Central Bank Digital Currency

Strategic Design Insights Dossier

2024

Reserve Bank of New Zealand Te Pūtea Matua

accenture

Foreword

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At the Reserve Bank of New Zealand – Te Pūtea Matua we are guardians of our financial system, working to enable economic wellbeing and prosperity for all New Zealanders. As kaitiaki o te toto—the steward of money and cash in New Zealand—we aim to ensure central bank money contributes to a sound and dynamic monetary and financial system by being:

- a stable anchor of value and confidence and convertibility in our money
- a fair and equal way to pay and save in our modern and inclusive economy.

This objective reflects the fact central bank money (whether in physical or digital form) plays an underpinning role in ensuring all prices are set in New Zealand dollars and people can confidently expect to be able to make payments and settle debts in New Zealand dollars now and into the future.

While we work to ensure that cash remains available and accepted for as long as New Zealanders want and need it, increasing public preference for digital transactions, and emerging innovations in private money (such as stablecoins) make it appropriate to consider the potential for a Central Bank Digital Currency (CBDC) for New Zealand. We have been undertaking a programme of work to consider this, including publication of an issues paper and public consultation (September 2021), and later by publication of responses and a summary document advising how we were taking feedback into account in subsequent work (April 2022).

"CBDC would work alongside cash, so people would have the option to use both."

Reserve Bank of New Zealand website

This CBDC Strategic Design Insights Dossier, prepared by Accenture on a collaborative basis with us, represents a further step in our multi-stage approach to policy development, including consideration of the strategic choices a CBDC could offer and design options we need to understand.

This dossier does not represent any RBNZ decision making on any case for a CBDC, but it will inform discussions and future work to establish one. This dossier was commissioned by RBNZ and is to be distinguished from Accenture's own published research.

I want to acknowledge the research and thinking of Accenture's team of global experts, and of our own team at the Reserve Bank who have helped move our understanding forward with the work represented in this dossier.

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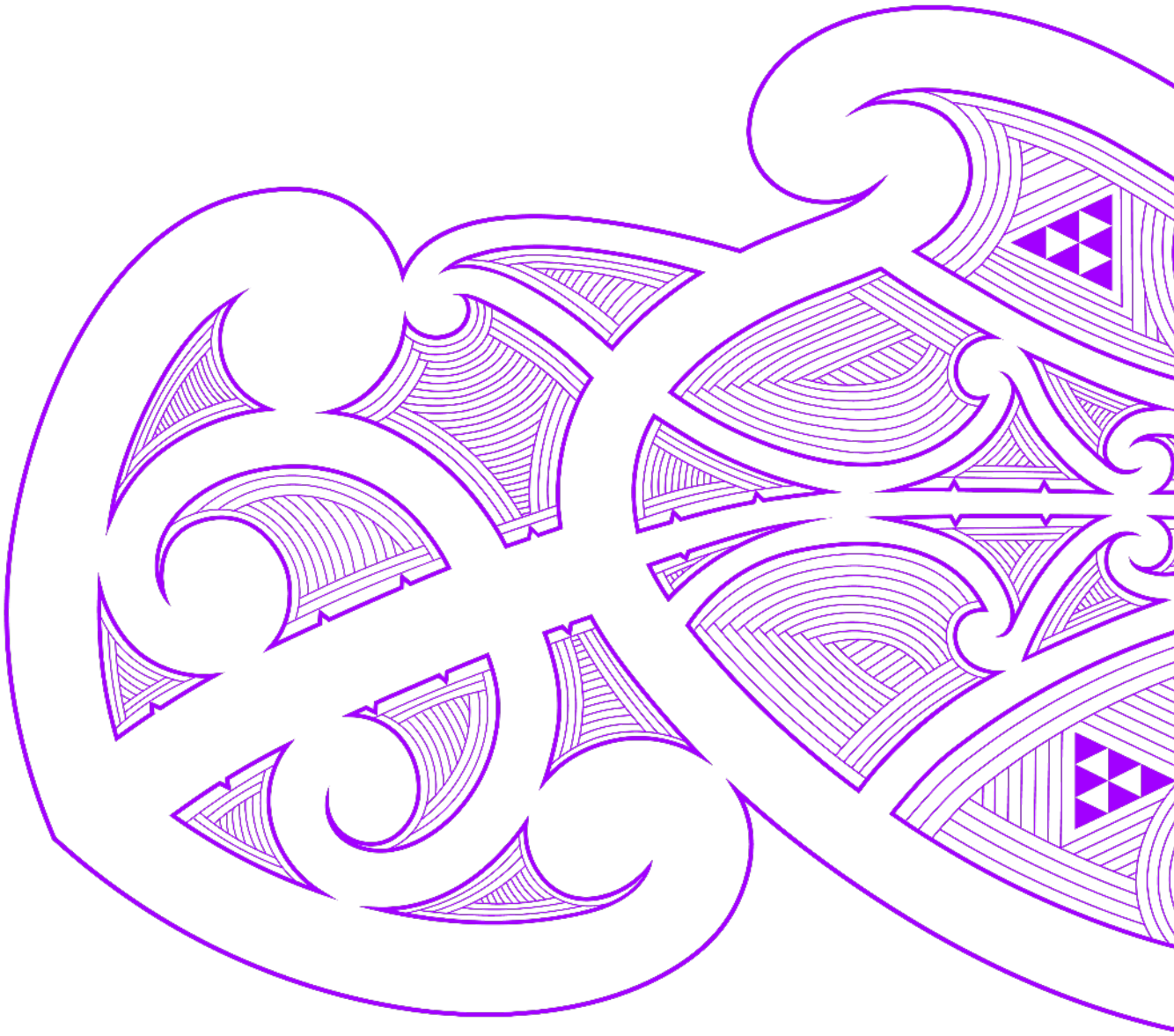


01. Executive Summary

01 – Executive Summary

1.1 Introduction

Purpose

The purpose of this dossier is to outline the options and choices associated with the most important questions for development of a CBDC in New Zealand, as well as a shortlist of Use Cases and Journey Maps that articulate how a CBDC might be used in New Zealand. The document does not issue definitive strategic technology choices for a CBDC. The Use Cases are not exhaustive.

Introduction

Over 10 weeks in April-May 2023 RBNZ, with support from Accenture, conducted a strategic design phase, as part of the Bank's multi-phased, multi-year staged gate CBDC programme, in which the current stage, Stage 2, seeks to identify the potential CBDC design options, through three workstreams – policy development for design, design elements and proof of concept explorations. This initial phase of work in Stage 2 had the objectives of:

- Aligning and formulating key strategic principles and design choices regarding CBDC in New Zealand
- Defining a list of open questions and design options for further exploration. The outputs from this work, including the materials gathered through a great number of collaborative workshops, are recorded in this Dossier.

Dossier Overview

The Dossier is divided into the following sections:

1. Executive Summary
2. Approach
3. Global CBDC Context
4. New Zealand Market Context
5. Design Choices
6. Capabilities
7. CBDC Use Cases
8. Key Questions
9. Next Steps

Sections 2, 3 and 4 set the context for the following sections and their output materials.

Section 5 charts the outputs through a process that worked through Design Principles, Strategic Choices and on to Design Options. A number of key Use Cases (covered in Section 7) were used to explore and test the thinking behind the documented outputs. Design Options are illustrated through a series of 'sliders' that indicate RBNZ's initial preferences together with rationale and further insights.

Section 6 looks at the typical capabilities required to support a general purpose CBDC Ecosystem

Section 7 details the process of moving from a long list of Use Cases to a short list of Use Cases to explore key focus areas of the CBDC Design Principles. Finally, 4 Use Cases were selected to understand and test Design Options, and as vehicles for developing User Stories and Journey Maps. The latter bring these Use Cases to life in a sequence of illustrations that step through the sequence of a transaction.

Section 8 identifies a number of questions both posed at the start and collated throughout this phase of work.

Section 9 considers what Next Steps are critical to building on the outputs achieved in this initial phase of work

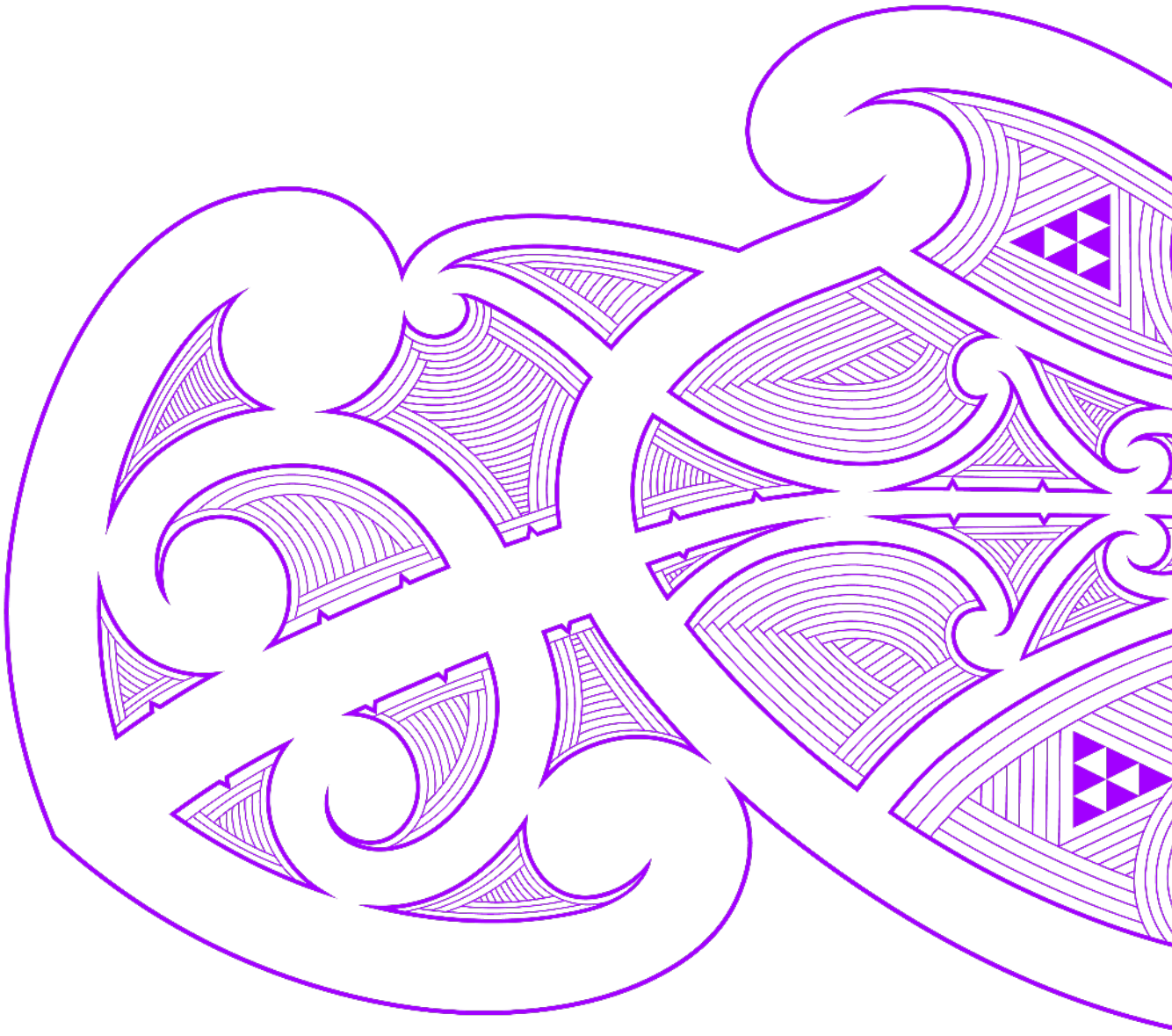
Conclusion

This phase of work covered a lot of key questions in a very short time, through a series of intense, collaborative workshops, combining Accenture's global experience and insights with the detailed work already done by the RBNZ team. A focus was on the foundational design principles, and insights into the unique aspects of the New Zealand ecosystem and how this would impact a CBDC. Key takeaways include that NZ has an opportunity to develop world leading CBDC capability, addressing inclusion, resilience and monetary sovereignty, that maximises synergies with other national digital initiatives, such as Digital ID, CDR and Real Time Payments through interoperability.

01 – Executive Summary

1.2 Glossary

Term	Description
CBDC	Central Bank Digital Currency
Wallet	A CBDC wallet is a designated storage location for digital assets that has an address used for sending and receiving funds to and from the wallet. The wallet can be online, offline, or on a physical device.
Payment instrument	A set of procedures agreed between the payment service user and the payment service provider in order to initiate a payment order (transferral of funds).
Payment methods	The number of ways in which Merchants can collect payments from their customers. Examples include, credit cards, direct debit, cash, etc.
Payment infrastructure/rails	A network of systems and technologies that enable the processing of electronic payments.
Interest bearing	The ability for CBDC being held in wallets to earn interest, and can be used as a monetary policy tool
Participants	Service providers within the CBDC ecosystem, such as Financial Intermediaries/PSPs/wallet providers etc.
Programmable payments	The ability to initiate payments automatically when conditions are met.
Programmable money	Digital currency that has rules and restrictions on its usage and value built into its logic
CBDC redemption	The process of converting/exchanging CBDC to its underlying fiat currency
Interoperability	The ability of two different systems to communicate and exchange data, usually via APIs.
Scheme	A set of rules and processes to govern the behaviours of participants within an ecosystem
Infrastructure Provider	An entity that offers the technological infrastructure to enable the issuance, distribution and management of CBDCs
Infrastructure Operator	An entity that is responsible for managing and operating the technological infrastructure to enable the issuance, distribution and management of CBDCs



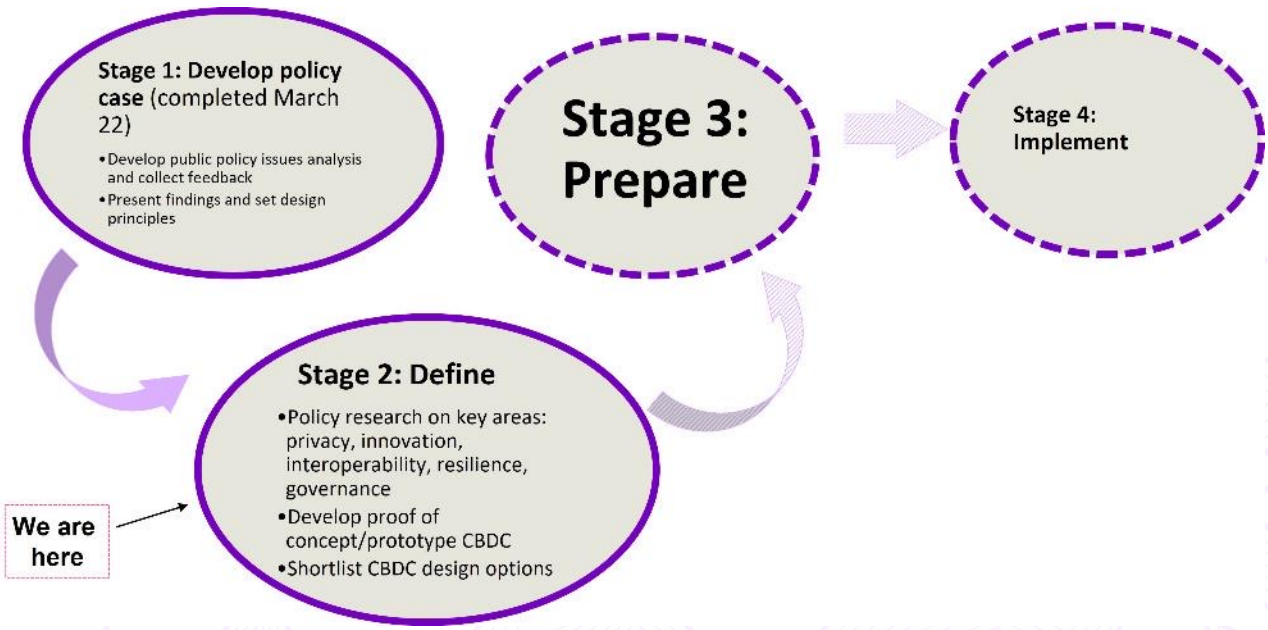
02. Approach Undertaken for CBDC Exploration Project

02 – Approach Undertaken for CBDC Exploration Project

2.1 CBDC Project Plan & Deliverables

2.1.1 RBNZ CBDC Exploration Stages

RBNZ's CBDC work programme is based around a multi-phased, multi-year staged gate approach. Stage 1 set out the policy case to begin the investigation, which was completed in early 2022. Stage 2 will seek to identify the potential CBDC design options, through three workstreams – policy development for design, design elements and proof of concept explorations.



2.1.2 Accenture's Assignment

RBNZ selected Accenture to deliver the following outputs – 4 CBDC use cases and associated journey maps, and an insights dossier that includes options and choices associated with developing a CBDC for New Zealand.

The brief

- 10-week surge
- Be ambitious
- Apply 80/20 rule
- Set RBNZ up for 'design options'
- Focus on use cases

Approach

- Collaborative
- Workshops
- Cross-RBNZ teams
- Intensive
- Draw from Accenture tools and experts

Deliverables

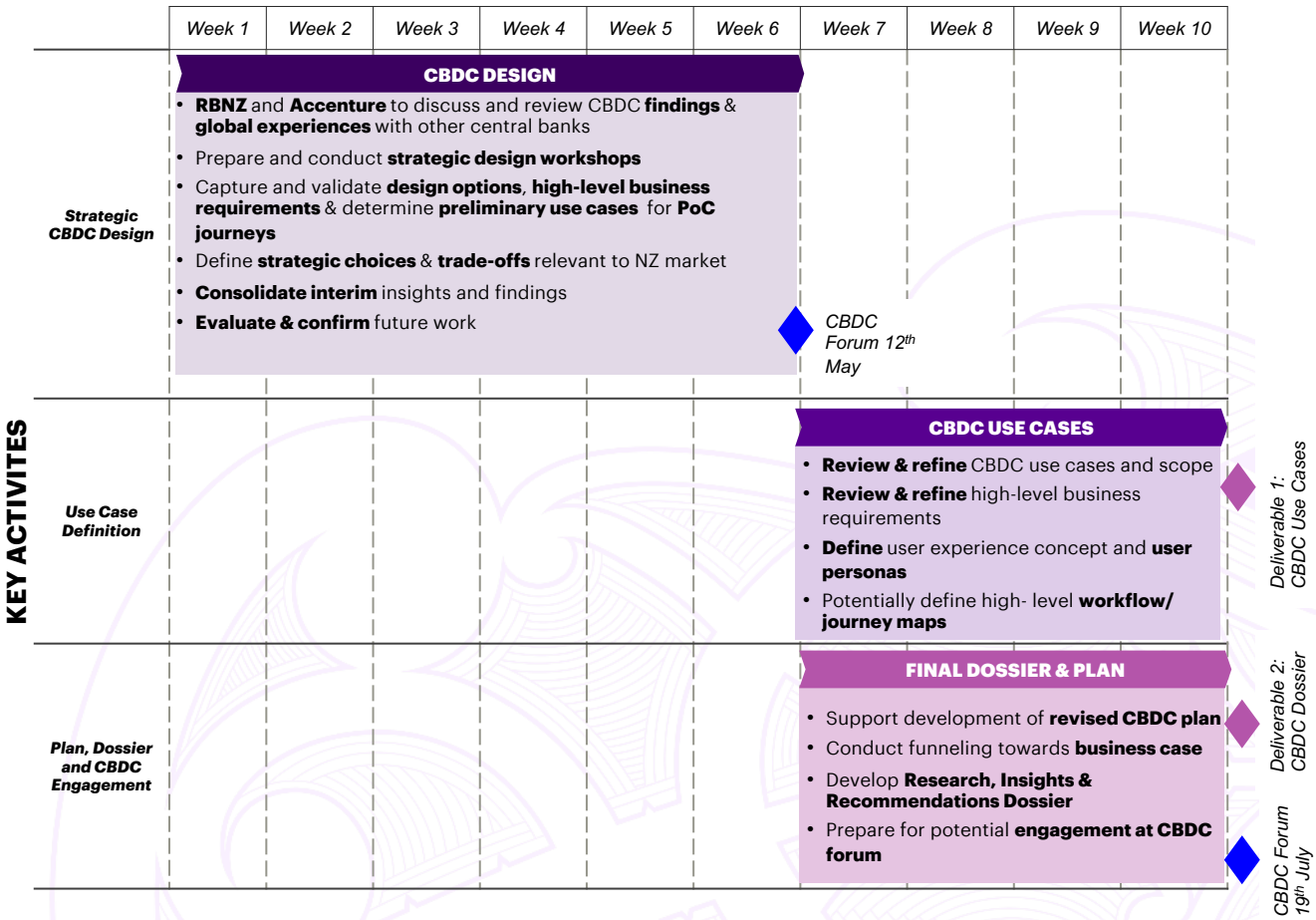
- Resulting design options / choices
- Priority use cases (x4)
- User journey maps (x4)
- Insights dossier

02 – Approach Undertaken for CBDC Exploration Project

2.1 CBDC Project Plan & Deliverables

2.1.3 CBDC Exploration Project 10 Week Plan

The 10 week plan for the project was developed across three main workstreams – Strategic CBDC Design, Use Case Definition, and Plan, Dossier and CBDC Engagement. Check in milestones occurred at the end of week 6 and week 10.



02 – Approach Undertaken for CBDC Exploration Project

2.2 – Definition of Focus Areas

Six focus areas were identified by RBNZ during earlier policy research work as topics to address during the development of design options for a CBDC for New Zealand. The subsequent work performed throughout this project (strategic and definition workshops) was aligned to these focus areas:

2.2.1 Adoption & Inclusion

RBNZ's preliminary insights identified adoption & inclusion as a focus area for designing a CBDC for New Zealand – factoring in New Zealanders' choice (ensuring access and availability of different products and services) and agency (the ability to use the product or service they choose to use with freedom and autonomy).

2.2.2 Privacy

The Future of Money – CBDC issues paper, published in 2021, describing the high-level opportunities and challenges of a CBDC for New Zealand, where many respondents identified privacy as a key aspect of freedom and autonomy, highlighting digital identity concerns and privacy in digital payments. Te Ao Māori data privacy principles are a key consideration in designing privacy within a CBDC system for New Zealand.

2.2.3 Holdings & Transactions

A focus area that covers the considerations for user CBDC holdings – how they will be able to manage their CBDC wallets, and how they will be able to make payments and transfers to other CBDC users and merchants.

2.2.4 Innovative Payments

A key area for the RBNZ to explore with regards to a CBDC for New Zealand is how it can spur efficiency and innovation by enabling greater competition in New Zealand's money and payments landscape, including enhanced payments functionality and as an alternative to the existing payments systems.

2.2.5 Reliability, Safety & Scalability

This focus area revolves around the considerations for RBNZ in developing a CBDC system that will be highly resilient, reliable and can scale to provide services for all New Zealanders.

2.2.6 Implications on RBNZ Technology & Operations

This focus area centres around the technology considerations and operational changes that may arise for the RBNZ with the implementation of a CBDC for New Zealand

02 – Approach Undertaken for CBDC Exploration Project

2.3 - Activities performed during the project

2.3.1 Accenture & RBNZ Sharing Sessions

RBNZ shared their preliminary findings from their CBDC exploration activities, as well as their current CBDC policy work, whilst Accenture provided their experience from working on similar CBDC projects across the world.

2.3.2 Strategic Workshops

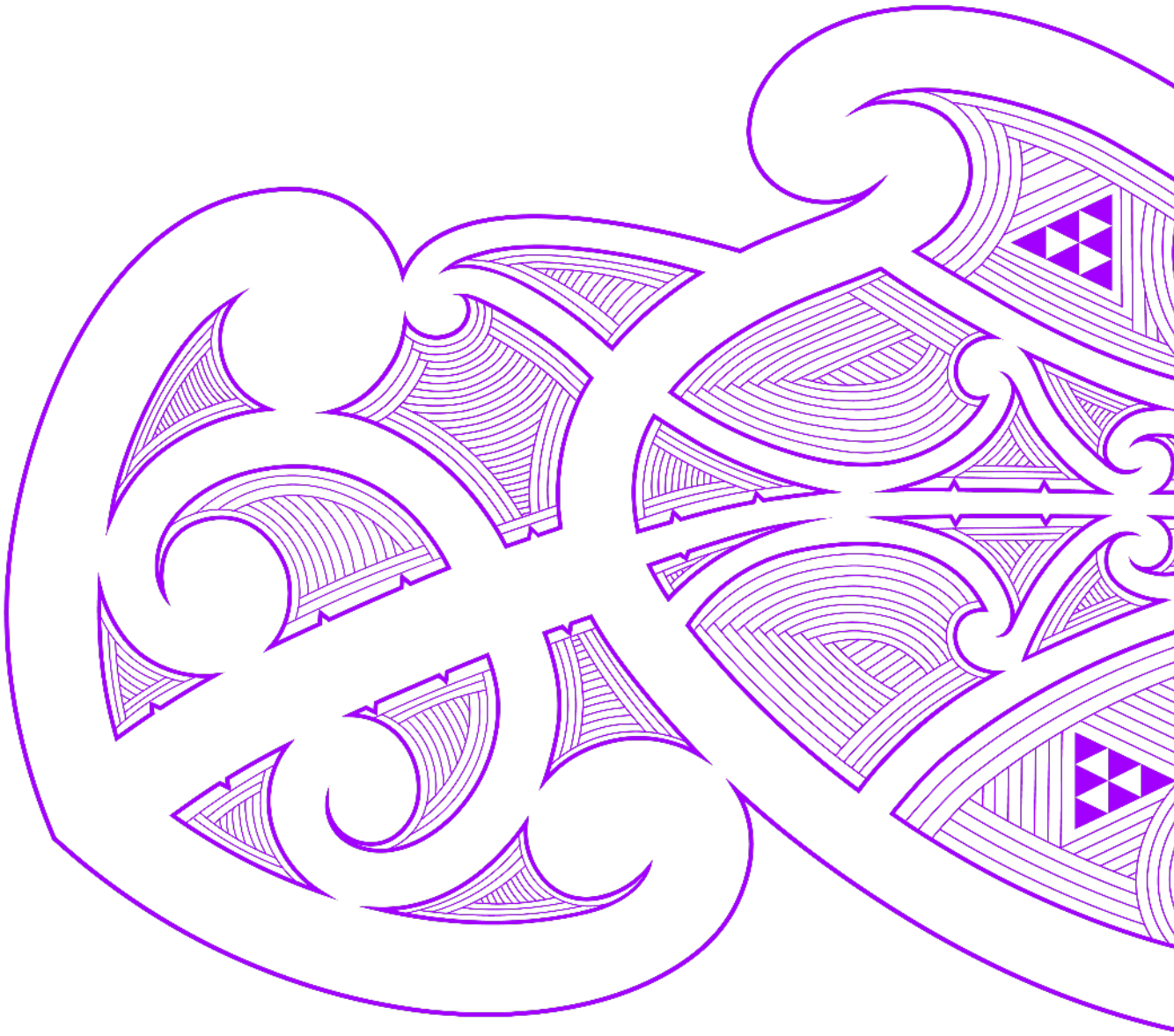
Strategic workshops were conducted across each of the focus areas to capture design options, trade-offs and strategic choices to be made for a CBDC system. Additionally, an approach for identifying and selecting potential use cases was covered, and workshop exercises were conducted to begin the use case ideation process.

2.3.3 Definition Workshops

Strategic choices, design options and trade-offs were consolidated and agreed upon during this series of workshops. Use cases were also narrowed down from a long list to a short list, and the descriptions and future solutions were outlined.

2.3.4 Use Case and Journey Map Development

Four use case descriptions detailing the challenges, future CBDC solutions and the considerations for technical proposals were written, whilst journey maps specifying a particular deep dive scenario from each of the use cases were developed.



03. Global CBDC Context

03 – Global CBDC Context

3.1 What are CBDCs?

3.1.1 What are CBDCs?

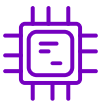
CBDC represents a potential new form of money that exists alongside existing forms and is exchangeable 1:1 with current central bank monies. While CBDC can be used to describe a specific instantiation, it should be thought of as an encompassing term that can take different forms based on functional and technology requirements.

3.1.2 Design Considerations

A CBDC can be token based or account based. A token based CBDC would be recommended by Accenture as there is greater potential for innovation.

Another design consideration for a CBDC would be its distribution model. For example, implementing a two-tier distribution model would limit disintermediation of the existing payments system. This model can enable efficiency, innovation and competition with an open access ecosystem for market participants such as banks, financial intermediaries, FinTechs, etc.

3.1.3 Technology Considerations



The introduction of a widely accessible, token based CBDC can be enabled by Distributed Ledger Technology (DLT) due to the functional and non-functional characteristics of the technology; tokens may better support offline functionality and greater programmability.

3.1.4 Accenture Identified Critical Digital Currency Themes

Accenture identified five critical digital currency themes that should be considered when designing a CBDC.

Diversification	Settlement	Functionality	Co-existence	Programmable Money
Consider whether to create a diverse payment system that may increase resilience, access, and autonomy.	The possibility of enabling atomic end-to-end settlement in financial market infrastructures.	Consider whether functionality allows the development of new payment methods.	Consider whether a CBDC can exist alongside private and official currencies to maximise economic efficiency.	Consider whether to have the ability to "program" rights, events, and obligations into the digital object.

Sources: Accenture Research

03 – Global CBDC Context

3.2 Motivations and trends relating to the adoption of CBDCs by central banks globally

3.2.1 Strategic Goals for CBDC (according to Bank of International Settlements (BIS) study)

- Expanding access to central bank money
- Diversifying and enhancing the sustainability of payment mechanisms
- Improving financial inclusion
- Improving the efficiency of cross-border payments
- Improving the security and confidentiality of payments
- Stimulating the growth of the volume of transactions and reducing their cost
- Increasing the level of sovereignty of monetary policy at the global level

These strategic goals for a CBDC identified by BIS help to give an understanding as to what has been considered for the adoption of CBDCs globally.

3.2.2 Motivations for Issuing a Retail CBDC and a Wholesale CBDC

The following graphs show a comparison of the motivations for issuing a retail CBDC and a wholesale CBDC between advanced and developing economies.

(1) = "Not so important"; (2) = "Somewhat important"; (3) = "Important"; (4) = "Very important".

Sources: Bank of International Settlements (BIS): Central bank digital currencies: foundational principles and core features (1), The technology of retail central bank digital currency (2), Results of the third BIS survey on central bank digital currency, Jan 2021 (3)

03 – Global CBDC Context

3.2 Motivations and trends relating to the adoption of CBDCs by central banks globally

3.2.3 List of CBDC Benefits

CBDCs can over the longer term become a key component in re-architecting the global financial infrastructure.

The following list shows the possible benefits and therefore motivations for Central Banks wanting to issue a CBDC.

Tokenised Asset Ecosystem

CBDC would create a **new, more efficient settlement infrastructure for Capital Markets** by enabling settlement in CB money and speeding up time to market for security issuances. CBDC are an essential component of a **Tokenised asset ecosystem**, enabling instant settlement of assets reducing risk and liquidity required to execute transactions.

A More Resilient & Diverse Payments Landscape

Introduces a **new format of money and payment infrastructure** that could make the payments landscape **more diverse and resilient**.

New Services, Innovation & Competition

The introduction of a CBDC would **unlock payment innovation** in retail, cross-country and wholesale payments, encouraging competition and spurring the **creation of new services** like offline payments, immediate asset settlement and custody solutions by existing Financial Institutions and Fintech start-ups.

Expanded Functionalities

A CBDC could **enhance the usability of the currency** and **promote its use as a global/regional reserve currency**. The Central Bank and authorised entities can **program capabilities into the CBDC,** supporting more flexible access , while allowing currency to be held offshore.

Societal Benefits

CBDC would accelerate the **transition to a digital economy**, while **accelerating financial inclusion**. Smart contracts can be written **to enable new functionality and spur innovation**. Authorised entities could also **programme capabilities into the money itself**.

Payments Efficiency & Risk Elimination

DLT leveraged CBDC token facilitates **instant and atomic Payment vs Payment settlement** , in both domestic and international payments. **CBDC cross-border transactions** can derive significant speed and efficiency gains, by eliminating counterparty risk and providing substantially more transparency.

03 – Global CBDC Context

3.2 Motivations and trends relating to the adoption of CBDCs by central banks globally

3.2.4 Examples of Global CBDC Projects

Below are some examples of global CBDC projects and their motivations.

European Union – Digital Euro

Motivation:
The motivation factors are digitisation and independence of European economy; the declining role of cash; increasing use of other digital currencies; impact on monetary policy; and the need of a contingency mechanism for catastrophic events and disaster.

USA – Digital Dollar

Motivation:
The benefits for a CBDC in USA are still under discussion, but could include mitigation of counterparty risk, countering private sector competition, mechanism to transfer relief payments, and enabling cross-border and helicopter payments

France – Project Jura

Motivation:
The benefits for a CBDC in France that are being explored are improving conditions for wholesale cross-border payments, reducing interbank settlements costs, increasing the traceability of transactions and the digitisation of government bonds

Sweden – E-krona

Motivation:
The motivating factor is retaining Central Bank primacy of influence on the payments system as the use of cash declines and private solutions proliferate

Switzerland – Project Helvetia

Motivation:
The benefits for a wholesale CBDC seen by the Swiss National Bank are cross-border payments, Delivery-versus-Payment mechanisms for securities trading, multi-currency payments and settlement of interbank payments.

South Africa – Project Khokha

Motivation:
Currently exploring the implementation of wholesale issuance, clearing and settlement against tokenised money. The driving factor for a wholesale CBDC is the aim to ensure effective payment system and for a retail CBDC is improving financial inclusion.

Kazakhstan – Digital Tenge

Motivation:
The motivating factors are improving financial inclusion, increasing resiliency of a national payment system, bringing efficiency to social functions and boosting innovations in the economy

03 – Global CBDC Context

3.3 Challenges, Risks and Threats to the adoption of CBDCs

3.3.1 Country-specific Risks and Threats Identified from Accenture CBDC Projects

Throughout our engagements with central banks globally, we observed the following risks and threats with CBDC projects

Risk	Threat
A collaborative model is broader than a payment scheme and a payment system. This means that there is a risk to adoption if there is not a balance between the opportunities and challenges inherent in the alternatives. The level of governance of participants interfaces and range of services affects their ability to compete and innovate.	Requires significant co-operation with consensus and clarity on the rights and obligations describing the form of co-operation.
The level of regulatory complexity can be high with interdependencies between government departments both within and external to the Central Bank. This means that there is a risk to the overall timeline to introduce a Digital Currency.	The absence of a clear governance framework poses a threat to achieving stated outcomes.
There is a risk from the retail payment sector that PSPs may be reluctant to support the usage of token-based money due to the unknowns associated with using new technology and lack of familiarity with this novel form of money.	The primary concern within retail payment sector lies in the potential for an unfavourable business model for PSPs, caused by the setup, change and transition costs associated with Digital currency.
There is a risk of stating requirements in terms of a solution that could result in making design decisions that which may have a major impact to the technology outcomes. Examples include: • a requirement for a centralised settlement does not imply an account-based approach (it can equally be met by a token-based solution). • a token-based approach may be DLT based (or not) and it may support smart contracts (or not). • Intermediated access to CBDC (i.e. wallets access the network via their PSP) does not imply hosted wallets.	There is a threat to the validity of design decisions when high level business requirements (together with common but not necessarily valid assumptions) lead to implicit technical design decisions. These can then result being unnecessarily restrictive.

03 – Global CBDC Context

3.3 Challenges, Risks and Threats to the adoption of CBDCs

3.3.2 Accenture's Views from projects conducted internationally

Below is a list of challenges, risks and threats discovered by Accenture from previous projects involving CBDC internationally.

Challenges

- Impacts of CBDC on price stability, is partly dependent on the propensity to hold CBDC
- Holding CBDC will naturally affect the size of a central bank's balance sheet, and holdings of both central bank and bank money can be state-of-the-world dependent
- Banks' abilities to differentiate bank money from central bank money
- Possibility of a CBDC that can pay negative interest can allow mitigating restrictions if the policy rate is near effective lower zero bound, and allows symmetry between positive and negative policy rates
- Central banks being able to replenish possible deposit withdrawals in a digital environment instantaneously, where the lending rates may become a policy variable, and installs confidence in the non-bank public and/or reduces the probablity of bank runs *(see Figure 1)*
- CBDC features may constrain off-shore use
- Transactions can be made anonymously or configured to various degrees of pseudonymity, but ultimately all transactions are still traceable

Risks

- Central bank risk mitigation would depend on the assets it acquires from the CBDC issuance
- CBDC Design and its effects on set monetary policy objectives will vary (lending rates)
- CBDC that is interest bearing can broaden channels for transmission of monetary policy
- Regulation for undue large net movements of CBDC can complicate monetary management
- Reduction of non-banked public desire to hold bank deposits
- If non-banks develop a preference to settle in CBDC for wholesale transactions, this can lead to increases in central bank liabilities
- Central banks must weigh privacy concerns against transparency gains for monitoring and preventing illicit transactions (money laundering, terrorism financing, counterfeiting)

Figure 1 – Bank Intermediation
Source: Accenture research

Threats

- CBDC's potential to change operating environments for central banks, and affect their ability to pursue price and financial stability
- Perceived subsitutability between a central bank and bank money could lead to recalibration and reduction of bank's holdings of central money
- Situations of financial distress can see the non-bank public use rapid conversion of bank money for central bank money (substitutability) and because of low transaction costs to do so (digital bank runs)
- Central bank control of monetary aggregates can be altered if non-residents increase their holdings of CBDC and may not be able to control its off-shore use
- Large net cross border movements of CBDC can complicate conduct of monetary policy and undermine financial stability

Sources: Accenture research

03 – Global CBDC Context

3.4 Digital Currency consumer trends

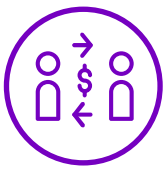
3.4.1 Benefits of Digital Currencies

Below is a list of the benefits of digital currencies that provide insight on why the use of digital currencies are increasing.

Tokenised Financial Ecosystems

- Digital currencies increase resilience, choice, and autonomy throughout the current payments landscape
- Tokenised Securities Issuance
- New trading instruments unlock new value pools across both public and private markets
- Non-Fungible Tokens (NFT) offer unique digital representation

DeCentralised Finance (DeFi)



- Individuals and institutions are making use of broader access to financial applications without the need for trusted intermediaries
- People, previously without access to financial services, are increasingly gaining access

Clearing, Settlement & Corporate Actions

- Reduction of counterparty risk, margin, collateral, and liquidity requirements
- DLT and smart contracts can modernise current corporate actions processes
- Atomic payment versus payment (PvP) and delivery versus payment (DvP) address current industry pain-points

Secondary Trading Services

- Market participants are building new and innovative technologies to perform fiduciary and non-fiduciary services
- Digital asset custodians provide secure ways to execute, transact, and store digital assets.

3.4.2 Valuations of cryptocurrencies not backed by a government authority

#	Name	Price	1h %	24h %	7d %	Market Cap	Volume(24h)	Circulating Supply	Last 7 Days
1	Bitcoin BTC	$26,130.17	0.58%	2.11%	4.78%	$506,481,004,150	$15,932,867,185 609,272 BTC	19,383,000 BTC	
2	Ethereum ETH	$1,779.72	0.29%	2.12%	2.79%	$214,029,209,801	$6,997,467,057 3,931,810 ETH	120,260,126 ETH	
3	Tether USDT	$0.9996	0.01%	0.04%	0.03%	$83,033,700,017	$24,514,639,878 24,521,129,233 USDT	83,063,097,247 USDT	
4	BNB BNB	$304.66	0.16%	1.08%	2.92%	$47,484,279,441	$421,548,461 1,382,515 BNB	155,857,707 BNB	
5	USD Coin USDC	$0.9997	0.02%	0.03%	0.02%	$29,131,974,040	$3,285,903,923 3,286,245,172 USDC	29,141,053,512 USDC	

Sources: RevolutionMoney POV –pdf, https://coinmarketcap.com/

03 – Global CBDC Context

3.5 Key Accenture Learnings from Global CBDC

3.5.1 Key Accenture Learnings from Global CBDC Projects

Below are some of the learnings from Global CBDC projects, indicating that motivations develop and change over time whilst noting that constant feedback and growth is required, amongst other learnings.

Evolution of "Why"

- A key consideration for developing a CBDC for now, and in the future, must factor in the changing motivations for a CBDC over time. The "Why" today may not be the same as the "Why" tomorrow.
- Different users of a CBDC will lead to different motivations for using a CBDC. If a central bank's objective is to cater to all users, they will need to consider the different motivations for CBDC use.
- Development of a CBDC will need a constant feedback loop from users to ensure that users' needs and requirements are being met as they evolve over time
- A consideration for central banks will be the role a CBDC plays within the existing payments and non-payments ecosystems, as well as where a CBDC will play within a regional and global context

Considering "How"

- A factor to consider when developing a CBDC is the length of time it takes to build the market ecosystem, especially with new entities being created and the time taken for users to adopt a CBDC. This is necessary to ensure market-led innovation.
- In developing a CBDC ecosystem, central banks should consider an approach to working with market participants: to engage, educate, co-create and co-pilot.
- The role of the central bank and the market participants within a CBDC ecosystem is a key strategic choice that will need to be made to define who will be responsible for what within the ecosystem.
- Central banks should consider the development of guidelines and accelerators to ensure seamless integration and effective use of the CBDC system by market participants

Designing "What"

- In designing a CBDC system, central banks will need to consider the technology feasibility of the design choices being made.
- In developing a CBDC system, central banks will need to be aware of the learning curve when building the capabilities required for a CBDC system.
- Central banks use a hypotheses-driven exploration approach to test different elements for a proof-of-concept
- Central banks can consider a top-down approach to ensure that CBDC development & bottom-up design

Preparing for "When"

- To enable the wide adoption and to ensure that users and participants better understand the CBDC system, central banks must build stakeholder awareness through effective external communications and PR
- Central banks should conduct a regulatory analysis to ensure that specific regulatory processes are created and maintained for CBDC systems

03 – Global CBDC Context

3.5 Key Accenture Learnings from Global CBDC

3.5.2 CBDC Considerations

Multi-year CBDC engagements have revealed a set of important factors to examine for central banks to consider (non-exhaustive)

Policy

- CBDC impact on monetary policy & stability
- Independent Sovereign Payment Rails – does one need to exist and does this depend on existing infrastructure?
- Durability of the CBDC system - considering demonetisation/expiry/ retiring/upgrade and its value
- CBDC adoption needs and strategies

Foundational concepts

- Leveraging Commercial Bank/PSP Relationships – who is responsible for KYC/AML/CTF?
- Parallels to Cash Distribution Cycle – what is the distribution model?
- Extensibility – network ecosystem for PSPs and other participants?
- Wholesale/Retail CBDC

Governance

- CBDC participant onboarding/offboarding and associated responsibility
- CBDC participant roles and responsibilities
- Control/Access to monies – will there be the capability to freeze or seize funds?
- Remuneration/costs associated with the Business Model
- Governance of user safeguards

Technical governance

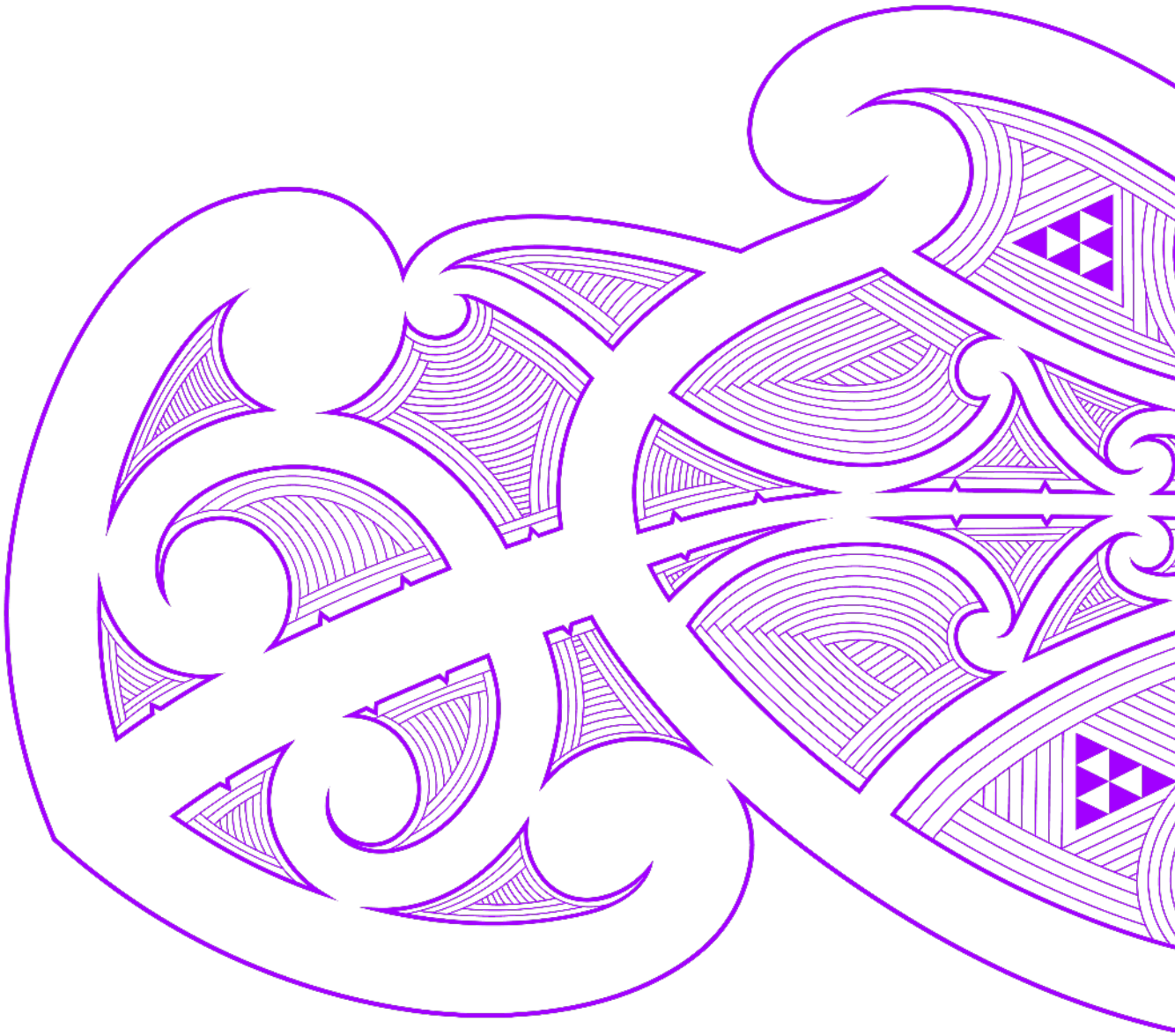
- Technical considerations for transaction finality (e.g., consensus)
- The capability for applications/smart contracts
- Identification, authentication and authorisation – where and how?
- Management of self-sovereign identities

Functionality

- User-centric privacy/confidentiality
- Offline capabilities for a CBDC
- Programmable payments/Smart Contracts - network enforced rules vs. local business logic
- Functional modularity of the solution

Technology

- Distributed Architecture vs Centralised
- Interfaces and integration with traditional payment systems (RTGS and payment schemes)
- Performance & Scalability – latency and transactions per second
- Resilience – limited points of failure, failure scenarios, recovery time and point objectives
- Security
- Crypto agility (if applicable) e.g., shoebox attack
- Technical modularity of the solution



04. New Zealand Market Context

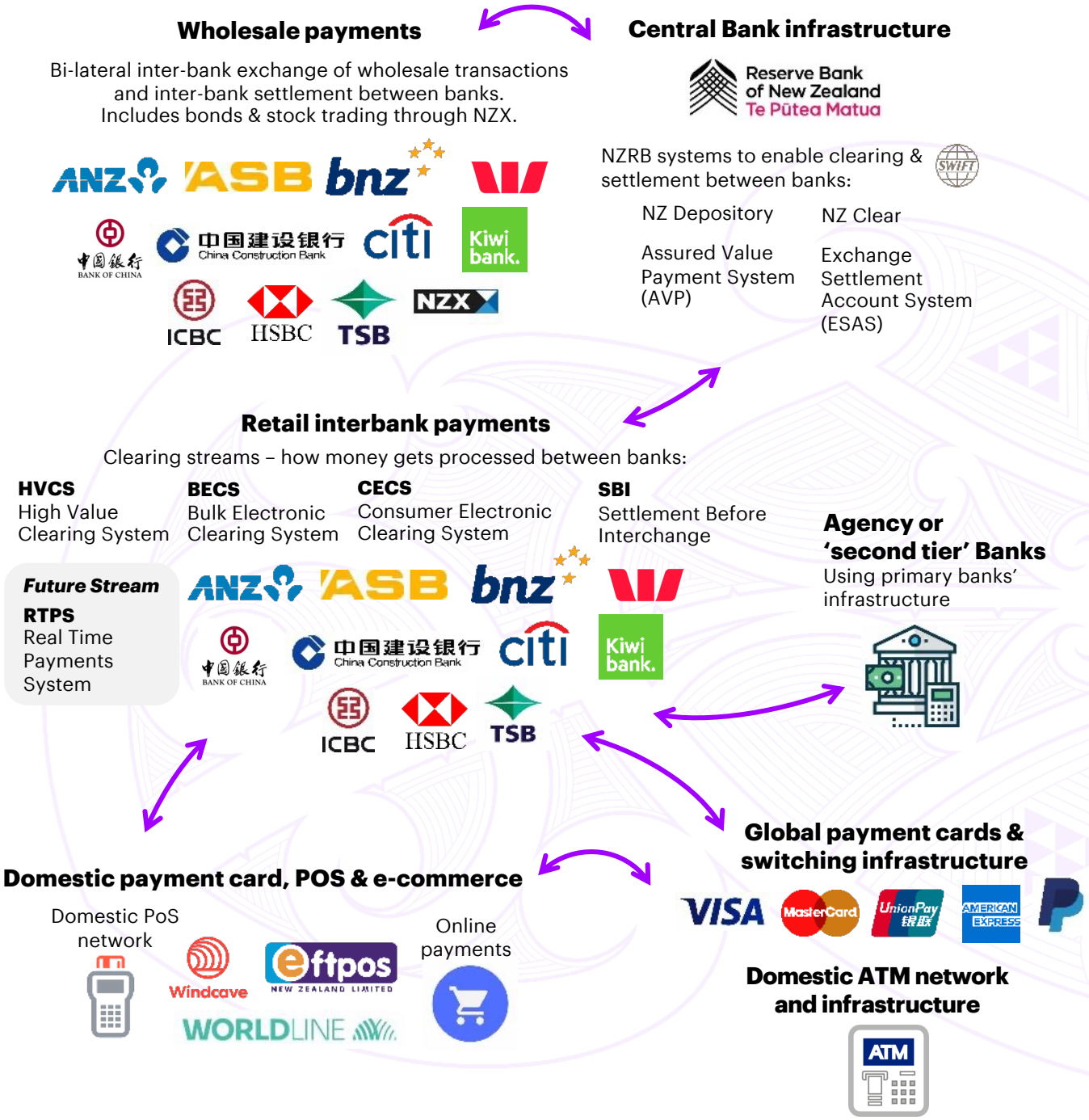
04 – New Zealand Market Context

4.1 NZ Economic landscape

The potential for a CBDC system to impact the existing ecosystem is clear, so it is important to understand the New Zealand contextual landscape when exploring and developing a CBDC. The opportunities and challenges for a CBDC interacting with the market must be considered.

4.1.1 New Zealand's payments ecosystem

The New Zealand Payments Ecosystem is relatively simple compared to many advanced nations. Despite New Zealand having one of the lowest levels of cash usage globally, the properties and market dynamics associated with the payments ecosystem have meant that domestically-generated innovation has not occurred at the RBNZ's desired pace of change.



04 – New Zealand Market Context

4.2 Consumer trends and behaviours

4.2.1 Key Insights from the Cash Use Survey Summary Report 2021 (RBNZ)

The Cash Use Summary Report published by RBNZ in 2021 shows insights on the why, who and how of cash use.

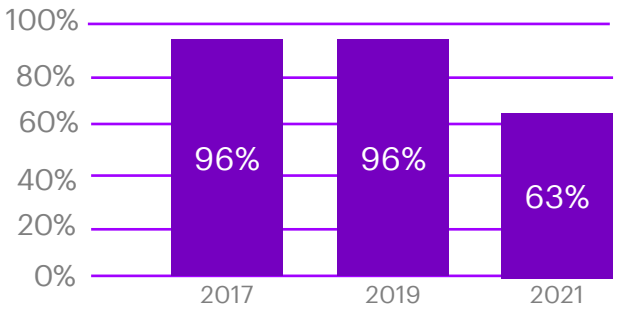


Figure 1: Cash users in New Zealand

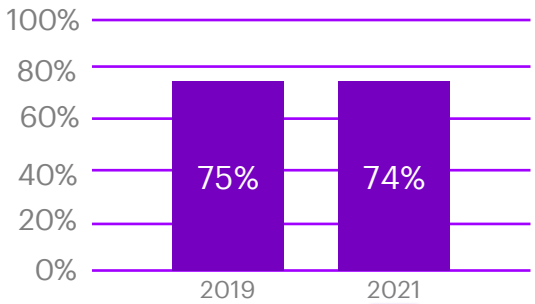


Figure 2: Cash held by New Zealanders in their wallet, purse or pocket

Reasons identified for why people use cash:

- 29% said the main reason is because they shop in places that only take cash
- 18% said they don't like using cards for small payments
- 17% said cash is used for their budgeting
- 42% of Māori said cash is used for cultural reasons such as Koha compared to 24% of non-Māori

Reasons identified for storing cash were:

- 60% said 'access to money quickly' and 'emergencies'
- 41% selected 'I feel better for the unknown'
- 28% said 'saving for unplanned spending' and 22% said 'saving for specific events
- 5% said 'keep savings private' and 'lack of trust in government'

Insights on cash use across various user groups

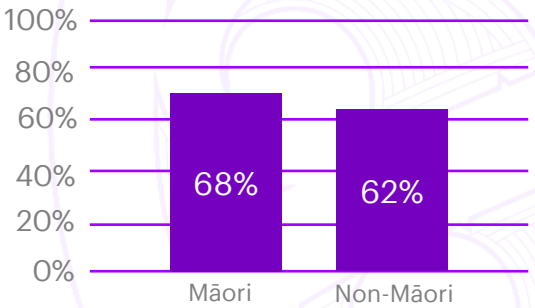


Figure 3: Percentage of Māori cash users compared to non-Māori

Note: 14% of Māori used cash in the seven days before completing the survey compared to 7% of non-Māori

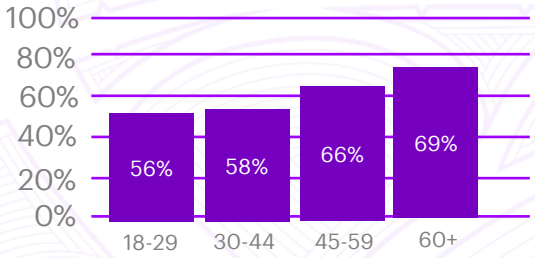


Figure 4: Cash usage by age group

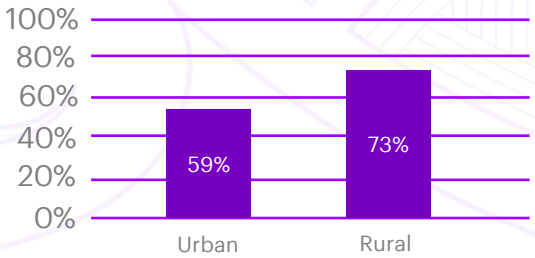


Figure 5: Cash users in urban and rural areas

Sources: Cash Use Survey Summary Report 2021

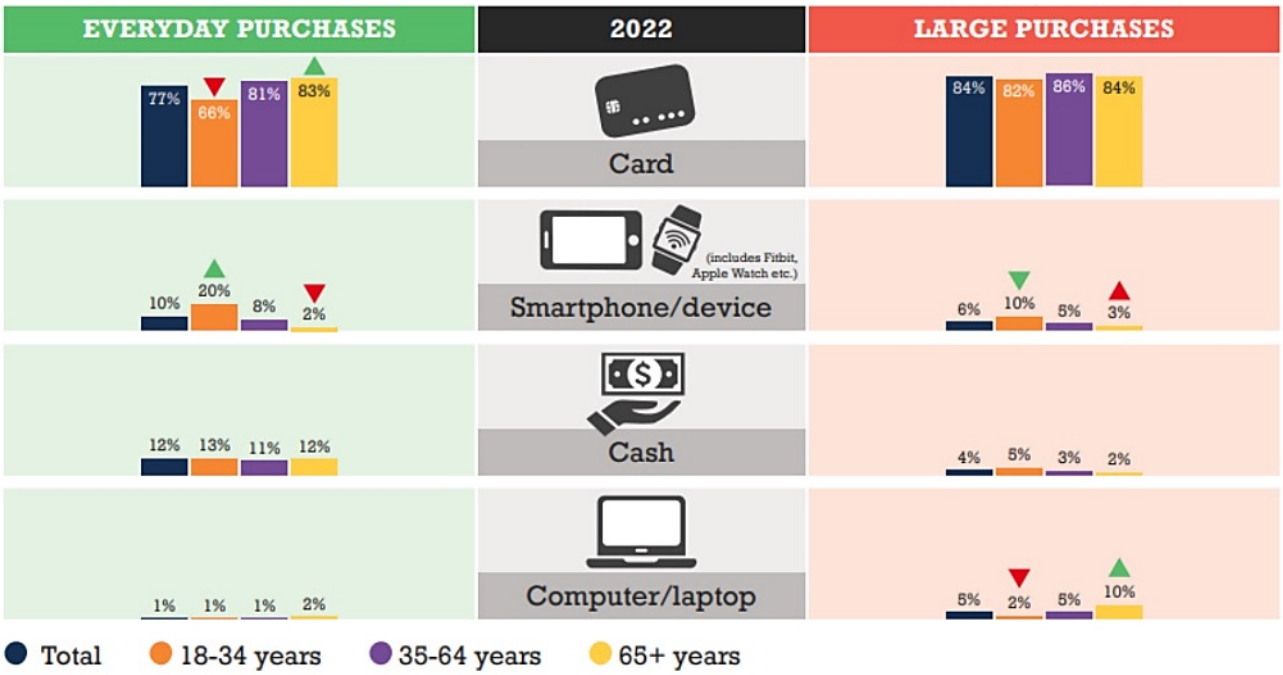
04 – New Zealand Market Context

4.2 Consumer trends and behaviours

4.2.2 Payments NZ Consumer Research 2022

A collection of key insights from the consumer research done by Payments NZ in 2022.

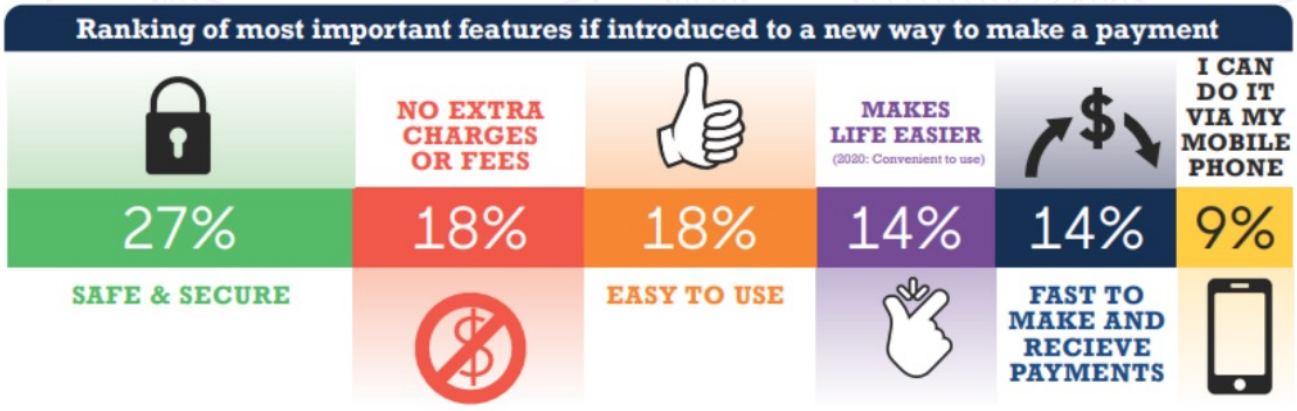
Preferred payment methods vary by age group with over 65s+ more likely to prefer traditional methods and under 35s smart devices:



The key barriers to using contactless payment are concerns about security and because transactions don't show in real time:

- Security concerns (especially if card is lost)
- Transactions don't show immediately
- Charges can go to the wrong account or credit card
- Surcharge – to either the individual or retailer

Key features New Zealanders are looking for in new payment solutions:



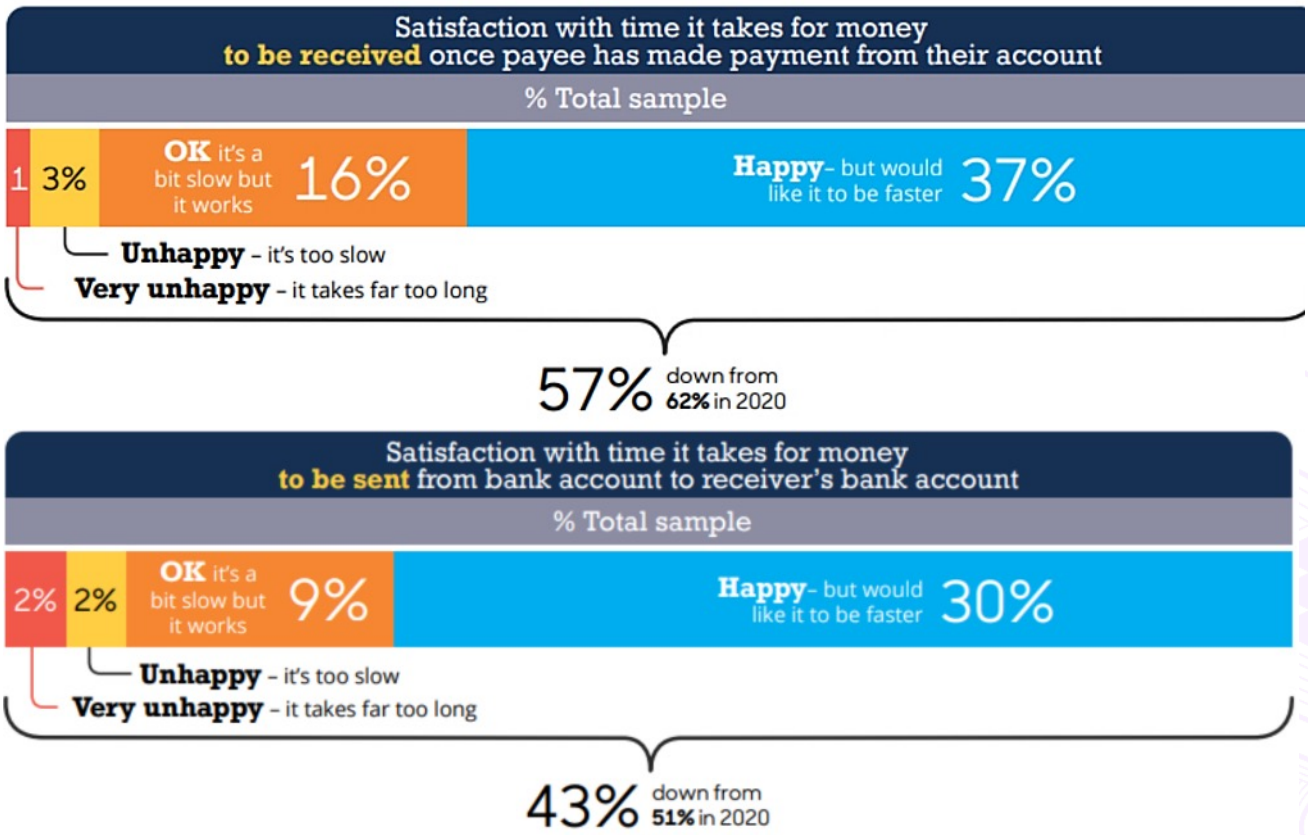
Sources: Payments NZ Consumer Research 2022

04 – New Zealand Market Context

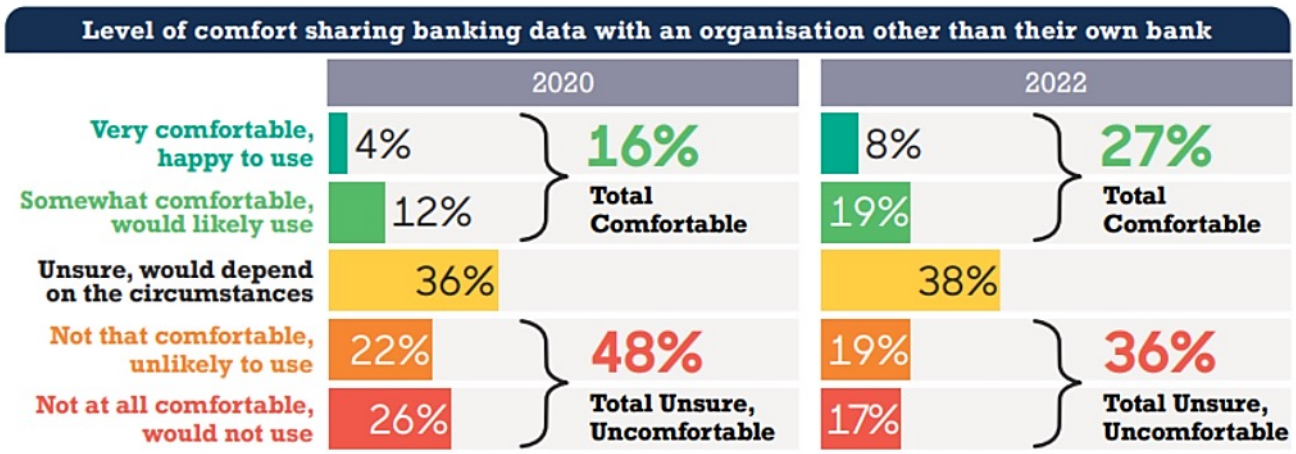
4.2 Consumer trends and behaviours

4.2.2 Payments NZ Consumer Research 2022

Satisfaction with the time it takes to make payments is higher than in 2020, but there is still a higher proportion who would like payments sent faster (43%) and for payments to be received quicker (57%):



More New Zealanders are comfortable sharing their banking data than two years ago but there remains a large group who are unsure (38%):



Sources: Payments NZ Consumer Research 2022

04 – New Zealand Market Context

4.2 Consumer trends and behaviours

4.2.3 Technology, choice, and financial inclusion

New Zealanders are increasingly using digitally-enabled financial products and services. Continuing this trend by providing better access to people who have to date found it difficult or undesirable to use 'digital finance' is important – as is the provision of choice between either digital or physical financial products and services.

Infrequent or no use of digital payments

A small portion of New Zealanders are reliant on cash payments all the time, with a higher number of people that rely on cash in certain circumstances..

Some people do not have debit or credit cards that can be used for online payments. This gives them few options if they need to make or receive an online payment.

40%

Of New Zealanders use cash more than twice a week

Infrequent or no use of financial services

Improving access to digital financial products and services such as borrowing and saving is important. A key part of financial resilience for individuals is being able to access funds in an emergency or during a period of no income. In 2021, 97% of adults reported 'it was possible' to obtains funds in 30 days. The main source of these funds were savings (59%), family and friends (11%), borrowing from a bank or private lender (9%) and other sources (5%).

97%

Of adults reported 'it was possible' to obtains funds in 30 days

Infrequent access to the internet and digital services

Digital device and internet access presents a barrier to digital financial inclusion. Infrequent use of financial products and services can be due to infrequent digital connectivity.

Only 79% of households are on unlimited data plans. According to the Digital Equity Coalition Aotearoa, these plans remain unaffordable for many households.

79%

Of households have unlimited data plans

The unbanked minority

Although many people have access to transaction accounts, 1.25% of adults don't have any (just over 51,000 people). This means that people without bank accounts cannot receive salary or wages, receive a benefit and struggle to pay for basics.

1.25%

Of adults don't have transaction accounts

Ability to Exercise Choice

Inclusion involves the ability to confidently exercise choice. When this is not possible, barriers are created and adoption slows. Choice can be restricted when the design, packaging or delivery of financial products of services mismatches the abilities, social or financial needs, or confidence of potential users. Choice can be restricted by:

Literacy, financial and digital skills

RBNZ research shows that the uptake of digital financial products and services is dependent on literacy, financial and digital skills.

Trust and information

At present, only 69% of New Zealanders feel safe using the internet for online transactions (BNZ digital skills report). Given that trust-levels and the provision of information are highly correlated, it is assumed that providing more, and better information to New Zealanders will enhance levels of trust.

Confidence and motivation

RBNZ research shows that some New Zealanders can feel anxious, overwhelmed and unsure about using financial services.

Sources: Cash use (H3) - RBNZ - Te Pūtea Matua (rbnz.govt.nz); Demirgüç-Kunt, A, Klapper L, Singer D and S Ansar (2022) 'The Global Findex Database 2021: Financial Inclusion, Digital Payments, and Resilience in the Age of COVID-19.' ;Digital Equity Coalition Aotearoa (DECA) (2022) 'Affordable Connectivity for all in Aotearoa', White paper

04 – New Zealand Market Context

4.2 Consumer trends and behaviours

4.2.4 Consumer Vulnerability Framework

The Consumer Vulnerability Framework created by the Members of the Council of Financial Regulators (CoFR) was designed to help the industry to develop approaches that assisted vulnerable customers.

The Consumer Vulnerability Framework can help to shape use cases defined by RBNC to support CBDC development by ensuring that each use case we design reflects the vulnerability issues consumers face.

Key takeaways from this framework are the risks the CoFR have identified, as shown in the below table:

Health and physical factors	Life events	Resilience	Capability
Mental health issues	Recently migrated	Low savings	English as a second language
Physical health issues	Caring responsibilities	Loss of income	Low literacy levels
Addiction issues	Bereavement/ending of relationship	Lack of self-confidence	Lack of knowledge of consumer rights
Learning disabilities	Natural disasters	Over indebtedness	Low level of financial capability
Physical disabilities	Non-standard requirements: women in refuge, ex-offenders, children in care	Lack of time	Digital exclusion

Financial Inclusion

The Digital inclusion Research Group (DIA) states, "a digitally included person is someone who has access to affordable and accessible digital devices and services at a time and place convenient to them, as well as the motivation, skills, and trust to use the internet to pursue and realise meaningful social and economic outcomes." The DIA recognises that people who are digitally excluded usually have underlying challenges as is represented in the inclusion iceberg (figure 2). This links closely with the consumer vulnerability framework identified by the CoFR.

Using the inclusion iceberg and consumer vulnerability framework, two main barriers to inclusion were found to exist in New Zealand.

These barriers are:

- Meaningful choice of products and services.
- Ability to exercise choice.

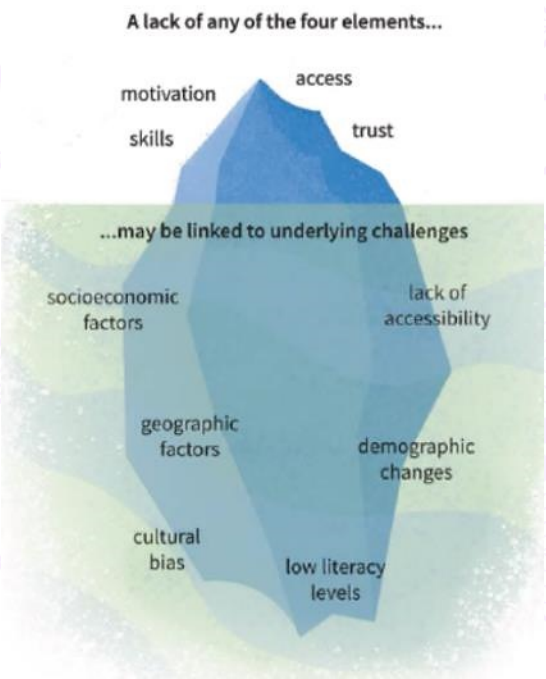


Figure 2 – sourced from DIA

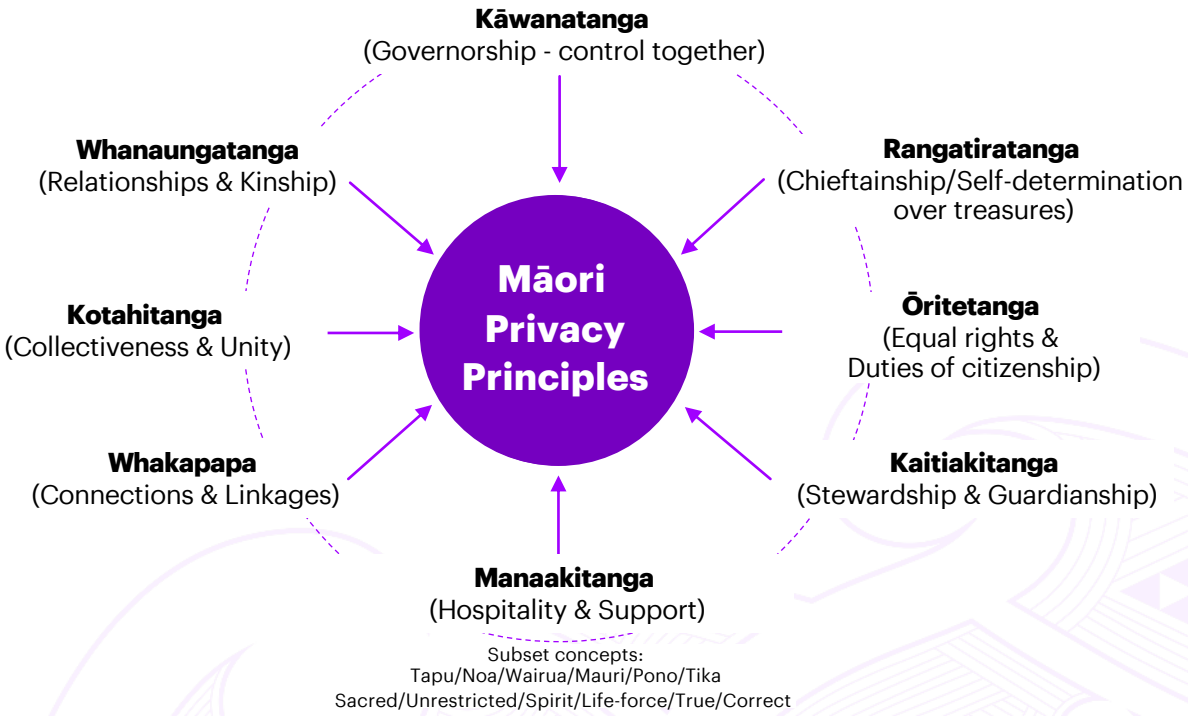
Sources: CoFR Consumer Vulnerability Framework , Department of Internal Affairs (DIA) (2019), 'The Digital Inclusion Blueprint', March

04 – New Zealand Market Context

4.3 Cultural Context – Data Privacy & Māori Data Sovereignty

4.3.1 Māori Privacy Principles

The following diagram and the descriptions relating to Māori Privacy Principles were derived from each of the privacy elements detailed in the *Māori Data Sovereignty Principles* report.



Rangatiratanga | Chieftainship & Self-determination over treasures

Control

Māori have an inherent rights to exercise control over Māori data and Māori data ecosystems. These rights are inclusive but not limited to the creation, collection, access, analysis, interpretation, management, security, dissemination, use and reuse of Māori data.

Jurisdiction

Any decisions of Māori data (physical or virtual) shall enable the enhancement for Māori (and future generations). Preferences is that any Māori data shall be stored in New Zealand and Māori are informed before a decision is made about offshoring data.

Self-determination

Māori have the right to any data that is about, for and by Māori for ensuring self-determination and self-governance and the right to request removal of data that is contrary to Māori tikanga or disempowers or creates bias against Māori.

Whakapapa | Connections & Linkages

Context

All data is connected and has a lifeforce.
Metadata should, at minimum, provide information about the origin of the data, the reason or purpose for collection, what the context of the data is for, and who are the parties involved.

Data disaggregation

If Māori data is disaggregated, then it increases the relevance for Māori. Māori data shall be collected and coded using categories that prioritises Māori and their needs and aspirations.

Future use

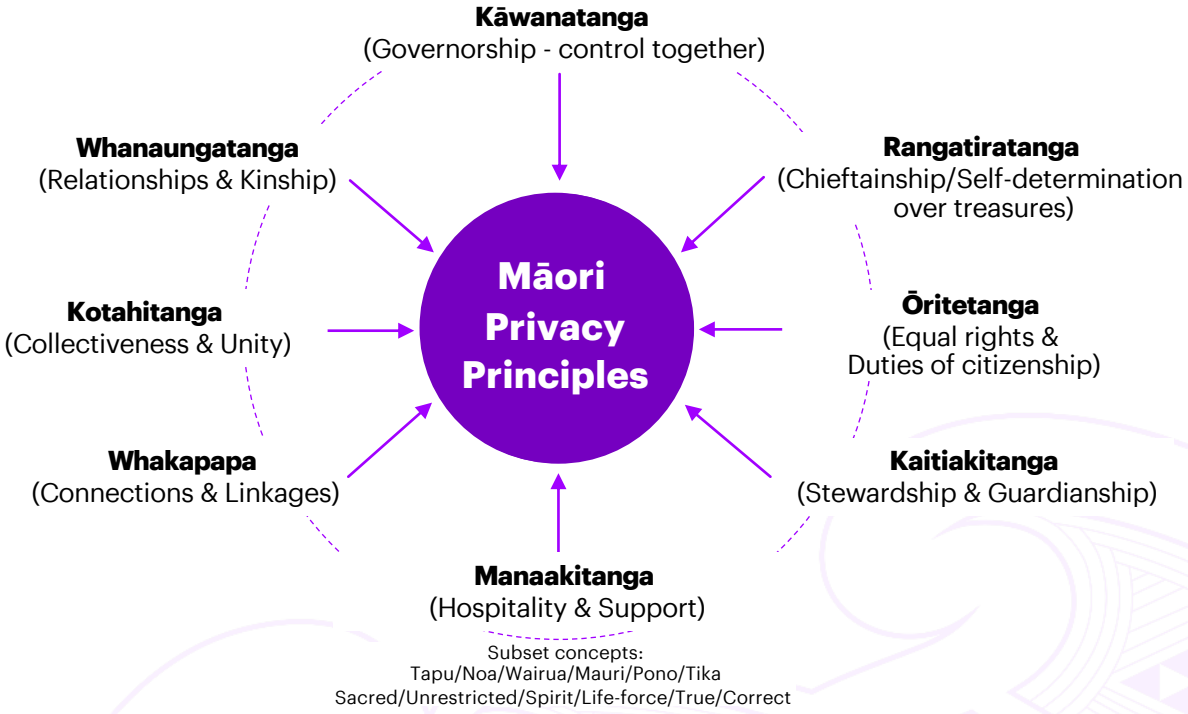
Any decisions over Māori data can have long-term consequences (positive and negative) for Māori and their future. Māori data governance should ensure no harm is done to Māori.

Sources: *Māori Data Sovereignty Principles Updated - Dr Karaitiana Taiuru PhD, JP, ACG, MInstD, RSNZ Tawhiti Nuku | Te Kāhui Raraunga (kahuiraraunga.io)*

04 – New Zealand Market Context

4.3 Cultural Context – Data Privacy & Māori Data Sovereignty

4.3.1 Māori Privacy Principles



Whanaungatanga | Relationships & Kinship

Balancing rights

Individuals' rights (including privacy rights), risks and benefits in relation to data need to be balanced with those of the wider collective groups - whānau, hapū, iwi, marae, rōpū which the individuals are inherently part of. At times, based on the context the collective rights will prevail over the individual rights.

Accountabilities

Māori are responsible for the creation, collection, analysis, management, access, security or dissemination of Māori data, and they have intergenerational responsibility and accountability to the wider collective groups - whānau, hapū, iwi, marae, rōpū where data may derive from.

Kotahitanga | Collectiveness & Unity

Benefit

Any data ecosystems shall be designed and function that enables Māori to derive individual and collective benefits both present and future.

Build capacity

The development of a Māori data governance and sovereignty workforce to facilitate the creation, collection, management, security, governance and application of Māori data.

Connect

Connections between Māori collective groups and other Indigenous peoples shall be supported to enable the sharing of strategies, resources and ideas in relation to Indigenous data and that leads to attainment of their collective goals.

Manaakitanga | Hospitality & Support

Respect

The collection, use and interpretation of data shall uphold Māori dignity. Any data analysis that stigmatises or blames Māori can result in collective and individual harm and should be actively monitored, reported and avoided.

Consent

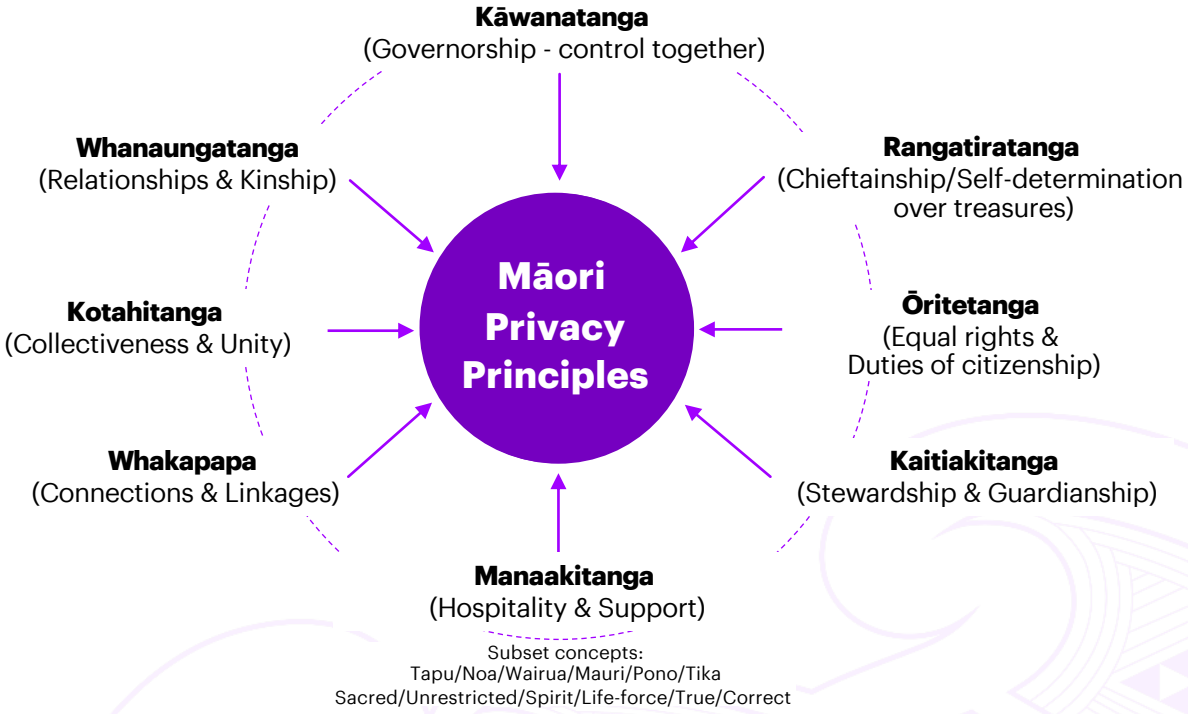
Free, prior and informed consent (FPIC) is part of the United Nations Declaration of the Rights of Indigenous Peoples (UNDRIP) declarations that should underpin any collection and use of Māori data.

Sources: Māori Data Sovereignty Principles Updated - Dr Karaitiana Taiuru PhD, JP, ACG, MInstD, RSNZ Tawhiti Nuku | Te Kāhui Raraunga (kahuiraraunga.io)

04 – New Zealand Market Context

4.3 Cultural Context – Data Privacy & Māori Data Sovereignty

4.3.1 Māori Privacy Principles



Kaitiakitanga | Stewardship & Guardianship

Māori Data is ever only loan

Māori data shall be stored and transferred in such a way that it enables and reinforces the capacity of Māori to exercise kaitiakitanga over Māori data. Non-Māori can not own or appropriate Māori data.

Ethics.

Tikanga (Māori law), kawa (Māori protocols), mātauranga (Māori knowledge), Te Tiriti (Treaty), He Whakaputanga (Declarations) and The United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) all underpin what access, use and protections should be for Māori data.

Restrictions.

Māori shall decide which Māori data shall be accessed and parameters around it.

Ōritetanga | Equal rights & Duties of citizenship

Māori-Crown Co-design continuum approach

Māori and crown implement shared decision making, Māori determine who represents them, acknowledgement from both parties on authorising environments.

Ethics and process.

Equal and shared explanatory powers, acknowledgement of different perspectives between Māori and crown, bilingual and bicultural voices are present.

Resources.

Priorities for resources are co-determined and measured for impacts by both parties, the crown invests in outcomes determined by Māori.

Kāwanatanga | Governorship – control together

How Māori input is implemented and treated

Respective views of Māori being afforded the same as the crown, actively protect Māori data, traditional practices and systems are recognised as valuable cultural resources.

Ethics.

Māori have inherent rights and can exercise control over Māori data and ecosystems, are partners for decision making that ensures mana-enhancing outcomes for Māori.

Process.

Māori emphasise and uphold collective rights, having Māori leadership that can exercise collective authority (Iwi/hapū) over Māori data, and removes any barriers for Māori accessing and using their data.

Sources: Māori Data Sovereignty Principles Updated - Dr Karaitiana Taiuru PhD, JP, ACG, MInstD, RSNZ Tawhiti Nuku | Te Kāhui Raraunga (kahuiraraunga.io)

04 – New Zealand Market Context

4.3 Cultural Context – Data Privacy & Māori Data Sovereignty

4.3.2 Key Considerations for Māori Data

The following important considerations relating to Māori Data Sovereignty, privacy and Te Ao Māori must be considered as part of RBNZ CBDC design.

- Based on feedback from various Māori interviewees, for Māori to be able to have trust and confidence in relation to Crown cloud storage decision making, Māori worldviews should at least be identified by the relevant experts and genuinely considered by agencies as part of their data storage decision making processes.
- Many Māori interviewees considered that there is a low level of transparency in terms of the particular data held by agencies, the way that the data is stored, and the decision-making processes adopted in each case. This perception led to a low level of confidence in the Crown's ability to act as a steward in relation to Māori data and, in some cases, a level of mistrust
- Echoed by various Māori interviewees, is that agencies should not simply look to comply with their legal obligations in respect of Māori data (including how and where it is stored) and go no further than they are legally required. To do so would place too much emphasis on "western" notions of rights and interests, and not enough focus on the inherent rights which Māori have by virtue of their inalienable relationships with the land, water and natural world. Instead, as various Māori interviewees noted, agencies should, in their cloud storage decision making, consider how they can operationalise Māori aspirations in relation to data'
- A number of Māori interviewees expressed the view that mana tangata (mana of people) should be respected in decision making regarding cloud storage. We understand that the concept of mana tangata refers to the authority of the individual and therefore the idea that individuals should be entitled to have a say in, or make, decisions which affect them. In addition to individuals, the views of whānau were also seen as important by various Māori interviewees
- For any cloud storage decision making relating to Māori data, the decision maker should seek to ensure a consensus across: tangata Māori (individuals), iwi/hapū Māori (representative organisations), and pūkenga Māori (experts)'
- Build capacity. Māori Data Sovereignty requires the development of a Māori workforce to enable the creation, collection, management, security, governance and application of data."
- Furthermore, the Te Mana Raraunga Principles of Māori Data Sovereignty document relevantly provides as follows: "Control. Māori have an inherent right to exercise control over Māori data and Māori data ecosystems. This right includes, but is not limited to, the creation, collection, access, analysis, interpretation, management, security, dissemination, use and reuse of Māori data." On this definition, "control" extends beyond access and use by Māori and also includes the prevention or regulation of use by others, including ensuring that the data remains secure
- Māori interviewees summarised the risk to the Māori – Crown relationship if agencies continue to manage Māori data and make decisions regarding its use (including storage) as they have been as a risk of further reducing trust and diminishing the relationship. The risk of future Waitangi Tribunal claims was also raised'
- Māori interviewees also observed that if the Crown is holding, and not sharing, the data and making decisions about the data that is so important to Māori for their future, then the risk is that this only increases disparity and disenfranchises iwi Māori. One Māori interviewee said: "We need data to understand our world – take it away from Māori then [you are] taking away that ability to understand." '

Sources: *Offshoring New Zealand Government Data Report*

04 – New Zealand Market Context

4.4 Related New Zealand Initiatives

4.4.1 Payments New Zealand - Payments Modernisation Plan (PMP)

Payment instruments and systems are critical to the effective functioning of our economy.

They enable consumers to make and receive safe and efficient payments, and they support the day-today financial transactions that facilitate commerce and trade.

Those instruments and systems need to reflect not only the evolving way Kiwis want to make and receive payments, but also trends in technology, regulation, and developments in other jurisdictions around the world, especially those where we have significant cross border economic relationships.

"Our vision is to ensure New Zealand has the world's most progressive payments system while making sure payments are simple and secure for kiwis"

Payments New Zealand: Payments Modernisation Plan

What are the benefits of real-time capability? Why is the infrastructure more than just real-time capability?

International experience demonstrates that a well-designed, modern real-time payments infrastructure can deliver significant benefits for people and communities, as well as for businesses and technology innovators. As well as acting as the foundation of any CBDC programme, modern real-time systems:

- Provide improvements in payment speed and efficiency through the ability to transfer funds instantly between bank accounts or mobile wallets at any time.
- Have the potential to deliver a more resilient, open and inclusive payments landscape.
- Utilise messaging standards that support the exchange of 'rich data', which can further enhance solutions in the digital economy and enable cross border interoperability.
- Can remove some of the constraints inherent in legacy systems and deliver tools and capabilities that enable innovation and flexibility in payment products and services.
- Play a fundamental role in supporting a country's plans to develop a vibrant digital economy, especially those that are grounded in open banking, open finance, and open data systems.
- Enable widespread ecosystem participation due to the use of flexible and adaptable infrastructure that supports the use of APIs.

04 – New Zealand Market Context

4.4 Related New Zealand Initiatives

4.4.2 The Digital Strategy for Aotearoa

The Digital Strategy for Aotearoa (The Digital Strategy for Aotearoa | NZ Digital government) aims to secure Aotearoa New Zealand's place as a world-leading, trusted, thriving digital nation, built around 3 connected themes: Mahi Tika — Trust, Mahi Tahi — Inclusion, and Mahi Ake — Growth. Measuring progress against Trust, Inclusion and Growth will help to realise the vision for a digital Aotearoa New Zealand: enabling all of Aotearoa New Zealand to flourish and prosper in a digital world.

Goals and Measures of Success For The Three Themes *(from The Digital Strategy for Aotearoa)*

Theme	Goals	Measures of Success
Mahi Tika – Trust	• New Zealanders feel safe and empowered in online environments • Organisations and businesses design and use digital technologies and data systems in fair, culturally appropriate, trustworthy ways • • Our digital and data infrastructures are fit-for purpose and secure	• All New Zealanders feel safe and supported online • The economic impacts of cyber-incidents in New Zealand are lower than comparable nations • All New Zealanders are able to use verified digital identity should they choose to.
Mahi Tahi – Inclusion	• All New Zealanders have the tools, skills and confidence to participate in an increasingly digital society • Digital infrastructure, content and services meet people's diverse needs	• All New Zealanders have the tools, skills and confidence to do all they want online • High-speed internet is available to all New Zealanders • All New Zealanders can afford a quality internet connection and internet enabled device
Mahi Ake - Growth	• Our businesses and organisations innovate and increase productivity using digital technologies and data • We have a thriving, fast growing and inclusive tech sector	• Digital & ICT exports are on track to becoming New Zealand's leading export earner • All New Zealand businesses are born digital, and supported to adopt the digital tools that work for them • The digital sector employs more than 10% of the New Zealand workforce in high value jobs

Keeping Māori Aspirations in Mind *(from The Digital Strategy for Aotearoa)*

In order to work towards a thriving and equitable digital future for Aotearoa, Māori aspirations have to be kept in mind. When engaging with Māori about their aspirations for the strategy, four core themes emerged.

These four themes are:

- Rangatahi (young people) are the future in technology
- Genuine collaboration on the vision and actions
- Strengthening cultural identity and wellbeing
- 'By Māori, for Māori' approaches drive change

04 – New Zealand Market Context

4.4 Related New Zealand Initiatives

4.4.3 Consumer Data Right (CDR)

In 2022, the Government announced a new Consumer Data Right (CDR) framework (Consumer data right | Ministry of Business, Innovation & Employment (mbie.govt.nz)) for the New Zealand banking sector in order to push towards open banking. Open banking allows customers to 'securely share their own banking data with trusted third parties through standardised technology'. CDR legislation is expected to be passed in to be passed in 2024. The main goal of CDR is to ensure that the consumer has full control of their data.

Barriers to Preventing Data Access and Sharing

CDR aims to remove barriers that prevent consumers from being able to share and access their data. Barriers include:

a) A lack of incentives for data holders to transfer data to third parties.

b) High costs in negotiating agreements and transferring usable data - A lack of industry-wide standardisation and adoption of application programming interfaces (APIs) and data formats for data transfers makes it difficult and expensive to set up any new data sharing arrangement.

The current lack of CDR has led to consumers sharing data via third parties using insecure technologies, creating data security and privacy concerns. Consumers may be in breach of their bank's terms and conditions by using such platforms.

Additionally, existing approaches to data sharing often involve consumers giving very broad authorisations to transfer and use their data via long and complex standard-form contracts. These authorisations may not meet information privacy principles under the Privacy Act 2020, and consumers may not be aware what data is being collected or how it is being used.

Without CDR, the ability for consumers to consume improved financial services by safely sharing their data will be inhibited. Security and privacy concerns are also likely to grow.

Elements of a New CDR Framework

Businesses that hold data (data holders) will be required to transmit certain data that they hold about consumers (CDR data) to trusted third parties (accredited persons), and carry out actions on behalf of the consumer, with the consumer's consent. To help consumers compare or manage offerings from different providers, obligations will also exist on the data holder to share data relating to the goods and services that they offer (product data). It has also been proposed that a user of an organisation's good or service should be able to receive data from that organisation in a way that also complies with CDR.

As part of CDR, consumers will be able to consent to:

a) Read access – the ability for an accredited person to read consumer data; and

b) Action initiation – the ability for an accredited person to carry out an action with the consent of a consumer. This comes with additional risks, but is necessary to support many important CDR use cases, with accompanying safeguards providing protection for consumers.

4.4.4 Payments NZ Minimum Open Banking Implementation Plan

Payments NZ have published their plan that outlines the minimum requirements and timelines for open banking that five API providers (ANZ, ASB, BNZ, Westpac & Kiwibank) must adhere to, in order to standardise APIs to make them operationally ready for use by third parties. This standardisation will cover more than 90% of all consumer accounts across New Zealand's banking market and will cover payment initiation and account information features of an Open Banking framework.

04 – New Zealand Market Context

4.4 Related New Zealand Initiatives

4.4.5 Digital Identity Programme

The New Zealand Digital Identity Programme (Home - Digital Identity New Zealand) has worked with digital identity providers, individuals and organisations using digital identity services, iwi, and government information holders to design a safe, decentralised, and user-centric approach for managing the exchange of digital identity information.

The programme advises ministers on the right environment, rules, policy settings and new technologies to allow people access to secure digital identification services that meet their evolving needs.

Key Points

- The digital identity system is a network of: digital identity service providers, users requiring access to a service, and service providers requiring information to offer their service. Information will not be held in a central database. Using the system will not be compulsory.
- The four main themes to the issues with digital identity are (1) trust and confidence; (2) privacy and security; (3) data control and minimisation; and (4) ease of use.

The Digital Identity Services Trust Framework

The Digital Identity Services Trust Framework will establish rules to protect the privacy and security of people's information when it is shared within the trusted environment. The framework will not be compulsory, and will prioritise user permission for all actions.

- Key concepts of The Digital Identity Service Trust Framework include the following: Consent is always required; Personal information will not be held in centralised database; The system is opt-in; Sharing between government departments remains controlled; Privacy and security standards are built in; Rules incorporate Te Ao Māori perspectives of identity; Identity theft risks are managed.
- Principles of this framework are people-centred, inclusive, secure, privacy-enabling, enabling Te Ao Māori approaches to digital identity that are sustainable, interoperable, open and transparent.

Expected Outcomes

People can expect:

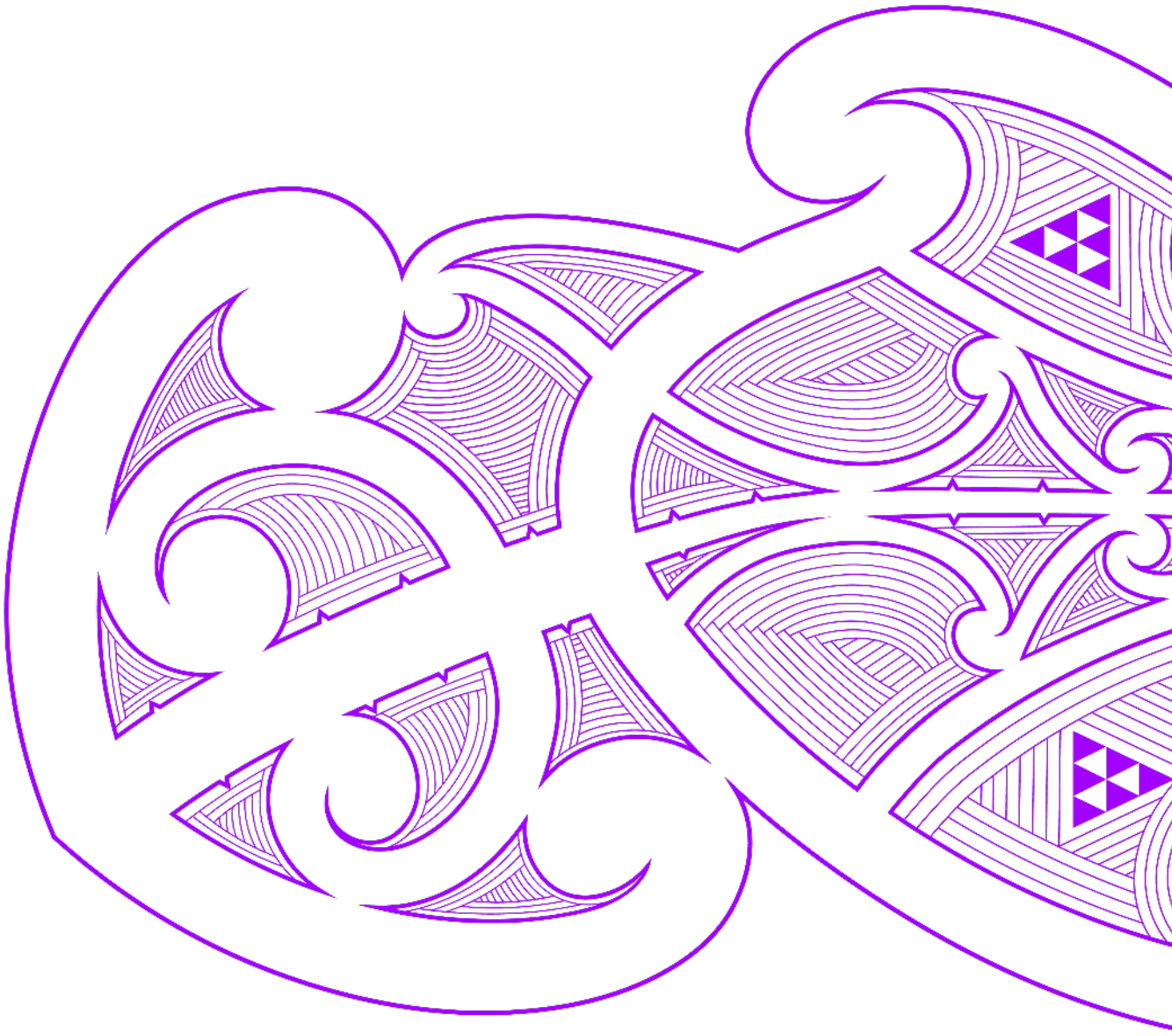
- Trust and confidence that their information is secure and private.
- Reduced risk of identification fraud and privacy breaches.
- Greater choice, and control over when and how they share their information.
- Easier digital access to services.

Businesses and organisations will experience:

- Business efficiency, such as less duplication.
- Increased confidence to invest, with more ability to meet regulatory requirements.
- Greater confidence in the validity of information, with higher trust and lower risk.

Government will see:

- An improved ability to detect and deter security and privacy breaches.
- Easier options for sharing information with people's consent.
- Greater international alignment.



05. Design Options: Preferences, Rationales & Insights

05 – Design Options: Preferences, Rationales & Insights

5.1 – Macro level

At a programme or "NZ-inc." level, RBNZ has the opportunity to design a 'CBDC system' with the capacity to drive genuinely significant transformation. The below elements have been identified as key areas of focus to support this.

5.1.1 Convergence of NZ-wide initiatives

Several current and upcoming New Zealand-wide initiatives align well with RBNZ's CBDC goals and intended outcomes of financial stability, innovation, inclusion and systemic efficiency at a national level. These include:

- New Zealand government Digital Identity
- Customer Data Right
- Realtime Banking
- Māori Data Sovereignty

Accenture believes that the opportunity exists to explore how these initiatives might be designed in such a way to better align with one another, enabling a loosely coupled 'system of systems'. This approach ensures that each initiative is designed, deployed and managed independently of one another – but in a way that provides the opportunity for each one to contribute to the outcomes of the others.

This opportune situation has not existed commonly within other jurisdictions in which Accenture has designed and developed CBDCs. As such, it is believed that New Zealand should embrace the opportunity to think about a 'system of systems' – with CBDC as a central part of this – that is greater than the sum of its parts.

5.1.2 Cultural uniqueness

RBNZ is committed to inclusion with its Treaty-driven approach. Incorporation of a Te Ao Māori viewpoint into the RBNZ CBDC design process, alongside the inclusion of principles for Māori Data Sovereignty provides New Zealand with the opportunity to deeply embed inclusive design into a key element of New Zealand's economic 'infrastructure'.

This opportunity is rare, as is a country's commitment to this level of indigineous inclusion. The design choices that effectively provide for improved Māori inclusion are not only good for Māori, but provide improved user-focus and functions for everyone. As such, Accenture believes that the opportunity to create a globally-leading CBDC through Te Ao Māori, Māori Data Sovereignty and inclusivity more broadly should be embraced.

5.1.3 Connectedness through standards

After RBNZ CBDC has been delivered into market, requirements for CBDC will of course, continue to evolve.

To respond well to these evolving needs, RBNZ CBDC needs to ensure it has the ability to operate as an 'innovation platform' to the market by offering a simple, easy-to-use set of regulatory, technical, data and cultural standards. These will not only enable commercially-focussed innovation, they will also provide actors with the ability to easily design products and services that enhance inclusion for those New Zealanders that have traditionally been underbanked – for example, people with physical or mental disabilities.

Standards will also provide future opportunities relating to interoperability across other ecosystems within New Zealand (real-time payments and digital identify, for example), but also other jurisdictions like Australia and the Pacific Island nations to support the flow of finance, goods and services.

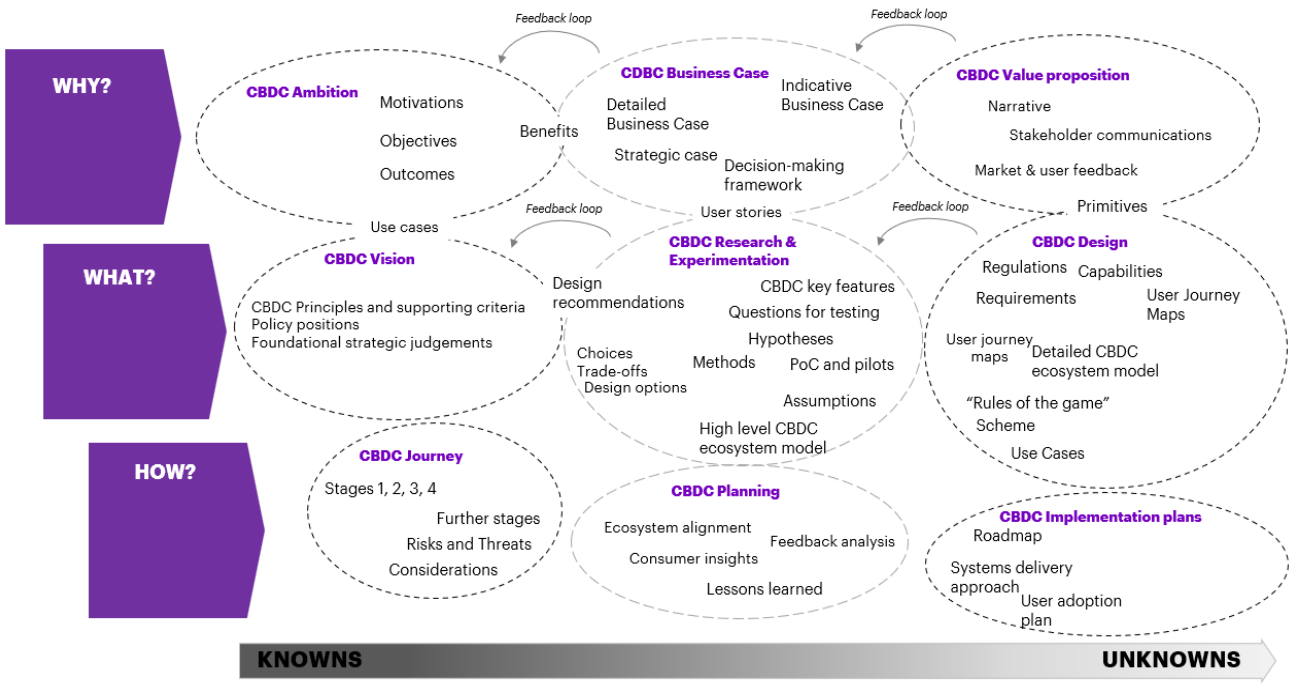
05 – Design Options: Preferences, Rationales & Insights

5.2 – Programme level

5.2.1 Dependencies framework

The following framework, presented as part of the CBDC design project, is intended to offer current and future project participants a clear view of the relationships between areas of focus across "WHY, WHAT and HOW." While the framework diagram provides a visual representation, it is important to note certain internal information is not disclosed here.

In addition to helping to understand these dependencies, the framework also helps to distinguish between 'levels' of information. This again helps project participants to more effectively navigate within a complex and oftentimes ambiguous information space.



5.2.2 Choice-making to support New Zealanders' needs

This 10-week phase of the RBNZ CBDC design process has helped to identify initial preferences across several foundational questions relating to New Zealand's CBDC design. It has also provided a set of topics to enable RBNZ in subsequent design phases to understand what additional choices to make (where these have not yet been made).

It is recommended that the process of choice identification/making continues in-line with the originally identified 'focus areas', namely:

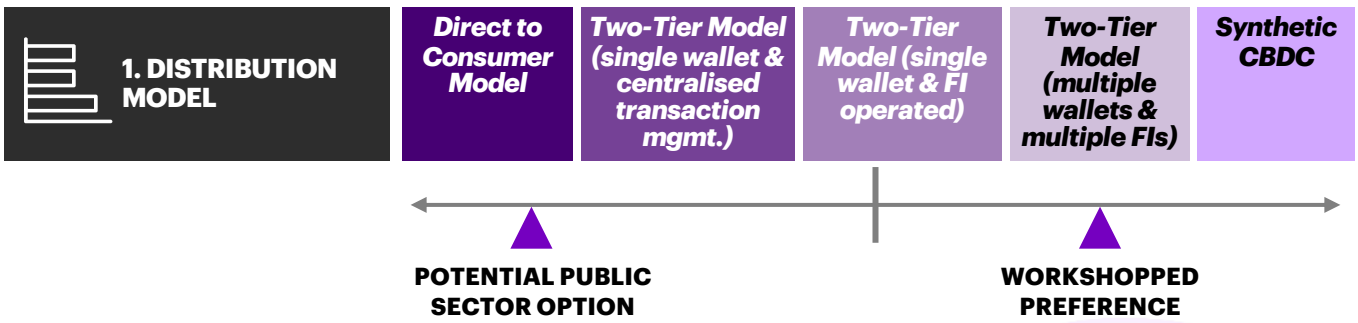
- Adoption and Inclusion
- Privacy
- Holdings and Transactions
- Innovative Payments
- Reliability, safety and scalability
- Technology and operations.

NB: as part of this future process, it is important to acknowledge that not all choices are equally important. As such, it is recommended that focus is applied sequentially from 'most' to 'least' important where possible.

05 – Design Options: Preferences, Rationales & Insights

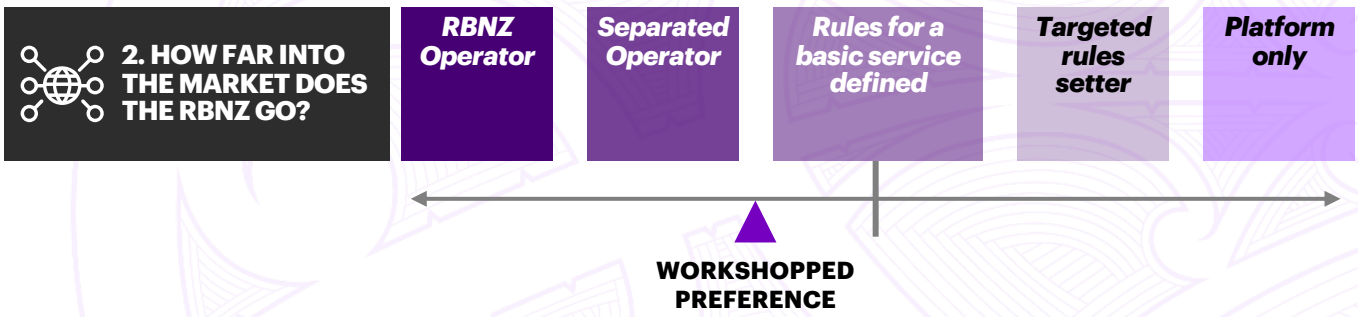
5.3 – Initiative level

The exercises conducted during the definition workshops helped to identify the design options for the strategic questions, and generated the initial RBNZ preferences for these design options. Further work will be required in subsequent phases before any decision is made.



Rationale:
RBNZ's initial preference was for a two-tiered model for the distribution of CBDC, using financial intermediaries to promote market-led innovation. However, in order to achieve its objectives of wide adoption and inclusion, there is the option to retain the capability for the public sector to distribute CBDC directly, possibly through another government agency or through the development of a new intermediary specifically responsible for CBDC distribution, in response to special circumstances.

Insights:
Whilst CBDC distribution models are still evolving, the majority of Central Banks are exploring the 'two-tier' model which aligns with the RBNZ's initial preference, for increased competition and innovation. The potential public sector option would require significant infrastructure and operational capabilities as it would involve user account creation. Based on the need to consider both options, an example would be the Peoples Bank of China who have developed the e-CNY as an account-based, quasi account based and value-based hybrid payment instrument. The Central Bank of Nigeria has also adopted an account-based CBDC.



Rationale
The ability to provide the market with organic innovation opportunities whilst retaining regulatory control to meet RBNZ objectives, using one or a combination of the following:

- Targeted rules setter: Steps into specific areas to define rules
- Rules for a basic service defined: RBNZ develops rules for a basic service, with market able develop beyond basic
- RBNZ Operator: RBNZ sets rules and payment instruments for all CBDC usage

Insights:
The current preference seeks to ensure there is a role for both the public and private sector. To use an analogy, the Central Bank needs to 'hold the candle' and lead the way by providing a core infrastructure on which the private sector can then identify opportunities to innovate. Evidence from most other Central Bank positions align with this preference.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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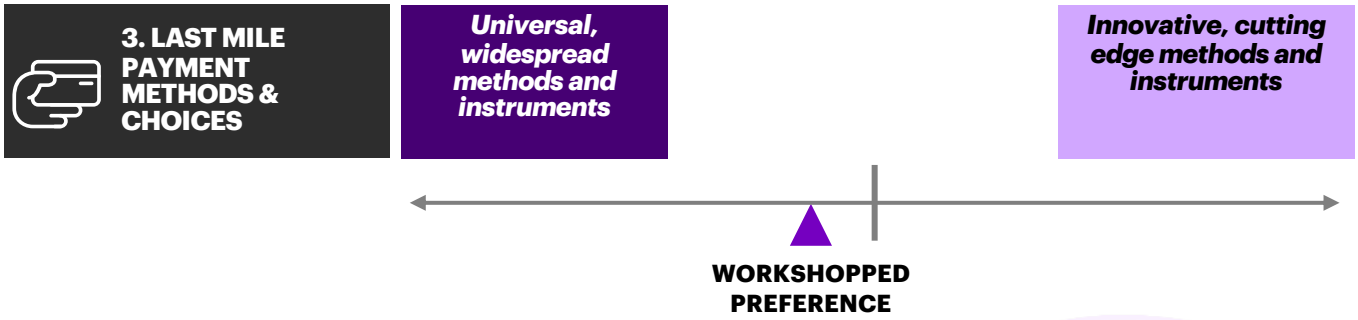

Rationale:
RBNZ's initial preference is for CBDC users to have the ability to transfer between Fiat to CBDC, make payments and manage their CBDC easily. This is to achieve its objective regarding payments and savings for all New Zealanders. However, RBNZ must also ensure that the opportunity to drive innovation and meaningful 'positive impact' is taken. This can, in part. be delivered by having financial intermediaries responsible for more niche, cutting-edge products and services.

Insights:
Based on RBNZ preferences and international CBDC projects, there is a need to ensure that 'core' universal methods such as mobile payments, digital wallets and payment cards can support retail CBDC adoption. Merchant integration (with appropriate incentives that improve adoption) would be necessary. Ensuring a clear roadmap to support 'right-sized' levels of interoperability with other payment systems for seamless integration is recommended. Partnership with the local Fintech sector could be a way to explore how CBDC can innovate for New Zealand and the wider pan-Pacific region.

Rationale:
In order to ensure both market-led innovation choice for the end user, RBNZ's preference is for- multiple wallet/access providers per user.

Insights:
Wallet providers will form a critical role in the widespread adoption of a CBDC. Other central banks are conducting experiments to understand whether existing wallets can be adapted to accept CBDC. It is worth noting that private sector wallet providers may not meet the needs of users where there is little financial incentive to do so. In response to this, RBNZ may consider whether policy changes would be required to ensure the right levels of commitment to non-financially-driven innovation.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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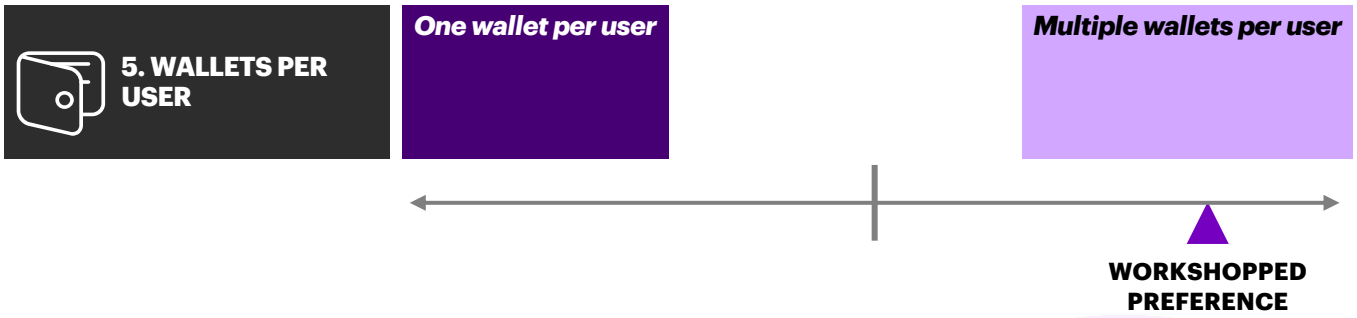
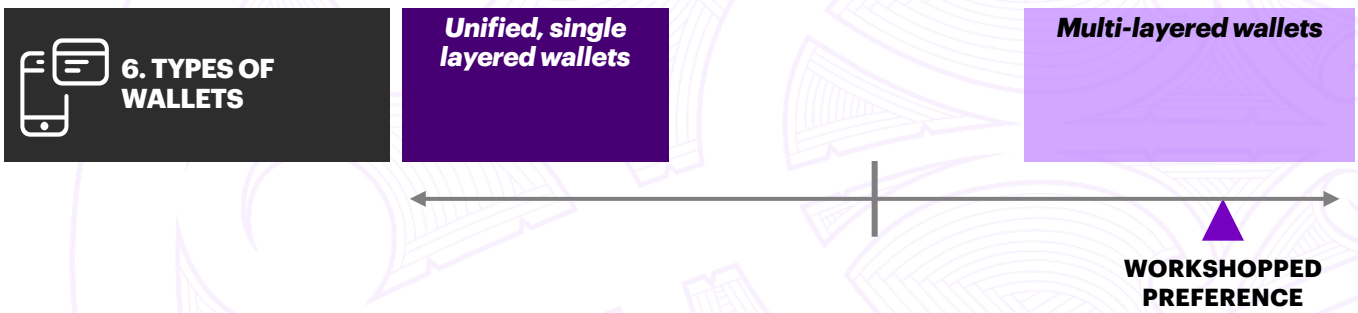


Rationale:
Multiple wallets per user will support competition and innovation within the market and ensure choice for the user. This will also reduce the need to develop additional validation processes to ensure that users only have one wallet.

Insights:
Multiple wallets per user will support a range of use cases catering to different tiers of privacy, data sovereignty, usage categories and limits. This initial preference also reflects Māori culture where one family member can share multiple wallets with their whānau. Other examples of why New Zealanders could request multiple wallets is to have separate funds for specific purposes. There is also the benefit reducing the risk of a single point of failure. It is also worth considering integrating their CBDC wallets with existing services.



Rationale:
In order to support innovation and competition, and ensure choice and flexibility for the end user, a CBDC user can own multi-layered wallets.

Insights:
Just as overall technology architectures are moving from a single 'monolith' to 'loosely coupled' architectures to yield the benefits for a greater level of flexibility, multi-layered wallets enable similar benefits. Typically, this approach would consist of a 'basic' layer to store, send and receive funds and then advanced features such as spending analysis or the ability to customise or choose modules based the preferences of each user. Integration with external service providers would enhance innovation.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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Rationale:
RBNZ's initial preference is for users to have the choice for their CBDC wallets collectively accessed and managed, for example, as part of a household/community, joint ownership and businesses. This would also include provision for data sharing across users.

Insights:
Ongoing CBDC projects in Kazakhstan, Sweden and China have not considered collective CBDC wallet access and management, so New Zealand could pioneer this feature amongst global CBDCs. This initial preference also reflects Māori culture where one family member can share multiple wallets with their whānau, or the authority of enduring power of attorney to act on behalf of others who are incapacitated. Examples could be Kaumatua/Kuia holding a shared wallet for their extended whānau to use and another shared wallet for Iwi community purposes e.g., Iwi leaders may organise distribution of Iwi funds within the community for koha or hui.

Rationale:
RBNZ's initial preference is for all customer onboarding and lifecycle management (including holding and managing customer KYC information) to be the responsibility of the market, not RBNZ. CBDC specific AML/CFT guidance should be provided to the market to ensure that CBDC users know that their privacy is protected. They will also have the option of choosing their provider (i.e. digital wallet provider) and have certainty as to who has access to their personal information.

Insights:
This choice is in line with the thinking of the majority of global CBDCs, with having intermediaries responsible for onboarding users and performing KYC and AML. Central banks issue the KYC/AML requirements for market participants to ensure compliance.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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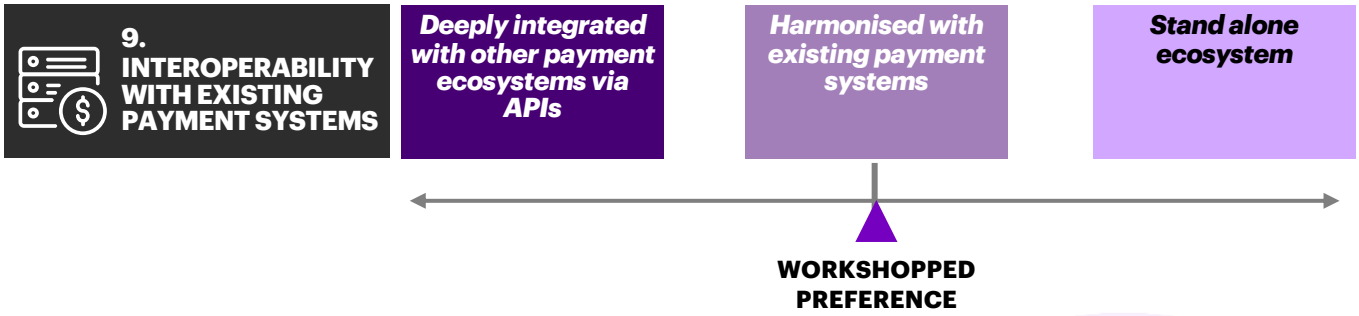

Rationale:
RBNZ's initial preference is interoperability with existing payments systems. A standalone CBDC ecosystem may inhibit competition and may not help RBNZ's objective of market-led innovation for the CBDC system. The following scenarios could be explored to enable interoperability between a CBDC system and existing payments systems:

- Integrating with existing payment systems via APIs.
- An intermediary institution required to integrate between the CBDC system and the existing payments ecosystem.

Insights:
Interoperability is generally seen by Central Banks globally as a primary requirement for future CBDC ecosystems as part of the wider payments landscape, ensuring seamless transactions and payments across systems.

Rationale:
CBDC settlement is, by its very nature, final and irrevocable. If reversals were possible within the system, this would destroy user trust.
Similar to real time payment systems, tools should be employed to help and assist the user in not making errors, but if one occurs, then providing a customer service to assist users who have problems recovering their funds.

Insights:
Globally, we see CBDCs designed with atomic settlement at its heart, with the finality of payments at the point of value transfer. In cases where reversals are required for erroneous transactions, an equal and opposite transaction can be made to reverse the initial transaction.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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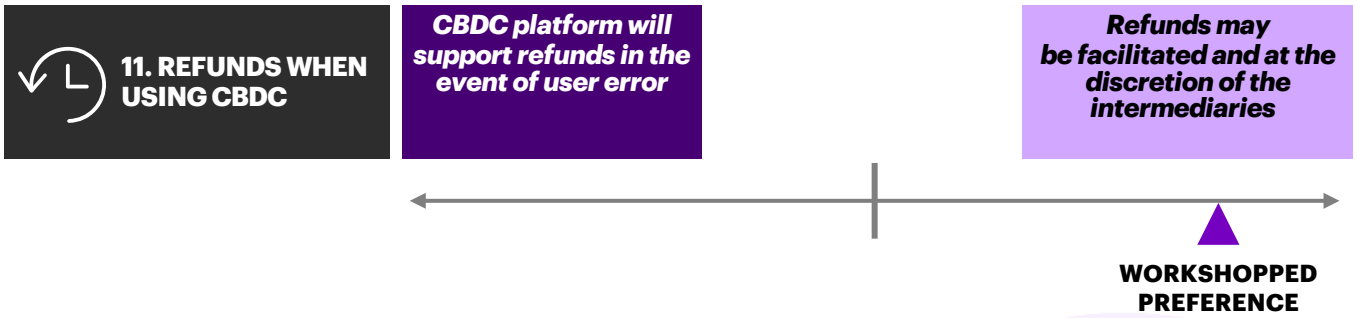
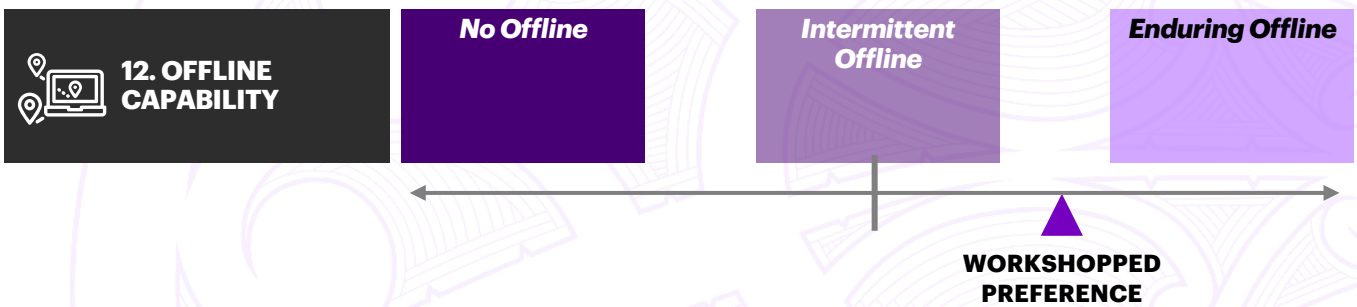


Rationale:
As with reversals, the concept of the core system providing refunds is not compatible with the final and irrevocable nature of CBDC.
Individual intermediaries may adopt a customer service position that may providing refunds to customers in the event of a situation in which goods have not been received.

Insights:
Similar to item 10, CBDCs have been designed with atomic settlement functionality. For refunds, an equal and opposite transaction can be made to refund the initial transaction in the event of an unfulfilled order, for example.



Rationale:
Offline capability will be an important feature of a NZ CBDC, as users will be able to spend/transfer/ receive CBDC without access to the internet or cellular data.
The following offline capability options could be explored further:

- Intermittent offline
- Enduring offline

Enduring offline is considered as a desirable end-state, subject to an understanding and management of risk, and the capabilities required.

Insights:
Many Central Banks consider offline capability as a key component of a retail CBDC strategy and is currently an area of intense exploration and PoC's to establish the best options for implementation. The recent CBDC Offline Handbook (known as project Polaris) published by the Bank for International Settlements provides the most in-depth analysis to date on this subject.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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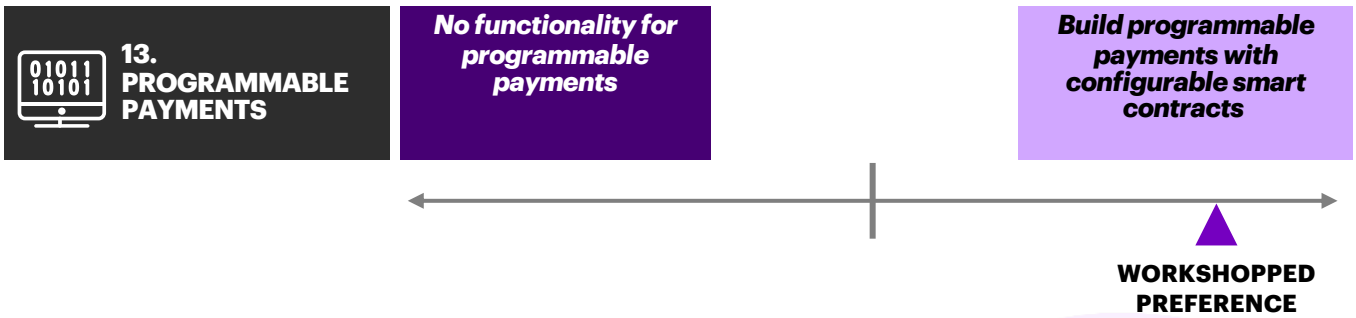


Rationale
Programmable payments, the ability to build CBDC with tools such as smart contracts, are a core component of CBDC's ability to unlock new and future value for New Zealanders and will be a foundational piece of the CBDC.

Insights:
Globally, programmable payments enabled by the smart contract feature of CBDCs are seen as a key differentiator for CBDCs over the existing payments systems. RBNZ will need to consider how to best enable users to take advantage of programmable payments, possibly through publicly available sandbox environments, awareness and training etc.

Rationale:
Programmable money, a feature of CBDC to enable conditional use, is largely regarded as likely to destroy trust, and as such is not a preference for RBNZ.

Insights:
Whilst many Central Banks regard programmable or conditional money as not viable due to its threat to adoption and public perception, some jurisdictions are nevertheless continuing to explore use cases where such functionality is of interest e.g., China, Kazakhstan, Singapore.

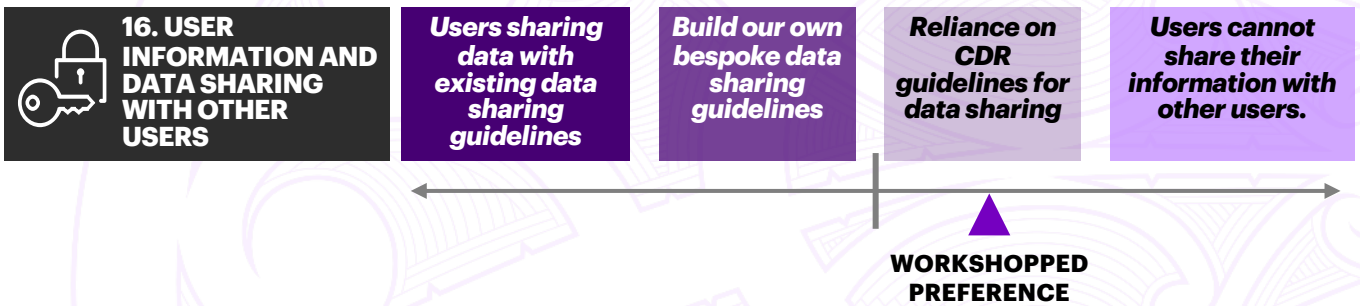
05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

The exercises conducted during the definition workshops helped to identify the design options for the strategic questions, and generated the initial RBNZ preferences for these design options. Further work will be required in subsequent phases before any decision is made.

Rationale:
RBNZ's initial preference is to ensure wide adoption of CBDC without inhibiting organic innovation opportunities. Users will be able to spend/transfer/receive CBDC using a payment method at the point of interaction that meets their needs

Insights:
Where a CBDC has been launched (China, Bahamas) the overall level of adoption remains low and could undermine the overall perception of this payment medium. In both cases, consumer research was undertaken to understand the attitudes towards a CBDC. Additional international research is due to be published, so it is recommended to review the reasons for low take up in other markets.



Rationale:
RBNZ's initial preference is to ensure that users have the right level of control over their own data whilst also not inhibiting innovation in the right places. Users should own their data and start opted out, with clear opt-in options supported by a consent framework similar to the future NZ Consumer Data Right framework. This would allow intermediaries to offer innovative services to benefit users consenting to share their data.

Insights:
Based on recent consultation papers issued by Central Banks, the consensus is not to have anything more strict or more lenient than what is currently in place. This 'equivalence' may help to support overall adoption and perceived fears on how data could be used.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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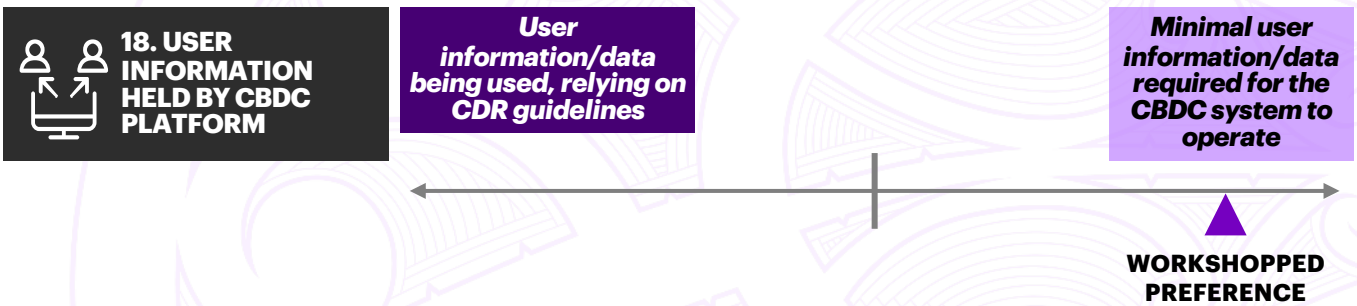
Rationale
RBNZ's initial preference is to ensure that there is the right level of data control whilst not inhibiting commercial innovation.

Insights:
The future NZ Consumer Data Right regime is likely to introduce a process whereby accredited commercial entities can request a consumer's data but only where the consumer has consented to this data sharing, along with boundaries on what data, purpose and timeline. This preference has a strong dependency on this framework so would be difficult to comment until full details have been released.



Rationale:
RBNZ's initial preference is that the CBDC system will require the least amount of user data possible in order for it to operate as there is the potential to endanger privacy with more user information gathered than is necessary.

Insights:
There is a consistent pattern of concerns from users with regards to data being held as a result of CBDC which makes this a very important consideration. The Bank of England consultation describes how the core bank ledger for CBDC will have all the personal data anonymised. Similar to item 16, it should do no more than what happens at present to monitor compliance with local country laws and legislation.

05 – Design Options: Preferences, Rationales & Insights

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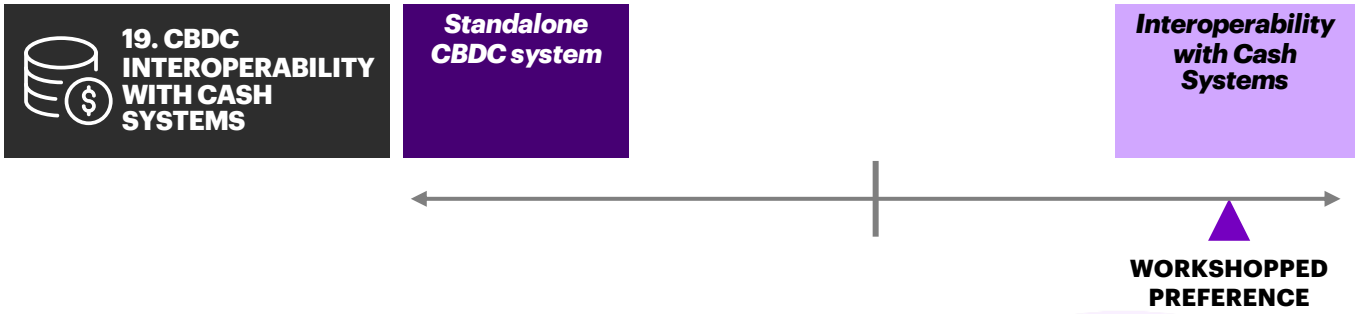
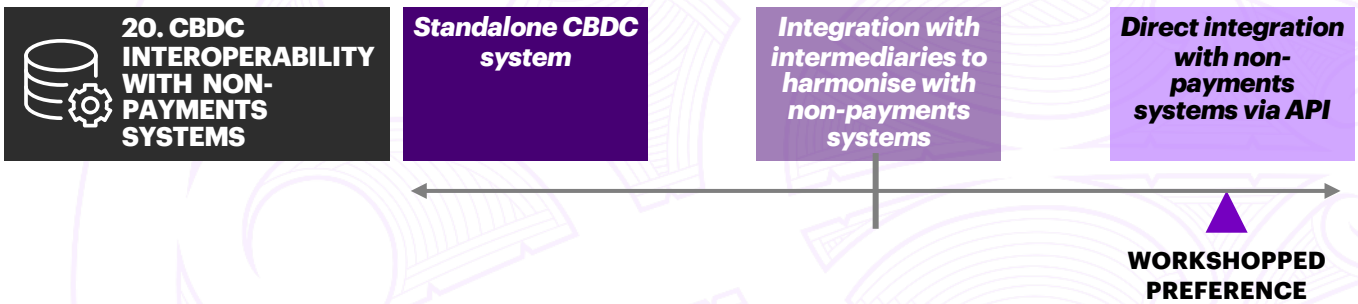


Rationale
A standalone CBDC ecosystem may exclude heavy cash users, so RBNZ's initial preference is that the CBDC will be interoperable with cash to ensure wide adoption and inclusion.

Insights:
This is consistent with almost all other Central Bank preferences. Interoperability is a very significant enabler of adoption so it is important to consider use cases such as transferring CBDC to cash via an ATM machine, having the option to quickly choose the payment method in self service scenarios (like cinema ticket machines etc.).



Rationale:
A standalone CBDC ecosystem may inhibit innovation with existing non-payment systems, so RBNZ's initial preference is for CBDC users to be able to connect their CBDC wallets to other existing non-payments systems, e.g., Digital ID systems
A CBDC directly integrated with non-payments systems will enhance new forms of innovation outside of payments.

Insights:
Project Rosalind (sponsored by the BIS Innovation Hub London) demonstrates the powerful impact of having a standard set of API specifications released as a public good to drive adoption and innovation. This will be formally published in August and would be helpful as part of the next phase of this project.

05 – Design Options: Preferences, Rationales & Insights

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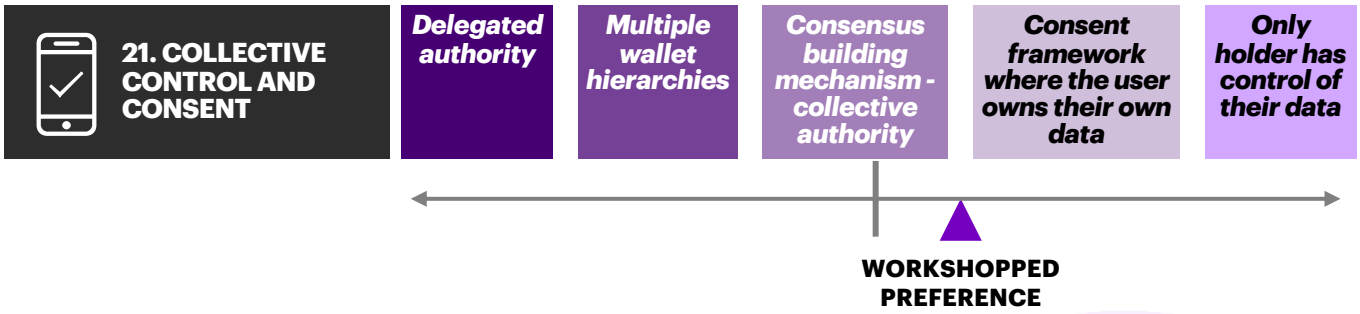
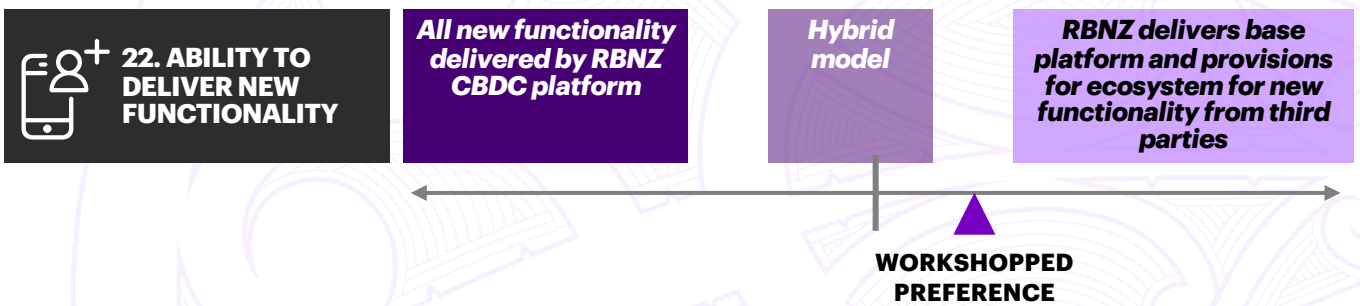


Rationale
RBNZ's initial preference is for a CBDC system to be developed with the highest possible levels of inclusion to meet the needs of collective owners currently not being met with existing solutions.
This can be done by creating wallets in a hierarchy with multiple owners and by creating and using a management and control hierarchy.

Insights:
Generally speaking, the more to the right of the axis, the greater the dependency on there being effective user identity technology, controls and policy mechanisms in place. The options here may be constrained by what is in place at present.



Rationale
RBNZ is best placed to support innovation by providing enabling functionality that third parties can create new features to improve the overall customer experience. However, there may be instances where a hybrid approach may be warranted, and this will be focused on in the future work.

Insights:
The initial position yet to be selected for this strategic choice - to be made in the next phase. To support the design option, it is recommended to assess the capability and incentive model for each third party within the ecosystem. In addition, it is also beneficial to assess recent initiatives such as Open Banking to determine how stakeholders like technology companies, financial institutions, fintech companies and payment service providers have approached on delivering new functionality and use this as input into this decision.

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5.3 – Initiative level

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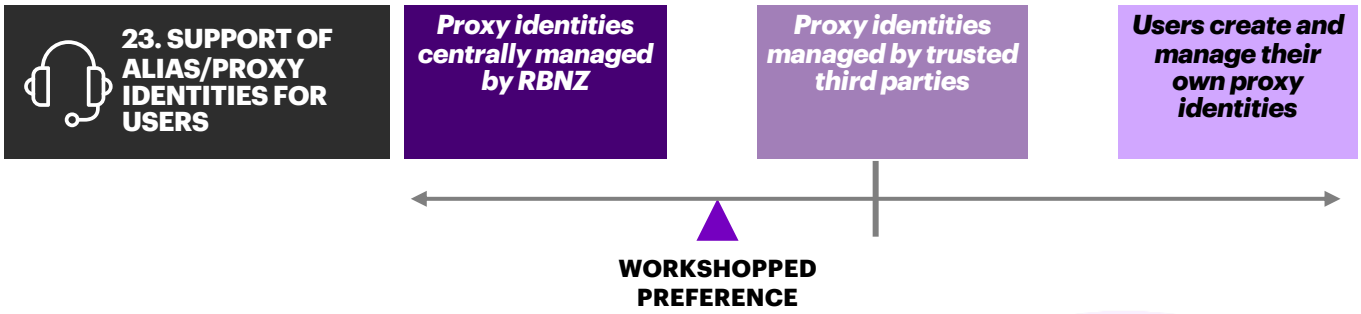

Rationale
RBNZ's initial preference is for CBDC users to use proxy identities to protect their privacy in the system. A balance between strong data control of proxy identities whilst allowing the option for the user to manage their proxy identities themselves.

Insights:
This is the recommended approach under the two-tier model. Please note that initiative 1 has a preference for the option of an account-based model in which there is a second RBNZ preference as proxy identities would need to be centrally managed.

Rationale
Initial position yet to be selected for this strategic choice - to be made in the next phase.

Insights:
Initial position yet to be selected for this strategic choice - to be made in the next phase.

05 – Design Options: Preferences, Rationales & Insights

5.3 – Initiative level

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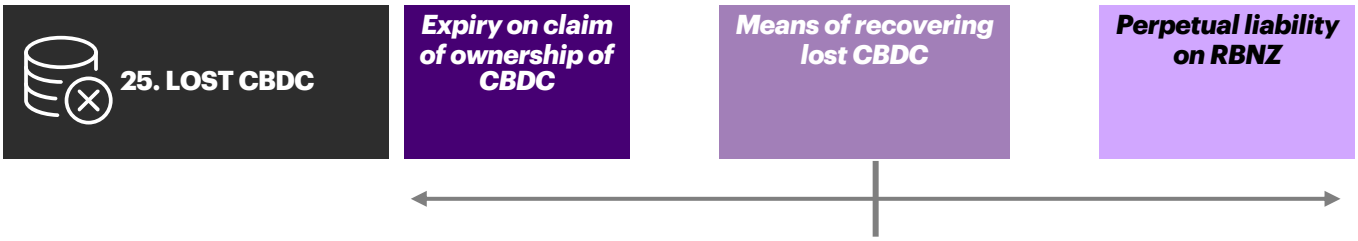

Rationale
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Insights:
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05 – Design Options: Preferences, Rationales & Insights

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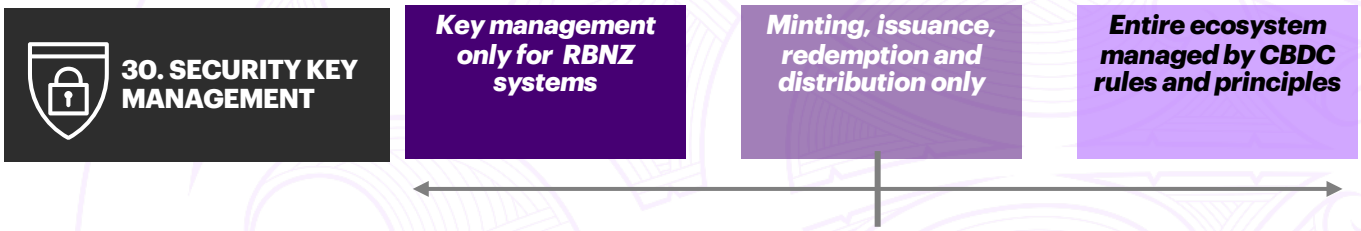

Rationale
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Insights:
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05 – Design Options: Preferences, Rationales & Insights

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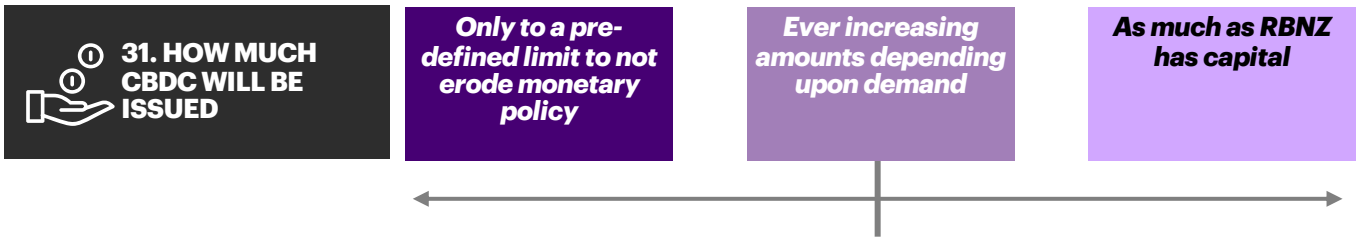

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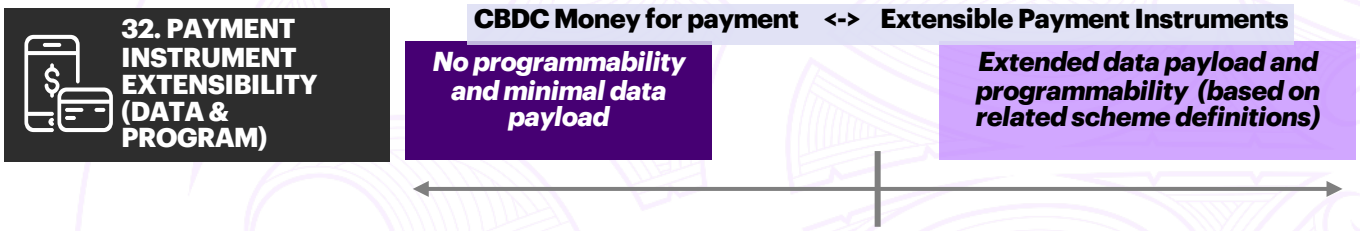

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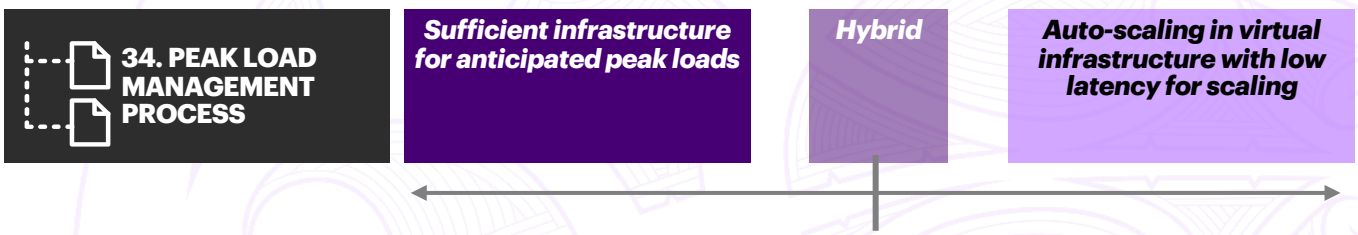

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Insights:
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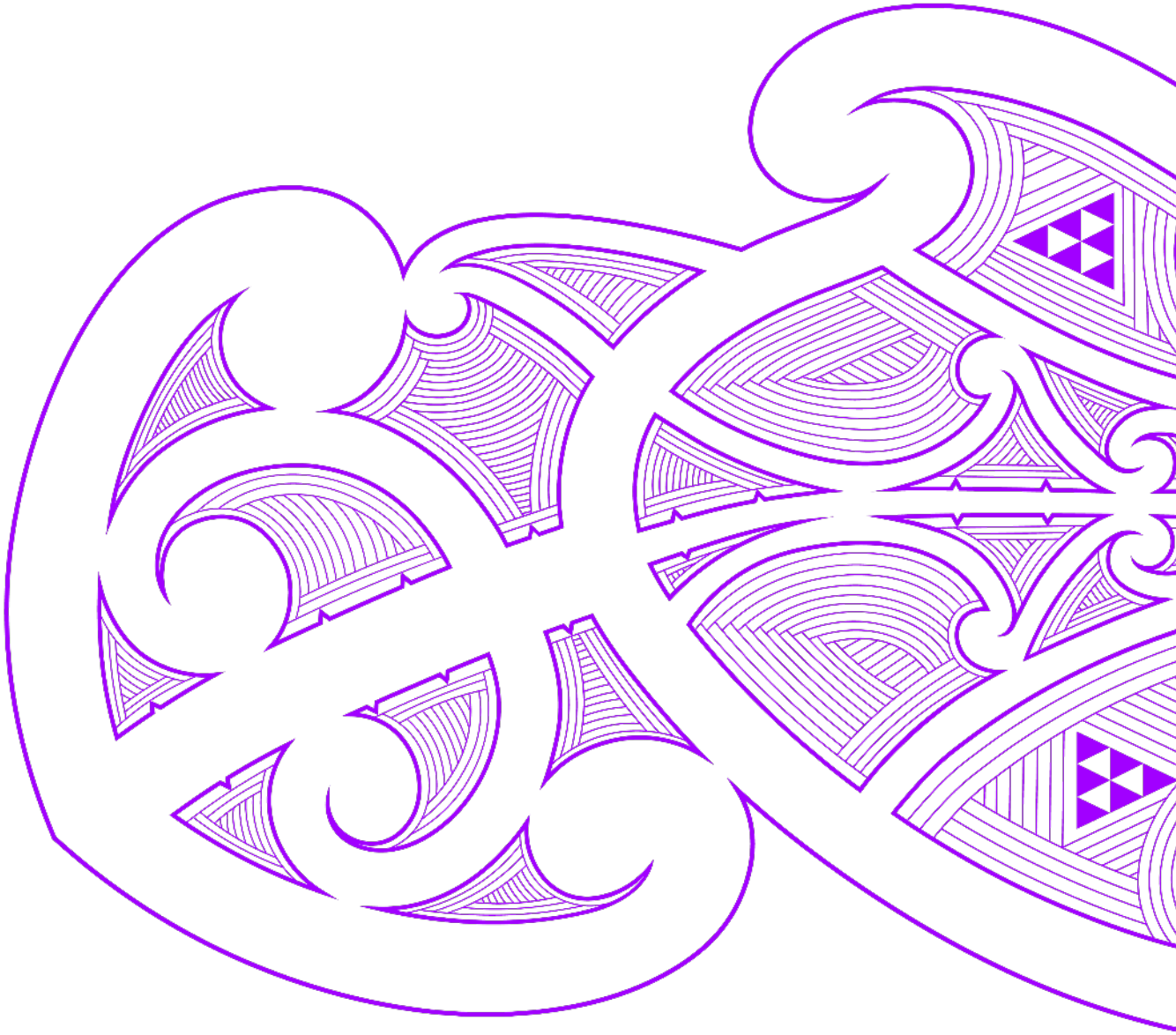
05 – Design Options: Preferences, Rationales & Insights

5.4 – Identified Risks and Threats

Through workshops with relevant stakeholders, various risks and threats to the success of a CBDC has been identified. Any CBDC product, and its delivery, will need to address these disparities and misconceptions.

No.	Risk/Threat	Focus Area
1	Lack of understanding of a CBDC or central bank money	Adoption & Inclusion
2	Too complex/too expensive to integrate for banks where interoperability is key	Adoption & Inclusion
3	Lack of digital literacy	Adoption & Inclusion
4	Lack of trust/bad perception of government	Adoption & Inclusion
5	Lack of affordability to access or participate with CBDC e.g. no access to digital devices	Adoption & Inclusion
6	Overcoming negative connotations associated with perceived lack of privacy	Privacy
7	CBDC is getting a badtub reputation in the media	Privacy
8	Failures in the wider ecosystem could have a reputation effect but ongoing safeguards may be difficult to implement	Privacy
9	How will data be protected from manipulation from third party services	Privacy
10	Apprehension with sharing data by consumers, including: • Can I delete my CBDC data and history when I don't need it? • Does the government know what I'm spending money on? • If I share my CBDC data can I call it backwards?	Privacy
11	Low adoption	Innovation
12	Regulatory frameworks and compliance barriers that limit market participation	Innovation
13	Privacy risk of low trust with data can cause consequential effects on innovation	Innovation
14	High barriers to entry/compliance and lack of white label options make it harder for smaller participants to develop and launch products and services	Innovation
15	Public may not trust the system or infrastructure will operate accurately in an offline mode.	Resilience & Reliability
16	Complexity of ensuring E2E security and resilience (ecosystem connecting multiple players will have too many failure points)	Resilience & Reliability
17	Comparatively, compared to other parts of the world, New Zealand has less availability of skilled resources and capabilities in its marketplace to design, implement, and operate a CBDC.	Resilience & Reliability
18	The costs for resilience may potentially be too high	Resilience & Reliability
19	Platform is unable to support and adapt to new requirements	Resilience & Reliability

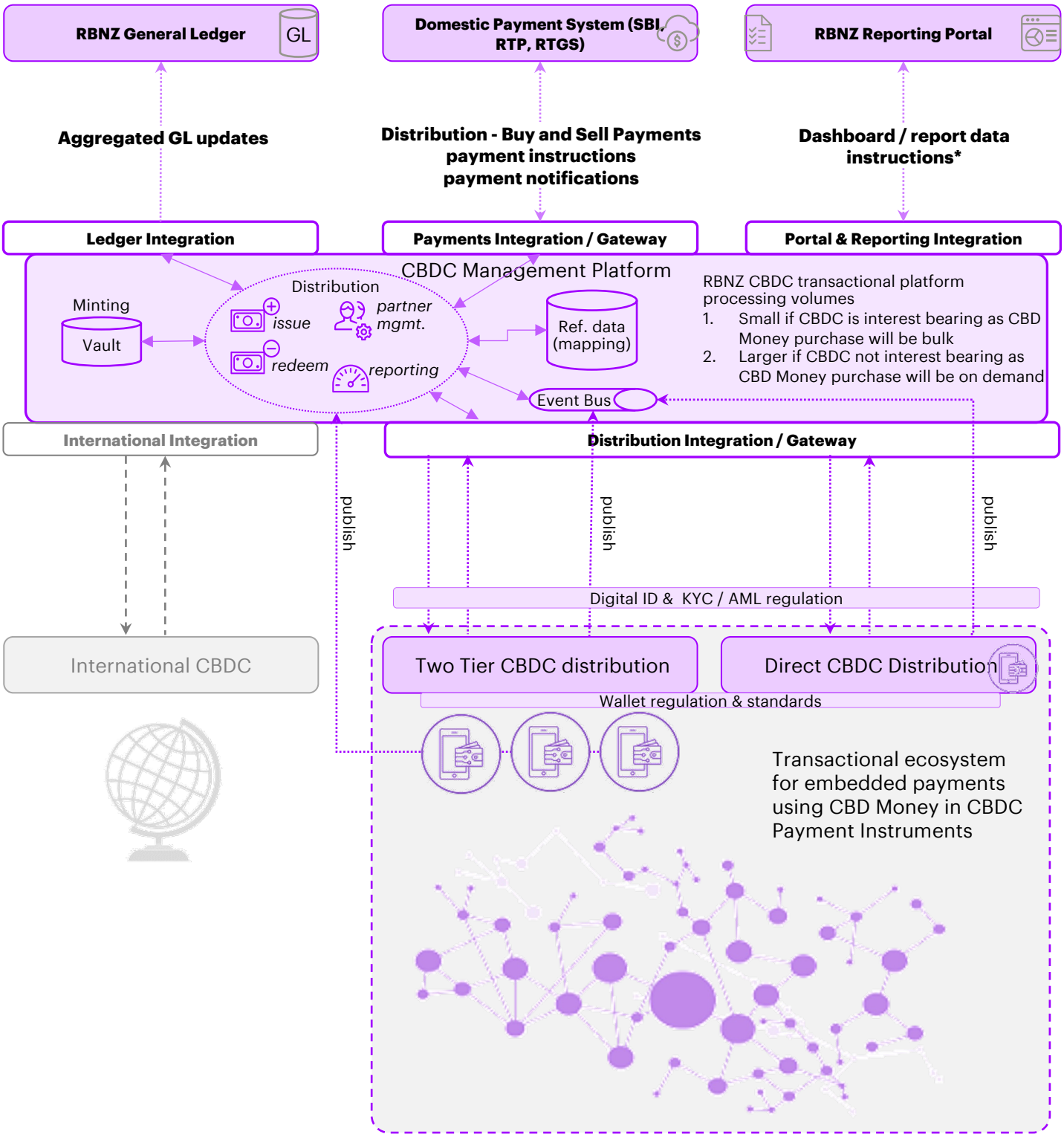
Sources: RBNZ CBDC Miro Board



06. Capabilities

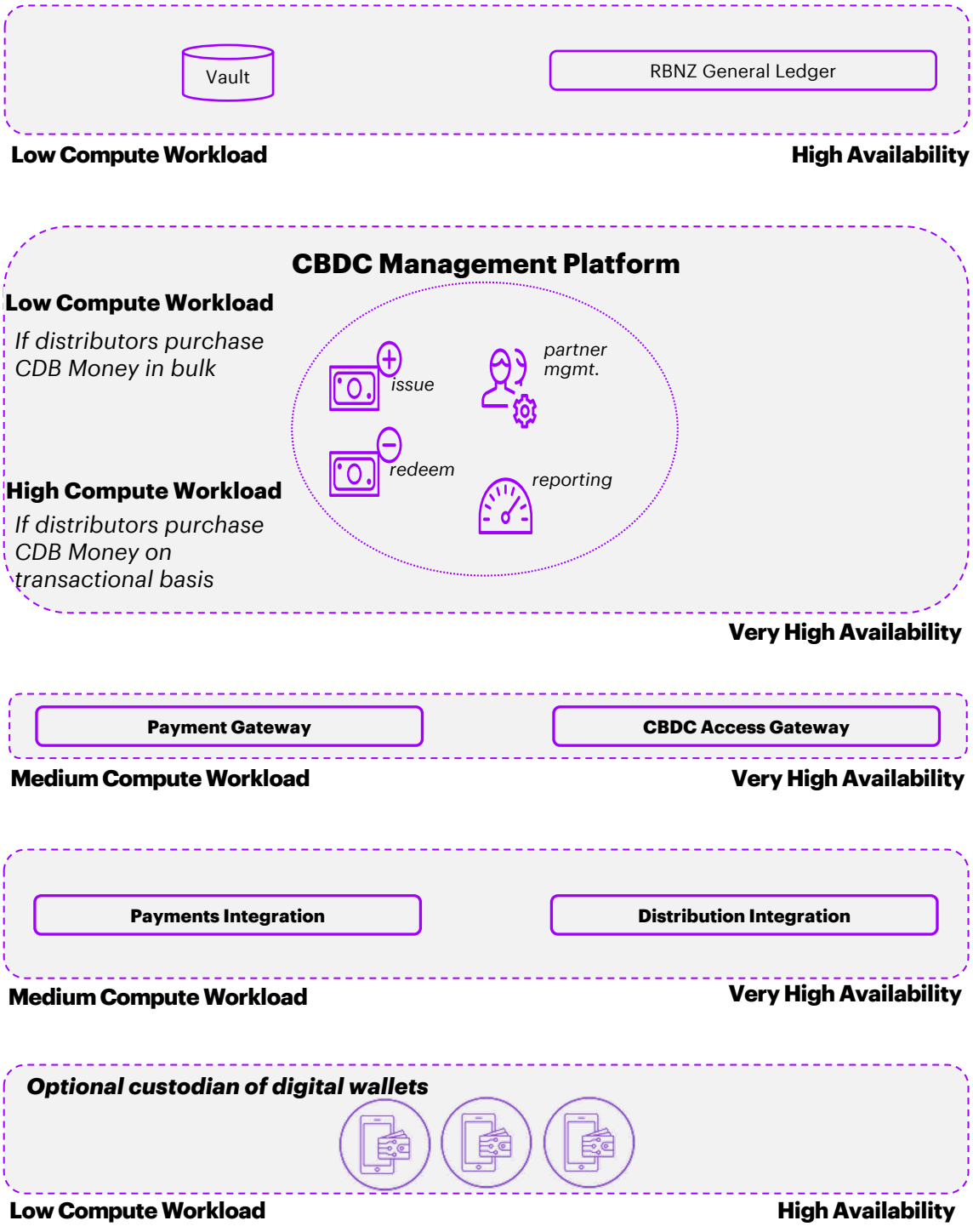
06 – Technical & Operational Capabilities

6.1 – General Consolidated View of a CBDC System



06 – Technical & Operational Capabilities

6.2 – Availability and processing workload considerations of a CBDC System for RBNZ



06 – Technical & Operational Capabilities

6.3 – RBNZ capabilities required to develop a CBDC solution

Controlling the Initiative

- Program Governance
- Strategic Directive

Managing Platform Delivery

- Product Management, Pipeline Planning
- Project Management
- Work Management Processes (Kanban)
- Risk & Issues Management

Analyse, Design, Develop, Test & Deploy

- Customer / User Experience
- Business Analysis
- Architecture & Design
- Solution development & configuration
- Data & Information Management
- Technical Document Writing
- Platform & Solution Deployment
- Integration & API Management
- Testing & Quality Assurance

Infrastructure & Security Services

- Cloud Infrastructure (design, config, automation, management)
- IT Security (data, security, network, people access, testing, training)
- PKI Key, Certificate, Digital Signature Management

Managing and Optimising the Platform

- Platform Management
- Performance Optimisation
- Provisioning, Feature Flags

Reporting Capabilities

- Portals & Dashboards
- Data Analytics & Management Reporting

06 – Technical & Operational Capabilities

6.4 – RBNZ capabilities required to run and sustain a CBDC solution

The following capabilities (non-exhaustive) exclude the governance, legislative and oversight layers to ensure that the CBDC ecosystem is appropriately managed and not misused.

Organisational Change Management

- New Roles & Responsibilities
- Stakeholder & Customer Engagement
- Hiring, Training, Reskilling & Human Resource Management
- New Service Centre Support functions

Managing the Platform

- Platform Performance Management
- Platform Health, Resilience and Capacity Management
- Runtime Dashboards
- Business Process Management
- Log Monitoring & Analytics
- Network Monitoring
- Physical / Virtual Infrastructure Monitoring
- Security Information and Event Monitoring
- Preventative Maintenance Monitoring
- Sandbox Management
- Test Harness Management
- Alerts and Notifications

Incident Management

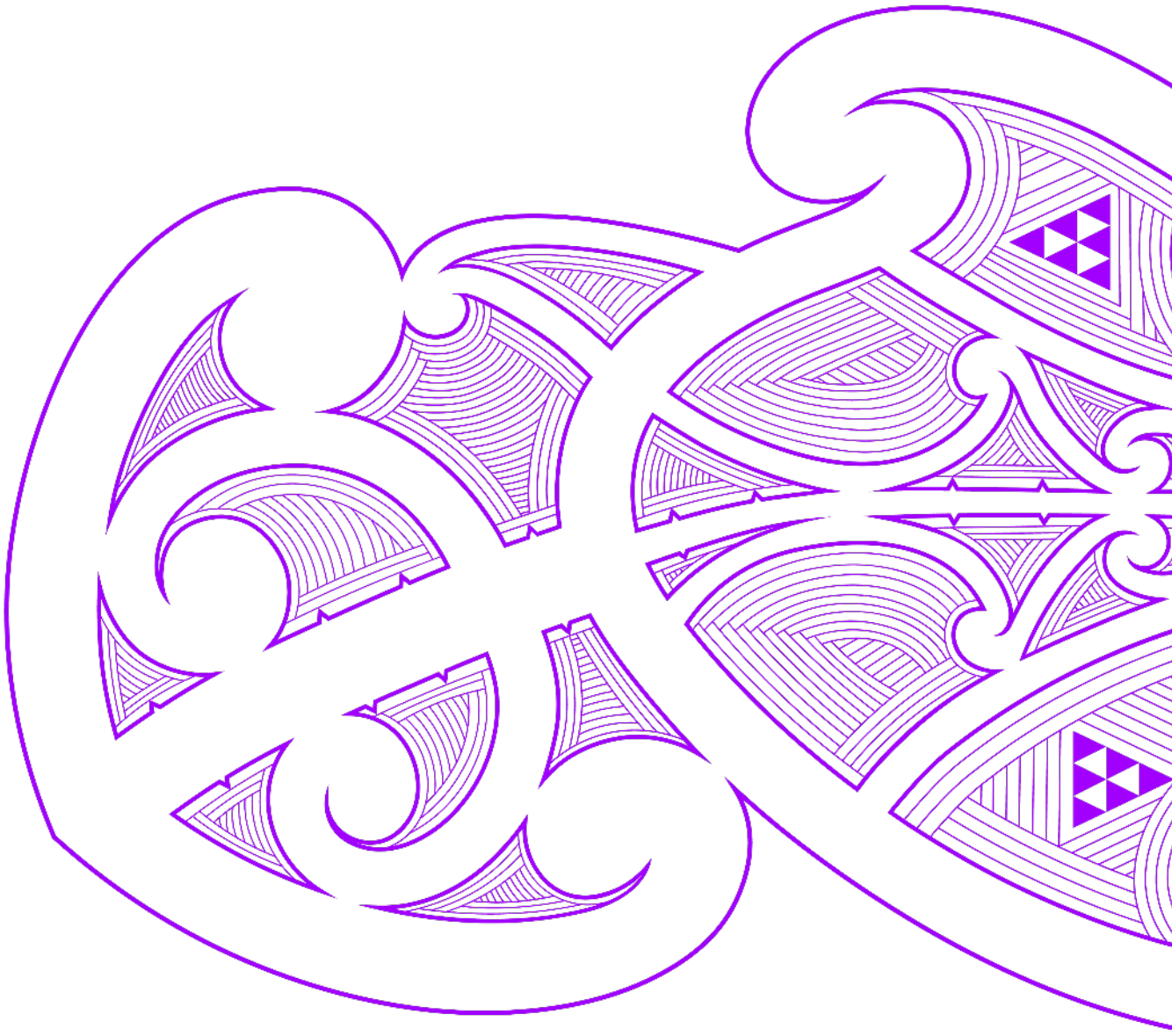
- Incident Management
- Problem Management
- Security Incident Response
- Fraud Incidence Response & Mitigation

Platform Lifecycle Management

- Release Management
- Version Management, Upgrades & Rollbacks
- Patching
- Retirement, Decommission & Archive

Participant Management

- Vendor / Supplier Management
- Customer Support
- Customer Relationship Management System
- Billing System
- Customer Onboarding & Access
- Communication & Stakeholder Management
- Industry Engagement



07. CBDC Use Cases – Process, selection and confirmed list

07 – CBDC Use Cases

7.1 – Long list of potential Use Cases

Use Cases were developed as part of this project as a tool to investigate broader strategic questions for a CBDC system. The Use Case shortlist is not a definitive list of Use Cases that will be implemented, but a set of user journeys that should be explored as part of a technical proof-of-concept.

7.1.1 Long list of potential Use Cases

Summary:

- **49** use cases for Consumer
- **19** use cases for Business (Large)
- **25** use cases for Business (Small/Medium)
- **23** use cases for Government
- **5** use cases for Innovation (added after discussions in workshop)

7.1.2 Consumer 'long list' - potential Use Cases

07 – CBDC Use Cases

7.1 – Long list of potential Use Cases

7.1.3 Business (large) 'long list' - potential Use Cases

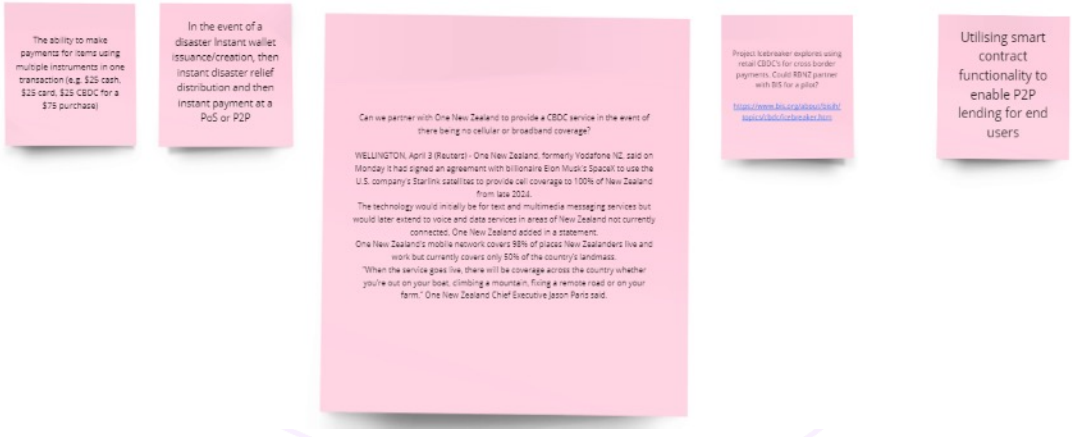
7.1.4 Business (small/medium) 'long list' - potential Use Cases

07 – CBDC Use Cases

7.1 – Long list of potential Use Cases

7.1.5 Government 'long list' - potential Use Cases

7.1.6 Innovation 'long list' - potential Use Cases



07 – CBDC Use Cases

7.2 – Short list of potential Use Cases

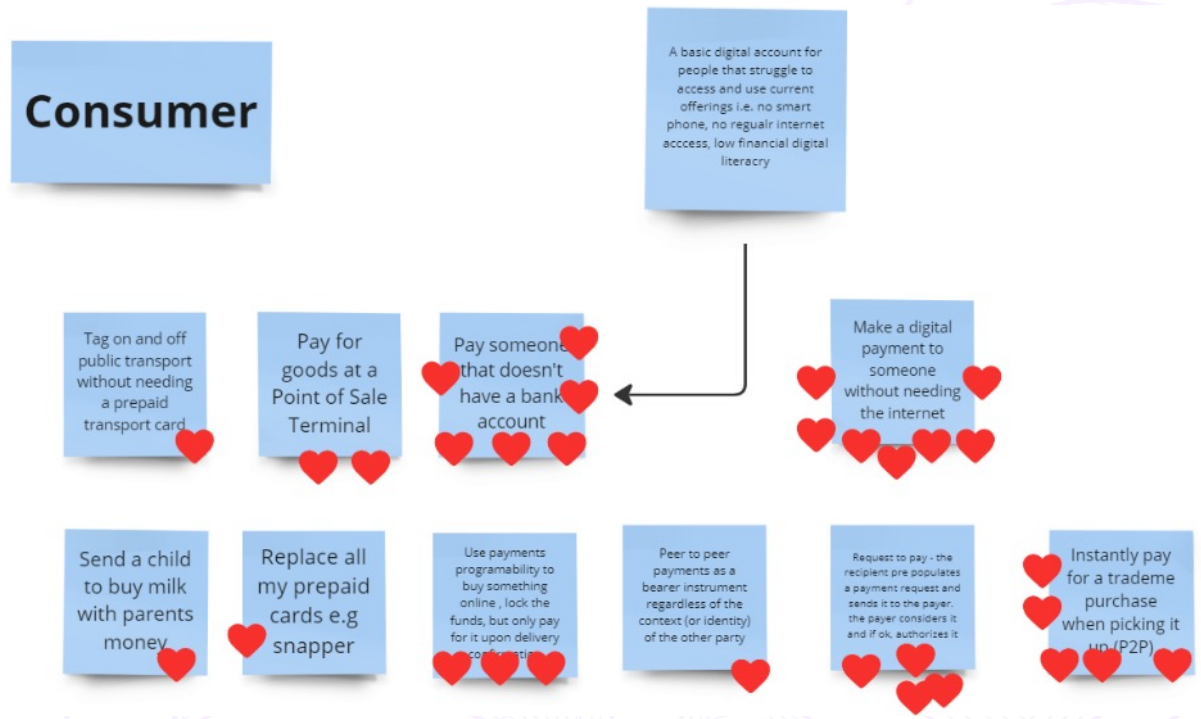
7.2.1 Selected short list of potential Use Cases

Summary:

Number of Use Cases voted for by category as follows:

- **11** use cases within Consumer
- **12** use cases within Business (Large)
- **13** use cases within Business (Small/Medium)
- **10** use cases within Government

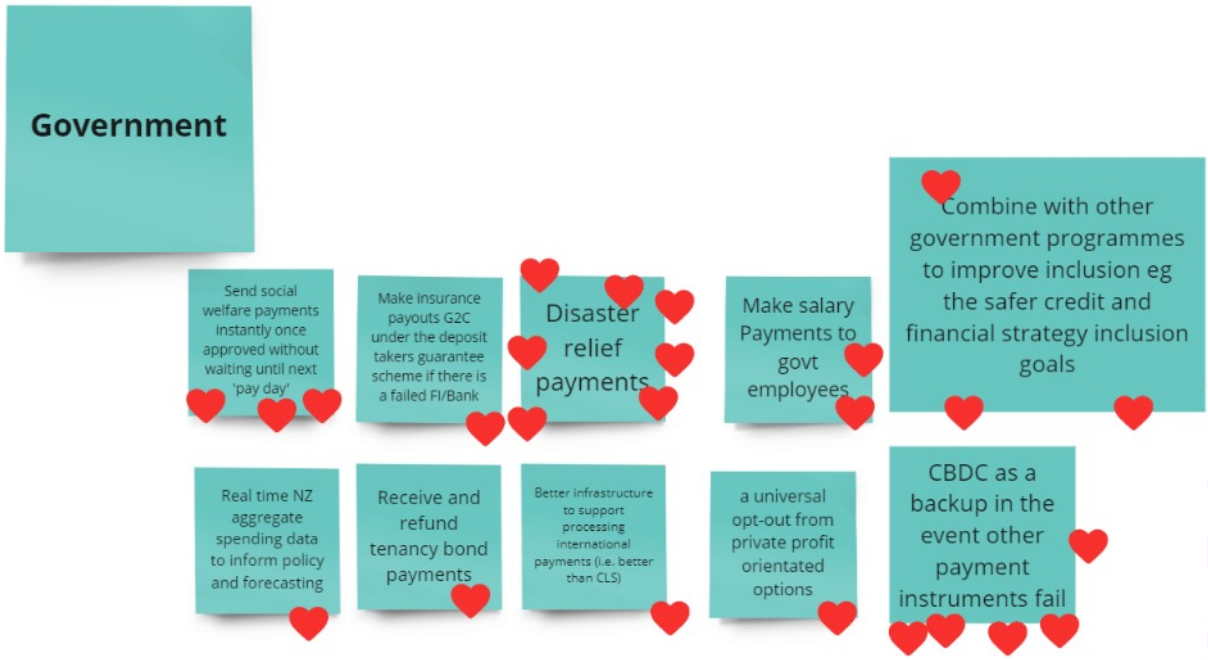
7.2.2 Consumer 'short list' - potential Use Cases



07 – CBDC Use Cases

7.2 – Short list of potential Use Cases

7.2.3 Government 'short list' - potential Use Cases



7.2.4 Business (large) 'short list' - potential Use Cases

07 – CBDC Use Cases

7.2 – Short list of potential Use Cases

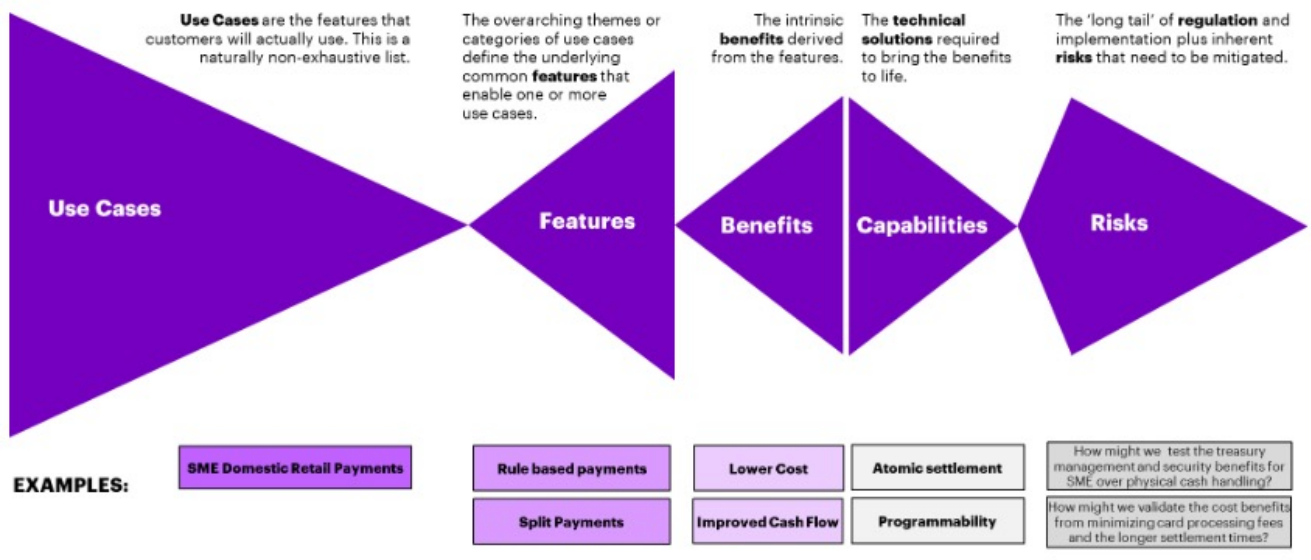
7.2.5 Business (small/medium) 'short list' - potential Use Cases

07 – CBDC Use Cases

7.3 – Frameworks to enable final Use Case selection

7.3.1 Use Case priorisation framework

7.3.2 Waveform approach used for analyzing Use Cases



07 – CBDC Use Cases

7.4 – Selected use cases

7.4.1 Confirmed list of selected use cases

1 **Resilience through offline payments** — **P2P** **P2B**

- **Description**: Payment option when other types of payment are not/less available
- **Outcome**: Improved resilience
- **Supporting Functionality**: Offline payments
- **Persona**: Digitally savvy. Preparing for outage events. Digital payments when remote/no internet access. Low value payments in certain social settings

2 **New payment options for SMEs, including Māori and collective enterprises** — **P2B**

- **Description**: New payment options to small orgs that support their unique needs
- **Outcomes**: Efficiency. Competition. Te Ao Māori sovereignty
- **Supporting Functionality**: Real time payments. Proxy/Alias. PoS acceptance
- **Persona**: Māori SME. Remote area. Addressing needs of Te Ao Māori data sovereignty

3 **Making digital payments more accessible (Financial Inclusion)** — **P2P**

- **Description**: New digital payment support options from friends, family or services
- **Outcome**: Financial inclusion. Meaningful choice. Enhanced autonomy
- **Supporting Functionality**: Consent/permissions. Joint control options. Cash/CBDC Interaction
- **Persona**: Banked but not confident making digital payments

4 **Improved cashflow from supply chain (Programmable payments)** — **B2B**

- **Description**: Conditional payment linked to delivery and inspection of sold goods
- **Outcome**: Supporting innovation. Efficiency & productivity gains. Cashflow benefits
- **Supporting Functionality**: Conditional (programmable) payments. Smart contracts
- **Persona**: Small agricultural manufacturer. Cashflow constraints/risks from timeliness of receiving payments from sales.

07 – CBDC Use Cases

7.5 – Confirmed list of use cases and journey maps

Use Case 1 explores the following CBDC design considerations:

Policy: Resilience; Inclusion: Interoperability

Technology: Offline; POS Payments; Holdings and Transactions

7.5.1 Use Case 1 – Resilience through offline payments (P2P/P2B)

Challenge

Kiri is a resident of a small remote town in New Zealand and is a well-known member of the town's tight-knit community (i.e., in physical proximity of lots of people).The nearest bank branch is located in a larger town an hour away, making it inconvenient to visit. She only uses cash when there is no other alternative and prefers digital methods of payment/transfer as she's comfortable using a smartphone to access the internet and social media.

Kiri's town has a history of severe weather events impacting the area/community and has patchy, but improving, mobile coverage. During a severe weather event, there is a high chance that her community may lose access to the internet or cellular networks, making payments/transfers difficult.

She is logistically well prepared for these events - but money and payments remain a challenge when there is an internet outage. She is also uncomfortable having a stash of cash just in case of adverse events/outages, not to mention a poor use of her money.

Future Solutions

In a world with a CBDC, Kiri and her community would have the ability to access digital wallet services to make payments and transfers through their mobile phone or smart card. Whilst this will not be the main means of managing their financial life (money and payments), a CBDC ecosystem will provide another option.

In a severe weather event where network connectivity is unavailable or unreliable, all digital currency in a digital wallet can be used to make payments. Kiri and her community will be able to purchase critical items from merchants/retailers and will be able to transfer money between each other.

The community will have multiple options for making payments/transfers, with the possibility of using mobile phones or secure smart cards. Smart cards add a payment option for individuals who are less comfortable with making digital payments and will enable users to make payments wherever and however they are comfortable with.

Furthermore, with the ability to accept offline payments at the Point of Sale (including if there is an outage of banking or payments systems), local shop owners and retailers in the affected area can remain open and continue to provide needed supplies, enhancing the resilience of the community.

Offline payments perform a triple duty:

1) The ability to continue to make payments during an occasional but major disruption event.
2) Another option for everyday payments and purchases, especially in remote areas with patchy network coverage.
3) A useful form of digital payment for certain 'social payment' scenarios when interacting with those in their community, i.e., with friends, whānau, local clubs, school fundraisers, etc. (irrespective of network availability)

Kiri and her community will be able to access online payments. In a disruptive event, this would enable Kiri to be fully offline for some time, and still receive and pay digitally with those in their community. This would also enable government agencies to disburse emergency disaster relief payments from outside the area to affected residents, with the ability to create and fund wallets on user's devices instantly when online, for users to then spend and transfer offline.

Technical Exploration Proposal Considerations

Technologically, a PoC should prove that CBDC held in an online wallet (i.e., not previously prepared into an offline state) can be used to make a payment in an offline mode when the payer and payee are in close physical proximity with each other and allow devices to mutually authenticate themselves and exchange payment instructions securely.

The programme should also outline processes to mitigate potential double spend risks and maintain compatibility across different wallet types/providers.

07 – CBDC Use Cases

7.5 – Confirmed list of use cases and journey maps

Use Case 2 explores the following CBDC design considerations:

Policy: Privacy; Te Ao Māori Data Sovereignty; Innovation; Distribution & Interoperability; Adoption

Technology: Holdings & Transactions; Programmable Payments; Settlement

7.5.2 Use Case 2 – New payment options for SMEs, including Māori and collective enterprises (P2B)

Challenge

Tama is a young Kiwi small business owner & shareholder that produces Mānuka honey for domestic sale and sells to a large NZ company for export e.g., China. Tama's Mānuka honey factory is based in a rural area north of Kaitāia, a small town where Tama is from, and where many of the residents are related either as whānau, hapū/Iwi or lived in the town for a long time.

Tama's business started as an opportunity to lease his family land to a major NZ honey producer for growing & harvesting Mānuka. Tama and his whānau decided to build their own small factory on their land for processing their Mānuka into honey using a small business loan provided by their Iwi, to later leasing land from extended whānau/hapū/Iwi members to cultivate Mānuka. Tama and his whānau see their business as intergenerational (to pass on to their mokopuna), to provide benefits to their whānau/hapū/Iwi & community through job creation (income), learning opportunities (sharing knowledge about Mānuka) and contributing to their local community with koha (donations for hui, tangi).

Tama is a customer (personal & business) with one of NZ's largest banks and deals with moderate volumes of cash, low volumes of online transactions. Tama will often travel significant distances to Kaitāia, to deposit & withdraw cash but this is done at irregular intervals e.g., when Tama is not busy with business operations, usually on a free weekend combined with other errands.

Tama would like to have an easier, faster and cheaper way to transfer his cash deposits & withdrawals regularly, has the capability to receive & send online payments & deposits, and is a proficient user with mobile & online banking services. However, many of Tama's lessors either have limited or no access to internet & devices. The lessors have told Tama they are largely unfamiliar with online payment or banking services, so prefer their lease payments to be made in cash. These preferences from Tama's lessors, who are critical to his business, is the main reason why Tama continues to use cash.

Future Solutions

In a world with a CBDC, Tama would have access to wholly new options for making and receiving payments, allowing him to reduce the amount of cash he handles and increase the number of online transactions being made. The use of person-to-person proximity payments in remote areas represent an alternative digital payment option beyond bank-based or card-based payments, allowing users more choice over how they want to make a payment.

With the configurability and flexibility that a CBDC provides through smart contracts, Tama can use this functionality to meet his specific business needs, such as ensuring that financial records are accurately maintained, being able to track personal & business payments, and being able to trace & verify payments with his Iwi, suppliers and lessors. The data generated from using a CBDC in Tama's business transactions can support proof of assets & liabilities for any future collateral purposes.

The atomic settlement and Delivery vs Payment (DvP) features of a CBDC ecosystem help to reduce some of the credit risks associated with payments for SMEs, helping Tama increase his business' productivity and allow him to focus on the business rather than payments. Implementing a consent mechanism where Tama enables his Iwi, bank & later lessors to share his CBDC business transaction data, helps remove frictions in the payment process, creates a mini ecosystem that incentivises users with enhanced efficiency and can lead to greater adoption rates.

Using a CBDC that leverages his existing technology and infrastructure from his business and region, including point of sale capabilities, reduces the cost to Tama by not having to purchase new devices. Some training to support his whānau & lessors on how to use a CBDC may be required.

The ease of onboarding, the Iwi's promotion & partnership of CBDC, integration with Tama's bank, makes it a convenient, safe and trusted choice for Tama to use.

Technical Exploration Proposal Considerations

A PoC should test universal access for low-cost devices & payment methods as a core capability in the CBDC design.

It should also engage with hapū/Iwi, communities, business & technical groups who can advise and test on the accessibility of potential end-point solutions. These key stakeholders can identify specific & diverse needs of NZ & Māori SMEs, further define the implementation steps needed for interacting with a CBDC and help mitigate against challenges between NZ & Māori SMEs and government (e.g., paying business tax or GST).

07 – CBDC Use Cases

7.5 – Confirmed list of use cases and journey maps

Use Case 3 explores the following CBDC design considerations:

Policy: Inclusion; Privacy; Adoption; Interoperability

Technology: Holdings & Transactions; Wallet structure; Devices; Funding/De-Funding

7.5.3 Use Case 3 – Making digital payments more accessible (Financial Inclusion / P2P)

Challenge

Malia is a young mother living with her child and family in social housing. Malia and her family have little money and they mostly rely on government assistance for now. Malia prefers to make payments using cash as she is not comfortable using the internet, or mobile banking services and feels unsafe doing so. Malia and her family have access to the internet with a limited data plan, and they use a shared family tablet to do so.

She also uses a basic mobile phone to make calls and send texts. Malia and her family are not confident using digital or online processes and are concerned if something goes wrong, they may lose their money. They are also unsure why they need to provide information about themselves online when making purchases.

Malia attends a Support Centre where there is a PC and free internet. She has various friends she often meets at the same centre. Some of them are digital savvy and have smartphones and, when she needs to make online payments or purchases, they help her and she pays them with cash, even though she may not receive any change after the payment has been made.

Future Solutions

In a world with CBDC, Malia could make online payments using a smart card linked to her family tablet with CBDC from the family's digital wallet with shared access. When Malia is at the Support Centre she can now confidently use her card to make payments online using their PC, free internet and staff help. She also knows that any errors or unfulfilled orders will be immediately refunded to her family's digital wallet. In fact, the Support Centre previously organised a session with Malia and her mother to help them set up the CBDC wallet facility on the family tablet, together with how to load CBDC into wallet using funds from her mother's bank account, and how they could also transfer CBDC from the wallet back into funds in the bank account . Malia and her family can also use the NFC capability on their card to tap the tablet and check the balance without needing to access the internet. Features in the digital wallet means that she is also able to customise how it looks for her, including being able to change the language used.

Malia can also top up her digital wallet using cash, by depositing money at a government social services contact centre, participating merchant kiosk, or at a smart ATM.

Malia and her family also have the option to choose the type of smart card best suited to their needs & preferences:

1) A card similar to existing prepaid cards where the CBDC balance is stored on the card after being topped up from the digital wallet

2) A card linked to the digital wallet that does not store CBDC on the card but debits from the digital wallet when a payment is made

Additionally, the family can also issue sub-wallets and cards to family members sharing the same device to manage funds separately, delegating permissions to spend a certain amount of money.

For example, Malia's mother can give access to Malia and delegates a set amount of money for her to use from her sub-wallet, so that Malia can purchase or make payments on her behalf.

Technical Exploration Proposal Considerations

A technical exploration should consider public accessibility through various types of contact centres e.g., kiosks in supermarkets/gas stations/community centres/local government offices, where users can physically visit to be onboarded into the CBDC ecosystem, learn how to use a CBDC, how to manage their digital wallets and where to go to for in-person support. It should also explore whether users are able to login, either at these centres or remotely (mobile phone/tablet) using their official government issued ID e.g., IRD/NHI/Driver's license/Passport number to provide user access to the CBDC ecosystem.

The accessibility needs of different users, for example physically or intellectually disabled New Zealanders can be catered for via specific tools embedded into the CBDC ecosystem (e.g., text-to-voice, biometric pin/facial recognition scanning for visual, hearing and intellectually impaired). The broad utilisation of a CBDC ecosystem would facilitate different participation pathways for a wide range of users, meeting various needs and providing additional benefits to for New Zealanders.

The technical exploration of the interface between physical smart cards and devices should also be considered to ensure there is compatibility between systems to enable easy, seamless interaction.

07 – CBDC Use Cases

7.5 – Confirmed list of use cases and journey maps

Use Case 4 explores the following CBDC design considerations:

Policy: Innovation; Privacy; Adoption; Distribution & Interoperability

Technology: Holdings & Transactions; Smart Contracts;

7.5.4 Use case 4 – Improved cashflow from supply chain (Programmable payments/B2B)

Challenge

South Island Dairy, a small New Zealand manufacturer produces dairy products for their domestic customers and has different terms of payment for different categories of buyers (from food retailers to food exporters). These terms of payment are largely influenced by national logistics schedules, and their payout cycle to their own farmer-suppliers.

A significant impact on the dairy manufacturer's business is cash flow management. They usually have to pay their farmer suppliers on a prompt and regular cycle. They also have to pay their logistical distribution partner within 7 days of delivery. However, their receivables payment for manufactured goods sold to buyers is often paid one or two months later, well after their supplier and logistical costs have been paid.

The timing of receiving payments from their sales is hard to forecast, and late payments can have a significant impact on their cashflow.

Their logistics provider has sophisticated distribution management and digital tracking systems. However, the financial processes remain disconnected to the logistical process, making it challenging to speed up the payment for sales made. The manufacturer has little control of the payment processing time of the buyers. As one small manufacturer selling to large distributors, they have limited ability to influence payment timeframes, despite having good business relationships.

Future Solutions

The manufacturer could use the smart contract functionality provided by a CBDC to send a conditional payment request in advance of dispatching the manufactured goods to the buyer, with a built-in prompt payment discount. The buyer, looking to benefit from the prompt payment discount, authorises the conditional payment and locks the CBDC funds that will be used to make the payment. With the payment embedded in a smart contract, the manufacturer knows with certainty that they will receive the payment automatically if their manufactured goods are delivered to the buyer as expected. Both the manufacturer and the buyer can track the dispatch and delivery of the goods using the logistics and transport provider's tracking systems. Using these tracking systems, the conditional payment is able to be linked to the confirmation of delivery and successful goods inspection. When the delivery and receipt conditions are met, the conditional payment is automatically processed and is instantly received by the manufacturer.

As the conditional payment is pre-authorised, the manufacturer has high levels of certainty as to when they will receive payment. This certainty puts them in a better position to obtain supply chain finance to help bridge any residual cashflow management challenges.

The logistics and transport provider is also potentially able to use conditional payments to build in the manufacturer paying their transport fees automatically upon the delivery and buyer inspection.

Potential outcomes from these benefits are:

1) Reduced financial risk as the manufacturer gains faster access to funds, which improves their cashflow position and ability to accurately forecast their finances.
2) The manufacturer, buyer and logistics and transport provider all have improved transparency and certainty as to when the payments will occur and can monitor timings via delivery tracking systems.
3) Faster access to the funds they are owed at the agreed intervals.
4) Buyers can gain more time to pay off their balances (agreed full duration to settle) without using external finance (factoring) for cash flow or impacting their credit ratings, reducing the delays for the dairy manufacturer to follow up on payments.

Technical Exploration Proposal Considerations

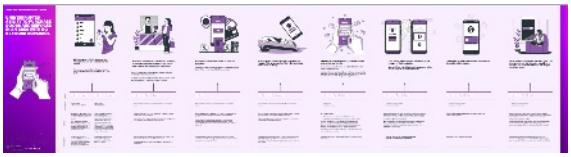
A technical exploration should work with manufacturers, retailers & logistics businesses to prove that a CBDC could potentially be more cost effective, efficient or convenient than existing alternatives (cash transfer, credit or finance with interest) due to its integration with smart contracts and delivery systems.

It should also test access and the parameters for smart contracts between the participating businesses to automate processes that have agreed conditions. For example, using a CBDC to transfer, receive and confirm funds immediately settled at the time when goods or services meet the conditions for delivery.

07 – CBDC Use Cases

7.6 – Journey maps overview of confirmed use cases

7.6.1 Use Case 1 – Resilience through offline payments (P2P/P2B)

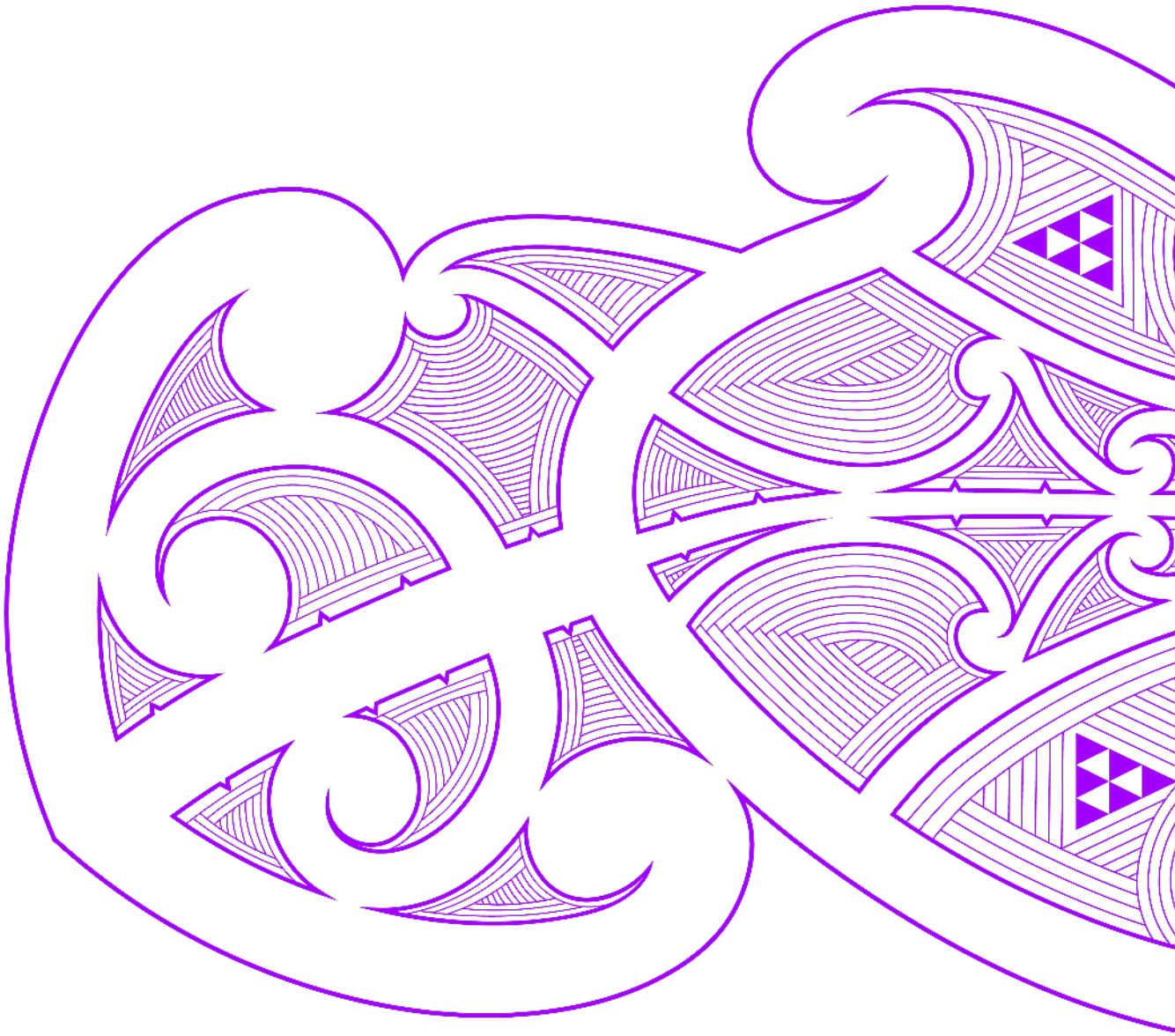


7.6.2 Use Case 2 – New payment options for SMEs, including Māori and collective enterprises (P2B)

7.6.3 Use Case 3 – Making digital payments more accessible (Financial Inclusion/P2P)

7.6.4 Use case 4 – Improved cashflow from supply chain (Programmable payments/B2B)

Sources: RBNZ CBDC Use Cases and Journey Maps



08. Considered Questions and Answers

08 – Considered Questions & Answers

The following non-exhaustive list of preliminary questions that have been considered throughout the project. Exploring the answers to these questions may be necessary in subsequent phases of the CDBC programme.

ID	Initial Key Question/Area of Concern	Design Area	Workshop in which it will be addressed	Accenture's Initial Answers
1	**Token based or account based?**	Asset	Strategic Workshop 3 - Focus on Innovative Payments	A NZ CBDC should be token-based.
2	**Programmable money or not?**	Asset	Strategic Workshop 3 - Focus on Innovative Payments	Programmable money will not be a feature of an NZ CBDC.
3	**What are the options for data collection, storing and retaining on CBDC platform itself?**	Platform	Strategic Workshop 2 - Focus on Privacy, Holdings & Transactions	Whilst the specific options for data collection and storing have not been finalised, it is recommended to proceed with the principle of minimal user information being used on the CBDC platform.
4	**Can a CBDC platform protect privacy while also being innovative in using data.**	Platform	Strategic Workshop 2 - Focus on Privacy, Holdings & Transactions	Using consent frameworks and tiered usage, a CBDC can achieve the balance between privacy and innovation (as demonstrated in open banking).
5	**How can we ensure the safe sharing of IDs & wallets etc. for payments?**	Platform	Strategic Workshop 2 - Focus on Privacy, Holdings & Transactions	We should use the following options for secure ID sharing: • Proxy identities to protect user privacy whilst ensuring that users can verify payment recipients • User consent frameworks to ensure that consent is obtained when sharing IDs
6	**Use of unique identifiers or not?**	Platform	Strategic Workshop 2 - Focus on Privacy, Holdings & Transactions	Unique identifiers should be used for users and their wallets within the CBDC system. Users should also have the choice of using proxy identities to protect their privacy.
7	**How feasible is interoperability with CBDC Platform and incumbents, new 3rd parties? What are the implementation barriers?**	Platform	Strategic Workshop 4 - Focus on Reliability, Safety & Scalability and the implication on RBNZ Technology & Operations	Interoperability with existing payment systems and participants is feasible using APIs. This would require standardised integration models and API documentation that new participants will need to adhere to.
8	**Offline - what are the financial & other risks**	Platform	Strategic Workshop 1 - CBDC Use Cases & Focus on Wide Adoption & Inclusion	The risks of offline capabilities for a CBDC are as follows: • Double spending • Loss of device • Fraudulent transactions • Increased operational risk
9	**What are the design options for data commercialisation whilst maintaining privacy/ inclusion? e.g. would Opt-In promote privacy goals and Opt-Out promote innovation goals?**	Ecosystem	Strategic Workshop 2 - Focus on Privacy, Holdings & Transactions Strategic Workshop 1 - CBDC Use Cases & Focus on Wide Adoption & Inclusion	Using consent frameworks and tiered usage, a CBDC can achieve the balance between privacy and innovation (as demonstrated in open banking). Users should also have the option to opt-in/opt-out to cater for their choice.

08 – Considered Questions & Answers

ID	Initial Key Question/Area of Concern	Design Area	Workshop in which it will be addressed	Accenture's Initial Answers
10	**How feasible is it to have extensive partnerships to support an MVP and timely delivery approach?**	Ecosystem	Strategic Workshop 4 - Focus on Reliability, Safety & Scalability and the implication on RBNZ Technology & Operations	Yes, it is feasible to have extensive partnership to support MVP and timely delivery.
11	**Is there an over-arching technology solution that supports safety and privacy, whilst allowing 3rd party innovation? Would tiered membership or customers support this?**	Ecosystem	Strategic Workshop 4 - Focus on Reliability, Safety & Scalability and the implication on RBNZ Technology & Operations	Most of the technology solutions that support CBDC have Privacy included as a core component. Designing a 'fit for purpose' innovation capability will depend upon the configuration which will drive optimal outcomes.
12	**How do you embed RBNZ Policy into the platform so that 3rd parties have to adhere to these e.g. APIs?**	Ecosystem	Strategic Workshop 4 - Focus on Reliability, Safety & Scalability and the implication on RBNZ Technology & Operations	Development of standardised integration models and API documentation is required for participants to adhere to, in order to integrate with the CBDC system.
13	**What are the relationships between funding and defunding wallets, distribution and clearing systems?**	Platform	Strategic Workshop 1 - CBDC Use Cases & Focus on Wide Adoption & Inclusion Strategic Workshop 3 - Focus on Innovative Payments	The relationships between these core components of a CBDC proposition are complex and dependent on the ecosystem design. This should be explored as part of Phase 3.
14	**Who uses and who benefits from a candidate use case?**	Use Cases	CBDC Forum Workshop 12 May 2023	Refer to the selected use cases and their journey maps for more detail in section 7 – CBDC Use Cases – Process, selection and confirmed list
15	**What functionalities support a candidate use case?**	Use Cases	CBDC Forum Workshop 12 May 2024	Refer to the selected use cases and their journey maps for more detail in section 7 – CBDC Use Cases – Process, selection and confirmed list.
16	**What dependencies, relationships or constraints enable/constrain a candidate use case?**	Use Cases	CBDC Forum Workshop 12 May 2025	Refer to the selected use cases and their journey maps for more detail in section 7 – CBDC Use Cases – Process, selection and confirmed list.
17	**What does good look like for a candidate use case?**	Use Cases	CBDC Forum Workshop 12 May 2026	Refer to the selected use cases and their journey maps for more detail in section 7 – CBDC Use Cases – Process, selection and confirmed list.

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