



CBDs: an opportunity for development?

Financial digitization: a sustainable development tool for Africa?

5 June 2023, Paris

Morten L. Bech, BIS Innovation Hub

The views expressed here are those of the presenter and not necessarily those of the BIS

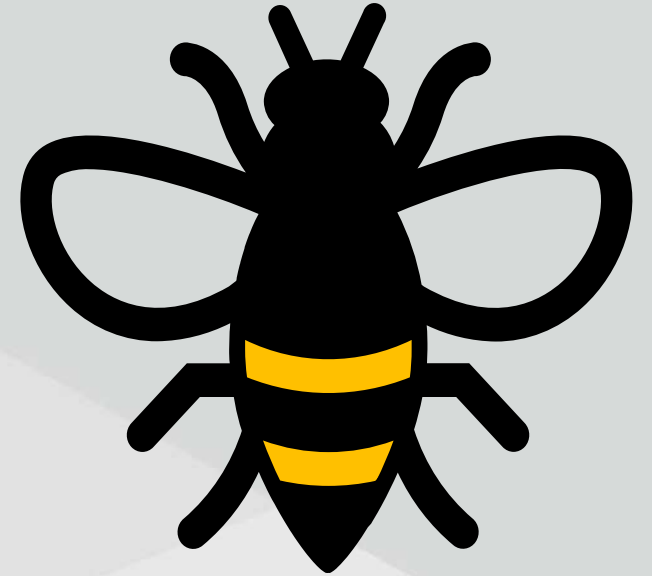
Agenda

- **BIS Innovation Hub**
- **Central bank digital currency**

What is innovation?



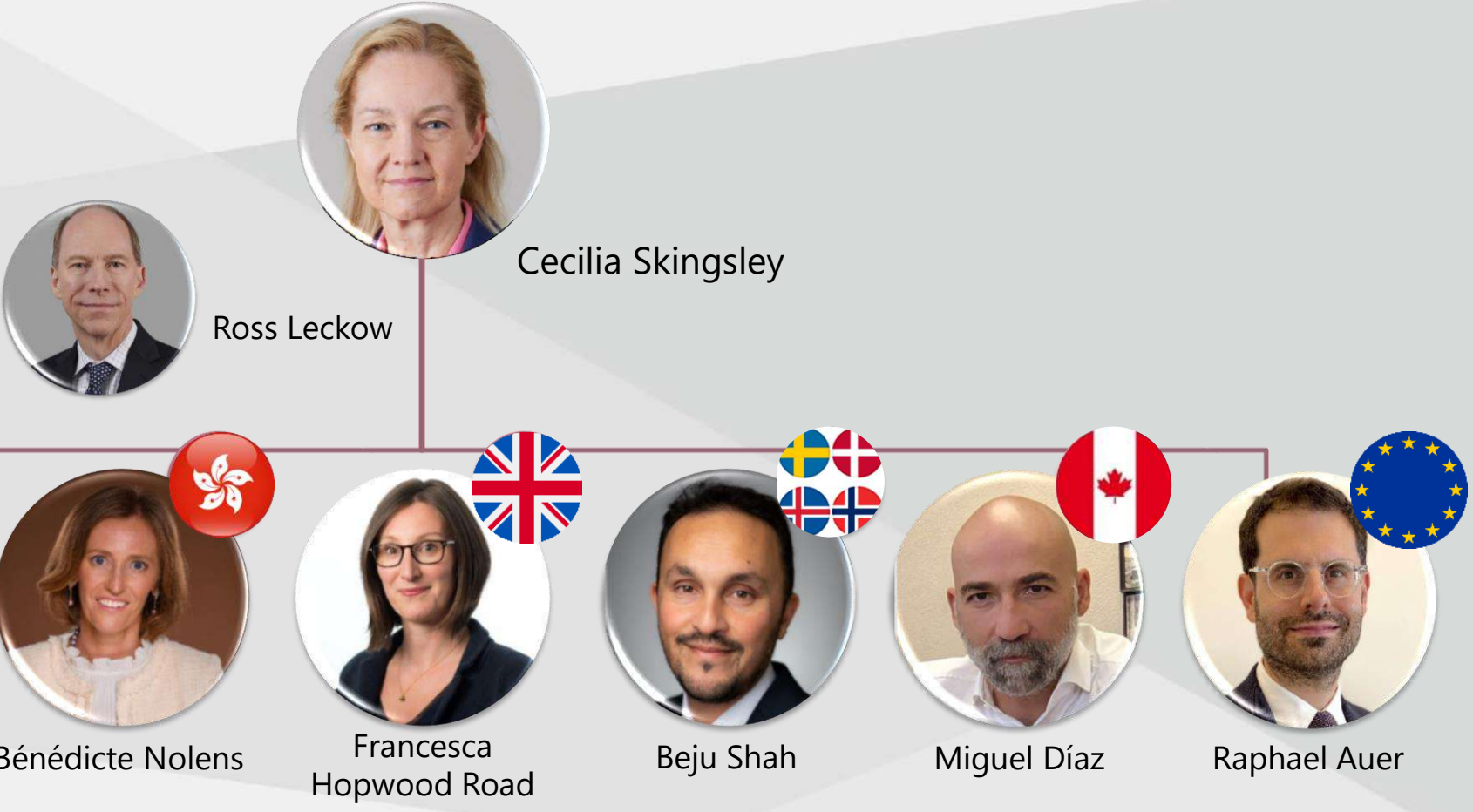
What is the BIS Innovation Hub?



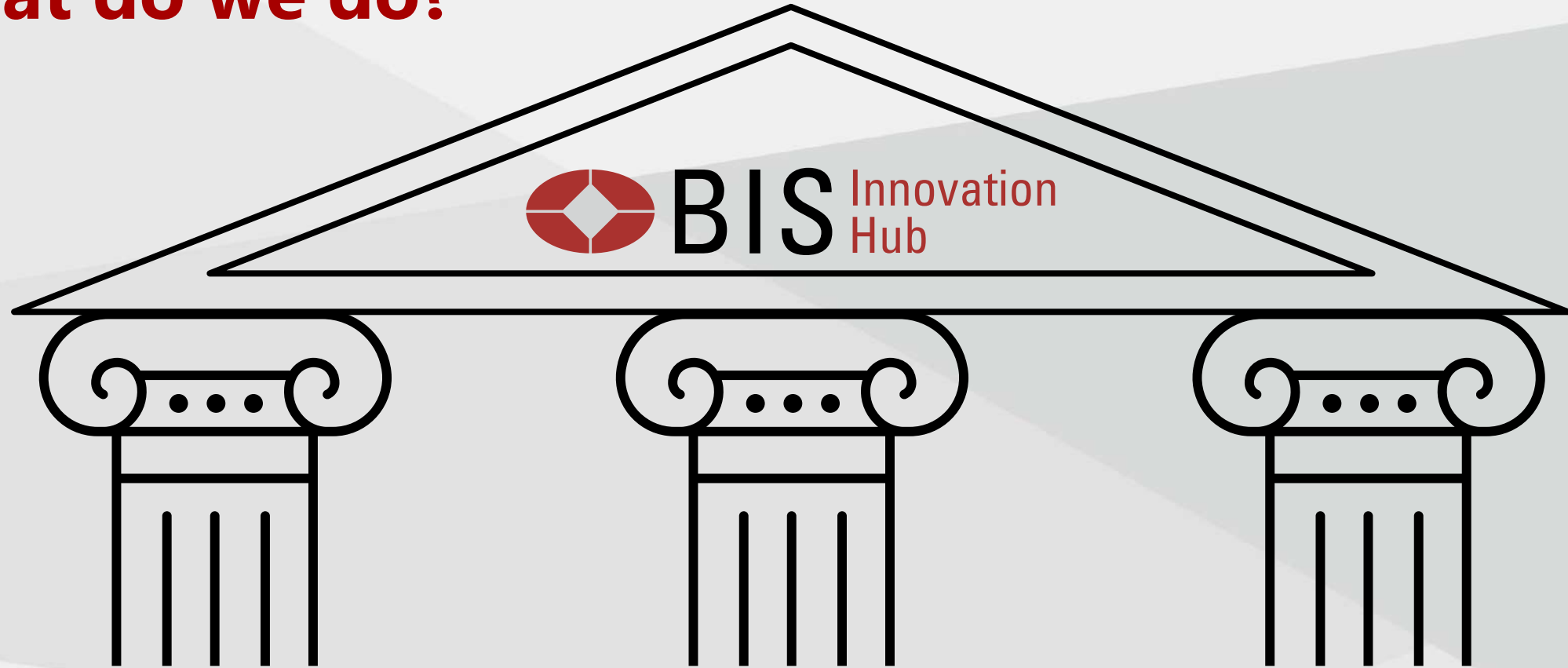
Global force for innovation



BIS Innovation Hub Management



What do we do?



**Horizon
scanning of
technologies**

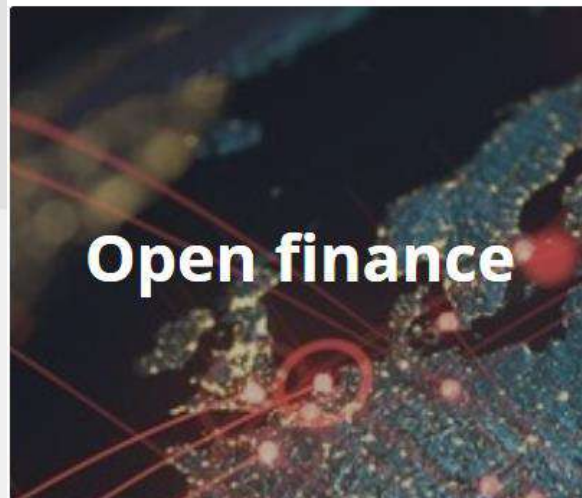


**PoCs and
prototypes**



**Focal point
central bank
innovation**

Strategic themes



What are CBDCs?

- A CBDC is a **digital payment instrument**, denominated in the **national unit of account**, that is a **direct liability** of the central bank.
- CBDC is a digital form of central bank money that is **different from balances in traditional reserve or settlement accounts**

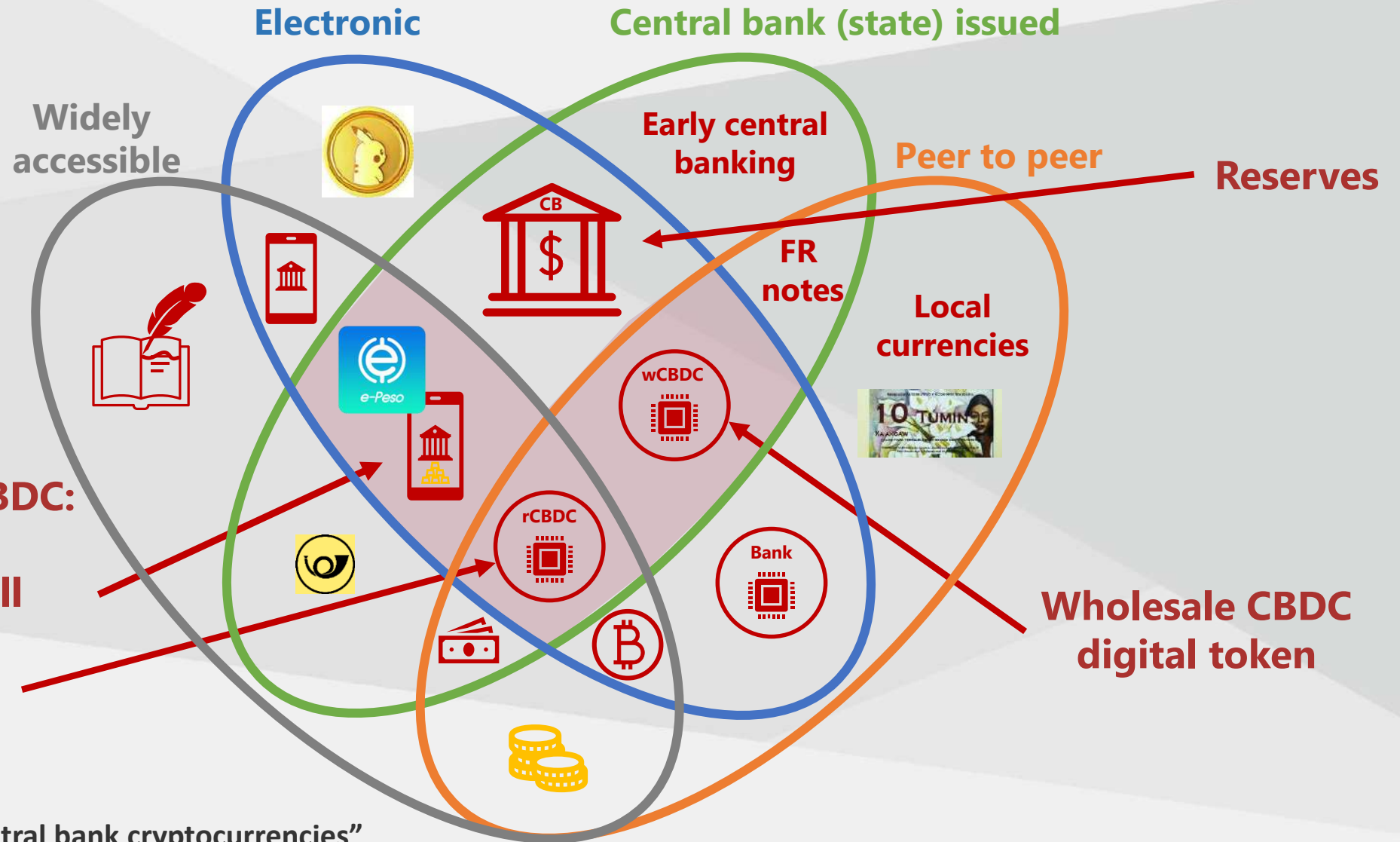
What sounds like a CBDC but is not?

- A liability issued by a central bank that is not in its own currency



Joint report by The Bank of Canada, ECB, Bank of Japan, Sveriges Riksbank, Swiss National Bank, Bank of England, Federal Reserve Board and BIS (2020)

Types of CBDCs: The money flower



Bech and Garratt (2017): "Central bank cryptocurrencies"

One equation to explain CBDC

$$\text{CBDC} = \text{MM}_0 \text{GA}$$

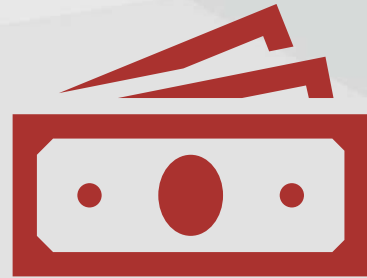
The right-hand side is short for

$MM_0GA =$

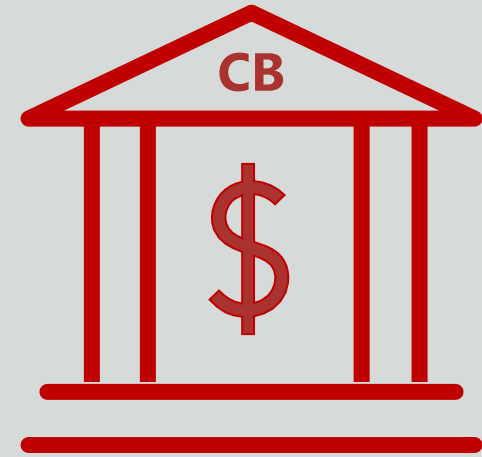
Making M_{zero} Great Again
(base money)

Recall base money is ...

$M_0 =$



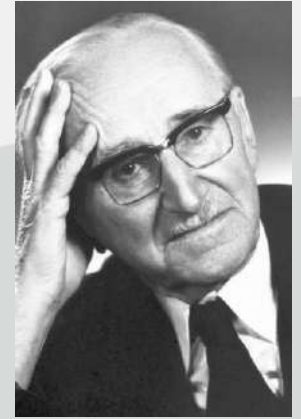
+



Cash


Reserves

Base money for the future



Friedrich von Hayek

$$1) \quad M_0^{\text{Future}} = \emptyset$$

$$2) \quad M_0^{\text{Future}} = \text{Reserves}$$
A red icon of a classical building with a pediment, labeled 'CB' above it and a dollar sign '\$' inside. Below the icon is the word 'Reserves'.

$$3) \quad M_0^{\text{Future}} = r\text{CBDC} + w\text{CBDC}$$

Why wCBDC? Are reserves not great? ...

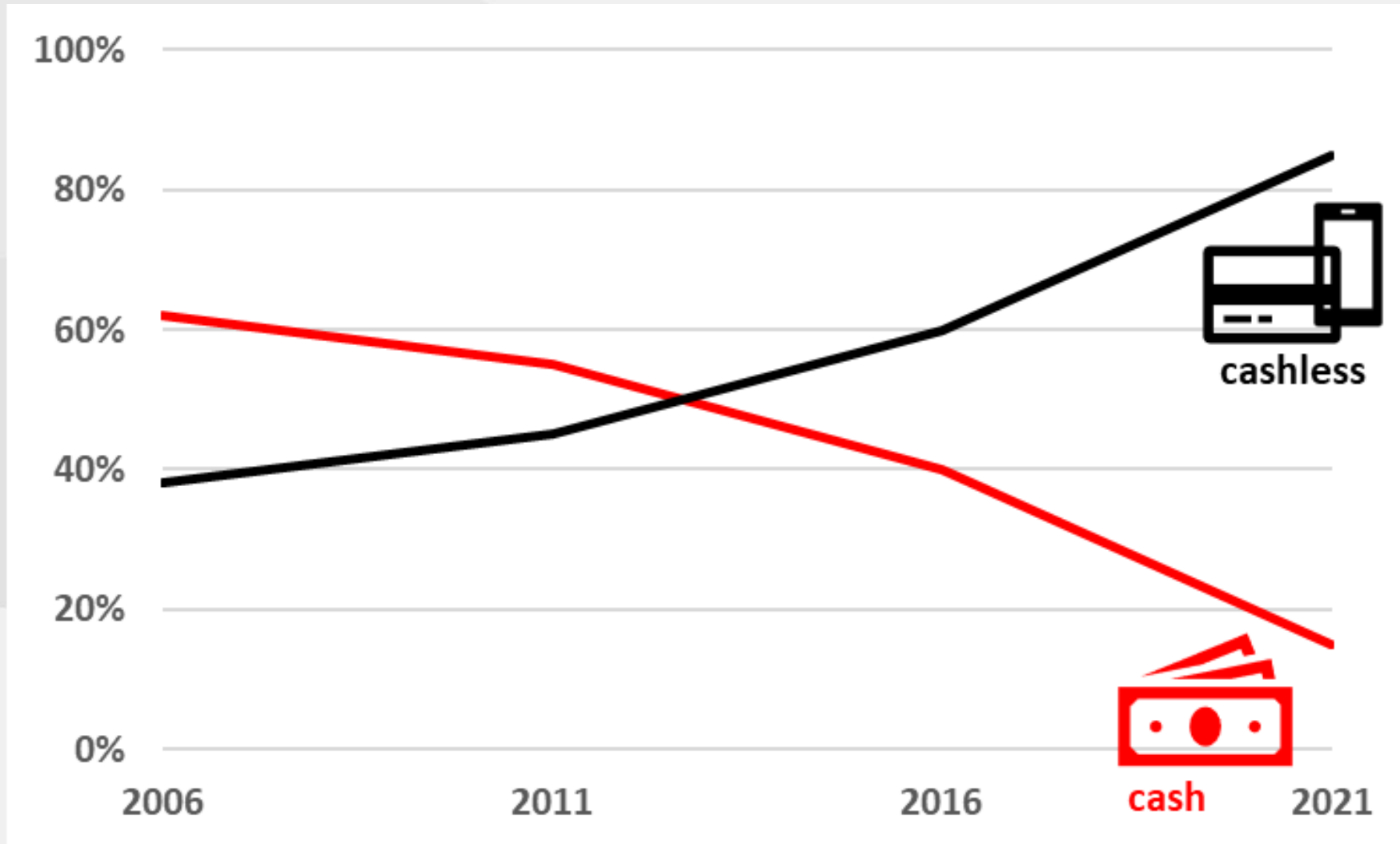
Might need a wCBDC, if the private sector

- **moves to tokenised securities**
- **can't improve cross-border payments**
- **moves to tokenised deposits**

Why rCBDC? Cash is not the answer for the future ...



Digitalisation of payments

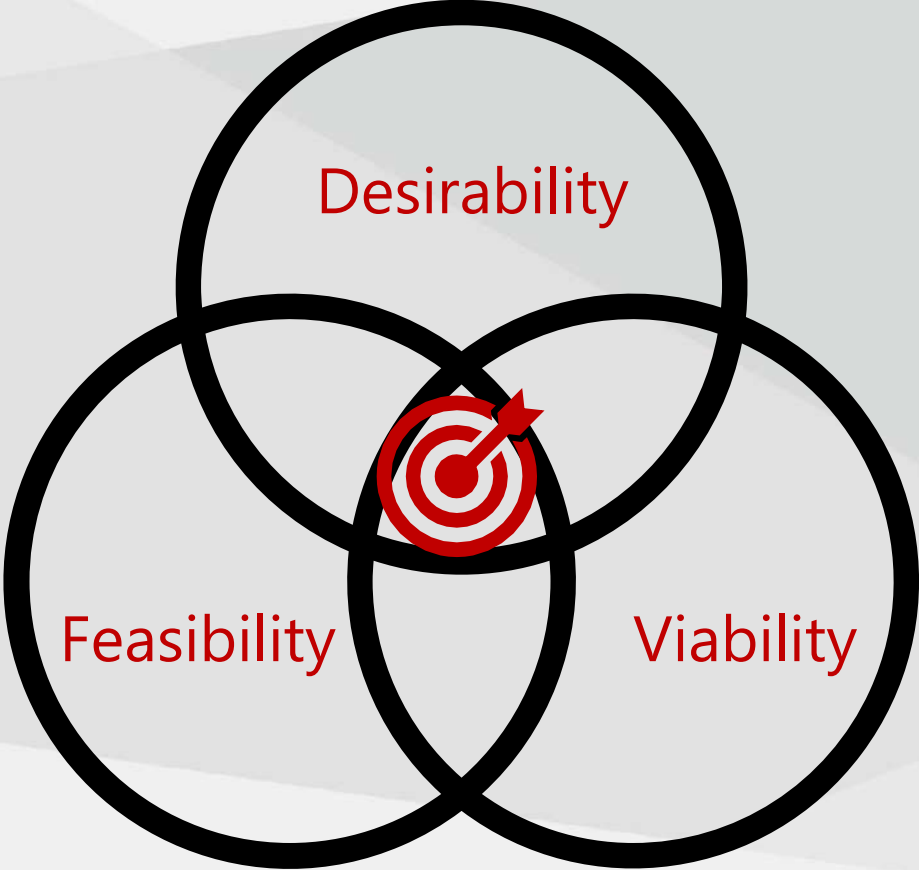


16%
global annual
growth
of cashless
payments

Source: CPMI Red
Book statistics.

Source: UK Payments Markets, 2022

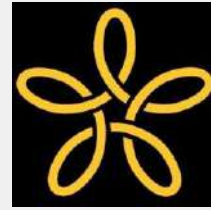
Meaningful innovation



Desirability: Why rCBDC?

Countries	Proponents	Opponents
Developed	<ul style="list-style-type: none">• Trust of public money• Monetary sovereignty• Strategic autonomy• Cross-border payments	<ul style="list-style-type: none">• Solution in search of a problem• Disintermediation• Financial stability• Surveillance state
Developing	<ul style="list-style-type: none">• Financial inclusion• Remittances	<ul style="list-style-type: none">• Dollarization• Offline difficult

Feasibility?















- **Four live systems**

- **Bahamas, ECCB, Jamaica, Nigeria**
- **Advanced pilot: China**

- **BISIH projects**

- **Technical feasibility**

BISIH: Leading cross border – shaping domestic

	Domestic	Cross-border
Wholesale	<p>Helvetia I + II </p>	<p>Jura </p> <p>Dunbar </p> <p>mBridge </p> <p><i>Mariana</i>   </p> <p>} *</p>
Retail	<p>Aurum </p> <p><i>Sela</i></p> <p>Rosalind </p> <p>Polaris </p> <p><i>Tourbillon</i> </p>	<p>Icebreaker </p> <p>Report published <i>Ongoing</i></p>

Using wCBDC across borders

150

Dunbar



mBridge



Jura



Project Dunbar
International settlements using multi-CBDCs
March 2022



Project mBridge
Connecting economies through CBDC
October 2022

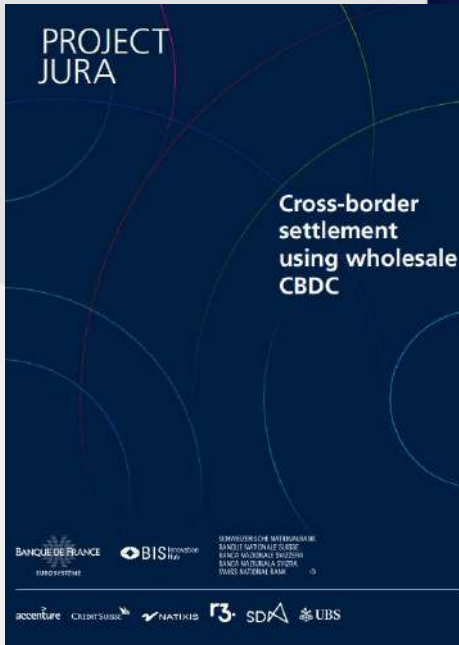


Journal of
**Payments
Strategy &
Systems**



Using CBDCs across borders: lessons from practical experiments

June 2022



PROJECT JURA

Cross-border settlement using wholesale CBDC



Viability?

Mantra of the dot com bubble

- **Fields of dreams: If you built it. They will come**



Viability?

- **Adoption**

- **So far low for live systems ... early days**
- **Goldilocks – neither too high or too low**
- **Network effects**
- **Consumer choice**

- **Contestability**

What do consumers want? Privacy?

The New York Times

OPINION

Does the End of Cash Mean the End of Privacy?

March 30, 2022

FINANCIAL TIMES

JS COMPANIES TECH MARKETS CLIMATE OPINION WORK & CAREERS LIFE & ARTS HTSI

Monetary policy [+ Add to myFT](#)

The end of privacy? Central banks plan to launch digital coins

As regulators crack down on cryptocurrencies, policymakers develop state-run versions

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PRO CYBER NEWS

Surveillance Risks Shape How Central Banks Test Digital Currencies

Race to explore new payment systems highlights trade-offs between performance, privacy and security

SHARE



Project Tourbillon – Coming H2 2023

How to issue a central bank digital currency

David Chaum, Christian Grothoff, Thomas Moser

SNB Working Papers
3/2021



Thomas Moser



David Chaum



Christian Grothoff

...ing of any c
simply cannot l
over the privac
privacy where i
inalienability, m
particular persc
used to protect the privacy of aggregated payments made by others.
The supply of currency is completely controlled by its issuer, and th
currency is provably protected against counterfeiting even by a quantu
computer. Optionally, a blockchain, or individual customer choice of
public blockchain, can bring the advantages of such chains, including
transparency of the total amount of unspent digital cash outstanding. The
design builds on several well-established cryptographic protocols, like
public-key digital blind signatures and mix networks, as well as some new
cryptographic techniques of its own. Its improved privacy and quantum
resistance, when combined with its Visa- or PayPal-like scalability,
make it an ideal candidate for central bank digital currency (CBDC).

Introduction

Most central banks are currently exploring the issuance of central bank digital currencies (CBDCs), and a recent BIS survey on the topic found

eCash 2.0

Inalienably private and
quantum-resistant
to counterfeiting

eCash 2.0

Design proposal, 2021/2022



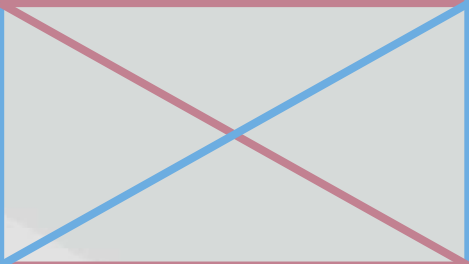

Key take aways

- **CBDC is not a panacea for development**
 - **Do not trust people that say otherwise**
- **wCBDC is hard – rCBDC even harder**
 - **No longer a monopoly**
- **Digital ID is foundational**



The End

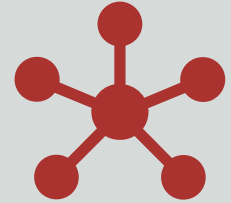
The future of securities settlement

		Cash leg payment in central bank money		
		Reserve balances	Stable or bankcoins	Wholesale CBDC
Delivery (securities) leg	Traditional securities			
	Tokenised securities	Project Helvetia		Project Helvetia






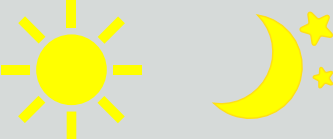
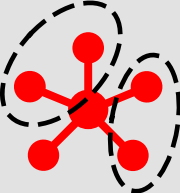
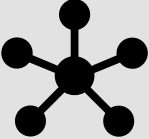
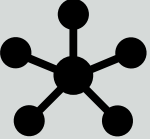


Bech et al (2020): "On the future of securities settlement"

How are the experiments similar?

- All experiments built a **prototype** of a **common platform**
- ... based on distributed ledger technology (**DLT**)
- ... allowed **foreign entities** to hold and transfer wCBDCs
- ... tested **payments** and **payment vs payment** use cases

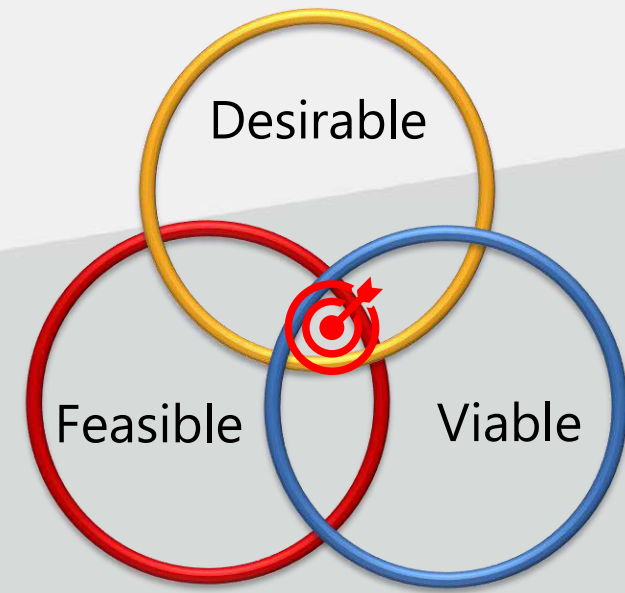


How are the experiments different?

	<u>Jura</u>	<u>Dunbar</u>	<u>mBridge</u>
<u>Currencies</u>	 EUR, CHF	 AUD, MYR, SGD, ZAR	 HKD, CNY, THB, AED
<u>Type of CBDC</u>			
<u>Jurisdictional control</u>		 Sponsor bank	
<u>Digital assets</u>	 French CP (DvP)	X	X
<u>Operator</u>	 Private	Central banks	Central banks

Key lessons learned

- **Desirable:** Yes
- **Feasible:** Yes
 - A **common DLT platform** – more upside
 - **Governance** and **control** are key elements
 - Location of “clouds”, data protection
 - Policy: **Access to foreign entities** – game changer but
 - **Regulatory** and **legal** requirements: difficult
 - **Scalability** and **resilience** need further testing
- **Viable:** Built it and they will come?

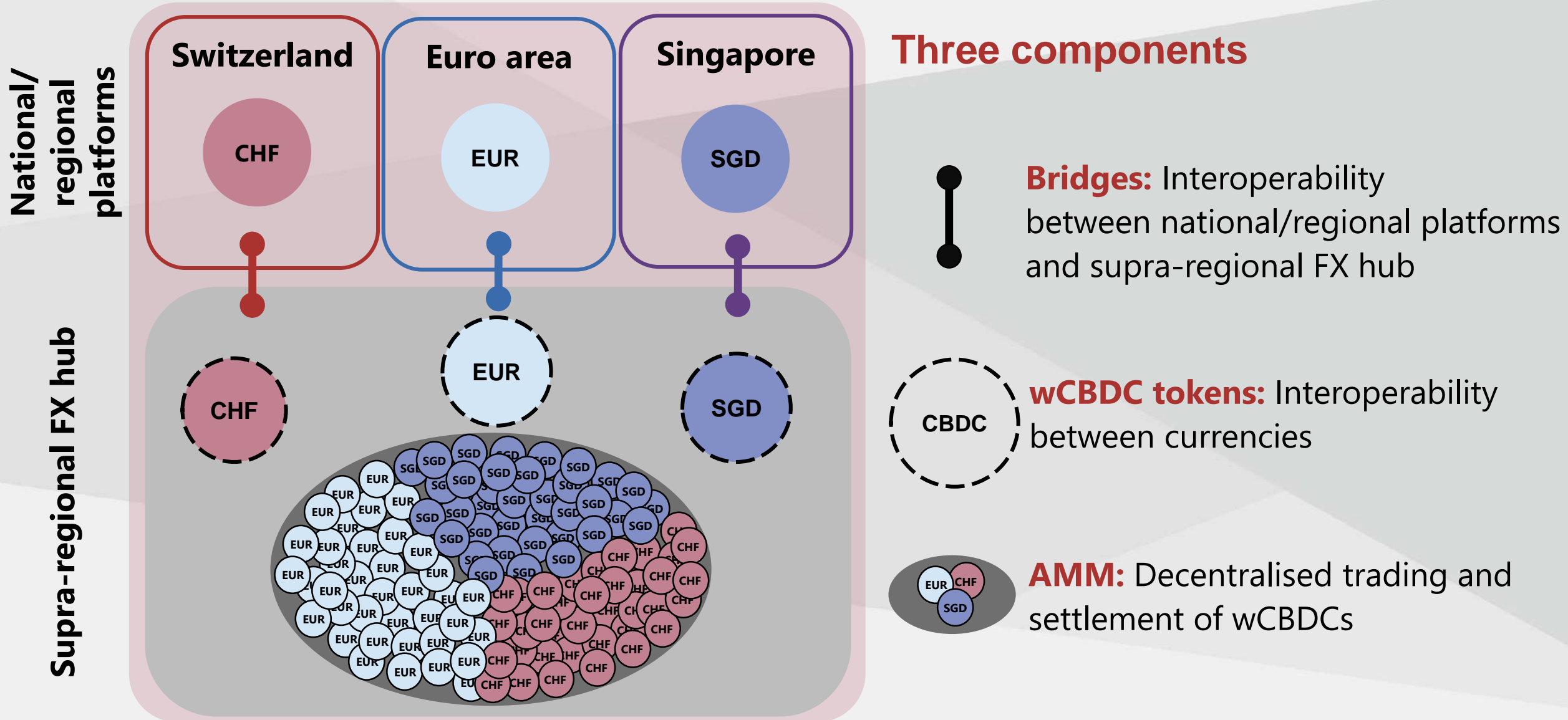


We Pioneer

The next frontier:
DeFi + wCBDC?

Project Mariana: Building on DeFi

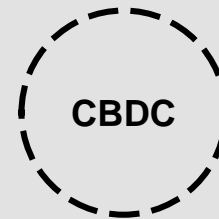
Open, transparent and composable technology



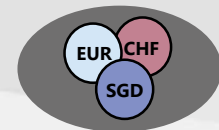
Three components



Bridges: Interoperability between national/regional platforms and supra-regional FX hub



wCBDC tokens: Interoperability between currencies

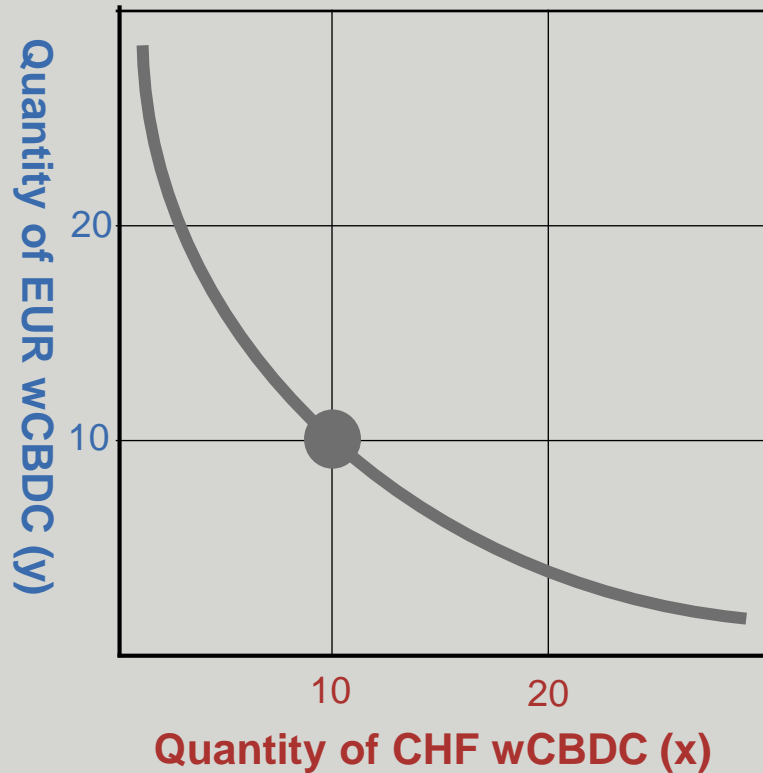


AMM: Decentralised trading and settlement of wCBDCs

An AMM at work

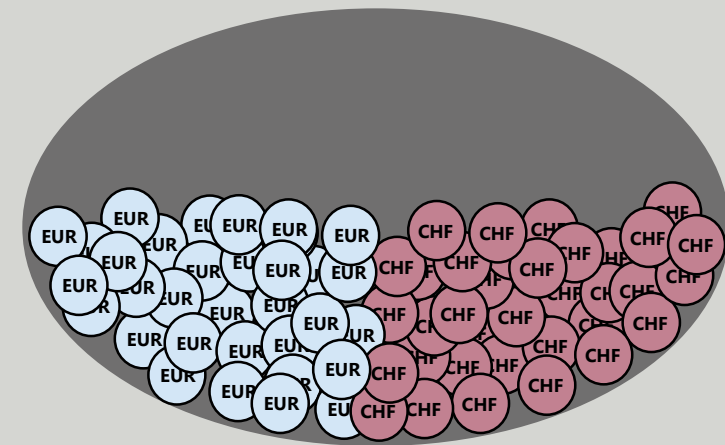
Two main ingredients

Bonding curve



- Deterministic pricing
- Example: $x*y = 100$

Liquidity pool



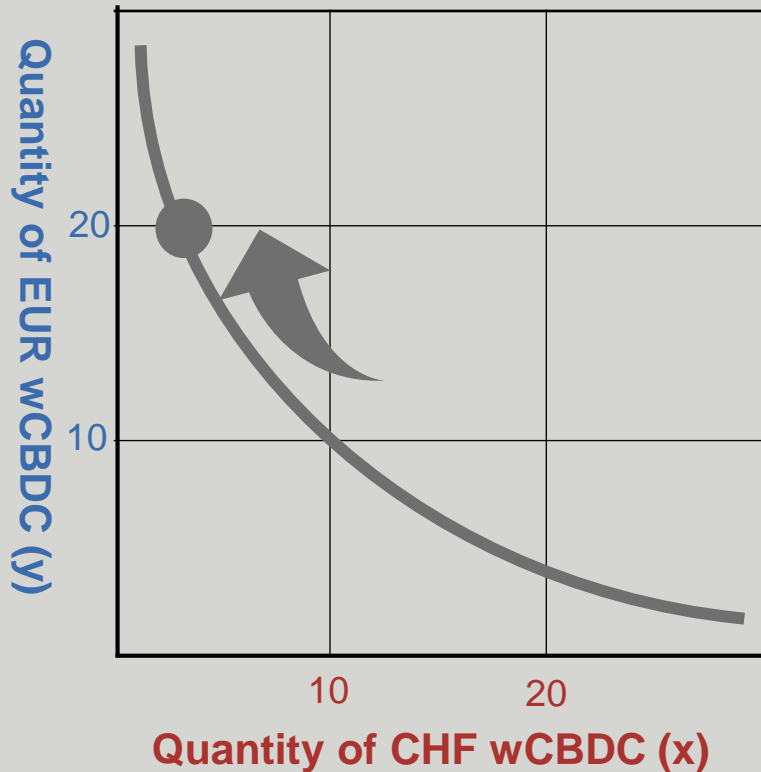
Smart contract...

- ...holds liquidity
- ...is counterparty for FX

An AMM at work

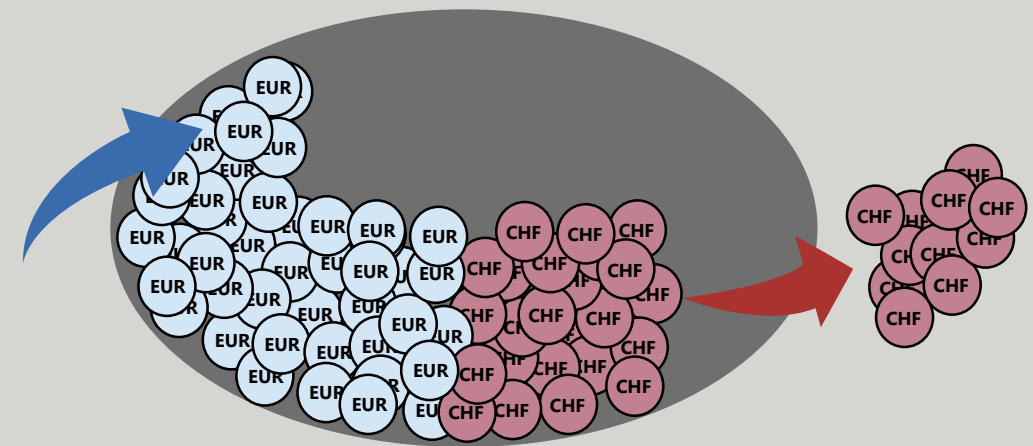
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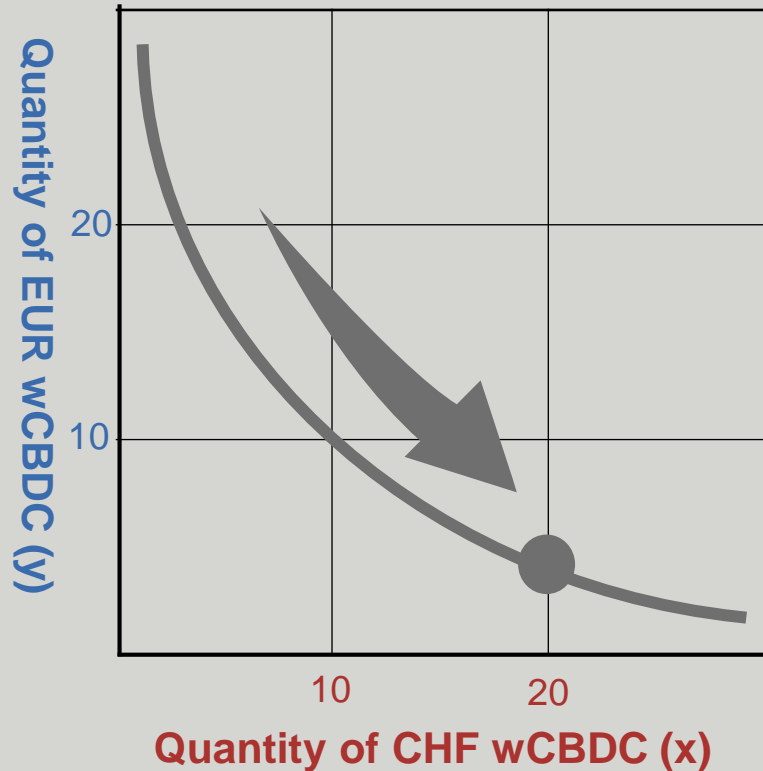
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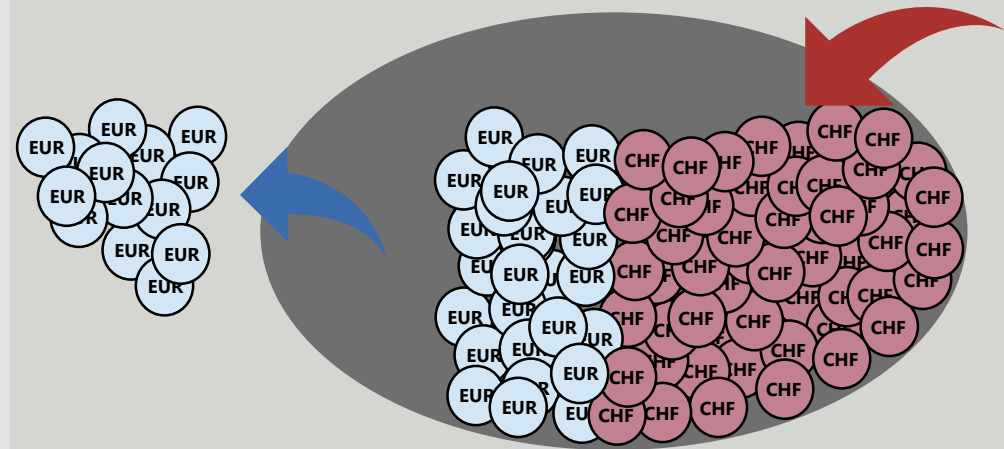
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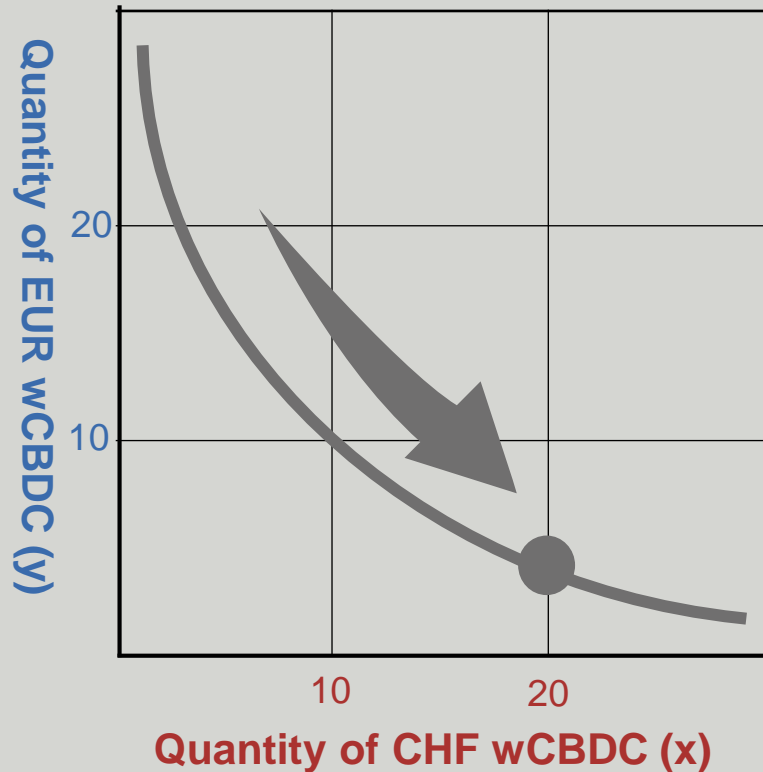
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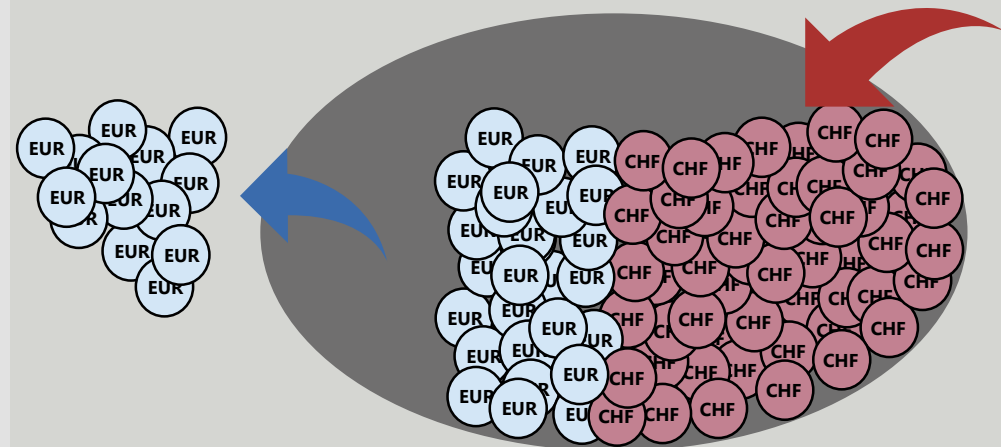
Two main ingredients

Bonding curve



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Liquidity pool



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Lessons learned

- **Wholesale – A (comparatively) small step**
 - Mostly about technology – domain of an innovation hub
 - The exception is access for foreign entities
- **Retail – A giant leap**
 - Complex policy and design questions
 - Not just a question for the central bank
 - Central bank will not enjoy bank note like monopoly
 - Competition with private digital monies
 - Live rCBDC adoption is low
- **Cross border – In the DNA of the BIS**

S. Kitch — HEDGEYE



Here to stay...

