صندوق النقد العربي
ARAB MONETARY FUND

CBDCs: A Practical Guide for for Arab Central Banks

Sixth Meeting for the Arab Regional Fintech WG

November 24-25, 2021

Contributors

Yasmeen Alsharaf

مصرف البحرين المركزي
Central Bank of Bahrain

Dorra Marrakchi

البنك المركزي التونسي
Banque Centrale de Tunisie
Central Bank of Tunisia

Helena Haddad

مصرف لبنان
BANQUE DU LIBAN

Hasna Franjiah

مصرف لبنان
BANQUE DU LIBAN

Marten Nelson

M10

Richard Char

M10

Nouran Youssef

صندوق النقد العربي
ARAB MONETARY FUND

Objective

To Provide a practical guide for Central Banks in the Arab Region

To Assess the Suitability of CBDC to Meet their Particular Requirements

Objective

To Better Understand the Design Decisions They Will Want to Consider in Selecting the CBDC Most Relevant For Them

صندوق النقد العربي
ARAB MONETARY FUND

Content

Survey findings

Other Payment Modernization Alternatives

Retail CBDCs Alternatives

Global and regional Initiatives

Cost & Time Constraints

Flow chart for Considering CBDCs

Testing CBDCs

Regulated liabilities

A Path Forward

صندوق النقد العربي
ARAB MONETARY FUND

What makes this paper different?

Written by Central Bankers and Experts in the Arab Region

Focus on the Arab Region Requirements and Use Cases

Designed to be Actionable

Respondent Central Banks in the region

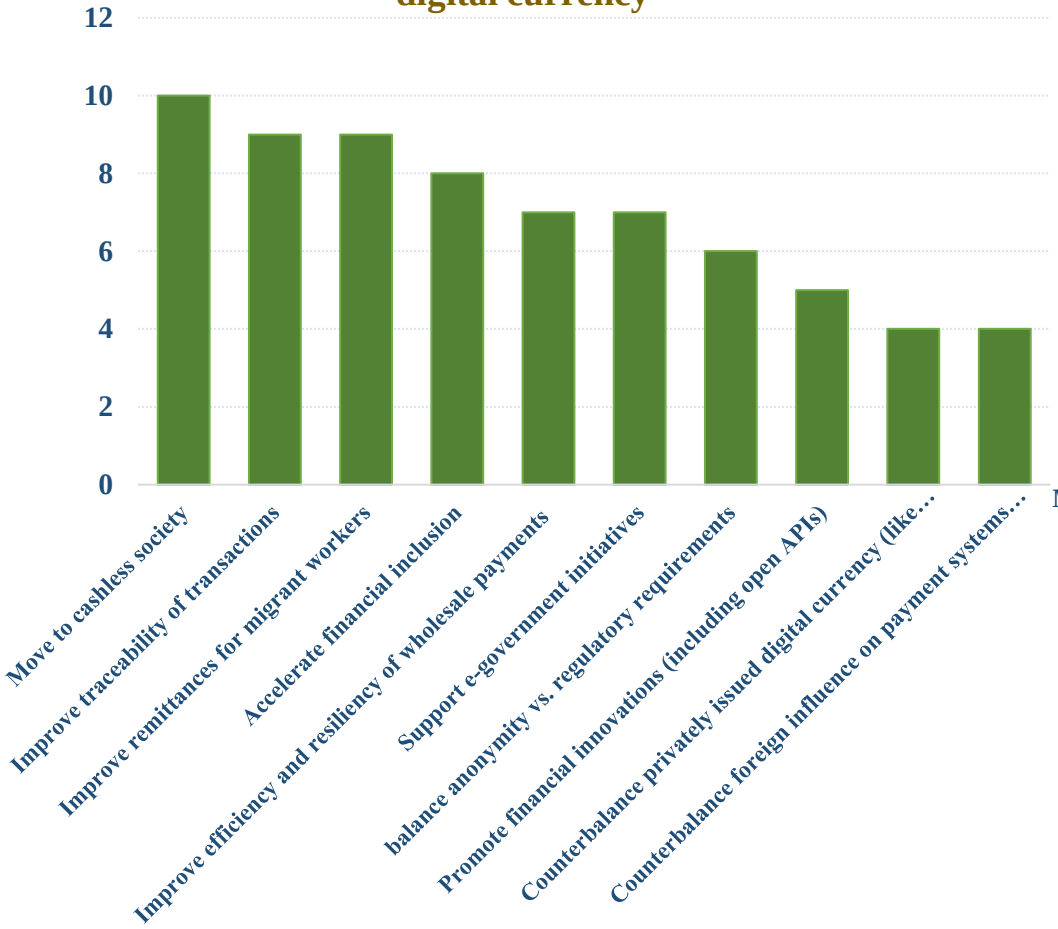
Arab Central Banks & Monetary Authorities

1. Central Bank of Jordan
2. Central Bank of UAE
3. Central Bank of Bahrain
4. Central Bank of Tunisia
5. Banque D'Algérie
6. Saudi Central Bank (SAMA)
7. Central Bank of Sudan
8. Central Bank of Iraq
9. Palestine Monetary Authority
10. Kuwait Central Bank
11. Banque du Liban
12. Central Bank of Libya
13. Central Bank of Egypt
14. Banque Al Maghrib
15. Yemen Central Bank

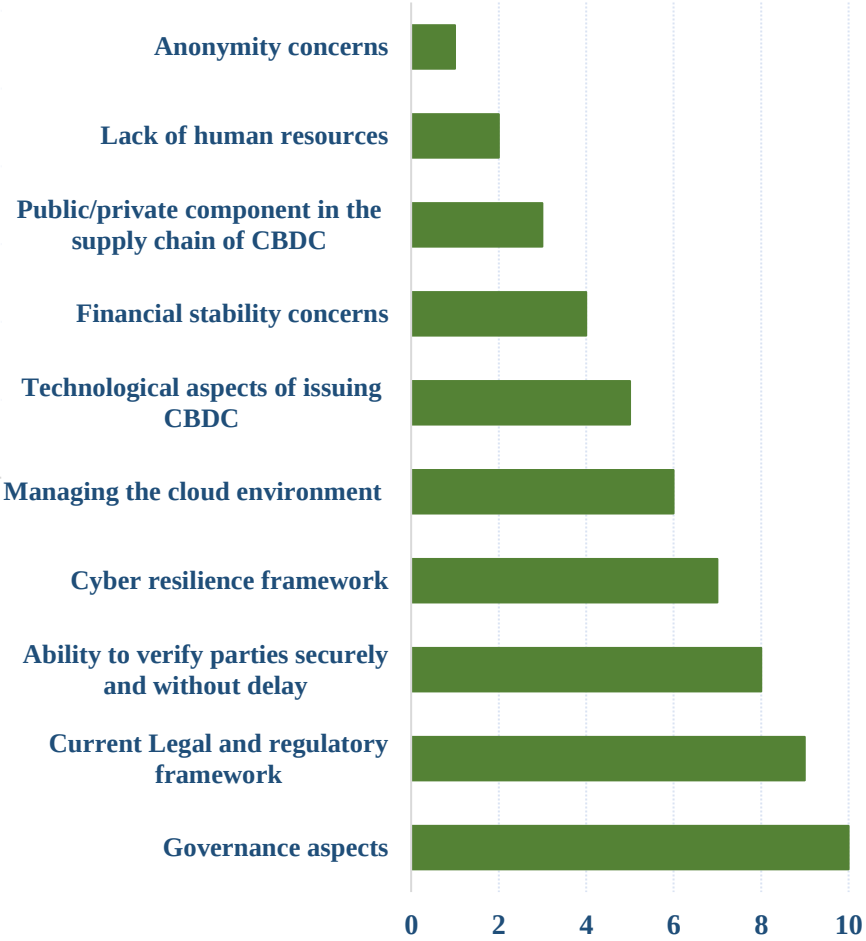
صندوق النقد العربي
ARAB MONETARY FUND

Drivers and Barriers

Prioritization of drivers to issue a central bank digital currency

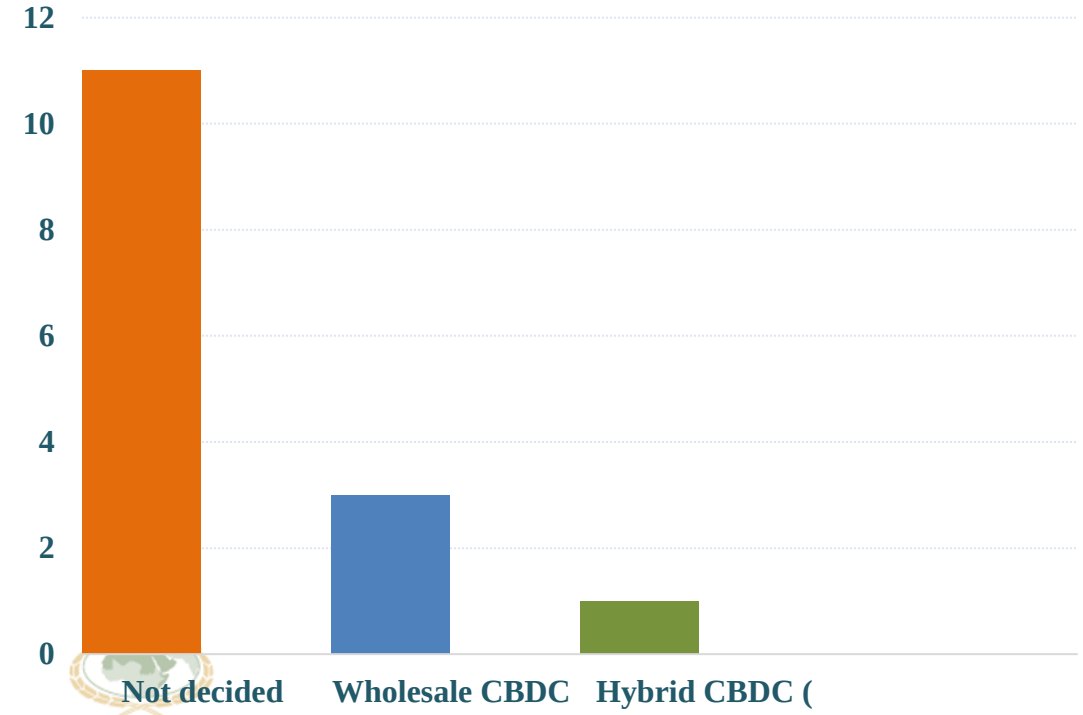


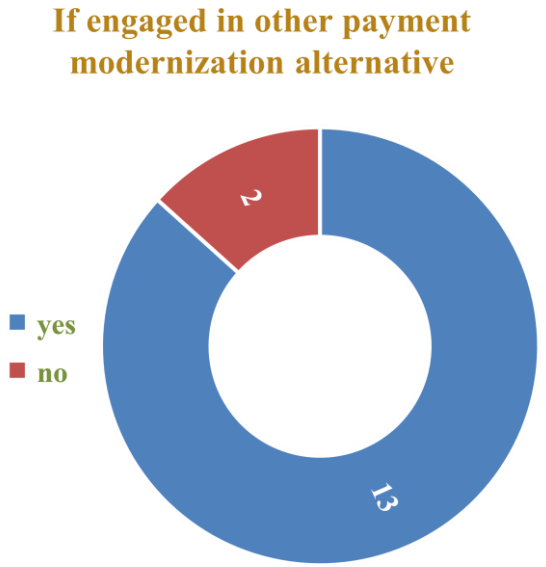
Barriers impeding the issuance of CBDC



Types of CBDCs

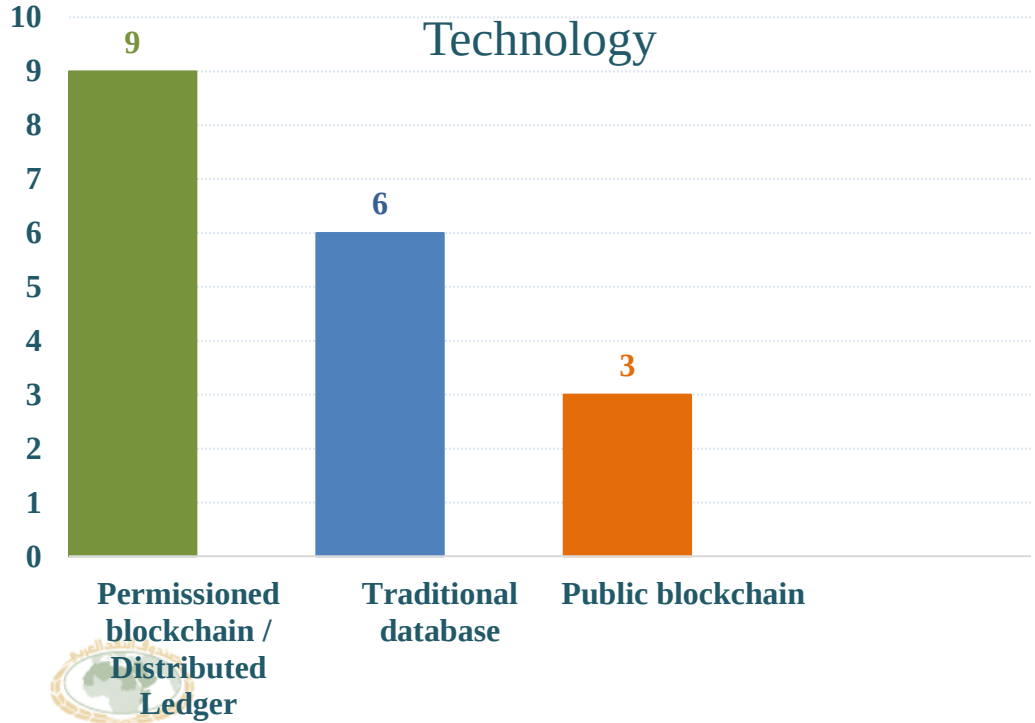
- Majority of respondents (73%) did not decide yet the type of prospective CBDC.
- 86% of central banks that are conducting or planning a proof of concept for CBDC, while the remaining 14 % are considering the modernization without CBDC issuance.

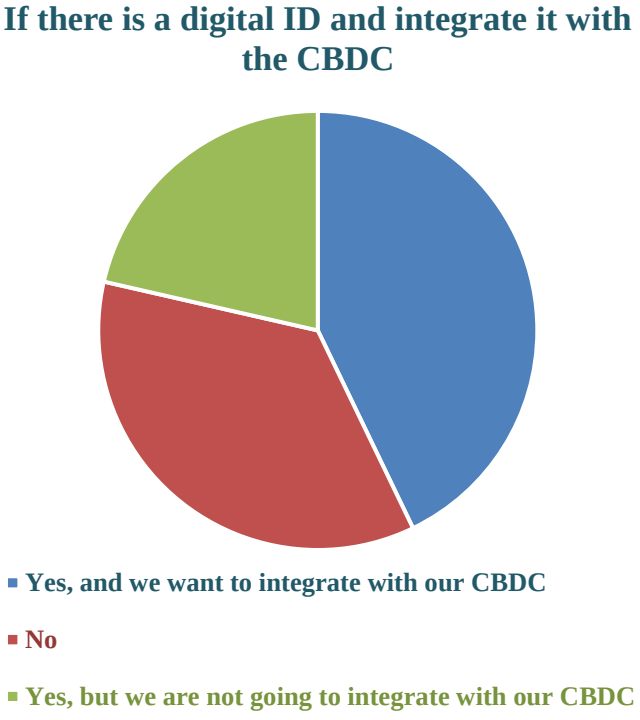




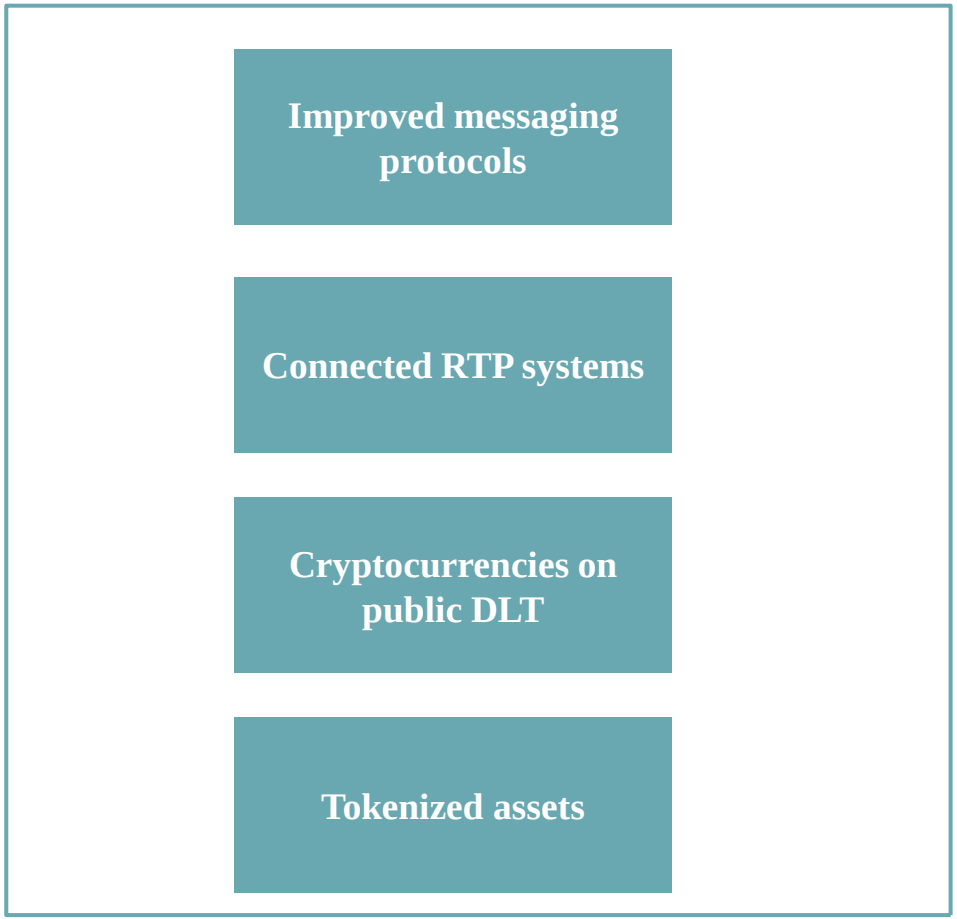
Operational Aspects

- 60% of respondent central banks are considering the permissioned blockchain DLT for CBDCs.
- 64% of respondents have an ID program, among them 43% with the intention to integrate it with the CBDC.





Non-CBDC efforts at Payment Modernization



Non-CBDC efforts at Payment Modernization

Types	Comments	Examples
Improvements to messaging protocols but continued reliance on correspondent banking for settlement	Payment service providers can use their bank deposits in the receiving country to advance funds to recipients. Does not help countries with correspondent banking challenges.	Example: SWIFT GPI, Transferwise, Remitly, Revolut, RippleNet
Coordination of existing RTP systems for interoperability	Synchronize settlement in one instant payment system with settlement in the other and convert real-time messages between both systems. Does not promote financial inclusion or domestic payment modernization.	Example SWIFT, EBA Clearing and The Clearing House (US) to connect RTP systems in US and Europe using ISO20022. Singapore's PayNow and Thailand's PromptPay linked in April 2021. Subsequent blueprint from BIS and MAS for a gateway to connect RTP systems.

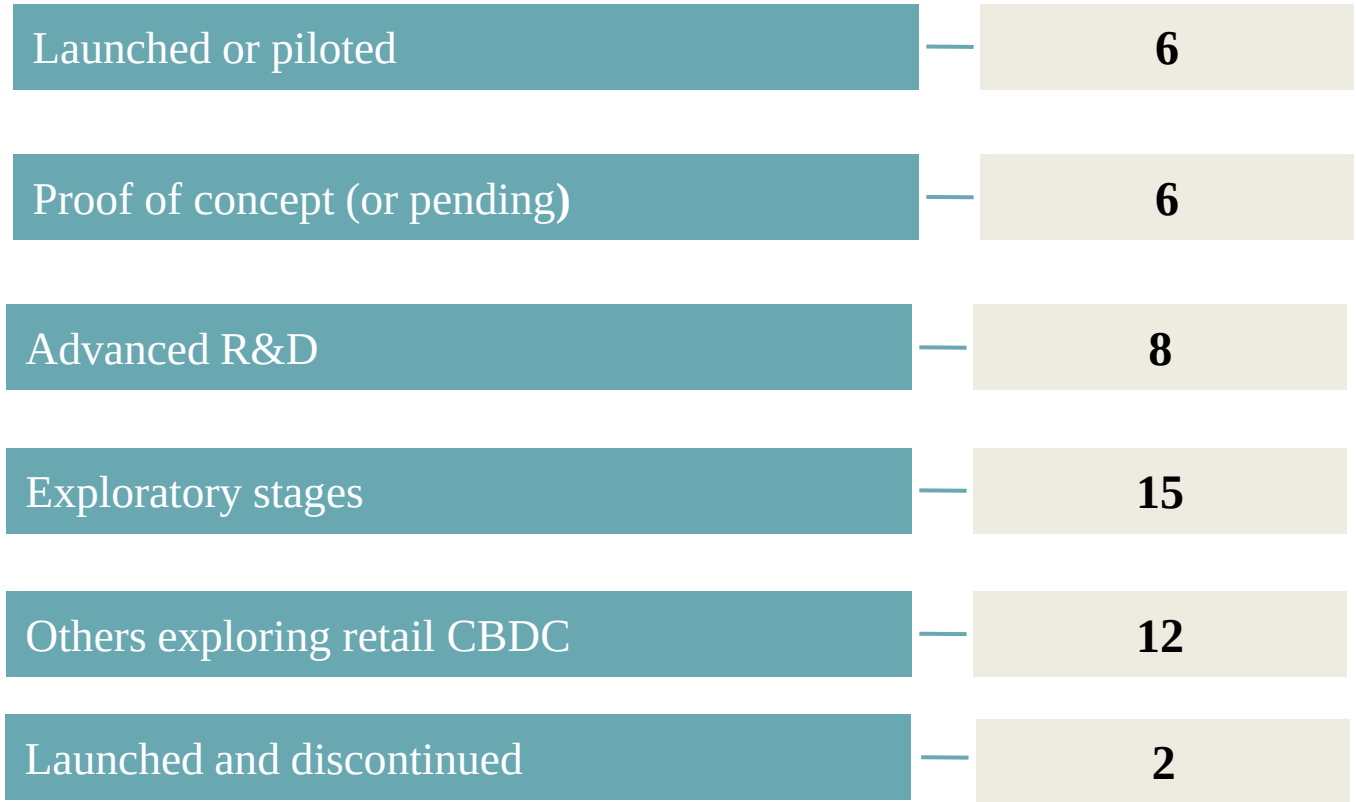
Non-CBDC efforts at Payment Modernization (Cont'd)

Types	Comments	Examples
Cryptocurrencies on public DLT	Value fluctuates and is not pegged to a fiat currency. Generally cryptocurrencies have been used more as a (speculative) store of value rather than a method of payment. Designed to be bearer instruments and facilitate anonymous payments; this represents a challenge for anti-money laundering and sanction screening. For this reason, commercial banks are wary of cryptocurrencies. Also represents a threat for currency substitution and can destabilize a country's monetary and banking systems.	One of the first cryptocurrencies designed primarily for payments was Ripple's XRP. On September 7, 2021, El Salvador became the first jurisdiction to adopt bitcoin as legal tender.
Tokenized assets (fungible and nonfungible)	Tokens represent a fractional interest in property or assets. Fungible (interchangeable) takens can be used as digital currency. A common example of this is tokenized interests in real property. Costly to implement.	In 2018, Elevated Returns, a New York-based asset management firm, completed its first tokenization real estate deal. The offering was made on St. Regis Resort in Aspen, Colorado, worth $18 million on the Ethereum blockchain.

Many Central Banks seem to find these alternatives to be flawed or inadequate.

Jurisdictions Where Retail CBDC is Being Explored

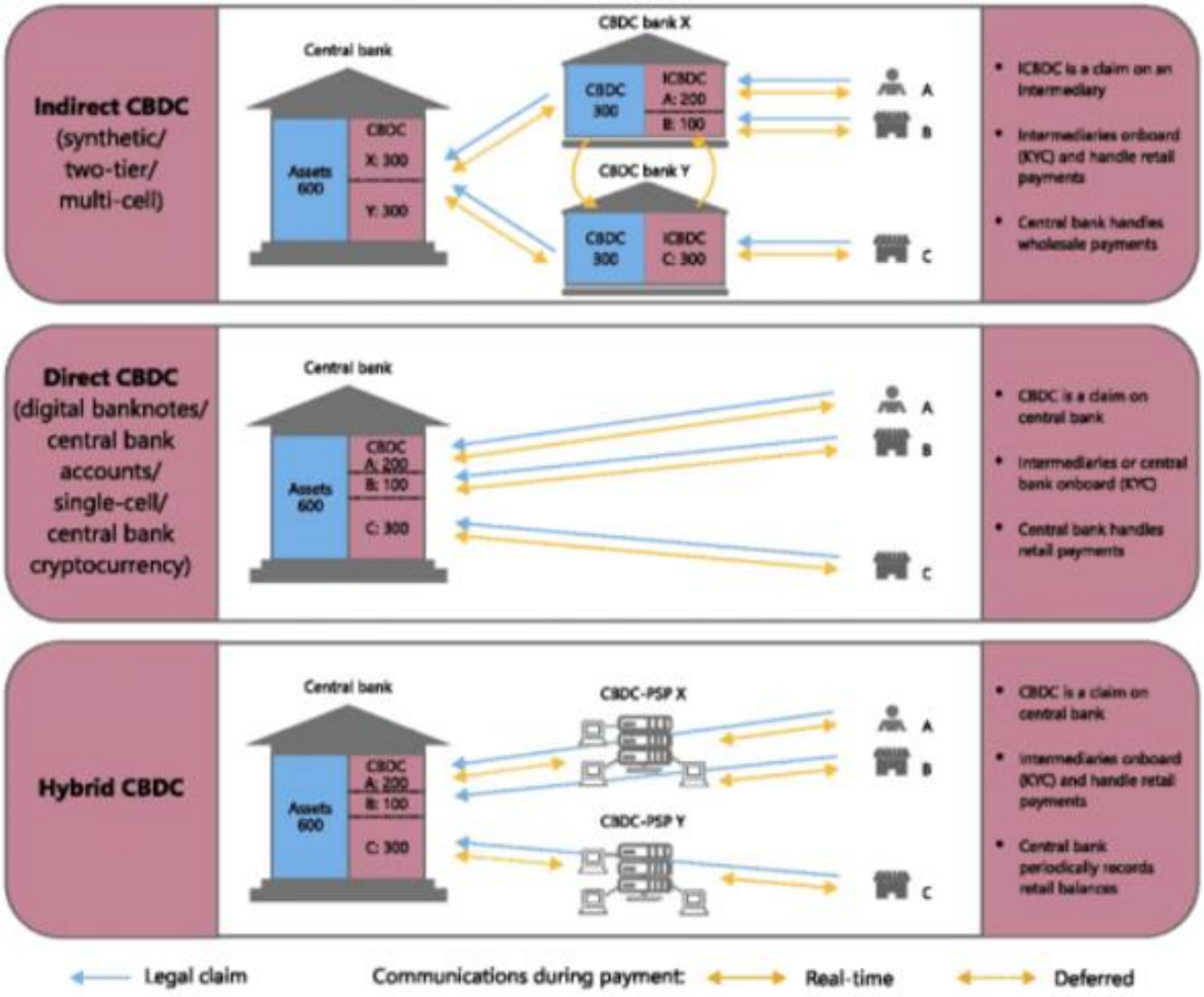
(as of November 9, 2021)



Retail CBDC Alternatives

Types	COMMENTS
Central bank digital currencies (CBDC): issued by the central bank as legal tender.	Can be issued by central banks directly to consumers and businesses **(direct CBDC)**, or distributed through commercial banks **(indirect CBDC)**.
Synthetic central bank digital currencies: issued by commercial banks or e-money institutes. Not legal tender but backed 100% by central bank reserves. Obligation to exchange for legal tender at any time.	Introduced by Tobias Adrian and Tommaso Mancini-Griffoli from the International Monetary Fund. In a **synthetic CBDC** setup various tasks are outsourced to private sector e-money institutes, which are "all sources of substantial costs and risks" . The ECB, in this case, would only be responsible for managing some tasks, therefore, saving resources.

Retail CBDC Alternatives



Source: BIS, 2020

Other Currencies that can be Tokenized

Types	COMMENTS
DLT-based commercial bank money: issues by regulated financial organizations, e.g. commercial banks. Not legal tender and only partially backed by central bank reserves (i.e., fractional reserve system). Obligation to exchange for legal tender at any time.	Example" JPM Onyx (previously JPM Coin).
Fiat-pegged stablecoins: issued by regulated (e.g., commercial banks, payment service providers) or unregulated financial organizations (e.g., companies not having all required licenses in all required countries).	Stablecoins are only "fiat derivatives." They replicate the price of a fiat currency, but are neither legal tender nor is there an obligation to exchange them for legal tender, as in the case of commercial bank money. For this reason, they exhibit counterparty, exchange rate, and liquidity risks. According to the MiCA regulation proposed by the European Commission, these would be so-called asset-references tokens (ARTs).
DLT-based e-money: issued by e-money institutes. No legal tender. Fully backed by e-money on accounts. Obligation to exchange for legal tender at any time.	In the sense of the new MiCA regulation proposed by the European Commission, these would be so-called E-Money tokens (EMTs).

CBDC Pilots

Complex

Lengthy

Expensive

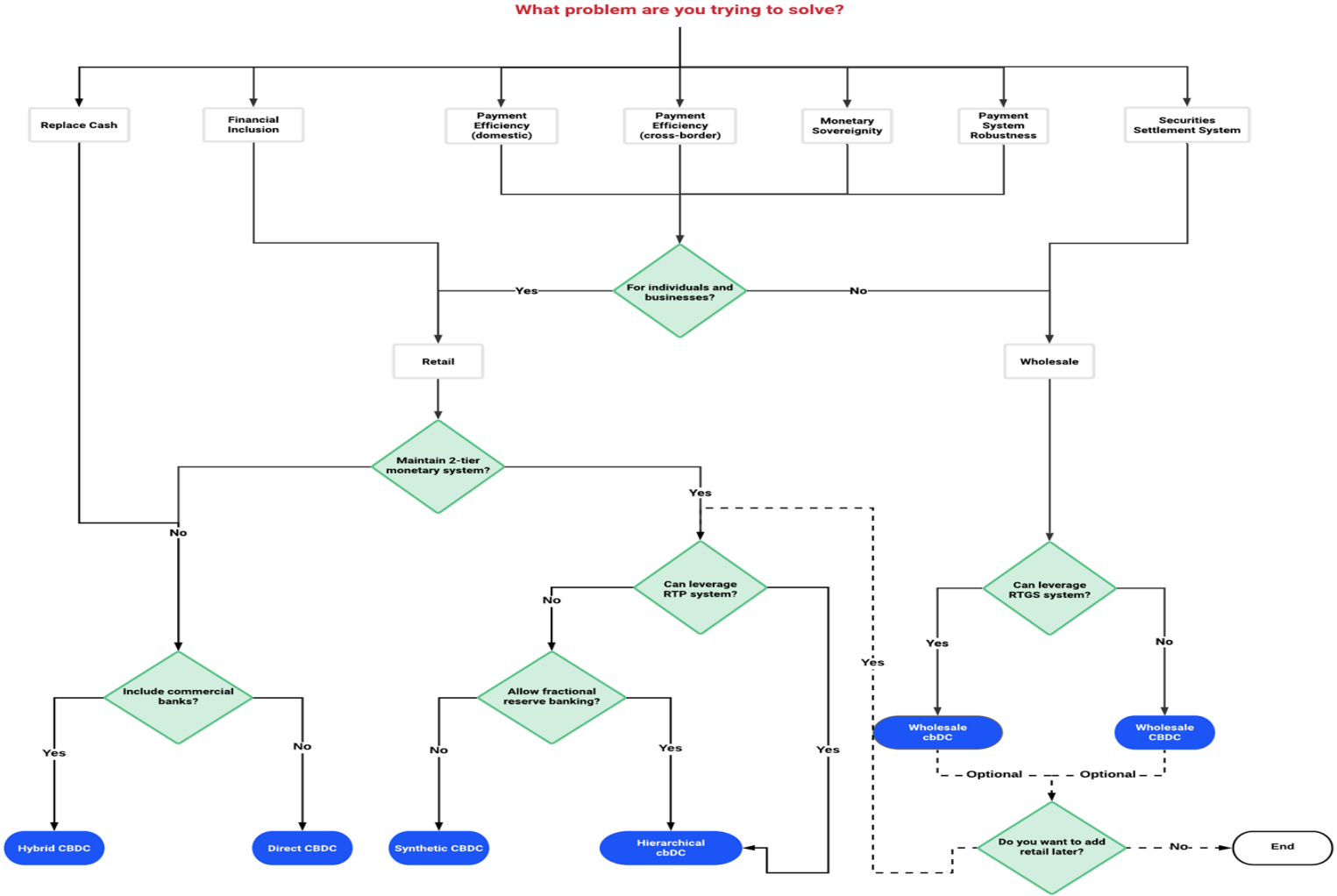
Bahama's Sand Dollar Project

January 2016	▪ John Rolle joins the Central Bank of the Bahamas from the IMF to champion a CBDC
August 2018	▪ Central Bank of the Bahamas issues Expression of Interest for a technology solution provider. More than 30 entities submit a bid
March 2019	▪ NZIA Limited selected as the preferred solution provider
November 2019	▪ National Payments Council approves Sand Dollar approach
December 2019	▪ Island of Exuma pilot launched
February 2020	▪ Expansion to island of Abaco
October 2020	▪ Expansion to nationwide pilot available to general public
February 2021	▪ Request for public comment on proposed legislation for the regulation and use of Sand Dollar CBDC
April 2021	▪ Request for public comment on Project Sand Dollar in "project communications management, communication strategy, public relations, event design and execution, social media strategy and management, community outreach, brand strategy, and brand activation"

Riksbank e-krona Project

March 2017	▪ Riksbank starts analysis on e-krona project
June 2019	▪ Riksbank issues proposal solicitation for technical solution provider
December 2019	▪ Riksbank selects Accenture to design and test a prototype
February 2020	▪ E-krona pilot begins
April 2021	▪ Riksbank issues report on e-krona pilot phase 1. Riksbank will continue testing the technical solution and investigating required legal requirements to issue e-krona. ▪ Agreement with Accenture is extended another year and work begins to study integration with commercial banks, development of offline functionality, key and token storage, development of customer support, improvement of performance and scalability and acceptance at physical retail.
June 2021	▪ Riksbank extends e-krona pilot with integrations to Handelsbanken

What type of CBDC would you like to test?



Source: M10 Networks, Inc.

An option: Experiment Lab

A sandbox environment where employees of a central bank can easily create a basic CBDC test environment.

- Each central bank would have their own cloud-based CBDC environment, and operated out of a UAE data center
- The environment includes command line interface, web interface, mobile app, and APIs
- Hosting environment: AWS, GPC, or Azure

Turnkey

Partitioned

Suitable for Experiments

Configurable and Flexible

Easy commercial bank integration

Path to full production

What tests could a central bank run? (1/3)

Tests	Description
Create & Destroy	
Issue CBDC Destroy CBDC	Create CBDC and distribute to individuals and businesses. Take CBDC out of circulation (“destroy”)
Basic payments	
Pay P2P/C2B with CBDC (online) Pay P2P/C2B with CBDC (offline) Request a payment with CBDC	Basic payment operations (send/receive/request) from a payer’s and a payee’s perspective
Privacy	
Configure privacy settings	Privacy settings configured by the payment services user
Payments and privacy	Re-run payment test using different privacy settings.

What tests could a central bank run? (2/3)

Transaction visibility	
User interface and notifications Regulator dashboard Commercial bank dashboard	Look at available transaction information from the perspective of different personas in the ecosystem.
Programmable money	
Payments using contracts	Conditional (if/then) payments programmed using contracts.
Performance	
Throughput Latency Scalability	Test sustained high volume of transactions and measure transaction latency. Increase volume and increase resources to measure scalability.

What tests could a central bank run? (3/3)

Resilience	
Component failure(s) System recovery	Test the resilience of the overall system if a certain component(s) fail.
Security	
Prevention of double spending and Byzantine Consensus Authentication using public key cryptography Authorization using role-based access control Memory safety use of RUST Content trust and use of security-focused dev tools and signing solutions Infrastructure testing on AWS, GPC or Azure	Test various security aspects.

Beyond CBDC:

The Regulated Liabilities Network

صندوق النقد العربي
ARAB MONETARY FUND

citi

Treasury and Trade Solutions

Home About Us Global Network Advisory Insights Solutions

Return to Articles

Download PDF

The Regulated Internet of Value

Executive Summary

If the 'tokenization thesis' is to be believed, then Distributed Ledger Technology (DLT) is a superior mechanism to represent and transact digital value. DLT may provide 'always on', resilient, global, programmable, multi-asset financial networks.

Tony McLaughlin,
Emerging Payments and Business Development,
Treasury and Trade Solutions

Assume for a moment that tokens triumph over accounts, then what types of tokens are desirable forms of money? Based upon current news flow, we might think that the future of money is a digital choice between 'stablecoins' and Central Bank Digital Currencies (CBDCs).

There may be a third way: the tokenization of all 'regulated liabilities'. Regulated liabilities include central bank money, commercial bank money and Electronic Money. Bitcoin, for example, is not a regulated liability because it is neither regulated nor a liability. Stablecoins occupy a grey zone but may become regulated liabilities in due course.

A network that tokenizes regulated liabilities on the same chain may deliver a next generation digital money format without the downsides of more narrowly drawn proposals. Safe digital money needs to be: (a). regulated, (b). redeemable at par value on demand, (c). denominated in national currency units and, (d). an unambiguous legal claim on the regulated issuer.

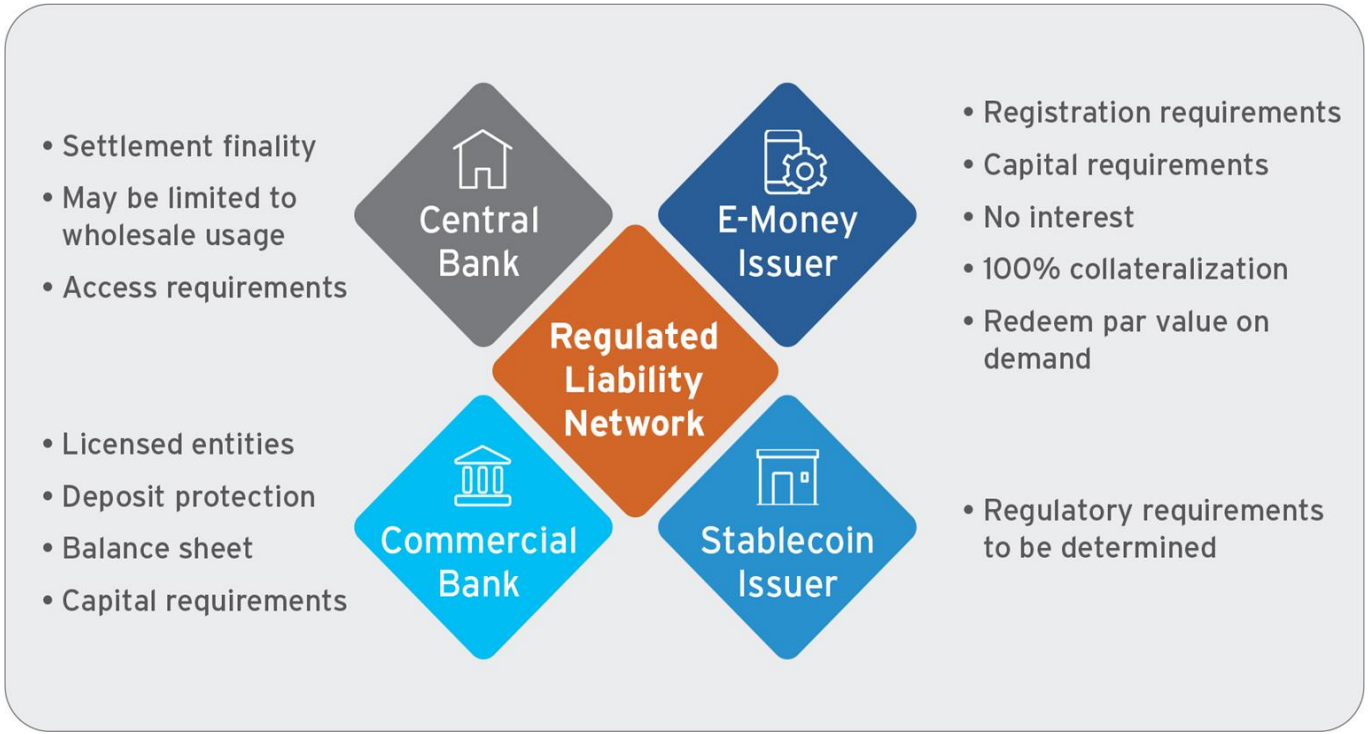
As DLT has the potential to represent multiple forms of digital value, we might go further and envision the creation of networks that tokenize regulated liabilities and regulated assets on the same chain. Such a network would be significantly different from today's siloed financial architecture — a regulated internet of value. This system would embody tokenized currencies, bonds, equities, trade instruments and other regulated financial instruments in an 'always on', programmable and global network.

While the creation of such networks may seem a pipe dream, the 20th Century witnessed the creation of highly successful regulated, global, account-based networks, such as global card schemes. If the tokenization thesis holds true, then the 21st Century may see the creation of regulated, global, token-based, multi-asset networks. It would be undesirable for the functionality of unregulated multi-asset networks to pull too far ahead of regulated financial infrastructures. Financial transactions may migrate to the more capable platforms, even if they fall outside of the regulatory perimeter.

The Digital Money Format War

The battle between physical and digital money has entered the endgame. We are in the early stages of a contest between different forms of digital money.

A ‘Regulated Liability Network’ would store the liabilities of multiple types of institution



صندوق النقد العربي
ARAB MONETARY FUND

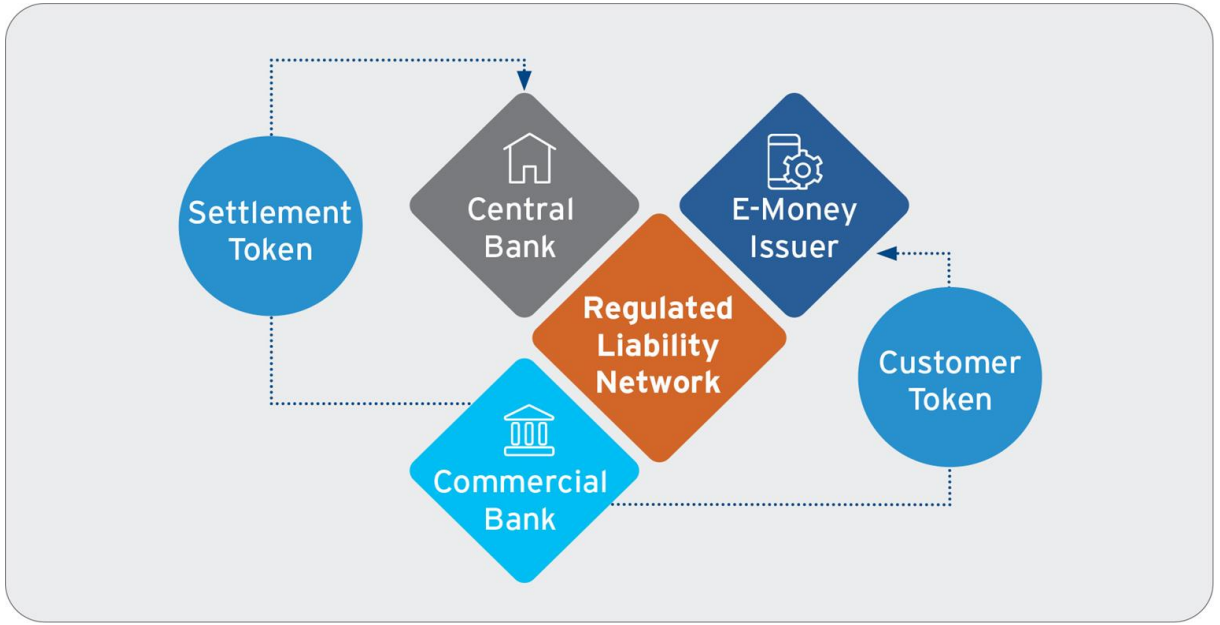
Source: Citibank, 2021

Regulated liabilities

- Regulated liabilities are denominated in national currency units and proceed from the sovereign right of nation states to decide what counts as money within their territories
- The end user has an unambiguous claim on a regulated institution, enforceable through the legal system
- The claim is redeemable at par value on demand in national currency units
- Institutions are regulated to ensure that they are able to meet those claims, e.g. capital rules for banks and collateral rules for E-money institutions
- The liabilities are fungible between regulated institutions, i.e. a dollar is a dollar irrespective of the regulated institution holding the liability
- Regulated liabilities are in favour of verified legal persons, they are not bearer instruments. This feature helps to combat financial crime

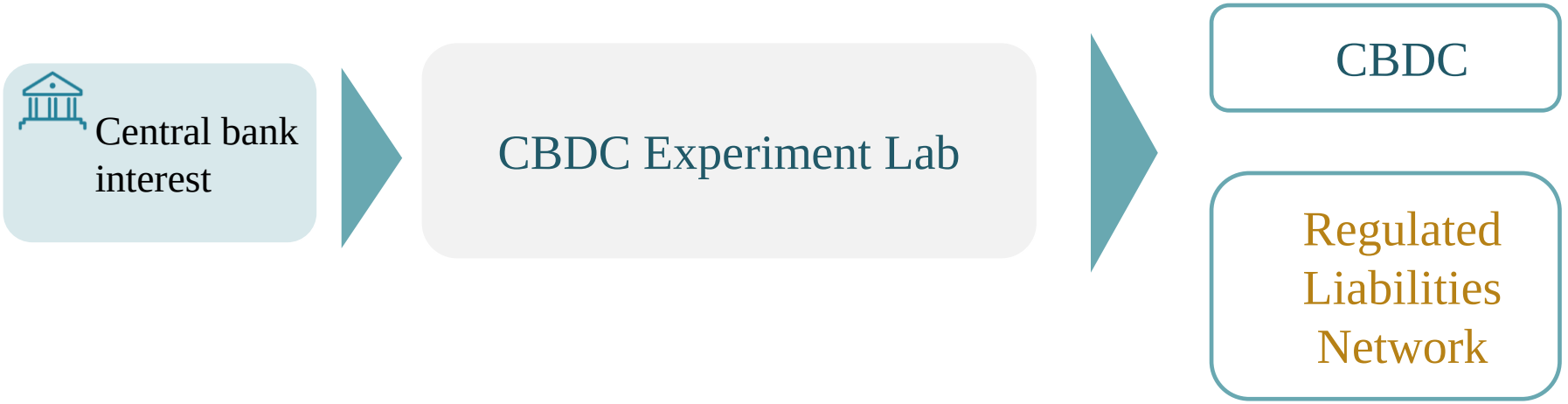
Source: Citibank, 2021

Payments on the Regulated Liability



A Constellation of Interoperable Regulated Liability Networks

A Path Forward



Thank you

صندوق النقد العربي
ARAB MONETARY FUND