than 60 seconds.

Canadians have already embraced near real time consumer options where they are available. For example, consumers have access to Interac e-Transfer, a secure, near-real time money transfer service offered by most financial institutions in Canada. Some financial institutions also offer e-Transfer to their small business customers. Funds are typically available to the payee within 30 minutes, and customers can access e-Transfer 24/7/365 through on-line banking.

For transfers over \$3500 and for business to business payments, the only same day payment option identified by users is a wire transfer. Wires can take several hours to reach the payee, require detailed payee account information for routing, and are more expensive than cheques and AFT payments.

"Businesses want to pay how they like, as fast as they like..."

There is agreement across all Canadian stakeholders that not all payments need to be near real-time payments.

There are use cases where existing functionality serves end user needs very well (for example, fixed recurring payments such as payroll or bill payment). However, near real-time availability of funds will be valuable to support irregular, time-sensitive payments between businesses and consumers where funds must be guaranteed and accessible. Examples of these payments include business to business (B2B) payments where funds must be verified before services can be provided, and payments to small businesses who today may prefer to be paid with cash to ensure good funds.

Expanded and standardized information accompanying payments:

Businesses envision a future where end-to-end, straight-through processing of payments is a reality. Rather than capturing payment information from paper invoices and cheques, data about the payment could be provided electronically with the payment, and these details could automatically populate user Accounts/Receivable and Accounts/Payable systems, eliminating the need to manually enter payment information into multiple applications.

Today, businesses continue to rely on cheques in part because of the payment-related information that can be

provided with a cheque. Small businesses in particular seek to have invoice information accompany an electronic payment to reduce their reliance on cheques, which remain their main source of transaction information.

“Businesses use cheques because they provide key information about the transaction that isn’t available from other payment options like wires.”

The ability to include important data about the payment with the payment can facilitate the continued shift to digital domestic and international payments. ISO 20022 is a global message standard designed to support the exchange of robust payment-related information as part of a payment. ISO 20022 standards are being created to support enhanced messaging for different transaction types. In Canada this work is being led by the CPA.

Transparency into transaction status for payors and payees:

Consumers and businesses alike have indicated that for many payment types it would be valuable to receive notifications that provide updates on the status of payments.

Some payments today do offer notifications, such as Interac e-Transfer notices and alerts offered by credit card

companies and some financial institutions. However, users want expanded and more generally available functionality.

Businesses that accept electronic bill payments would like to receive information about payor actions. Notifications that inform business payees that a bill payment has been initiated and that funds have been debited from the account will assist businesses in the management of Accounts Receivables and support cash management activities.

Easier ways to send and receive payments:

Consumers seek the ability to pay other consumers and businesses using information that they already have such as an e-mail address, telephone number or even social media identifiers, rather than using bank account information. In addition to making transacting easier, sharing a ‘token’ or alternate identifier other than account number is perceived by consumers to be more secure than sharing account information.

Businesses of all sizes also seek the ability to safely route payments using publicly available information. This feature would be particularly valuable for governments and businesses that still rely heavily on cheque payments due to the challenges and

privacy concerns associated with capturing account numbers. This may also support better ways to connect with the under-banked/un-banked.

More convenient cross-border payments:

End users highlighted the challenges of making international payments. Businesses may choose to establish correspondent relationships to support payments in foreign countries, or, if necessary, will establish accounts in other countries to facilitate expeditious payments (processed as “on-us” transfers). Businesses welcome opportunities to accelerate the availability of funds, to simplify the process and to reduce transaction expenses and provide clarity on fees.

Consumers are also frustrated by the limited options available to pay consumers and businesses in other countries. Cheques are perceived to be impractical – they take too long, and foreign exchange fees borne by the payor can be substantial. Wire payments and use of third party money transfer services are said to be inconvenient and can be expensive. Electronic P2P options are available, but it can take up to five business days for funds to reach the recipient.

The challenges with international payments have been recognized by technology disruptors (i.e. blockchain solutions) and improving cross-border payments is an area of focus for the payments industry.

Organization-agnostic oversight rules, applied consistently based on activity:

Electronic payments is an area of financial services that is very attractive to new entrants. Non-traditional players such as large technology companies and nimble “FinTech” start-ups are entering the industry. A modernized system needs to have the ability to properly identify system participants and monitor their compliance with rules/requirements in order to support a more consistent and inclusive approach to consumer protection and enhance overall safety and soundness of the system. This is increasingly important as the pace at which innovative products and services are introduced is expected to continue to increase.

“Expanding access and encouraging innovation is a good thing, as long as regulations are applied to all players in the same way”

Regulation aims to protect end users, and has historically focused on the role played by payment system participants.

Ecosystem participants seek a regulatory environment where new entrants and incumbents are subject to regulation based on the services they provide rather than the type of institution they are.

New entrants are providing services that traditionally have been available only from financial institutions and, as non-FIs, may be able to provide these services without being subject to the same level of regulation. Similarly, financial institutions may be disadvantaged in competing against new entrants to offer innovative products and services due to regulatory constraints that financial institutions must observe.

Open and risk-based access:

FinTech players and non-bank payments service providers envision a future where improved access to core clearing and settlement systems is supported by payment system rules and regulations. However, non-bank payment service providers expressed minimal desire to connect directly to core clearing and settlement systems. Rather, most of these entities desire improved access to core payment system functions through existing participants, via more technologically advanced access options and interfaces. Enhanced access opportunities will promote

Canada can benefit from studying modernization efforts in other countries

competition across the payments ecosystem and restrict the ability of any one firm from exercising market power to the detriment of users of the payments system.

Regulators have stated that they envision a more level playing field in the payments ecosystem with open, risk-based access rules that are organization-agnostic. Oversight will continue to be informed by internationally recognized risk management requirements, adapted as necessary to Canada's unique environment.

Systems that are flexible, adaptable and reduce processing costs over time:

Financial institutions envision a future where they are able to easily introduce and enhance products and services to meet customer needs. They recognize that modernization will require investment in core national systems, in addition to significant investments in their own systems. They expect these investments to deliver a platform for innovation, decreasing costs and delivering ongoing efficiencies over the longer term.

Also identified were opportunities to incorporate support for select shared

services with new investments in core payments infrastructure. Examples of potential shared services include proxy directories, fraud detection services, AML transaction monitoring and collateral management. New payments infrastructure should be accommodating as to whether a shared service is part of the core system or offered on a standalone basis, with market forces playing a role in these decisions.

Modernization of core payments systems is occurring around the globe

In addition to stakeholder consultation, the CPA has evaluated modernization efforts in other countries. There are a number of countries that can provide valuable learnings for Canada as we embark on our modernization journey.

As the pace of modernization increases around the globe, common solution elements and themes are emerging from the most successful implementations:

- Establish a new faster payments system rather than upgrading existing infrastructure to support faster payments.

- Extend and enhance existing infrastructure in the short term where possible and practical to meet other user needs.
- Consider market solutions from payment infrastructure vendors, rather than building new systems – Several solutions have been implemented in multiple jurisdictions. Existing solutions and learnings can be leveraged, with positive implications for costs and implementation timelines for modernization efforts.
- Continue to operate existing payment systems (typically batch and high-value) and allow transactions to migrate to new faster payments systems over time.
- Incorporate support for ISO 20022. It is becoming the global message standard and will support global interoperability.
- Coordinate infrastructure investment with FI/industry developments to bring new commercial products and services to the market – Ensure one or more differentiated products or services that address specific use cases are launched to coincide with

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The time is right to proceed with modernization

the introduction of new faster payments infrastructure.

Most recently, the United States announced the introduction of same day retail clearing and settlement in 2016, and the introduction of a real time payment system offered by The Clearing House is planned to support real time payments in early 2017.

The majority of Canada's trading partners are well along in their efforts to upgrade core payments infrastructure. Canada will need to consider these international approaches when determining its strategy for modernization. It is important that the payments ecosystem in Canada remain globally competitive; the costs of falling behind could be significant, especially for Canadian businesses.

The potential impacts of modernization are significant

Preliminary estimates indicate that enhancing Canada's core payments infrastructure could address the potential migration of up to 1 billion AFT, cheque, cash and wire transactions each year to a faster data-rich payments platform.

The migration of these transactions should create significant operational savings for large and small businesses (including government), consumers and FIs. Modernization should also result in benefits for end users by reducing friction and increasing access to products and services. Additional benefits include the improved management of working capital and broader macro-economic benefits from productive reinvestment of efficiency gains.

For financial institutions and other payment service providers, a modernized payment system will deliver ongoing transaction processing efficiencies and will reduce risk through the provision of 'good funds' payments.

Upgrading existing or building new core payments infrastructure should create a platform for product and service innovation that will allow ecosystem participants to compete and partner even more effectively to meet evolving end-user needs.

Canada must determine how faster, data-rich payments can be best delivered

The creation of a vision has confirmed that end-user needs and expectations are evolving to include faster, data-rich, cost-effective payments. Although safe and secure, existing CPA core systems are largely outdated (as are many FI legacy payments systems) and struggling to match the pace of change in the industry.

Core payment infrastructure modernization is occurring globally, and it is important that Canada remains competitive. At a minimum, a roadmap is needed to support the implementation of ISO 20022, and access to faster payments for consumers and businesses. Over the longer term, the ability to support payments in seconds with 24/7/365 availability will be a requirement for Canada to remain globally competitive.

What are the next steps for modernization?

A modernization initiative typically consists of several phased activities. For Canada, the next step is to translate stakeholder/ user needs identified in the vision into business requirements.

Once business requirements have been completed, solution options can be defined and

evaluated to prepare a conceptual solution design. This will include a thorough review of existing capabilities in-market as part of the solution design exercise, to confirm if and where existing capabilities can be enhanced and integrated to reduce cost and accelerate speed to market.

As part of modernization activities, the CPA will work with FI participants to identify possible shorter term modifications to existing systems, CPA rules and standards that could address

select business requirements. The impacts, costs and benefits of capturing these opportunities will need to be confirmed.

For modifications requiring greater effort, a case for proceeding will be prepared that outlines the impacts, costs and benefits of implementing the recommended modernization solution to meet the defined requirements.

The CPA will work closely with members and industry stakeholders to define requirements, identify solution options and prepare the case

for modernization. It is expected that these activities will be completed by early 2017.

Upgrading or replacing core infrastructure to support faster, data-rich payments will require considerable investment and a multi-year, multi-phase implementation plan based on a prioritized roadmap. As changes are introduced it will deliver substantial value for users, deliver cost efficiencies for industry participants, and provide a platform for on-going product and service innovation.

1. Introduction

Recently, domestic and international developments have created the need for Canadian payments ecosystem participants to develop a long-term plan to ensure the needs of its constituents continue to be met. From magnetic stripe to EMV and from plastic card to mobile phone, the payments landscape is evolving rapidly. With the ubiquitous availability and use of internet and smart phones, consumers and businesses increasingly expect to be able to pay and be paid for anything, anytime and anywhere.

Payments modernization is a global trend. At time of writing, 17 countries have implemented infrastructure enhancements that support faster payments, decreasing the time span between payment initiation and the availability of funds from days to minutes, and even seconds. ISO 20022 is emerging as the preferred international messaging standard and is being, or has been implemented in over 30 countries¹.

Canada is known internationally as a payments leader – both in payment functionality and security. Canadian financial institutions have invested in new solutions and Canadians are quick to adopt new methods of payment being offered including contactless (“tap and go”) for both debit and credit cards, mobile cheque deposit or using their mobile device to pay for purchases.

However, legacy core payment infrastructure is largely outdated and requires investment to ensure these core systems remain compliant with regulatory requirements designed to preserve financial stability. Existing systems lack flexibility and present challenges from a technology and operations perspective for incumbents and new players to introduce innovative products and services.

Canadian regulators are carefully monitoring global developments to ensure that payment system attributes in Canada continue to evolve in order to meet the stated public policy objectives (PPOs) of safety and soundness, efficiency and protecting end user interests.

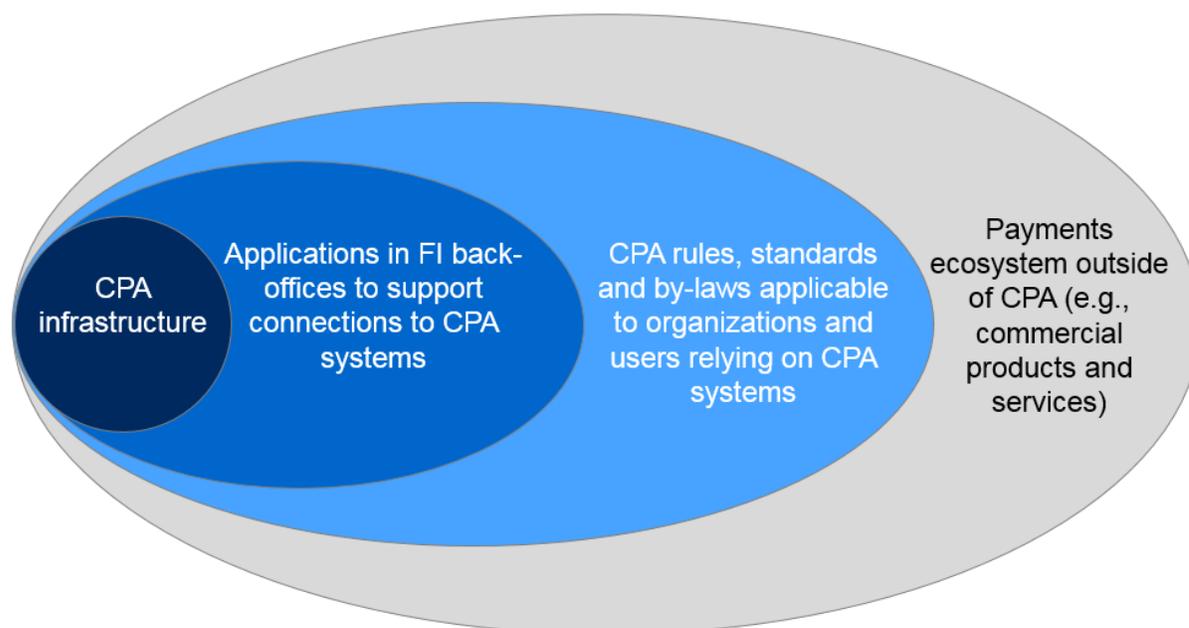
The Canadian Payments Association (CPA) is a public purpose corporation that establishes and operates Canada’s core national payments infrastructure (including associated systems), allowing member financial institutions to clear and settle payments made between themselves and their customers. Along with operating payments infrastructure, the CPA develops, implements and updates the rules and standards that govern the clearing and settlement of payments between its members. (Please see Exhibit 1 for more detail.) The CPA’s wider mandate also includes the responsibility to support regulator PPOs in the provision of its services.

To address drivers for change and provide a next generation of payments infrastructure to better support the payment needs of Canadians, the CPA has embarked on a multi-year initiative to modernize its infrastructure.

¹ More information on ISO 20022 standard is available at www.iso20022.org

Exhibit 1: CPA's current role in the ecosystem

The CPA operates infrastructure and sets rules within the broader Canadian payments ecosystem



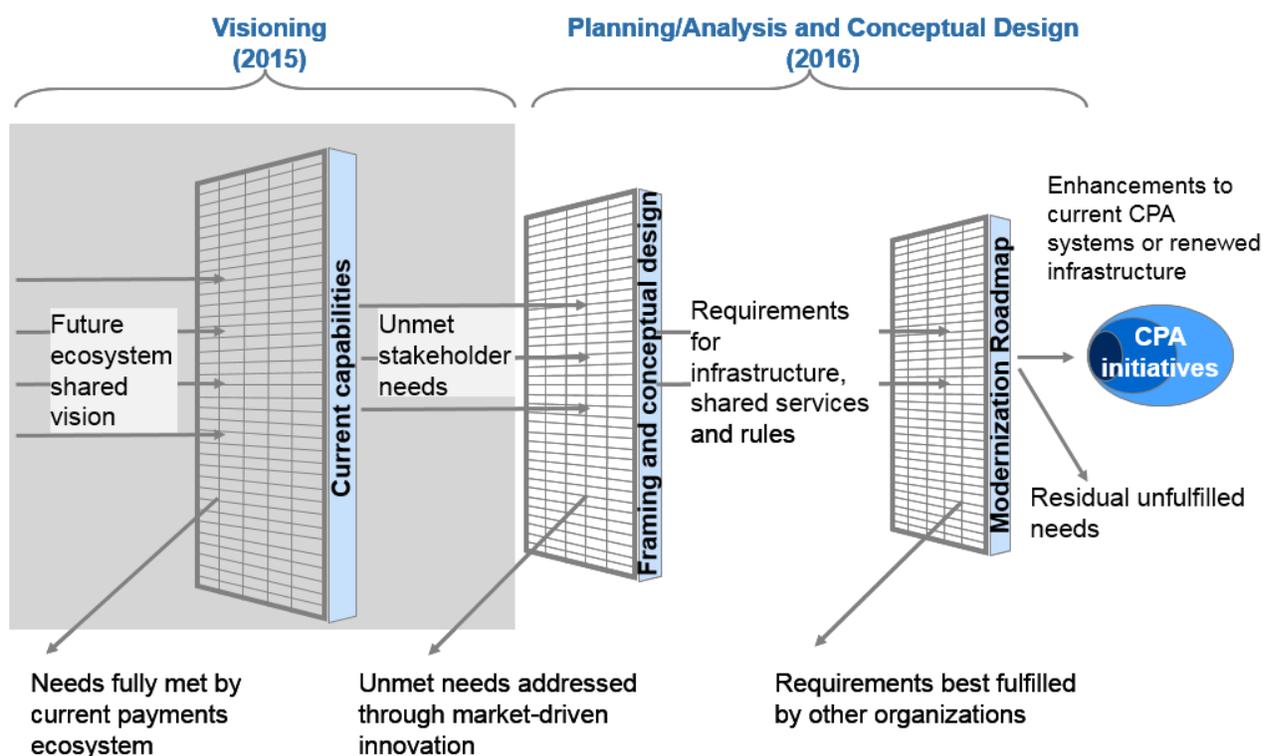
Source: Canadian Payments Association

As one of the first critical steps in its modernization, CPA has taken the initiative to consult with end users, members and industry and government stakeholders to develop a vision for the Canadian payments ecosystem. This vision reflects the stated needs and priorities of multiple constituents: end-users of the payment system (consumers, business and government); traditional and new payments product and service providers; and regulators.

The vision has been developed at an industry level to generate alignment between constituents, identify the required features and functionality of the ecosystem, and evaluate if there is a strong case to proceed to the next phase of modernization – framing the CPA's role in enabling key aspects of the vision and developing the conceptual design and solution options for new infrastructure and other associated changes. For added clarity, the vision does not address the future role of the CPA in the payments ecosystem, or contemplate specific solutions to deliver the proposed features and functionality.

Exhibit 2 summarizes the relationship between the vision and the next phase of the CPA's Modernization initiative.

Exhibit 2: Relationship between vision and CPA modernization



SOURCE: CPA

This paper presents the results of the vision effort, and is organized as follows:

- Overview of the drivers and context for modernizing the Canadian payments infrastructure
- Summary of findings on user/stakeholder needs, and comparisons with global modernization initiatives
- Impact and implementation considerations, including potential value associated with proceeding with addressing user/stakeholder needs
- Summary of the case for proceeding to the next phase (planning/analysis and conceptual design)

2. Context for modernization

There are a number of forces contributing to the accelerated pace of payments evolution in Canada and around the world. Advances in technology are impacting payments both from a user experience perspective, as well as in the provision of products and services. New entrants are identifying and targeting opportunities that are requiring incumbents to react quickly. Global standards are emerging for payment messages, providing opportunities for improved interoperability for payment exchange and processing both within the ecosystem and across borders. The increasing presence of new players in the payments ecosystem is creating awareness of the need and impact of regulation based on function and interaction with end users, rather than regulation based on the type of institution/entity. Lastly, existing core payment infrastructure is largely outdated, and is challenged to support advancements in the industry and the increasing pace of innovation.

Exhibit 3 summarizes the forces driving modernization in Canada.

Exhibit 3: Forces creating a need and opportunity to modernize in Canada

Force	Description
End user needs and expectations are evolving – payment experiences need to keep up	<ul style="list-style-type: none"> Stakeholder expectations for speed, ubiquity, and available data in payments are increasing as digitization of the economy continues Security and privacy must keep pace with payments in a digital age
New payments players and technologies are entering the market	<ul style="list-style-type: none"> Some the world's largest and most innovative companies are introducing payment products and services New entrants are focused on providing a seamless customer experience – and are willing to accept risk to deliver it Disruptive technologies (e.g., blockchain) are generating substantial interest
The world is moving to faster, more information-rich payments – Canada risks becoming less competitive	<ul style="list-style-type: none"> Over 40 countries have begun modernizing infrastructure Global standards are emerging for remittance information (i.e., ISO 20022) Modernization is improving the lives of consumers and competitiveness of international businesses
Canada's regulatory regime is evolving but can do more to foster innovation and competition	<ul style="list-style-type: none"> Oversight of infrastructure is being enhanced in line with international best practices Existing infrastructure will require ongoing investment to comply Oversight in payments is evolving but currently remains focused on the institutional ("who you are") rather than the function ("what you do")
Canada's core systems are aging, and lack the flexibility to adapt to domestic and international forces	<ul style="list-style-type: none"> Canada's clearing and settlement infrastructure systems are decades old; many FIs' core systems are even older Largely outdated infrastructure will need to be enhanced to maintain soundness, but lacks the flexibility to create a platform for rapid innovation

These forces have and will continue to impact key attributes of payments systems, including the timing of payment (speed of funds availability and hours of operation), functionality (support for

products and services), access (number and types of organizations that interact with core systems), interoperability (domestic and international), and risk management.²

2.1 End-user needs and expectations are evolving. Payment experiences need to keep up

As users search, shop, and purchase across physical, online, and mobile channels, the formal act of payment is merging with the selection of goods and services, and end user expectations are growing for more seamless and instant payment options.

2.1.1 Canadians are moving to electronic payments

Canadians are increasingly using electronic forms of payment, replacing cash and cheques. At the point of sale (POS), the widespread deployment of NFC-enabled³ terminals in key merchant locations in Canada has led to consumer adoption of contactless payment. Cash payments are being replaced by electronic debit, credit and prepaid transactions - cash now represents 43 percent of total transactions at POS, having declined 17% over the past 6 years. The increased availability of open mobile wallets (still evolving) and the introduction of new products and services will likely accelerate this migration away from cash to electronic payments.

The substantial increase in smart phone ownership in Canada (about 70 percent of Canadians use smartphones⁴) is changing consumer behaviour. Online banking is moving to the mobile device; consumers are now able to log in to their financial institution (FI) using their phone, and can bank or transact payments from anywhere. Almost 35 percent of Canadians reported using mobile banking in the last year, and 43 percent expect to conduct their banking using mobile devices in the near future.⁵ In addition, 48 percent of Canadians now use online banking as their primary method of bill payment.⁶ The continued expansion of mobile services is a key driver to accelerating the move to electronic payments.

Exhibit 4 summarizes shifts in payment methods at point of sale in Canada.

² See Chapman, Jaffri, Chiu Saiz (September 2015), "Public Policy Objectives and the Next Generation of CPA Systems: An Analytical Framework" CPA Discussion Paper 2015-2 for a full definition and discussion of these attributes

³ Near-field communication (NFC) is a short-range wireless technology for smartphones and similar devices that enables data transfer between devices and operates within ranges of less than 10 cm

⁴ Catalyst "With Growth Comes Change: the evolving mobile landscape in 2015"

⁵ Ibid

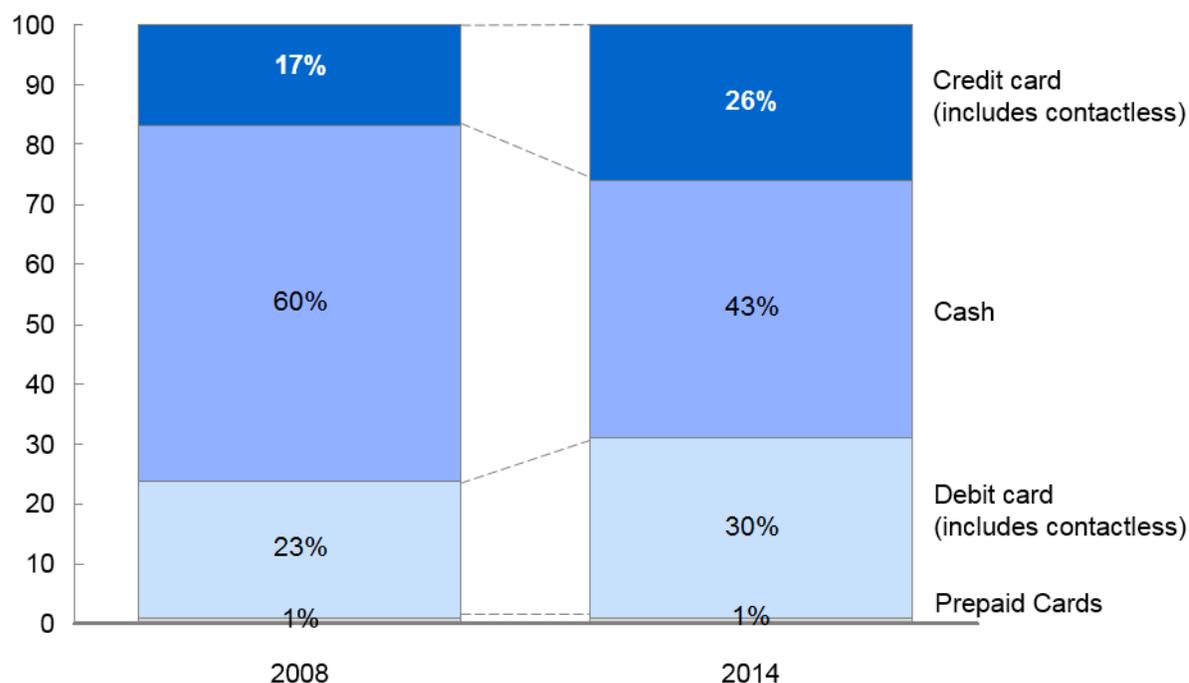
⁶ CBA Report "How Canadians Bank", July 29 2015

Exhibit 4: The electrification of payments is ongoing

Cash usage has fallen as debit and credit cards have expanded for POS

Canadian payment share by volume of transactions

Percent



Source: CPA- https://www.cdnpay.ca/imis15/pdf/pdfs_publications/2015-12-Payment-Methods-Trends.pdf

2.1.2 Security and privacy requirements are evolving

Fraud is also evolving as fraudsters seek out weak points in the system. Electronic commerce, where transactions are conducted remotely in seconds, requires clear rules and robust supporting processes. FIs have to make rapid authorization and fraud management decisions based on customer authentication and account information, transaction value, channel, and payee identity. To do so, FIs are increasing using new types of data (such as payment form factor and location) to support advanced analytics and to better manage fraud.

In Canada, transactions at POS have been protected from fraudsters through the introduction of EMV Chip and PIN technology. Contactless transactions also leverage the security provided by EMV. End-users continue to generate more electronic payments through other channels and with additional merchants. New authentication methods that use sensitive personal information, such as active and passive biometrics, are being developed and adopted. Protection of payment-related information by all ecosystem participants will be critical to minimize risk and maintain consumer and merchant confidence in the payments ecosystem.

In the e-commerce arena, where EMV chip cards are of limited value, payments players are increasingly leveraging tokenization of data “at rest” - and encryption to protect data “in motion”. Tokenization is the use of a proxy string of numbers rather than the true account or card numbers to protect sensitive payment information against credential theft. Encryption is being used to encode sensitive payment information so it cannot be used by hackers.

2.2 New players and technologies are entering the ecosystem

2.2.1 New entrants are focused on enabling a seamless payments experience for end users – and will accept risk to deliver

Payments is a popular arena for innovation. Some of the world’s largest digital companies (Apple, Google, Amazon, Facebook, PayPal), as well as hundreds of smaller financial technology (FinTech) companies are introducing innovative payment products and services. Examples include digital wallets, in-app payments, and app-based virtual banks. Some new entrants are focused on the revenue and data that can be captured by providing payment services, while others treat payments as an opportunity to strengthen the value proposition of their core products (e.g., Apple’s iPhones) or software (e.g., Amazon’s e-commerce platform for small merchants). (See Exhibit 5 for more details on innovations by new entrants.)

The evolution of the payments user experience is substantial. Innovators have made payment as simple as clicking a button (‘buy now with one click’), and some mobile applications remove the distinct act of payment completely from the transaction experience (as with ordering via Uber). Consumers are increasingly expecting payments to be fast and convenient, and even an invisible part of the transaction process – whether for paying a utility bill or a taxi.

However, these payment experiences may change the economics of the payment transaction. New entrants often choose to rely on credit or debit cards (which attract interchange) or pre-funding to support the immediate availability of funds for customers. Alternatively, these non-FI participants may choose to accept the risk (and cost) of providing customers with immediately available funds even though the funds will take a few days to work through the payment system. In addition, non-FI payment service providers (PSPs) using proprietary risk controls and operating without the regulatory obligations of deposit-taking institutions may introduce unintended risk into the payments arena.

FIs are also innovating payments, in part through peer consortiums and by partnering with FinTechs. For example, as of December 2015, there were 42 FIs from around the globe (including CIBC, RBC, TD, BMO and Scotiabank) participating in the consortium managed by R3CEV to explore applications of distributed ledger technology. Other examples include: Canadian Banks’ relationship (Scotiabank, RBC & TD) with FinTech Nymi in applying wearable biometrics for authentication; TD’s partnership with Flybits to provide more personalized mobile banking experiences; CIBC’s partnership with MaRS Discovery District to create a new corporate innovation hub and join MaRS’ new FinTech cluster; TD’s agreement with Communitel to explore innovation; and CIBC’s partnership with Earthport to deliver faster and more cost-effective international remittances. Earthport is a supplier to FIs that has partnered with Ripple, the creator of an open source distributed ledger application, to facilitate the exchange of value in near real-

time across borders.⁷ Network providers are also actively engaged in collaborating with FinTechs and other related innovators.

Exhibit 5 summarizes broad innovation types by new entrants and service providers in the payments space.

Exhibit 5: The payments landscape is evolving as new entrants and service providers innovate

Category	Nature of innovation	Impact on status quo*	Players
Digital giants	Create a more seamless payments experience to further build brand loyalty, gain customer data, and increase market share in their core hardware or software markets (e.g., one-click ordering for e-commerce)	<ul style="list-style-type: none"> “Owns” customer relationship and influences payment choices; potentially replaces existing payment options Provides platform provider with additional customer data Increases challenges for FIs to compete without level regulatory playing field 	
FinTechs	Fill market gaps created by traditional operating models (e.g., branch networks), legacy systems (e.g., aging national payment infrastructure) and regulatory constraints (e.g., KYC) using cutting-edge technologies	<ul style="list-style-type: none"> Routes transactions through systems with proprietary risk management controls due to challenges with existing rules 	
Service providers	Add value to existing FI products and service by targeting upstream or downstream activities (e.g., preparing payroll files, integrating invoices into accounting) or underserved segments (e.g., consolidating many SMEs payments)	<ul style="list-style-type: none"> Providing improved access (e.g., through APIs) to service providers will multiply value of enhancing infrastructure capabilities 	

SOURCE: Interviews *Partnering with any of these players creates new opportunities for FIs to innovate.

2.2.2 Disruptive technologies may impact the entire ecosystem

Innovative technologies are emerging that offer alternatives to traditional payment infrastructures and solutions. This extends to infrastructure functionality. ‘Blockchain’/distributed ledger technologies are among the most promising, due to the ability to address many fundamental issues related to trust – which is key to managing counterparty risk in financial transactions. Blockchain solutions are well suited to address international transactions that are challenged by

⁷ The Ripple network coordinates simultaneous transaction (using the distributed ledger) from the sender to market maker and market maker to recipient, which eliminates counterparty risk. Fidor, a branchless German bank was the first bank to publicly announce adoption of the Ripple protocol in 2014

borders, currency exchange and a correspondent banking network that creates complexity and cost and results in a lack of transparency and predictability.

In addition to consortium efforts, FIs are experimenting with blockchain technology in proprietary applications⁸ and additional announcements outlining proprietary applications of the technology are expected.

It will be important to monitor the application and impacts of blockchain as part of ongoing modernization efforts. Although still in its infancy, if blockchain/distributed ledger technology becomes widely accepted for mainstream use, this could have a significant impact on centralized clearing and settlement infrastructure.

2.3 The world is moving to faster payments with more information

2.3.1 Countries around the globe are modernizing payment systems

To date, Canada's payment infrastructure has performed as required, supporting participants with adequate clearing and settlement cycles, strong risk management policies and efficient access rules. As the payments landscape evolves both in Canada and globally, and as more countries go live with modernized infrastructure, the attributes of Canada's payment systems must keep pace to ensure Canadian businesses remain competitive.

At time of writing, we have identified 17 countries representing 45 percent by value of global payment flows⁹ that have gone live with modernized retail payment infrastructure. More are in the planning stages, and/or are currently designing and building new national payments infrastructure. The majority of these initiatives include what is often referred to globally as 'faster payments' - typically delivering 24x7x365 support for irrevocable/"good funds" payments that are exchanged and provide payee funds access in less than one minute.¹⁰ Exhibit 6 provides some additional details.

The United States – which represents 76 percent of Canada's exports and 67 percent of Canada's imports¹¹ – has been moving forward aggressively with payment modernization and has announced suppliers to support the development and implementation of a near real-time, ISO compliant solution that is expected to be operational in early 2017¹², as well as same-day ACH payments scheduled for the fall of 2016.

Canada and ultimately Canadian businesses risk becoming less competitive as other countries modernize. Canada is in the 'second wave' of countries that are currently in the plan, design or

⁸ RBC has announced that it may launch a loyalty program that leverages the technology as a 'low risk' way to introduce blockchain to consumers. American Banker, November 13, 2015

⁹ McKinsey Payments Map Q1 2015; National Payment Associations; Expert Interviews

¹⁰ SWIFT

¹¹ Statistics Canada

¹² The Clearing House Press Release, "Innovative Real-Time Payment System for the US – Vocalink", October 26, 2015

build phases of modernization. Canada is well-positioned to benefit from lessons learned in earlier implementations which can reduce implementation costs and accelerate timelines.

Exhibit 6: Modernization efforts around the globe

Canada is in the second wave of infrastructure modernization initiatives



SOURCE: Infrastructure provider and central bank announcements and global scan interviews

2.3.2 Global standards are emerging, improving local competitiveness where implemented

Much of the value of modernization is delivered by creating the capability for payment-related information to travel with the payment. The inclusion of payment information reduces the need for labour intensive processes such as reconciliation, and supports automated processing. ISO 20022 is a multi-part international messaging framework that supports including standardized payment-related information along with payment instructions. ISO 20022 has emerged as the global payments messaging standard, and is considered an essential component of any payments infrastructure modernization.

To date, 30 countries¹³ – including the U.S., Eurozone, and Japan – have adopted or are planning to adopt ISO 20022 as a payment message standard. After extensive consultation with

¹³ International Organization for Standardization, "Adoption Initiatives Introduction Maps," October 2015

stakeholders, Canada has committed to the adoption of ISO 20022, and the CPA has already overseen the development of rules to support ISO 20022 implementation for batch AFT credit and debit payments. The widespread adoption of ISO 20022 will also support international interoperability of payments systems, although significant coordination effort will still be required.

2.4 Canada’s regulatory regime is evolving but can do more to foster innovation and competition

2.4.1 Regulatory requirements are being enhanced

The Department of Finance (DoF) has articulated three main public policy objectives (PPOs) for payment systems: maintaining safety and soundness; efficiently and effectively carrying out clearing and settlement processes; and meeting the needs of Canadians and protecting their interests. Each objective has important implications for the payments infrastructure and for the industry (see Exhibit 7 below).

Exhibit 7: Public policy objectives and implications for the core payments infrastructure

Department of Finance objective	Implied desired outcomes for core payments infrastructure
Maintaining safety and soundness by measuring, managing and controlling risk	<ul style="list-style-type: none"> • Meet relevant BoC standards for systemically important and prominent payments systems • Maintain Canadians’ confidence in core systems and foster confidence in the broader payments ecosystem
Efficiently and effectively carrying out clearing and settlement processes	<ul style="list-style-type: none"> • Apply objective risk based requirements for access to core systems • Be easily scalable and ensure the ability to accommodate new payment types • Foster competition and innovation further along the payments supply chain • Employ technical standards that facilitate interoperability of domestic and international • Exploit technological innovation to minimize cost for participants
Meeting Canadians’ needs and protecting their interests – such as convenience, privacy, safety and price	<ul style="list-style-type: none"> • Support all eligible payment instruments that meet minimum standards • Avoid undue barriers to end-users switching between payments providers • Foster a safe, secure and convenient environment for all Canadians to transact

SOURCE: CPA, based on guidance from the Department of Finance for the PPOs for the broader payments ecosystem

- **Safety and soundness are maintained through infrastructure that complies with oversight standards** which are based on international best principles.¹⁴ Payments systems can fall into three categories of potential oversight: systemically important systems,

¹⁴ BoC standards for systemically important and prominent systems are based on CPMI-IOSCO Principles for Financial Market Infrastructures (2012) available at http://www.bis.org/cpmi/info_pfm.htm?m=3%7C16%7C598

prominently important systems, and national retail payment systems. Canada's large value system (LVTS – see 2.5) is designated a systemically important payment system and has been subject to Bank of Canada (BoC) standards since its inception. Continued maintenance and investment in the LVTS will be required to ensure on-going compliance and effective risk management.

- The BoC has indicated that it will likely designate the ACSS as a 'prominent' system in 2016.¹⁵ However, the ACSS currently does not meet several of the "prominent system" requirements, including same-day settlement, collateralization, and operational and analytical tools to identify, measure and monitor intraday operational and liquidity risks. In addition to requiring ACSS system upgrades, the prominent system designation will have impacts on all Direct Clearers (in particular, the shift to same day settlement and collateralization requirements). Please see Appendix 2 for a full list of prominent system requirements.
- Full details on national retail payment system oversight are still under development by the Department of Finance, but the Card networks could fall into this category along with other payment providers.
- **Improved access can support greater efficiency by fostering innovation and competition.** The Bank of Canada has expressed the desire for "open and risk-based objective access criteria" to core national payment systems.¹⁶ Access to CPA clearing and settlement systems is currently limited to CPA members and tiered, with direct clearers or participants providing services to organizations that do not qualify or choose not to connect directly.
- Although some non-deposit taking financial institutions are eligible to be members of the CPA, of this group only security dealers are eligible to be direct clearers. Many other FI members do not meet the current volume requirements. However, even if they could connect, many would likely continue to access through intermediaries for cost and other business value reasons.
- Indirect clearers may currently experience an extra day delay in processing that can create a customer service disadvantage relative to direct clearers. The concentration of payments cleared in a small number of direct clearers increases systemic risk.
- Current restrictions on direct access to core infrastructure are therefore an issue for some Indirect Clearers, and have periodically been raised as an issue by other payment service providers.
- **Canadians' needs are evolving.** User expectations for speed, ubiquity and available data in payments are increasing as the digitization of the economy continues. Please see section 3.1 for a discussion of how expectations for convenience, security and privacy are changing.

¹⁵ Amendments to the Payment Clearing and Settlement Act in 2015 give the Bank of Canada the responsibility to designate and oversee payment systems that have the potential to pose payment system risk - referred to as prominent payment systems. See speech by BoC Deputy Governor Lawrence Schembri for likely designation

¹⁶ See speech by BoC Deputy Governor Lawrence Schembri, 2014 calling for open, risk-based access <http://www.bankofcanada.ca/2014/06/dual-vision-canadian-payments-system/>

2.4.2 Oversight is not systematically based on a functional approach (what you do)

Regulation is intended to promote markets that are fair and efficient, and to ensure that customers are protected from risk and treated fairly. A functional approach to regulation, where the focus is on the product or service, can provide better protection for system participants and end users through enhanced consistency of rules, regardless of the nature of the service provider. However, currently oversight is not systematically based on a functional approach across the payment ecosystem. Oversight should also be proportional to the level of risk that a payment system could introduce (e.g. systemically important payment systems are subject to higher risk management standards than prominent systems or national retail payment systems).

The evolution of the payments ecosystem has led to greater diversity in the participants that deliver products and services to end users. In the national retail payment space in particular, existing rules and regulation have focused on the nature of the provider (i.e., a bank is regulated differently than a non-FI PSP or retailer) rather than the service that is provided (e.g., both entities may hold or transact funds on behalf of consumers). To support flexibility and innovation, rules and regulation should ensure that all payment service providers, both FIs and others, are equally advantaged and equally obligated to deliver solutions that protect the safety and soundness of the ecosystem.

Other jurisdictions are exploring modifications to provide more flexibility and options for oversight and associated access to core infrastructure. The New Access Model in the UK is being implemented to provide a competitive market of accredited service providers to deliver technical and operational options to non-bank and other payment service providers, allowing access by a wide range of entities to the UK's Faster Payment Service. The Payment Services Directorate 2 (PSD2) in the European Union creates two new types of third party payment service providers allowing for arrangements that broaden access and clarify rules.¹⁷

2.5 Canada's core payment infrastructure is aging and will struggle to adapt to the evolving internal and external context

The CPA is the owner and operator of two domestic clearing and settlement systems: the Automated Clearing Settlement System (ACSS)¹⁸ and Large Value Transfer System (LVTS). While both have served the Canadian economy and payments ecosystem well, these systems present operational challenges and struggle to evolve at the speed now required by the industry and end users.

The ACSS was built in 1984 to support the clearing of retail payments including ATM/POS debit transactions, electronic funds transfers (debits and credits, electronic data interchange), and cheques. The ACSS is a batch total entry system. FIs exchange messages bilaterally outside of the ACSS throughout the day, make separate manual entries of batch totals into their individual

¹⁷ for the UK's New Access Model, refer to http://www.fasterpayments.org.uk/default/files/FPS_Payment%20Access%20Whitepaper.pdf; for PSD2, refer to http://ec.europa.eu/finance/payments/framework/index_en.htm

¹⁸ The CPA operates a third smaller clearing system called US Bulk Exchange (USBE) that facilitates the clearing of USD payment items between accounts held at Canadian financial institutions.

back-office ACSS terminals, and the ACSS calculates multilateral net positions that settle the next day. The lack of automation and limited functionality in the ACSS¹⁹ makes modifications challenging: any change requires coordination across all 12 direct clearers and will have secondary impacts on other PSPs.²⁰

The LVTS was launched in 1999, and facilitates irrevocable wire payments between direct participants including transfers between FIs to settle paper-based transactions, and transfers between FIs and the BoC to settle retail transactions made through the ACSS.²¹ While the LVTS provides standard risk management tools, it does not provide value-add services to participants, such as dynamic reporting, payment queue monitoring/prioritization, and business intelligence tools. The LVTS interfaces with the SWIFT network for payment messages and with proprietary systems operated by direct participants. These proprietary systems may also present technological and operational challenges to the introduction of new products and services that offer ubiquity.

The aging architecture of both the ACSS and LVTS makes the introduction of new payment products and services challenging. For example, systems lack modern APIs (application programming interfaces – a set of routines, protocols, and access tools) to facilitate the development of new applications and software that leverages payments infrastructure.

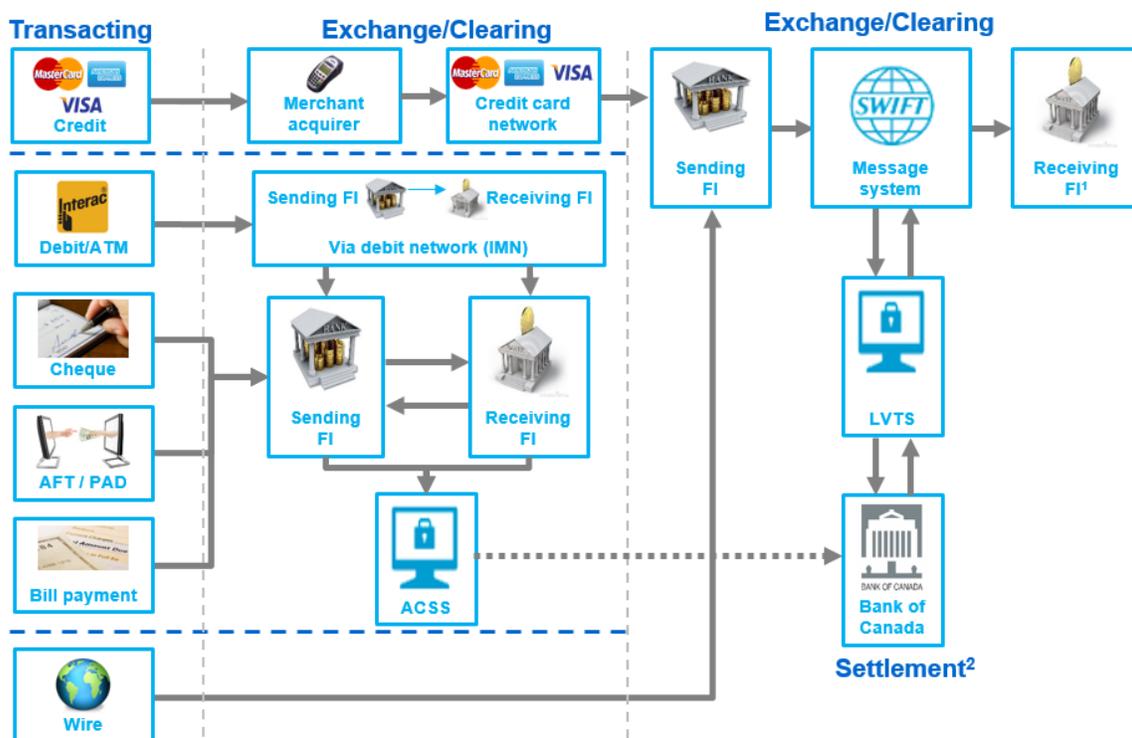
The existing clearing and settlement infrastructure is summarized in Exhibit 8.

¹⁹ Batch retail systems in other countries (such as the US, UK, and Japan) offer functions including intra-day reporting for treasury management, automated notifications and messages, and account switching service that automatically update customers' automatic payments

²⁰ For example changes in the timing of bilateral file exchanges will impact the timing for payroll companies to deliver their files to FIs

²¹ Direct participants in ACSS that have a net debit position make an LVTS payment to the Bank of Canada to cover their position (plus interest). Settlement is then effected by a credit entry on their ACSS settlement account with the Bank.

Exhibit 8: Overview of core exchange, clearing and settlement infrastructure



1 For credit card settlement, the 'Receiving FI' is the FI through which the credit card company (e.g. Visa) has its settlement account.

2 Settlement takes place via the Bank of Canada (BoC) by a credit or debit entry on the applicable FI settlement account with the Bank. Any FI that is in a short/negative position transfers the amount owed (plus interest) via LVTS to the BoC; any FI that is in a long/positive position receives a transfer from the BoC via LVTS for this amount (plus interest).

SOURCE: Canadian Payments Association

3. Findings on stakeholder needs

3.1 Methodology

This vision has been developed using input from ecosystem participants captured in workshops and interviews, and from a global scan of modernization initiatives in other countries. A consultative approach was designed to build on CPA stakeholder outreach efforts earlier in 2015 focused on the design and implementation of the ISO 20022 messaging standard. The vision has been created using a ‘market back’ or ‘end-user’ approach to understand where end-users and industry participants feel the existing ecosystem meets and does not meet their current and future needs in specific use cases.

The CPA consulted key payments stakeholders including consumers, small and medium businesses, large corporate businesses, governments, FIs, suppliers, network and payment service providers and FinTech companies. Discussions with the DoF and BoC also provided important input on public policy and regulatory objectives. The CPA gathered input and feedback on several payment use cases, as outlined in Exhibit 9. The findings in this document reflect the perspectives of approximately 100 organizations. For a full list of organizations that contributed to the vision, please see Appendix 1.

Exhibit 9: Use cases considered in consultations on user needs

Transaction category	Use case	Example
Business to business	<ul style="list-style-type: none"> ▪ Regular (recurring) domestic ▪ Time-sensitive domestic ▪ Regular (recurring) international ▪ Time-sensitive international 	<ul style="list-style-type: none"> ▪ Payment to Canadian supplier ▪ Purchase of commercial real estate ▪ Payment to foreign supplier ▪ Acquisition of international company
Business to person	<ul style="list-style-type: none"> ▪ Regular domestic payroll ▪ Irregular or temporary domestic payroll ▪ Other irregular or one-time payment ▪ Irregular international payroll ▪ Domestic government disbursement ▪ International government disbursement 	<ul style="list-style-type: none"> ▪ Monthly direct deposit of employee's salary ▪ One-time payment to temporary employee ▪ Payment for insurance claim ▪ Payment to web developer abroad ▪ Tax refund ▪ Pension payment to Canadian expatriates
Person to business	<ul style="list-style-type: none"> ▪ Recurring bill payment ▪ One-time bill payment ▪ In-person point of sale (POS) purchase ▪ Remote purchase 	<ul style="list-style-type: none"> ▪ Payment of monthly phone bill ▪ Payment to contractor for home repair ▪ Purchase at retail store ▪ Online (in-browser) purchase of books
Person to person	<ul style="list-style-type: none"> ▪ Domestic ▪ Cross-border 	<ul style="list-style-type: none"> ▪ Allowance for child at university ▪ Remittance to family abroad

SOURCE: Canadian Payments Association

3.2 Key findings from consultations – desired features

There are several common themes that emerged across stakeholder groups. These themes can be grouped into the following broad categories:

- Timing of availability of funds,
- Provision of payment data,
- Visibility into payment status,
- Improved privacy and ability to receive payments, and
- International payments.

Findings related to needs expressed by users in each of these categories are described in more detail below. See Exhibit 10 at the end of Section 3.2 for a summary of needs mapped against the major use case categories explored in the user workshops. For additional details, please see Appendix 2.

3.2.1 Provide capabilities to offer near real-time availability of funds with data, usable near 24/7

The most common request across end users was for the near real-time availability (seconds or minutes) of funds to support time-sensitive transactions²². There was also recognition across some end users that for certain use cases the availability of funds in hours is sufficient.

Consumers seek a P2P experience that is fast and simple “like using cash” but with enhanced functionality²³. Consumers are generally pleased with the existing market capability²⁴ to transfer funds, and expressed the desire to use electronic P2P functionality for more types of transactions with some additional data and for higher values of payments, truly in near real-time and with a simpler interface. Small merchants and other organizations (such as schools) typically only accept payment by cheque. The lack of a convenient, affordable electronic options hinders the migration away from paper payment instruments.

Business users are frustrated by the time delay and costs associated with wire payments. Businesses located on the west coast of the country are often challenged by the EST end-of-business-day cut-off time to submit a payment for processing. Many wires are for amounts that are not substantial (less than \$10,000) but need to be received by the payee the same day. Business users seek a cost effective solution that provides good funds and finality (irrevocable)²⁵ in near real-time (minutes or even a few hours), in some cases with notification and payment data.

Some transactions, such as regular payroll disbursements or recurring supplier payments are less time-sensitive and can often be scheduled well in advance of the payment date. End users were generally satisfied with existing options for many of their existing demands. However as business and employment models evolve – such as the growth in contract workers and distributed models

²² Near real-time availability of funds does not require real-time settlement of the payment.

²³ For unbanked and underbanked Canadians, consumer representatives advocated for the continuing use of existing products and/or new products that support financial inclusion.

²⁴ For some time, Interac has offered a near real-time person-to-person funds transfer service through most Canadian financial institutions that offers a convenient 7/24 service. Complementing this service, Interac recently introduced a new e-transfer bulk disbursement service in response to demands of today’s businesses. Leveraging email, Canadians and businesses can initiate near real-time funds transfers. Certain limits on transaction values, remittance data and automatic deposit services remain at issue for payment system users.

²⁵ While funds may be irrevocable, processes will need to be in place, particularly for consumers, to address error corrections and returns, similar to existing bill payment processes today.

of semi-independent employees (e.g., Uber or Lyft drivers) traditional solutions may no longer be adequate.

3.2.2 Provide more data about the payment and with the payment

Canadian stakeholders continue to rely on cheque and paper or electronic invoice information to provide information about the payments they send and receive. Businesses spend considerable time and effort reconciling electronic payments to their associated invoices for goods and services – which are often received separately from the payment – or matching invoices to the account information included on cheques. For large corporations, this challenge is compounded by the complexity of large shipments in which the goods/payments entered into accounts receivable (A/R) systems may not match invoices (for example, if one pallet of goods is damaged in transport and rejected). Often this information has to be manually entered which takes time, adds expense and creates the risk of errors. Ideally, electronic payment information could be integrated into business accounting software allowing for the fully automated (straight-through) processing of payments.

Lack of electronic remittance information remains a key driver of continued cheque usage for small businesses. Data requirements for small businesses are simple: in most cases, a name and brief description of goods/services would be sufficient. Small business users also identified the opportunity to send requests for payment with basic information (a 'light invoice') to customers, which could improve cash flow.

Federal government agencies send approximately 300 million payments every year.²⁶ These agencies often send payments that require explanation (such as tax refunds) to consumers and businesses. Without a method to send funds and explanatory information together, governments must continue to rely on cheques and paper statements. In addition, they cannot bundle multiple disbursements into a single payment without potentially confusing the recipient.

3.2.3 Provide transparency into payment status

Stakeholders would like more visibility into the status of a payment from initiation to completion. Consumers would like to be notified when recipients receive funds that have been sent electronically. This functionality would be especially helpful for recurring and time-sensitive payments. Businesses specifically called out the time and effort required to manually inquire into the status of wire payments, especially the processing delays for international wires which can be significant.

Businesses and governments would benefit from transaction tracking: notification of returns and errors from FIs can take several days and, in some instances, an error may not be apparent until a payee calls to inquire about a missing payment. FIs have also indicated that they would like more transparency into payment progress and status. The ability to track a payment through processing stages of domestic and corresponding bank networks would allow FIs to provide an improved customer experience.

²⁶ Public Works and Government Services Canada

3.2.4 Improve user privacy and make it easier to send and receive electronic payments

Stakeholders would like the capability to route payments using known information about the recipient (telephone number or email address, for example) rather than specific account information. Some consumers are sensitive about providing account information to send or receive payments and would prefer to provide less sensitive information such as a phone number.

Consumers would like the flexibility to select a destination account for an incoming payment that is not pre-arranged with the sender. The ability to route funds onto a prepaid card may be especially important for those Canadians who do not have bank accounts.²⁷

Businesses often do not have the bank account information necessary to make payments or refunds automatically to customers' accounts.²⁸ In these cases a solution that can route a payment based on commonly held employee or customer information (such as a phone number) would be helpful.

Governments are interested in paying consumers using an alternative to a bank account number. In addition, in certain situations, Governments would like confirmation that a payment is being sent to the correct recipient before the payment is sent, as error correction for misdirected payments is time-consuming and costly.

3.2.5 Make it easier to send and receive international payments

Consumers and businesses expressed frustration with the speed, efficiency, cost and lack of transparency provided with cross-border payments. Canadian consumers send approximately \$23B of remittance payments abroad²⁹ every year and cost is a concern, especially for lower value payments. Large corporations often maintain foreign bank accounts for urgent payments because international wires can take several days to process. Governments that need to provide payments to citizens residing outside of Canada either partner with a financial institution or issue foreign denominated cheques. Recipients of cheques sent from Canada in Canadian dollars often pay significant foreign exchange fees.

Commerce is increasingly global and payment solutions are needed for cross-border activities. As Canada considers opportunities to evolve the payments ecosystem, it is critical that any modernization efforts consider interoperability with existing and emerging international standards.

²⁷ 4% unbanked population based on 2015 Financial Consumer Agency of Canada figure

²⁸ Excluding purchases that were made with credit or debit cards, where the refund can be processed directly through the card network

²⁹ World Bank

Exhibit 10: Summary of needs by use case

	24/7 near-real-time availability of funds	Increased remittance data with payment	Transparency into payment status	Routing with minimal information	Easily send and receive international payments
B2B	One-time, time-sensitive domestic payments	All non-EDI B2B	Time, sensitive, international payments	One-time payments	International payments
P2B	POS and time-sensitive bill payments	All bill payments (time-sensitive and normal / recurring)	All bill payments (time-sensitive and normal / recurring)	One-time payments	
B2P	Payroll for temporary or irregular workers	Non-payroll business to person and government to person	All B2P	Payroll for temp or irregular workers	All non-domestic B2P payments
P2P	Low and moderate value domestic P2P		All P2P	All P2P	Low-value international remittance payments

Need partially met today  Need unmet today 

SOURCE: Stakeholder workshops and interviews; CPA

3.3 Key findings from consultations – rules and standards

FIs, payment service providers and regulators expressed a need for clearer system access requirements and for industry oversight that fosters competition and innovation while effectively managing risk. As the payment ecosystem evolves, core systems should similarly evolve and continuously improve cost efficiencies and remain flexible to support continued innovation of payments technology.

3.3.1 Streamline oversight to focus on functional activity rather than institutional entity

A number of ecosystem participants (FIs, FinTechs, Public Interest Advocacy Centre/PIAC, payment service providers) raised the need for an oversight framework that fosters payment innovation in Canada. Rather than focusing on the type of service provider (FI vs. non-FI), rules and regulations should be evenly applied to industry participants based on the service provided (for example, holding funds) and associated risks. A fair and balanced oversight model for the payments system better assures the compliance of system participants to rules which safeguard these participants and serve to protect consumers and other users.

Additionally, participants suggested that rules and regulation should focus more directly on outcomes rather than the process followed to deliver the outcome. Otherwise, it will be increasingly challenging for regulation to keep pace with technological change. Rules should also be more principle based in order to support innovation and varied approaches to meeting risk standards. For example, customer authentication processes have benefited tremendously as a result of additional customer-related data that is digitally available (such as geolocation embedded in mobile phones used for payments), but current rules and regulations make it challenging for industry participants to innovate away from traditional Know Your Customer (KYC) activities.

3.3.2 Improve access to clearing systems

The ACSS currently operates using a tiered structure where direct clearers/participants provide services to indirect clearers/participants. Indirect clearers typically experience an additional day, and sometimes two, for ACSS transactions to be processed. This additional time can create risk (and expense) for indirect clearers and places them at a competitive disadvantage relative to direct clearers. Indirect clearers expressed the need for more efficient access and to remove unnecessary and/or subjective barriers (e.g. half of one percent volume criteria) and implement objective risk-based criteria so decisions on whether they would directly access core systems and exchange payments with counterparties would be based on a proper business case. Rather than connect directly to core systems given the associated technology, operations, compliance costs and regulatory burden, new entrants expressed a desire for improved access to support their ability to exchange payment items with the core retail clearing system (to build software applications on top of core platforms) and greater competition and choice for exchange and clearing services. Ensuring access options, either directly or indirectly to the payments system, serves to promote competition and innovation and conceivably would reduce concern over concentration levels or the ability of participants to adversely impact market dynamics at the expense of users.

3.3.3 Deliver long-term cost efficiencies

Direct participants in both ACSS and LVTS have expressed a need for increased efficiencies across the ecosystem and long-term and sustainable reductions in end-to-end transaction costs. Infrastructure should be flexible to support innovation to drive efficiencies.

Direct participants in the LVTS seek more transparency into counterparty positions and liquidity management tools to assist in the management and reduction of collateral expenses. Examples include reports on recent credit-line use and over-collateralization and intraday forecasts of payments volumes. These tools will likely become even more impactful once the ACSS has been deemed a prominent system requiring collateralization (depending on how collateral is managed across both ACSS and LVTS).

3.4 Key findings from a global scan of modernization initiatives

Interviews were held with representatives from payment associations, central banks, suppliers and participating FIs in geographies that have implemented new payments infrastructure or taken steps toward modernization. Discussions focused on capturing key learnings and best practices related to stakeholder consultation, system architecture, access, common features and

functionality of enhanced infrastructure, implementation and governance. Detailed descriptions of selected international modernization efforts can be found in Appendix 3.

Based on these learnings, the CPA has defined five attributes for any payment system: timeliness of payment; functionality; credit risk management; interoperability; and access (see footnote #2). Global modernization efforts implemented recently at least partially address all of these attributes as outlined in Exhibit 11. Additional findings from previous implementations are discussed below.

Exhibit 11: Common features of modernized payments systems

Attribute	Design feature	Trend
Timeliness of payment	Near-real-time funds availability	
	Good funds	
	24/7 processing for payments exchange	
Functionality	ISO 20022 compliant	
	Notification services, switching services and proxy directories	
	Central queuing and optimization for high-value system	
Credit risk management	Deferred net settlement for retail and RTGS for high-value	
	Same-day or intraday (with 5-29 windows) retail settlement	
Interoperability	ISO 20022 compliant	
Access	FIs-only (vs non-FI and service providers having indirect access)	
	Tiered access	

 Included in almost all recent infrastructure modernizations

SOURCE: CPA Next Generation Core Payment System Research, Qualitative Analysis; McKinsey Payments sources

3.4.1 Global observations – timeliness of payment

International modernization efforts predominantly include ‘faster payments’ initiatives. ‘Faster’ is becoming synonymous with ‘near real-time’ - and recent implementations support the provision of good funds in less than 60 seconds. ‘Faster’ also means ‘always available’ - with most countries supporting end user funds availability 24/7/365.

This level of availability has impacts on system participants, as supporting payment processes such as customer authentication, account authorization, AML and other risk checks must also be

provided in near real-time. The irrevocability of these transactions requires clear communication with end users to ensure this is understood.

3.4.2 Global observations – functionality

Value added services can support adoption and drive transaction volumes. Several faster payments implementations have included additional functionality at launch that supports the creation of new products and services and supports transaction growth on the new system. A common service is a proxy or alias data directory to support payment routing using information such as a cell number or email address rather than account information. A proxy directory can be provided as part of a near real-time solution or as a standalone service. Additional value-added shared services include fraud management and compliance services that monitor all transactions at a system or industry level to identify suspicious activities.

3.4.3 Global observations – settlement and risk management

Near real-time payment clearing does not require near real-time settlement. With a few exceptions, most jurisdictions have continued to use deferred net settlement (DNS) processes to support near real-time payment systems. Payment modernization initiatives typically involve implementing additional settlement windows to support 24/7/365 operations and to provide additional risk management capabilities. Alternatives to DNS include prefunding where central bank accounts serve to support real-time good funds transactions (Taiwan, Poland, Sweden), and Real Time Gross Settlement (RTGS) where transactions are settled individually, in real-time (Switzerland, Turkey, Australia).³⁰

Efficiency improvements are also being introduced to large value systems as part of core payment system modernization efforts. Examples include queuing algorithms that delay processing transactions until they can be netted against an inverse payment order from the same participant, and improved collateral management tools. The implementation of digital tools to better manage collateral can substantially reduce collateral expense.

3.4.4 Global observations – interoperability

ISO 20022 has become the global messaging standard for the financial services industry, and provides a common payments language that enables interoperability and industry efficiencies in electronic payments processing. ISO 20022 can support the inclusion of basic payment details and associated remittance information, allowing this data to travel in a payment message. ISO 20022 is extensible, and can be adapted to use cases requiring more or less information (such as unstructured fields, or industry-specific information). Most recently, The Clearing House in the US announced that their faster payments solution will use ISO 20022 to support near real-time payments.

³⁰ Batch systems are increasingly relying on settlement before exchange (SBE) architectures that integrate exchange, clearing, and settlement processes by automatically linking to high-value systems for settlement upon batch entry (e.g., Denmark and New Zealand)

3.4.5 Global observations – access and approach to clearing arrangements

Bilateral clearing arrangements can work very effectively in situations where there is a limited number of direct participants, and one-to-one relationships can be easily maintained. As the number of participants increases, hub-and-spoke architecture becomes more efficient due to the ability to support the addition of new participants at the centre of the system (as opposed to at every end point). Hub-and-spoke with tiering (direct connectors support indirect connectors) is the most effective way to support participation in countries with a large number of participants. Hub and spoke architecture is also more conducive to the provision of shared services, as these services can be located in the hub and are easily accessible to all participants. Australia is the only country that has implemented bilateral clearing arrangements as part of its modernization initiative (several other countries have hybrid arrangements).

National payment systems are increasingly accessible to non-bank entities. Several countries, including Mexico, Japan, and Switzerland, have recently made rule changes permitting non-bank FIs (such as insurance companies), payment service providers, and non-financial corporates (such as telecoms) to directly access core payment clearing infrastructure. Brazilian regulation now allows non-bank payment service providers to open settlement accounts with the central bank.³¹

The UK is making use of several mechanisms to broaden access to the Faster Payments Service in 2016. These include a new accreditation scheme to support the introduction of payment aggregators; moving to a risk-based model rather than a 'one size' approach; and modification to the settlement model to reduce the reliance on cash as a form of collateral.³²

³¹Non-banks in Retail Payments, CPMI, September 2014

³² Faster Payments, <http://www.fasterpayments.org.uk/access-payments/vision-new-access-model>

4. Impact and potential implementation considerations

4.1 Initial estimates on opportunities to create value for ecosystem participants

Enabling payments providers to meet the evolving needs of end users could create substantial value for the ecosystem. A highly preliminary estimate has identified the opportunity to migrate a significant volume of addressable transactions that would drive value to each constituent group.

4.1.1 Methodology

- **Identify the pool of eligible transactions:** A review of 2014 payment transactions at an industry level identified that more than 1.2 billion transactions (“addressable transactions”) could potentially migrate from existing cash, cheque and electronic products to products and services that deliver the identified features of a modernized payment system. This figure includes only transactions that would benefit from additional functionality (see Appendix 4). For example, regular payroll transactions would not be included in the pool of eligible transactions as end user needs are already well met.
- **Estimates of potential value created are directional only at this time:** The methodology used for estimating potential value is based on determining the number of transactions (“addressable transactions”) that could benefit from new/additional functionality, estimating the potential benefits and fee impacts by user group and use case for those addressable transactions, estimating the portion of addressable transactions that migrate to new services over time, and using this to drive estimates of total potential value. Please see Exhibit 12 for additional information on drivers of value by use case. Additional information on value drivers can also be found in Appendix 4.

Exhibit 12: Drivers of value by use case

Low value High value Difficult to quantify

	Fis and other service providers	Large corporate	Government	SMB	Consumer
B2B (regular payments)	<ul style="list-style-type: none"> Operational efficiencies from collecting, verifying, and exchanging fewer cheques Incremental fee and float revenue 	<ul style="list-style-type: none"> Operational efficiencies from reduced reconciliation effort and cheque usage 	<ul style="list-style-type: none"> Operational efficiencies from reduced reconciliation effort and reduced cheque usage 	<ul style="list-style-type: none"> Operational efficiencies from electronifying invoicing Improved cash flow and working capital for supplier payments 	<ul style="list-style-type: none"> Not applicable
B2P (irregular payments)	<ul style="list-style-type: none"> Efficiencies from collecting, verifying, and exchanging fewer cheques Incremental fee and float revenue 	<ul style="list-style-type: none"> Operational efficiencies from electronification of cheque payroll and refunds 	<ul style="list-style-type: none"> Operational efficiencies from electronification of error replacement cheques 	<ul style="list-style-type: none"> Operational efficiencies from electronification of cheque payroll (e.g., temp workers, errors) 	<ul style="list-style-type: none"> Faster availability of funds Reduced fees from cheque-cashing services
P2B (bill pay)	<ul style="list-style-type: none"> Incremental fee and float revenue Greater intermediation of payments as use of cash is reduced 	<ul style="list-style-type: none"> Improved cash flow from faster receipt of payments Operational efficiencies from e-billing 	<ul style="list-style-type: none"> Less collections effort (e.g., by sending e-invoice for overdue payment) 	<ul style="list-style-type: none"> Operational efficiencies from e-billing Improved cash flow 	<ul style="list-style-type: none"> Reduced fees for emergency bill pay services Fewer late payments
Other including P2P (not exhaustive)	<ul style="list-style-type: none"> Reduced losses from card not present fraud, although fraud may migrate 	<ul style="list-style-type: none"> Operational efficiencies from improved reconciliation for B2B cross-border payments 	<ul style="list-style-type: none"> Ability to get time-sensitive funds to end users more quickly 	<ul style="list-style-type: none"> Improved productivity from faster release of goods from suppliers 	<ul style="list-style-type: none"> Lower fees for sending near real time funds for emergency, high-value P2P transfers

SOURCE: Stakeholder consultations; McKinsey Payments Map; expert interviews

4.1.2 Summary of impact

To facilitate scenario planning, preliminary value estimates are reported as the marginal impact of 1% increments of addressable transactions migrating to enhanced payments solutions.

For initial adoption, each 1% of addressable transactions that migrate to new products could generate at least \$14-20 million of estimated value per year for end users (refer to Appendix 4).

It should be noted that these are estimates that are net of any investment costs, and do not include other possible but difficult to quantify benefits.

Examples of other possible benefits include cases where businesses could benefit from improved cash flow and working capital productivity. Also, consumers would likely enjoy greater convenience and peace of mind from an improved payments experience. Finally, financial institutions could be presented with additional revenue opportunities from the introduction of entirely new products and services to customers (such as e-invoicing solutions) and may benefit from operational savings (such as decreased customer inquiries on the status of payments). Relevant areas of quantifiable and difficult to quantify value are summarized in Exhibit 13 below.

Exhibit 13: Summary of quantifiable and difficult to quantify value

Modernization will drive quantifiable value and other benefits

Quantifiable sources of value	Difficult to quantify sources of value
<ul style="list-style-type: none"> ▪ Operational efficiencies for Canadian businesses <ul style="list-style-type: none"> – Improved reconciliation (from additional and standardized remittance data) – Less cost, effort, and staffing preparing, sending, and processing payments (e.g., fewer cheques) ▪ Operational efficiencies for Financial Institutions <ul style="list-style-type: none"> – Reduced costs from collecting, verifying, and exchanging fewer cheques – Reduced effort to process and verify fewer wire payments – New variable costs for sending/receiving enhanced payments products (e.g., payments with more remittance data, near real time payments) ▪ Incremental fees paid by end-users to FIs <ul style="list-style-type: none"> – New bank fees for sending/receiving enhanced payments products (e.g., payments with more remittance data, near real time payments) – Reduced fee revenue from migration away from existing instruments (e.g., cheque fees, wire fees) ▪ Incremental fees paid by end-users to third-party service providers <ul style="list-style-type: none"> – Fees for emergency money transfers (e.g., money orders, emergency bill payments) 	<ul style="list-style-type: none"> ▪ Difficult to quantify business value <ul style="list-style-type: none"> – Improved cash flow and working capital productivity – Reduced effort sending, collecting, and reconciling payments for small business owners – Operational efficiencies from cross-border transactions ▪ Intangible consumer benefits <ul style="list-style-type: none"> – Ease and convenience of payment experience – Reduced costs from use of cash (e.g., loss, theft) – Peace of mind from notifications ▪ Additional sources of revenues <ul style="list-style-type: none"> – Revenue from innovative products and services (e.g., full e-invoicing solution) – Stronger customer relationships from greater intermediation of payments ▪ Broader macroeconomic benefits <ul style="list-style-type: none"> – Productive reinvestment of cost savings – Increases in commerce due to ease of payments ▪ Changes in fraud losses ▪ Long-term reductions in end-to-end-processing costs (e.g., from exception processing)

In terms of possible adoption paths for a modernized system, significant volumes of payments could eventually migrate to a near real-time, data rich payment system. For example, within 5 years, other countries have seen 10 to 40 percent of transactions use new infrastructure. UK Faster Payments saw greater than 20% transaction growth per year on the Faster Payments System to nearly one billion transactions in the fifth year.³³ The Canadian experience will likely differ as each country begins the modernization journey from a different starting point. The value and pricing of new payments solutions will also have a substantial impact on adoption rates.

More details can be found in Appendix 4.

4.1.3 Sources of value for large corporates

Quantifiable benefits will accrue primarily to large businesses and governments. Support for the ISO 20022 message standard for commercial payments will enable large corporations to reduce the labour costs associated with AR/AP reconciliation (especially for AFT and wire payments).

³³ Vocalink “Spotlight on UK Faster Payments: Five years on”

- As part of the its on-going Modernization project, the CPA will be conducting research and engaging Canadian FIs and other stakeholders to get a better understanding of these costs, benefits and adoption paths.

Payment details, including order details and account numbers, could be included with payments eliminating manual reconciliation effort. Standardized messaging can support a true straight-through processing solution that incorporates remittance and payment information directly into accounting and ERP software. Government bodies will likewise be able to bundle payments together and send them electronically with explanations to recipients rather than sending individual cheques or AFT payments.³⁴

Proxy routing directories will allow businesses to process payments without customer bank account information. This capability would support the use of electronic payments instead of cheques for regular and irregular payroll or to issue refunds electronically using a customer's email or phone number. The ability to quickly test and confirm payment details to identify routing errors could decrease the operating expenses and cheque processing costs related to payment exceptions and would improve the user experience (the notification of returns and errors from FIs currently can take several days).

Faster funds availability will enable businesses to compress ordering and payment cycles, improving their productivity. Greater transparency into payment processing will improve funds management. Large businesses should also benefit from a reduction in fees as transactions migrate from wire payments to a less expensive real-time alternative.

4.1.4 Sources of value for small and medium businesses

Like corporates, small and medium businesses (SMBs) will see productivity and cash flow benefits of faster funds availability. SMBs should benefit from the migration of transactions away from cheques to electronic alternatives and reductions in the aggregate costs associated with cheque processing and reconciliation. Near real-time notification of payee receipt of funds (and notification of delays or errors) will reduce effort spent tracking sensitive payments. Knowledge of when a payment will be, or has been received will allow businesses to better manage cash flow and investments. Proxy directories and the ability to send bulk electronic payments will provide SMBs with greater payment flexibility and functionality. The introduction of electronic invoicing capability will further reduce cheque and invoice-related expenses, including paper and postage costs.

4.1.5 Sources of value for consumers

The ability to transfer funds electronically in near real-time will reduce consumers' need to use cash or cheques for P2P and P2B payments, and will reduce the risk and penalties associated with insufficient funds or late bill payments (assuming corporations will move towards applying payments as they are received and/or apply rules based on the timing of receipt of payments).

Payment-related notifications to payees and payors will enhance the payment experience and reduce the need for payment status inquiries. Canadians who currently receive irregular payroll payments by cheque or are in urgent need of funds will benefit. Migration of cash transactions to electronic near real-time payments will be an early contributor to the system's growth.

³⁴ Impact estimates are not based on specific adoption curve. See Arjani "The economic benefit of adopting ISO 20022 payment message standard in Canada", CPA Discussion Paper, 2015 for an alternative approach

4.1.6 Sources of value for FIs

Enhanced infrastructure will provide a platform for FIs to innovate and enhance their strong customer relationships. Innovations in payments will complement and enhance other transformations FIs are undertaking, from digitizing key processes to providing customers greater transparency into their overall financial activities. Maintaining transaction volumes that might otherwise migrate to other non-bank platforms provides critical information about customers that will enable FIs to develop and tailor products across retail and commercial banking.

FIs will benefit from operational savings as consumers and businesses migrate away from instruments with relatively high processing costs (such as cash and cheques, which must be collected, exchanged, and reviewed) and may see decreases in customer inquiries with faster payments and more notifications. More digital payments and shifts in customer interactions around payments will also likely facilitate other opportunities for efficiency and effectiveness gains in banking operations. Countering this to some extent will be requirements on the part of FI's to maintain existing infrastructure and associated fixed costs until legacy products/services have fully migrated or been converted.

Migration to enhanced products and services will impact FIs' existing revenue streams. The net effect of customer migration between instruments (for example, from cheques to payments that provide rich remittance data, or from wire transfers to near real-time transfers) is expected to be positive, but will depend on pricing and costs of new products and services.

Collateral costs in the LVTS to support payment settlement could be reduced by using liquidity saving mechanisms³⁵ and better collateral management tools. Queuing algorithms that selectively delay outgoing payments until offsetting incoming payments are received could be extended to all payments (currently only payments over \$100M are queued). Improved visibility into payments flows (for example, through reports on recent credit-line use and intraday forecasts) could be used to reduce excess collateral and associated costs.

4.2 International lessons learned on implementation

Countries in the second wave of modernization are well positioned to benefit from studying earlier implementations. Six best practices emerge from a review of other countries' modernization experiences. These are instructive for Canada, but consideration must take into account the specific characteristics of the Canadian ecosystem.

4.2.1 Building a new, stand-alone, near real-time system is a common key element of modernization in most other jurisdictions

Most modernization initiatives have included building a new and separate near real-time system that is complementary to existing infrastructure. Only three countries identified (Switzerland, Turkey, and Mexico) have modified their high-value payment system to support near real-time payments of all values to support selected volumes of retail payments. While new and separate

³⁵ The LVTS risk controls provide liquidity-efficient intraday finality through two different "tranches". In Tranche 1, payments are required to be fully collateralized. In Tranche 2, only a portion of the exposure is collateralized by the sending participant (with survivors contributing to any loss on an allocation basis), making it very liquidity efficient. As of late 2015, approximately 98 percent of transactions are sent through Tranche 2.

near real-time infrastructure has been the initial modernization thrust in most jurisdictions, aspects of existing batch and high value infrastructure has also typically been enhanced (consideration typically given to more frequent batch clearing and settlement and enriched payment messages).

Standing up a new system may be less expensive and may provide a faster path to implementation than the substantial modification of existing systems to support the required attributes of modernized infrastructure. However, the introduction of near real-time payments capabilities on a separate system also generally requires enhancements or modifications to existing settlement systems support operations and manage the risks associated with near real-time payments.

Near real-time systems can be architected using a hub-and-spoke, bilateral model or hybrid model. Hub-and-spoke solutions provide advantages associated with ease of adding new participants and ability to centrally provide shared services. Most modernization initiatives have been deployed using the hub and spoke model.

System flexibility is a critical attribute to drive innovation and can be provided by modular architecture with clearly defined components.

4.2.2 Leverage known suppliers and existing infrastructure (if possible)

Early modernization initiatives required custom built solutions to meet requirements that were unique to the market. Over the past decade, vendors such as VocaLink, Nets and SWIFT have had the opportunity to support multiple modernization initiatives and are now in a position to offer more standardized commercial solutions. The availability of 'off the shelf' options can reduce cost and accelerate implementation timelines for countries that are in the second wave of modernization. For example, The Clearing House expects the core build (excluding FI integration costs) for a near real-time clearing system to cost approximately CDN \$110M, and be in-market by 2017.³⁶

Leveraging existing domestic infrastructure can also deliver cost efficiencies and improve speed to market. For example, Denmark was able to upgrade existing domestic transaction infrastructure in the creation of its near real-time payments platform. Infrastructure and integration costs for FIs in Denmark was approximately CDN \$50 million (\$250 million DKK³⁷). As Canada moves forward with modernization, the identification and evaluation of existing capabilities will be included in the conceptual design phase.

4.2.3 Ensure the appropriate incentives for modernization are in place

The earliest modernization efforts were driven by mandates from government, such as the SEPA initiative to eliminate differences between national and cross-border payments within the European Union. FI participation in newly built systems was often mandated. More recent efforts have focused on identifying specific user needs and scaling new platforms via commercialization.

³⁶ Interview, The Clearing House

³⁷ European Payments Council, "Instant Payments" 2015

4.2.4 Quickly build adoption by enabling near real-time products

Most infrastructure modernization initiatives have initially focused on implementing near real-time clearing infrastructure and quickly or simultaneously introducing a highly differentiated new product or service that addresses a specific use case. This alignment between building new infrastructure and developing the first wave of commercial applications that will use the infrastructure is critical to ensuring transaction volumes and business viability for the new infrastructure.

P2P solutions are often the first products to be commercialized on near real-time systems. Examples include the introduction of Pingit and Paym in the UK and MobilePay and Swipp in Denmark. Adoption of these solutions has been rapid: Paym is supported by over 90 percent of current accounts in the UK³⁸ and MobilePay is used by 88 percent of Danish adults.³⁹ These solutions have extended beyond P2P transactions to P2B, demonstrating the value of the near real-time system to ecosystem participants. Australia is planning for the launch of a P2P solution in tandem with the launch of its New Payments Platform.

The Polish national clearing house, (KIR), introduced Express ELIXIR in 2012. Participating banks had not developed new solutions that leveraged the new infrastructure.⁴⁰ This is a contributing factor to the slow adoption of Express ELIXIR which is processing fewer than 1,000 transactions per day on average.⁴¹

Exhibit 14 below provides a summary of the sequencing of new payments infrastructure with initial commercial applications in selected jurisdictions.

³⁸ UK Payments Council

³⁹ Nets, 2015 SIBOS Infrastructure and Policy Makers Roundtable

⁴⁰ McKinsey on Payments

⁴¹ By contrast, Singapore's FAST system processed over 33,000 transactions for over S\$64 million in its first two days of operation.

Exhibit 14: Common sequencing for modernization

Internationally, modernization efforts typically focus on launching P2P solutions on near real-time retail clearing systems

	Develop near real-time payments infrastructure	Launch initial commercial solutions	Extend to add'n commercial solutions	Consider batch retail and high-value systems
Australia 	New Payments Platform Owned: FI Association Operated: SWIFT	P2P and proxy directory solution announced	Not yet announced	No modernization publicly announced
UK 	Faster Payment Service Owned: FI Association Operated: VocaLink	P2P solutions: Pingit – Barclays Paym - industry	Paym extended to Zapp (pay from Bank account at POS)	No modernization publicly announced
Denmark 	Straksclearing Owned: FI Association, Operated: Nets	P2P solutions: MobilePay – Danske Swipp - industry	MobilePay and Swipp extended to POS	No modernization publicly announced
Poland 	Express Elixir Owned: FI Association Operated: FI Association	P2P solutions: IKO – PKO bank	BLIK (multiple banks using IKO platform) for P2B	No modernization publicly announced

Source: National Payments Associations

4.2.5 Ensure modernized systems can support speed and data needed for B2B use cases

Although P2P solutions are often the first products launched on enhanced infrastructure because they are visible, drive value for consumers, and are relatively easy to implement, B2B solutions generate the most substantial value from modernization investments. This value is created by the inclusion of remittance information with the payment, even more so than the increased speed of payment. For example, e-invoicing products such as FinVoice enable significant reduction in manual reconciliation effort and paper work. For this reason, it is important that modernization initiatives support the ISO 20022 standard from the start. B2B products that leverage ISO 20022 and deliver substantial business value include SEPA's Direct Debit B2B.⁴²

4.2.6 Consider all payment systems in long-term planning

Virtually all modernization initiatives have initially involved delivering a standalone near real-time solution rather than enhancing an existing batch retail or high-value system to support faster payments. However, this has not been done in isolation from longer term planning for the enhancement, retirement and/or replacement of existing infrastructure.

⁴² Danish Bankers Association

New solutions have been developed with the expectation that they will support net new transactions (from the electronification of cash and cheque payments) and that some volume from existing systems will migrate to new platforms. Once the new system is functioning and the initial effects of migration can be assessed, it is important to develop a view on the longer term strategy encompassing all public clearing and settlement infrastructure. For example, Denmark has announced that it intends, at some point, to retire one of its two batch retail systems and is encouraging the migration of B2B transactions to a near real-time system through advantageous pricing, a high transaction value cap and ISO 20022 messaging.⁴³

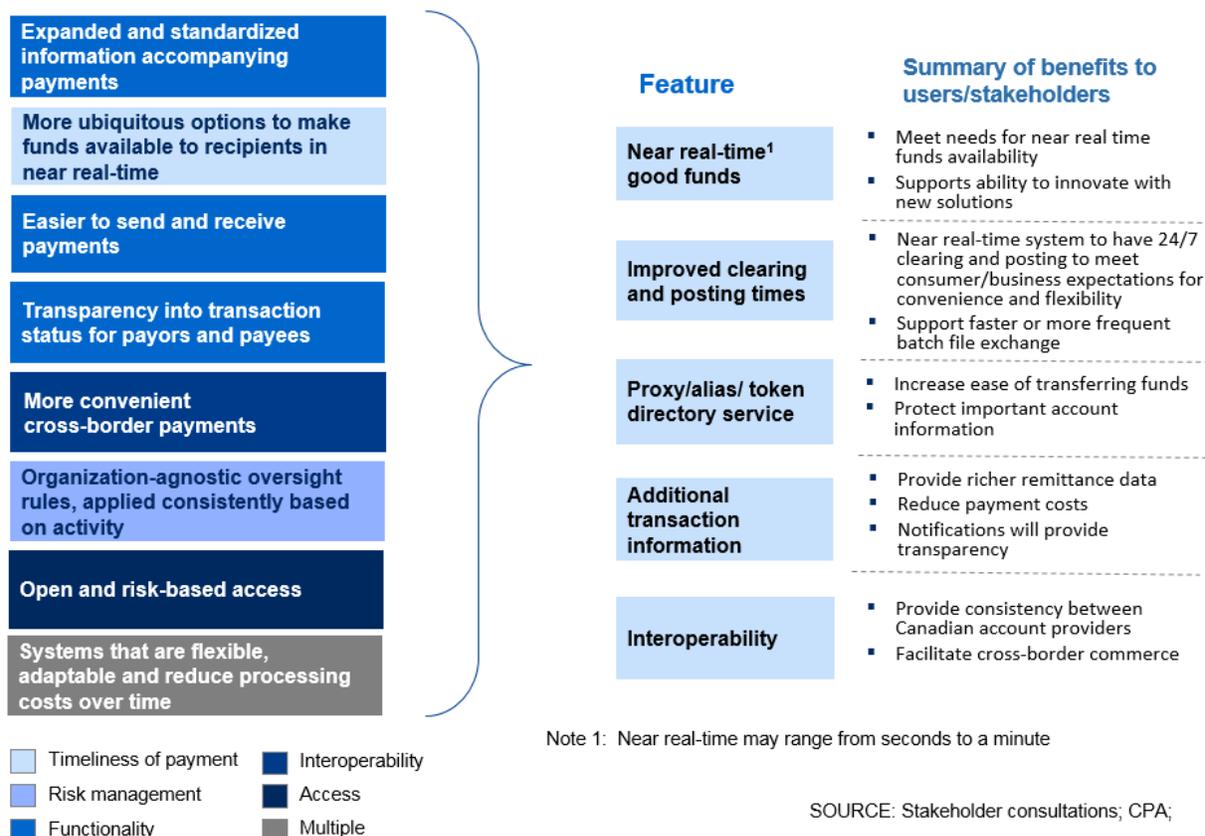
4.3 Modernization considerations for Canada

4.3.1 Required features for the Canadian ecosystem

Based on consultations with stakeholders and a review of international best practices, there are eight key expressed needs, and five sets of feature/functionality that the future ecosystem in Canada should provide to meet these needs (summarized in Exhibit 15). These features can be provided through a combination of infrastructure enhancements, rules and policies, and the introduction of shared services and proprietary products and services.

⁴³ Interview with Nets

Exhibit 15: Eight user/stakeholder needs and expectations for the future ecosystem and five features that would meet expressed needs



4.3.2 Rule and policy changes can address some expressed stakeholder needs in the near term

Consultation has uncovered some expressed end user needs that can be met through the modification of rules and policies prior to any infrastructure enhancements. Introducing one or more additional exchange windows on ACSS for AFT payments could allow more payments to qualify for same day funds availability and next-day settlement. This would be beneficial for direct and indirect clearers located in Western provinces who constrained by the existing 4:30PM ET cut off. Expanding operating hours for LVTS in conjunction with additional exchange windows for ACSS would also support a greater number of payments that can be cleared same day.

4.3.3 Options to provide near real-time capabilities should be explored

Enhancements to existing payments infrastructure will be required to meet some expressed user needs and to support international interoperability. The industry will need to work together to determine how to most efficiently translate expressed stakeholder needs into clear business requirements and to develop solution options. Delivering near real-time clearing capabilities to meet consumer and business needs for faster payments should be a priority.

Although improvements to existing ACSS and LVTS should be carefully considered, due to age and capability limitations, it is unlikely that these systems can be efficiently enhanced to provide the full flexibility required for future innovation. Options to deliver a complementary faster payments system (whether new or based on an existing network) should be investigated.

A near real-time system should support the functionality provided by recent international modernization efforts: good funds in less than 60 seconds; irrevocable transactions; 24/7/365 availability; notification to both sender and receiver; ISO 20022 communication standards and expanded remittance information. Its architecture should support efficient operations and access as defined by Canadian PPOs. To fully leverage a near-real time platform, FIs will need to support near real-time capabilities across impacted applications, and equip back offices to operate 24/7/365.

4.3.4 Payment solutions must support ISO 20022 communication standards

ISO 20022 has emerged as a global communication standard and is being adopted in many countries, including Canada. ISO 20022 will enable the introduction of products and services that include structured and unstructured payment information. Any infrastructure that supports near real-time clearing must support ISO 20022 to ensure international interoperability, which will be essential for B2B payments.

The implementation effort to support ISO 20022 for FIs is substantial: core legacy systems may need to be enhanced to accept larger message sizes, and compliance operations may need to be extended into the accompanying payment information (e.g., for use in AML screening). See Exhibit 16 for more details.

Required changes will extend beyond payment providers. For example, businesses will need AR/AP systems that can input and ingest remittance information in the appropriate format. It is likely to take several years for the full value of ISO 20022 to be realized by ecosystem participants due to long build timeframes and extensive testing cycles.

In Exhibit 16, we provide initial observations on potential implementation effort by FI's to support faster funds availability and enhanced payments information.

Exhibit 16: Implementation effort for faster funds availability and enhanced payments information

FIs may be able to support near real-time funds across use cases with less effort than enhanced transaction data

 Moderate effort

Objective	Near real-time funds across use cases 	Enhanced data with payment 
Current capabilities	<ul style="list-style-type: none"> ▪ Retail P2P: Near real-time funds (<30 mins); 24/7/365; transactions up to \$3,000; notifications to payor and payee provided by existing product in market ▪ Wires: Funds within hours; Fraud and compliance; traditional business hours; notifications for own clients and internal processes (e.g. receipt of payment) 	<ul style="list-style-type: none"> ▪ Custom-built legacy systems generally incompatible with size of ISO 20022 messages ▪ Wires 140 characters; AFT 15 characters; most FI's limited to posting up to 19 characters when crediting payment; EDI thousands of characters but only cost effective for large corporations
Rule changes	<ul style="list-style-type: none"> ▪ Standards for routing payment data (fields and format) ▪ Additional risk management capabilities ▪ Risk controls for higher value near real-time payments (e.g., up to \$100,000) ▪ Accepted formats and required fields for proxy identifiers 	<ul style="list-style-type: none"> ▪ Establish standardized fields for ISO 20022 messages across all products
Operations changes	<ul style="list-style-type: none"> ▪ Scale fraud and compliance to handle increased volume of real-time payments ▪ Extend operations (e.g., customer service) to 24/7/365 where required ▪ Possible intraday settlement through central bank and/or other extended hour arrangements 	<ul style="list-style-type: none"> ▪ Potential need to support KYC/AML screening on enhanced information ▪ Inform and support customers' transition to ISO 20022 compliant systems so payment-related information is inputted
Systems changes	<ul style="list-style-type: none"> ▪ Extend 24/7/365 posting and notification to commercial systems ▪ Update messaging systems to compile and forward notifications sent to and received from other FIs ▪ Extend system to translate proxy identifiers to accounts 	<ul style="list-style-type: none"> ▪ Update enterprise-wide systems to accept and send ISO 20022 ▪ Translation engines to support old and new message formats

SOURCE: Interviews with FIs

4.3.5 A near real-time solution should support value added shared services

To support ease of use and to drive adoption, any system that supports near real-time clearing should support the use of shared services such as proxy directories, fraud detection services, appropriate payor redress, AML transaction monitoring and collateral management. A near real-time system should be agnostic to whether a shared service is part of the core system or offered on a standalone basis. Market forces will determine how service providers choose to introduce shared service capabilities. In the event of a market failure to deliver required shared services, core provision of these services should be considered.

4.3.6 A significant number of transactions will likely migrate from existing systems to a near real-time retail platform

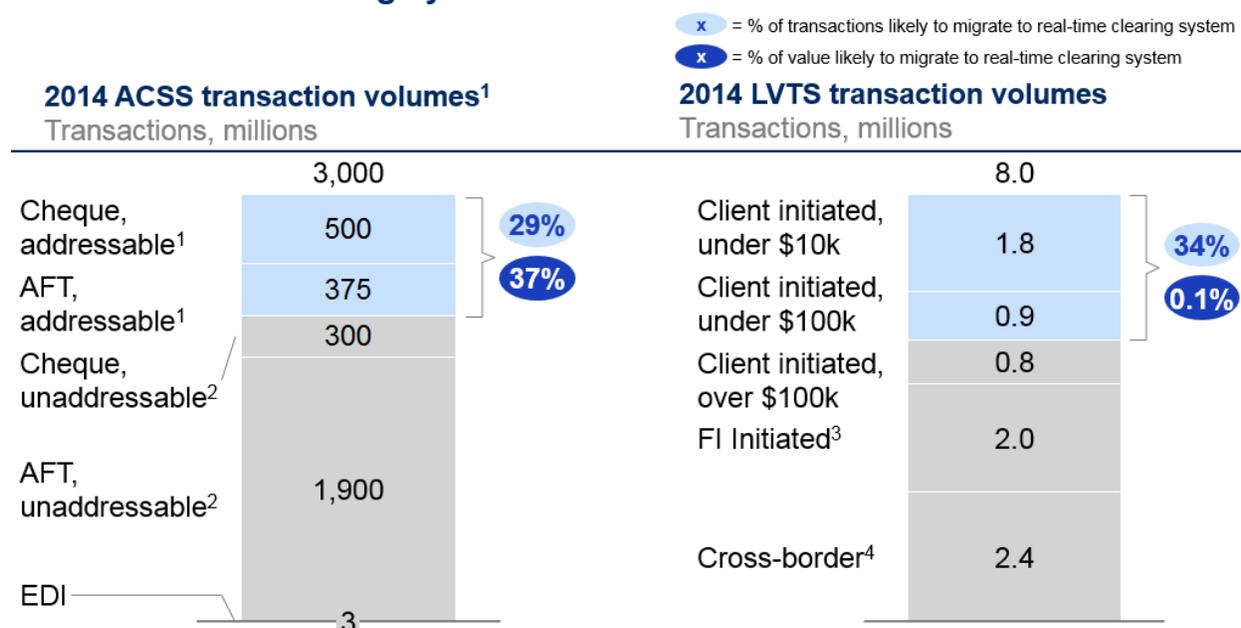
Delivering efficiencies and reducing end-to-end transaction processing costs is an important objective of modernization. To meet this objective, a near real-time system must process sufficient transaction volumes.

The migration of transactions from legacy systems has been evidenced in modernization efforts to date, and it is expected that this would also occur in Canada. Analysis of 2014 transaction volumes indicates that a sub-set of transactions could quickly migrate from cash and both the ACSS and the LVTS to a system with near real-time capabilities that supports enhanced and standardized remittance information.

In 2014, approximately 25% of customer-initiated LVTS transactions were domestic payments under \$10,000⁴⁴, and an additional 10% of customer initiated transactions were domestic payments under \$100,000.⁴⁵ (Most transfers initiated by FIs are for settlement purposes, and would likely not migrate away from the LVTS.) Similarly, 29% of transactions that clear through the ACSS are cheque and AFT transactions that would benefit from migration to a faster payment option. (See Exhibit 17 for more detail). A growing percentage of these sub-sets of transactions would be expected to migrate over time.

Exhibit 17: Potential migration from existing systems

A significant volume of transactions on ACSS and LVTS could migrate to a near real-time clearing system



¹ Excludes POS debit and ABM withdrawals

² Includes cheques and AFT B2B invoice payments (with a need for timeliness and richer remittance data), cheque payroll and other B2P (where timeliness is important and cheque processing is cumbersome), current paper-based billing and emergency bill payments, and P2P transfers with an expectation of near real time funds (e.g., emergency transfer, shared purchase)

³ Includes cheque at PoS (consumers and businesses express general satisfaction with PoS), AFT for anticipated recurring payroll, P2P transfers that do not have a need or expectation of timeliness, and fully electronic bill payments (i.e., e-billing and payment)

⁴ Assume financial institutions continue to use LVTS for settlement

⁵ Assume ~30% transactions are cross-border based on reduction in LVTS volumes on U.S. bank holidays.

Source: Statistics Canada; CPA; Expert interviews; McKinsey Payments Map Q1 2015

⁴⁴ CPA, 2014 LVTS and ACSS transaction volumes and values

⁴⁵ Ibid

4.3.7 Investments required by all participants to capitalize on value creation opportunities

There is recognition that significant investments will be required by the system operators to support modernization of the core payments infrastructure in Canada but investment will also be required throughout the ecosystem including financial institutions, end-users and payment services providers in order to capitalize on newly created opportunities. To achieve the full benefit of new or enhanced infrastructure there will be a need for alignment and coordination across all players.

4.3.8 A 'big picture' road map will be needed to efficiently deliver core infrastructure capabilities

CPA clearing and settlement systems will certainly be impacted by modernization efforts needed to deliver the vision. Decisions related to the prioritization and delivery of rule and policy changes and infrastructure enhancements required to achieve the vision will require and must carefully consider changes in the broader ecosystem (including development in non-CPA infrastructure) and clearly defined solution options. The case for proceeding must take into account the potential value of modernization, regulatory requirements, the costs associated with rule and policy changes, core infrastructure enhancements, and integration costs for key stakeholders.

5. Case for proceeding

5.1 User needs are evolving

Canada has historically been a global leader in payments, and transaction clearing and settlement experiences have largely met end user needs in terms of convenience, speed and cost. However, technology is impacting virtually all transaction experiences making them more data-rich and instant, and these trends are also evidenced in payments. New entrants into the ecosystem are delivering novel customer experiences and changing service and experience expectations for all industry participants.

Consumers and businesses increasingly expect near real-time funds availability in a variety of contexts beyond person-to-person transfers. More remittance information is needed to support the productivity and international competitiveness of Canadian businesses and to accelerate SMEs migration away from cheques. The ability to route payments with minimal information is more convenient for payors, including the government, and provides greater privacy to payees. Improved transparency into transaction processing would provide end users with the ability to track and monitor payments through the system and would reduce FI costs associated with customer inquiries, tracing and exception processing. Canada must focus on meeting identified needs domestically as a priority before contemplating potential changes to support cross border interoperability.

5.2 The opportunity to create value for the ecosystem is significant

An ecosystem that continues to meet end users' needs will offer consumers greater convenience and flexibility, enable small businesses to improve their cash flow, support greater automation of large businesses' AR/AP systems, and enable governments to more efficiently deliver services. Electronification of payments will drive processing efficiencies for FIs and greater processing transparency may enable operational savings. Perhaps more importantly, rules and infrastructure that foster innovation and competition will benefit the ecosystem as a whole. FIs will have a platform to develop innovative products, and to compete and partner even more effectively with new entrants to build and maintain strong customer relationships.

5.3 The risk of maintaining the status quo is growing

Modernization is truly becoming a global trend as many countries move to faster, data-rich payments infrastructure that supports the development and adoption of new payments products and services. It is important that Canada's payments infrastructure enables FIs and non-FIs to meet the needs of their customers, and to ensure that Canadian businesses remain globally competitive.

Many other countries that have invested in infrastructure modernization have done so to meet regulatory requirements focused on consumer protection, financial inclusion and customer experience. Canada's core infrastructure is struggling to match the pace of change in the industry, and this is impacting the speed at which product and service providers can innovate. Investment is required in CPA systems to manage systemic risk and to deliver effectively against regulators' stated objectives for the Canadian payments ecosystem. It is in the industry's interest to proactively drive modernization efforts in Canada.

5.4 The time is right to proceed

Canada must determine how near real-time, data-rich payments can be best supported in this country through either public (i.e. CPA) or private infrastructure in order to deliver the requisite economic efficiencies for the country. The ACSS and LVTS were never intended to support near real-time retail payments, and the investment to enhance either system to meet evolving stakeholder needs could be significant. The identification of options to support the industry's need for near real-time data-rich payments system will prove to be a valuable undertaking and additional work is required to quantify demands associated with various use cases. There is recognition that delivering these features will take place over several years and there are many important questions to be answered in translating the industry vision into solution options for Canada. Given the value that can be delivered through modernization and the possibility of falling behind global peers (most notably the US), it is imperative that we continue to advance change to ensure that Canada maintains its position as a global payments leader.

Appendix 1: Consultation process

Consultation has spanned all stakeholder groups

Group	Representatives ¹				
Large corporations	<ul style="list-style-type: none"> ▪ ATCO Ltd. ▪ Avmax Aviation ▪ BCE/Bell ▪ Canadian Depository for Securities, Ltd. ▪ Canadian Derivatives Clearing Corporation 	<ul style="list-style-type: none"> ▪ CGI ▪ CLHIA ▪ CN Rail ▪ Deloitte ▪ FYidoctors 	<ul style="list-style-type: none"> ▪ Gaz Metro ▪ Hydro-Quebec ▪ Rogers Communications ▪ Shaw Communications ▪ SNC Lavalin ▪ Suncor ▪ Sunlife 	<ul style="list-style-type: none"> ▪ Union Gas ▪ Walmart ▪ Wawanesa Insurance ▪ WestJet 	
Consumers and small/mid-sized businesses	<ul style="list-style-type: none"> ▪ 80 Proof Digital ▪ Advantage BC ▪ Canadian Payments Association ▪ Canadian Federation of Independent Businesses 	<ul style="list-style-type: none"> ▪ Consumers Association of Canada ▪ Consumer Council of Canada ▪ Egberts Engineering Ltd. ▪ EGS Consulting Inc. 	<ul style="list-style-type: none"> ▪ JCo Junk ▪ Option consommateurs ▪ Public Interest Advocacy Centre ▪ Retail Council of Canada 	<ul style="list-style-type: none"> ▪ Ross & McBride LLP ▪ Tactico ▪ Tannis A. Waugh PC ▪ Walker Ellis 	
Government¹	<ul style="list-style-type: none"> ▪ Canada Post ▪ Canada Deposit Insurance Corporation ▪ City of Toronto ▪ Department of Finance 	<ul style="list-style-type: none"> ▪ Financial Consumer Agency of Canada ▪ Office of the Superintendent of Financial Institutions 	<ul style="list-style-type: none"> ▪ Ontario Financing Authority ▪ Public Works and Government Services Canada 	<ul style="list-style-type: none"> ▪ Province of Alberta (Finance) ▪ Province of British Columbia 	
Financial institutions	<ul style="list-style-type: none"> ▪ ATB Financial ▪ Bank of America Merrill Lynch ▪ Bank of Canada ▪ Bank of Nova Scotia ▪ BMO ▪ Bridgewater Bank 	<ul style="list-style-type: none"> ▪ Caisse centrale Desjardins ▪ Canadian Bankers Association ▪ Canadian Credit Union Association ▪ Canadian Western Bank ▪ Central 1 Credit Union 	<ul style="list-style-type: none"> ▪ Concentra Financial Services Association ▪ Credit Union Central Alberta ▪ CIBC ▪ Citibank ▪ Federation de caisse populaire Acadiennes 	<ul style="list-style-type: none"> ▪ HSBC ▪ Industrial & Commercial Bank of China (Canada) ▪ JP Morgan ▪ Laurentian Bank 	<ul style="list-style-type: none"> ▪ National Bank ▪ Peace Hills Trust ▪ RBC ▪ Tangerine Bank ▪ TD Bank
Non-bank service providers	<ul style="list-style-type: none"> ▪ ADP ▪ Amazon ▪ D+H Canada ▪ Digital ID and Authentication Council of Canada 	<ul style="list-style-type: none"> ▪ Expertus ▪ Interac Association ▪ Koho ▪ LedgerLabs ▪ MasterCard Canada ▪ Nymi 	<ul style="list-style-type: none"> ▪ PayPal ▪ Profil Credit ▪ Ripple ▪ SAP ▪ Suretap ▪ SWIFT 	<ul style="list-style-type: none"> ▪ TelPay ▪ Trust 2 Pay ▪ Ugo ▪ Versapay ▪ Visa 	

¹ Consultation also included millennials and stakeholders engaged for ISO 20022 initiative: Amex Bank of Canada, Bank of New York Mellon, CFF Bank, Dovetail, Imperial Oil, Manulife Financial Insurance, Mega International Commercial Bank (Canada), Mizuho Bank, Pacific & Western Bank of Canada, PNC Bank, Shinhan Bank Canada, US Bank, Wells Fargo

SOURCE: CPA

Appendix 2: Stakeholder needs and opportunities

Needs and opportunities by use case (1/2)

	Needs	Opportunities	
B2B	Recurring domestic	<ul style="list-style-type: none"> Same day good funds availability Expanded and more standardized information to help with straight through processing and accelerate error correction Simpler and more secure authentication to mitigate front-end attacks 	<ul style="list-style-type: none"> Expanded remittance information accompanying payments to reduce effort expended on manual reconciliation
	Non-recurring/time-sensitive domestic	<ul style="list-style-type: none"> Real-time good funds availability Expanded and more standardized information to help with straight through processing and accelerate error correction Increased transparency into payment process and status for time-sensitive payment Simpler and more secure authentication to mitigate front-end attacks 	<ul style="list-style-type: none"> Options to ensure real-time good funds availability Expanded remittance information accompanying payments to reduce effort expended on manual reconciliation Notification to payee of funds initiation and to payor of receipt
	International	<ul style="list-style-type: none"> Same day good funds availability Expanded and more standardized information to help with straight through processing and accelerate error correction Notification to payee of funds initiation and to payor of receipt Simpler and more secure authentication to mitigate front-end attacks 	<ul style="list-style-type: none"> Ability to economically send funds internationally with same day availability for recipient Expanded remittance information accompanying payment to reduce effort expended on manual reconciliation Consistent messaging standard with major trading partners Increased transparency into payment process and status for international payments
P2B	Bill pay	<ul style="list-style-type: none"> Same day good funds availability for non-time-sensitive bill pay and near-real-time for time-sensitive bill pay Ability to send requests for payment to improve cash flow Expanded and more standardized information to help with straight through processing and accelerate error correction Notification to sender that funds are received by business Tokenization/encryption of customer data to decrease business risk from cyber-attacks 	<ul style="list-style-type: none"> Payment request capability for small business Expanded remittance information accompanying payment to reduce effort expended on manual reconciliation Increased transparency into payment process and status Consistent rules for posting bill payments Consistent tokenization and encryption
	Point-of-sale (POS)	<ul style="list-style-type: none"> Real-time or near-real-time good funds availability For remote POS (e.g., e-commerce) immediate notification to payor that payee has received funds Tokenization/encryption of customer data to decrease business risk from cyber-attacks 	<ul style="list-style-type: none"> Consistent tokenization and encryption

SOURCE: Stakeholder interviews and workshops

Needs and opportunities by use case (2/2)

		Needs	Opportunities
B2P	Payroll	<ul style="list-style-type: none"> Same day good funds availability for regular payroll and for temp/irregular workers 	<ul style="list-style-type: none"> Real-time electronic 24/7 payments for temp/irregular workers Same day electronic payroll options for temporary workers or contractors Consistent and visible rules for timelines for posting payroll to recipient's bank account
	Non-payroll business-to-person	<ul style="list-style-type: none"> Same day good funds availability Expanded and more standardized information to reduce cheque usage and accelerate reconciliation Increased transparency into payment process and status Ability to send electronic payment without requirement for banking information 	<ul style="list-style-type: none"> Expanded remittance information accompanying payment to reduce effort expended on manual reconciliation Notification to payee of expected date of receipt of payment Consistent tokenization and encryption via proxy database service
	Non-payroll government-to-person	<ul style="list-style-type: none"> Same-day good funds availability (both domestic and international) Faster payment options for expatriates Enhanced data to allow for bundling of multiple payments into one payment Increased transparency into payment process and status Ability to send electronic payment without requirement for banking information Near-real-time validation of correct recipient routing details 	<ul style="list-style-type: none"> Faster funds availability to countries with Canadian expat communities Notification to payee of expected date of receipt of payment Consistent tokenization and encryption via proxy database service Ability to validate routing credentials before sending full payment amount, e.g., low-value test payment
P2P	Domestic	<ul style="list-style-type: none"> Real-time good funds availability Real-time notification that good funds were sent/received Ability to scale authentication and verification with value of payment and based on strength of relationship with payor 	<ul style="list-style-type: none"> Real-time good funds not available over \$3,000 Ability to scale authentication and verification with value of payment and based on strength of relationship with payor Multi-factor authentication for higher-value payments; lower friction authentication and validation for lower-value payments
	International	<ul style="list-style-type: none"> Same-day good funds availability Increased transparency into payment process and status Ability to scale authentication and verification with value of payment and based on strength of relationship with payor Ability to economically send low-value funds internationally with same-day availability for recipient 	<ul style="list-style-type: none"> Faster funds availability to international recipients Notification to payee of expected date of receipt of payment Multi-factor authentication for higher-value payments; lower friction authentication and validation for lower-value payments Low cost electronic options for cross-border payments

SOURCE: Stakeholder interviews and workshops

Risk-management standards for a Prominent Payment System

Standard	Description of standard
Legal basis	A PPS should have a well-founded, clear, transparent and enforceable legal basis for each material aspect of its activities in all relevant jurisdictions.
Governance	A PPS should have governance arrangements that are clear and transparent, promote the safety and efficiency of the PPS, support confidence in and smooth functioning of the markets it serves, and support other relevant public interest considerations and objectives of relevant stakeholders
Framework for the comprehensive management of risk	A PPS should have a sound risk-management framework for comprehensively managing legal, credit, liquidity, operational and other risks.
Credit risk	A PPS should effectively measure, monitor and manage its credit exposures to participants and those arising from its payment clearing and settlement processes. It should maintain sufficient financial resources to cover its credit exposure arising from the default of the participant and its affiliates that would generate the largest aggregate credit exposure in extreme but plausible market conditions.
Collateral	A PPS that requires collateral to manage its credit exposure or the credit exposures of its participants should accept collateral with low credit, liquidity and market risks. A PPS should also set and enforce appropriately conservative haircuts and concentration limits.
Liquidity risk	A PPS should effectively measure, monitor and manage its liquidity risk. A PPS should maintain sufficient liquid resources in all relevant currencies to effect same-day and, when appropriate, intraday and multiday settlement of payment obligations with a high degree of confidence under a wide range of potential stress scenarios that should include, but not be limited to, the default of the participant and its affiliates that would generate the largest aggregate liquidity obligation for the PPS in extreme but plausible market conditions.
Settlement finality	A PPS should provide clear and certain settlement by the end of the value date. When necessary, or preferable, a PPS should provide intraday settlement or real time.
Money settlements	A PPS should conduct its money settlements in central bank money when practical and available. If central bank money is not used, a PPS should minimize and strictly control the credit and liquidity risk arising from the use of commercial bank money.
Participant-default rules and procedures	A PPS should have effective and clearly defined rules and procedures to manage a participant default. These rules and procedures should be designed to ensure that the PPS can take timely action to contain losses and liquidity pressures and continue to meet its obligations.
General business risk	A PPS should identify, monitor and manage its general business risk and hold sufficient liquid net assets to cover potential general business losses so that it can continue operations and services as a going concern if those losses materialize. Further, liquid net assets should at all times be sufficient to ensure a recovery or orderly wind-down of critical operations and services.
Custody and investment risks	A PPS should safeguard its own and its participants' assets and minimize the risk of loss on and delay in access to these assets. A PPS's investments should be in instruments with minimal credit, market and liquidity risks.
Operational risk	A PPS should identify the plausible sources of operational risk, both internal and external, and mitigate their impact using appropriate systems, policies, procedures and controls. Systems should be designed to ensure a high degree of security and operational reliability and should have adequate, scalable capacity. Business-continuity management should aim for timely recovery of operations and fulfillment of the PPS's obligations.
Access	A PPS should have objective, risk-based and publicly disclosed criteria for participation that permit fair and open access.
Tiered participation arrangements	A PPS should identify, monitor and manage the material risks to the PPS arising from tiered participation arrangements.
Efficiency and effectiveness	A PPS should be efficient and effective in meeting the requirements of its participants and the markets it serves, with a particular consideration for the interest of end-users.
Communication procedures and standards	A PPS should use communication procedures and standards that meet common industry practices and use or accommodate relevant internationally accepted communication procedures and standards to facilitate efficient payment clearing, settlement and recording.
Disclosure of rules, key procedures and market data	A PPS should have clear and comprehensive rules and procedures and should provide sufficient information to enable participants to have an accurate understanding of the risks, fees and other material costs they incur by participating in the PPS. All relevant rules and key procedures should be publicly disclosed.

SOURCE: Bank of Canada, "Proposed Criteria and Risk-Management Standards for Prominent Payment Systems", 2016
<http://www.bankofcanada.ca/wp-content/uploads/2016/02/criteria-risk-management-standards.pdf>

Appendix 3: Findings on other modernization initiatives

International participants

Participating organizations

	Australia Payments Clearing Association
	Dutch Payments Association
	European Banking Association
	European Central Bank
	Federal Reserve Bank of the United States
	Krajowa Izba Rozliczeniowa
	National Payments Corporation of India
	Nets
	Nordea
	Reserve Bank of Australia
	SIX
	Swift
	The Clearing House
	VocaLink

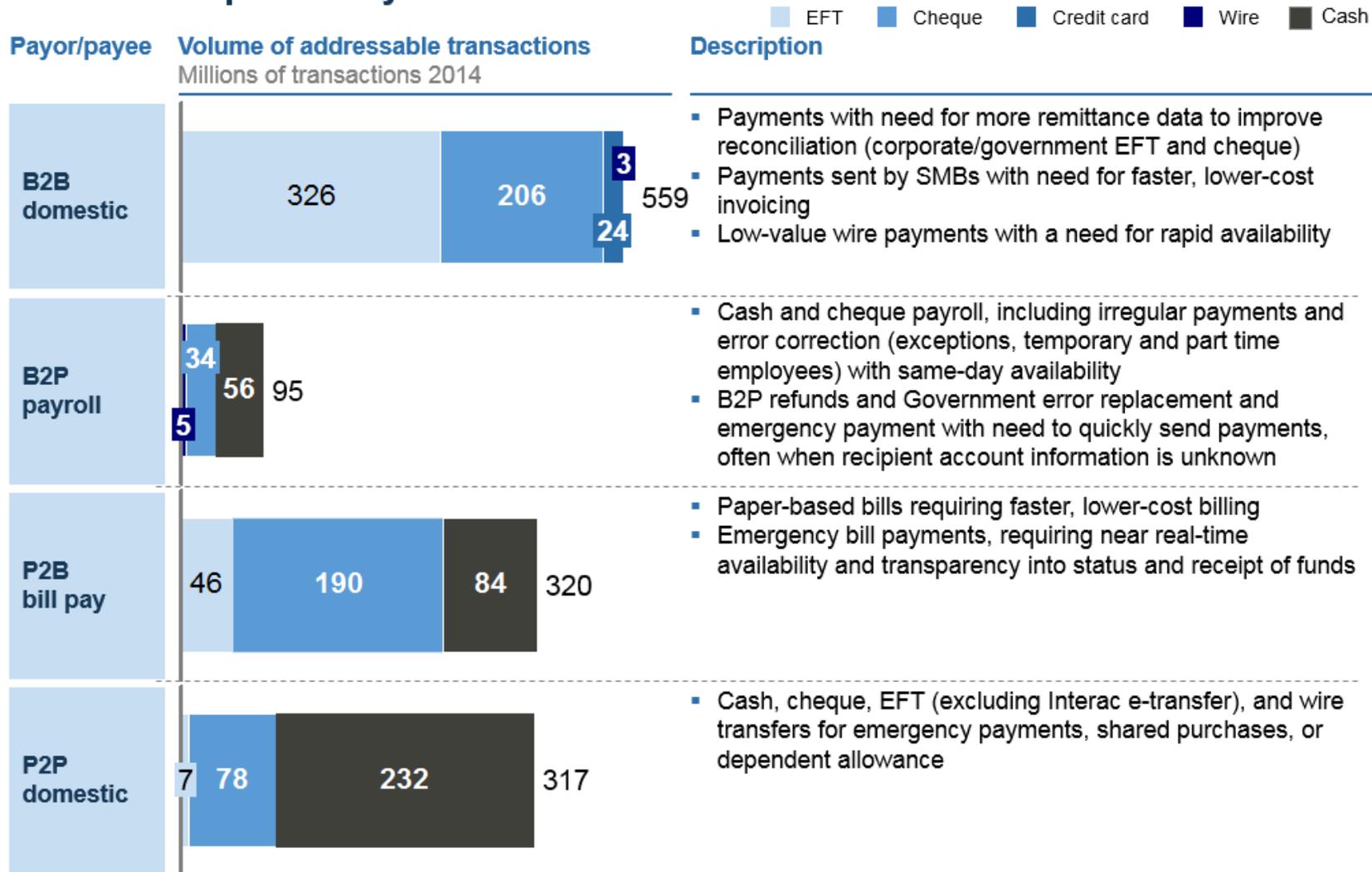
Overview of international modernization efforts

	Australia 	UK 	Denmark 	Poland 	USA 
Is clearing system near-real-time?	Yes	Yes - VocaLink	Depends on transaction type – Either end of day, intraday or real time	Yes – 3 clearing windows per day	Not currently but has expressed intent to implement via VocaLink
What is maximum transaction value for real-time clearing?	No limit set	250,000 GBP (~\$500,000 CAD)	75,000 EUR (~\$160,000 CAD)	100,000 PLN (~\$33,500 CAD)	N/A
Who owns/operates the real-time clearing system?	Bank-owned organization, including Central Bank	Bank-owned organization	Owned by Danish Bankers Association; operated by Nets (third party)	Bank-owned organization	N/A
Who built the real-time system?	SWIFT, FIServ and own development	Home built (VocaLink); Switch from FIS	Nets	Cap Gemini	N/A
Does country have 2 or 3 clearing and settlement platforms?	Three: Retail real-time, retail bulk, and settlement	Three: Retail real-time, retail bulk, and settlement	Four: Retail real-time, retail bulk intraday, retail bulk end of day, and settlement	Three: Retail real-time, retail bulk, and settlement	Three: Clearing, DNS settlement, RTGS settlement for high-value
Do systems support near-real-time posting?	Yes	No – Posts within hours	Yes	No – Posts within hours	No
Do systems support 24/7 processing?	Yes	Yes	Yes	Yes	No
Is infrastructure ISO 20022 enabled?	Yes	No	Yes	Yes	No
What is the settlement method?	Multilateral net with planned switch to RTGS	Hybrid DNS/RTGS	DNS for legacy system; pre-funded for new system	RTGS (SORBNET2) and hybrid DNS/RTGS (SORBNET)	DNS (National Settlement Service for retail) and RTGS (CHIPS for high value)
Who writes governing rules?	Payments association (Australian Payments Clearing Association)	Payment systems regulator (UK Payments Administration)	Central bank	Payments association (Polish Bank Association)	Central bank

SOURCE: McKinsey; literature search; payments association websites

Appendix 4: Impact modelling

B2B, P2B, and P2P use cases have the largest volume of transactions that could be impacted by modernization

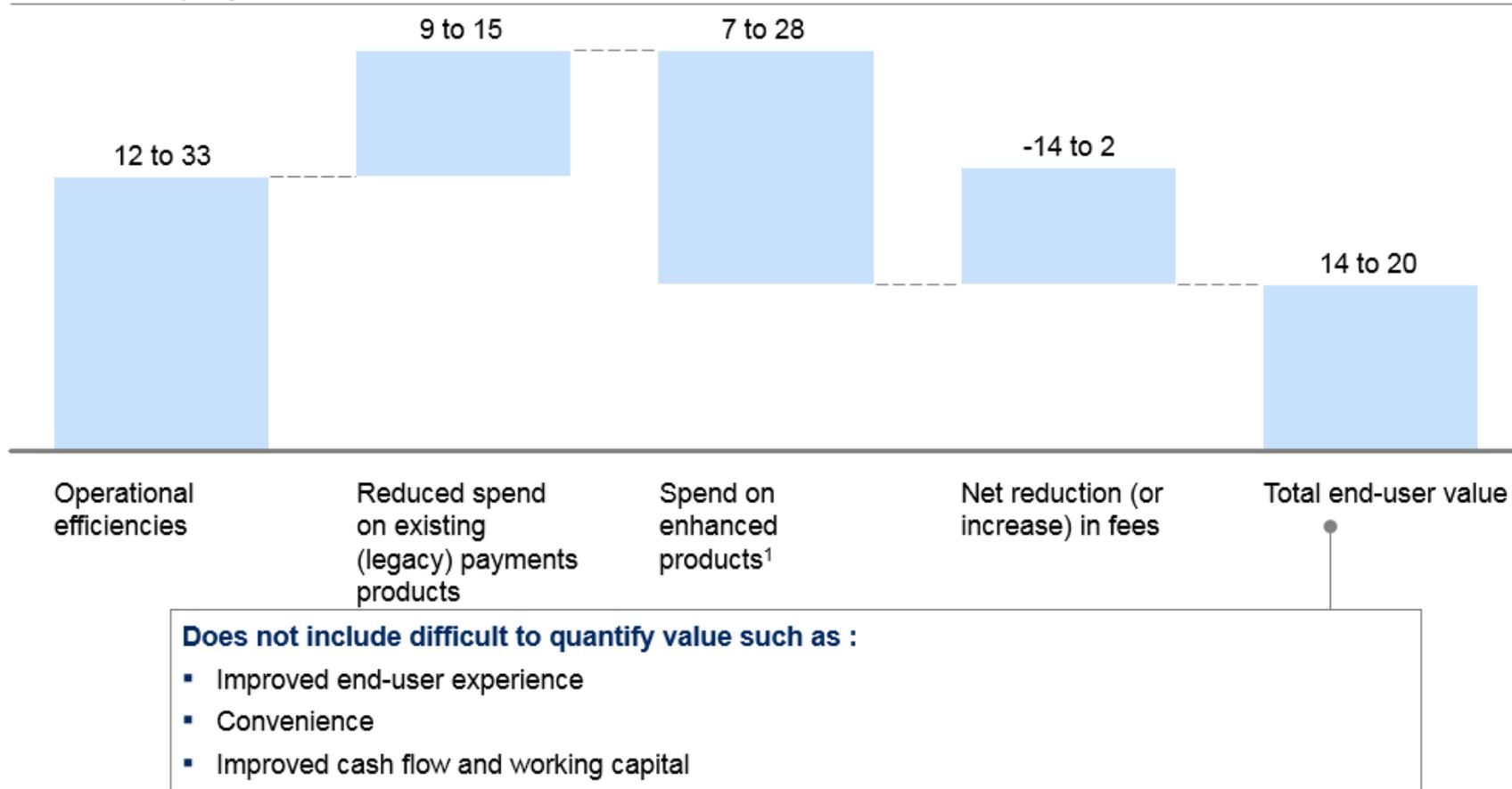


Source: McKinsey Payments Map, Q1-2015; McKinsey Consumer Financial Life Survey; Statistics Canada; CPA; CPA LVTS transaction volumes, 2015; Expert interviews

Each 1% of addressable transactions that leverage new infrastructure features could create \$14M to \$20M in value for end-users

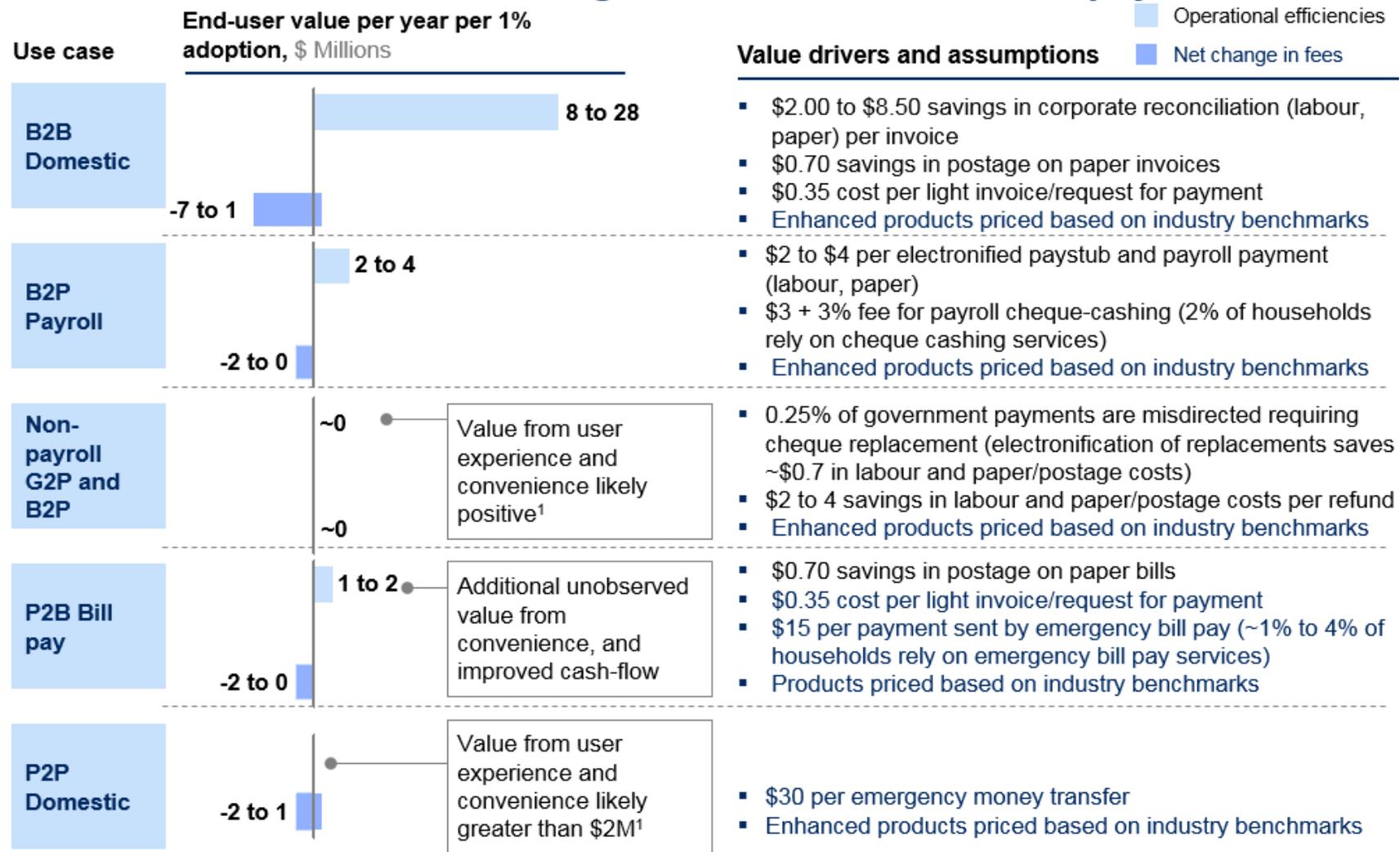
Value creation to end users per 1% adoption of addressable transactions

CDN, Millions per year



¹ Products and services that offer near real time funds availability and/or provide basic transaction remittance information
 Source: CPA; McKinsey Payments Map, Q1-2015; McKinsey Consumer Financial Life Survey; 2014 Payments Operations Benchmarking Study; Statistics Canada; CPA LVTS transaction volumes, 2015; CPA; CD Howe Institute; PWGSC; Australian Payroll Association; Western Union; expert interviews

End-user value creation will be greatest for B2B domestic payments



User value is understated since some efficiencies cannot be quantified (e.g., user convenience, peace of mind)

¹ Users unlikely to adopt if (unobserved) value does not offset increased fees

Source: McKinsey Payments Map, Q1-2015; McKinsey Consumer Financial Life Survey; 2014 Payments Operations Benchmarking Study; Statistics Canada; CPA; CD Howe Institute; PWGSC; Australian Payroll Association; Western Union; expert interviews; CPA "The economic benefits of adopting ISO 20022 payment message standard in Canada", 2015

Appendix 5: Glossary of terms

Term	Description
Access	The right of or opportunity for an institution to use the services of a particular payment system to exchange, clear and/or settle payments on its own account or for customers
Access criteria	The minimum conditions that an entity would need to satisfy in order to participate directly (or indirectly) in a payment system. Access criteria may differ depending on what role the entity will perform as a participant in the system (e.g. exchange of payment messages, clearing or settlement with the central bank)
ACH	Automated Clearing House; centralized architecture that is used to exchange, and reconcile batches of payment items. The process of submitted files vary greatly from region to region. Some systems only hold and forward batches upon settlement (i.e., settlement before exchange), while others will pull-out individual items for validation, sorting or routing
ACSS	Automated Clearing Settlement System; a batch total entry system used to enter batch totals for transactions exchanged by CPA member direct clearers. The ACSS calculates multilateral net positions to determine the balances due to and from participants; includes rules and standards that prescribe how payments should be made between direct clearers
AML/ATF	Anti-Money Laundering/Anti-Terrorism Financing; legal requirements by which financial institutions globally, and many non-financial institutions, are required to identify and report transactions of a suspicious nature to the financial intelligence unit in the respective country
Authentication	The process by which the identity of a User who wishes to access a system or service is confirmed. Authentication protocols may take many forms depending on whether validation is being done in person or electronically
Availability of funds	The point at which a payee can withdraw and use funds (which may occur before the participating FIs settle)

Term	Description
Batch Retail Payment Systems	Systems most commonly used to clear and reconcile direct credit and direct debit payments. Batch refers to the transmission or processing of a group of payment orders and instructions as a set at discrete intervals of time
Batch Total Entry Systems	Payment systems characterized by bilateral exchanges made outside of a central system, and the separate entry of batch totals into the clearing system to support settlement
Card network	A secure electronic payment system used to accept, transmit, process, authenticate and authorize transactions made by payment card (credit or debit) and to transfer information and funds among participants and payment card users
Centralized systems	Payments are exchanged, cleared and settled through a single central system, where they are routed and validated by a central institution
Clearing	Commonly understood to mean the process of transmitting, reconciling and, in some cases, confirming payment orders prior to settlement, possibly including the netting of instructions and the establishment of final positions for settlement. For the purposes of ACSS, it means the reconciliation of payment items that were exchanged and the calculation of net totals for settlement
Core payment system or infrastructure	The fundamental technology, rules and processes needed by any payment system
Decentralized systems	Payments are exchanged, cleared and settled through multiple point-to-point systems, where they are routed and validated by the participants
Direct participant	An entity(e.g. financial institution) that meets the applicable access criteria to access a payment system directly (without sponsorship or agency agreement with other bank/payment services provider)

Term	Description
End-user	Those who use, or are likely to use, services provided by payment systems (e.g. consumers, businesses, government)
Exchange	The delivery and receipt of payment instructions, which would result in a debit and credit being posted to the accounts of the Payor and Payee
Finality of payment	Payment cannot be revoked/reversed by any party involved
Good funds	Funds are delivered with finality to payee when the payee FI has certainty of credit from the payor
HVPS	High Value Payment Systems; a set of instruments and procedures that facilitates typically large-value inter-FI transfers with finality)
Indirect participant	An entity that cannot meet the applicable eligibility criteria or for business reasons accesses the core payment system through an agency agreement (i.e., sponsorship) with a direct participant
Interoperability	Ability for payments to be processed (exchanged, cleared and settled) across multiple systems or jurisdictions (e.g., cross-border) without manual assistance; generally facilitated by adoption of common standards and/or technical compatibility
LVTS	Large Value Transfer System; an electronic wire system that facilitates the transfer of funds between participating financial institutions in real time with finality of payment and certainty of settlement
Payee	The end-user (person or organization) who receives funds when a payment item is credited to their account

Term	Description
Payment service providers	A person or an entity that provides services directly to end users such as consumers and businesses/corporates, banks or other entities to support exchange, clearing and settlement services
Payor	The end-user (person or organization) who authorizes their financial institution to debit their account for the amount of a payment item
Posting	The process of debiting or crediting an end user's deposit account and making funds available (with possible restrictions)
Settlement	An act that discharges obligations in respect of funds between two or more parties
Timeliness of payment	The speed with which funds are initiated, processed, posted and made available to the recipient