Banking Blockchain Network

Introductory presentation to Banque du Liban

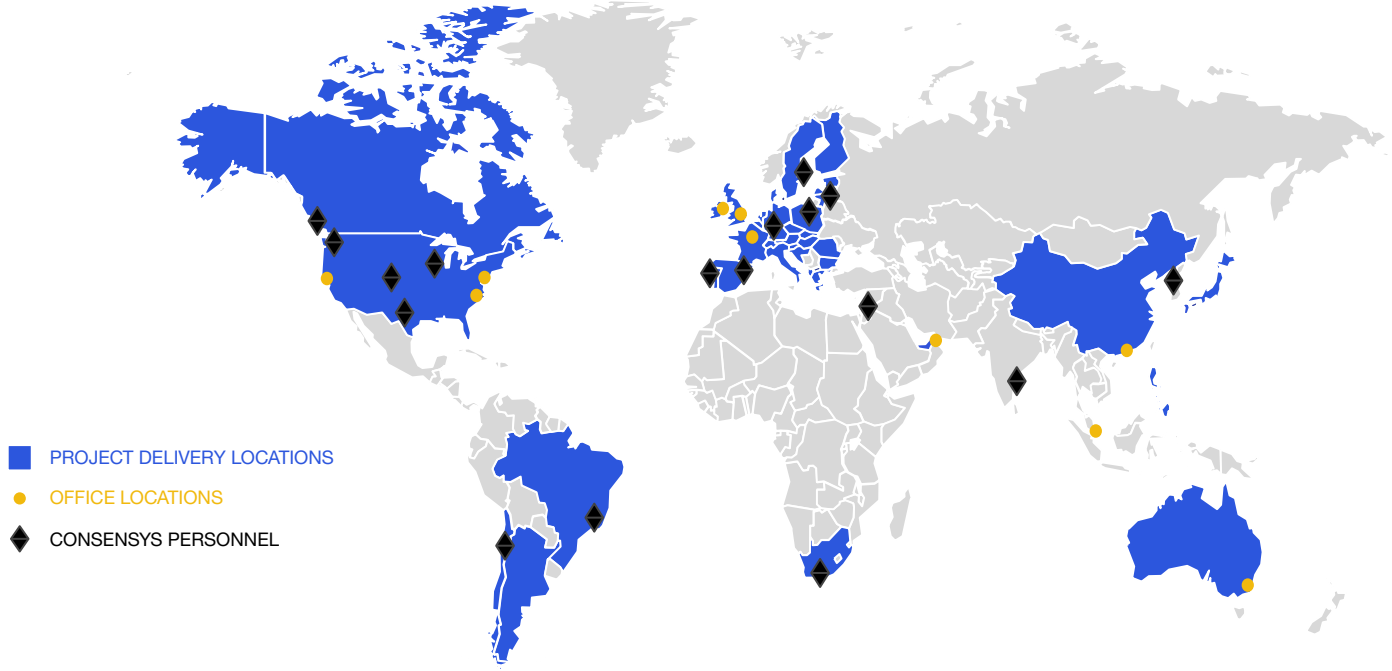
Workshop Agenda

Workshop Agenda		
AVH and ConsenSys Introduction	• Intro to Anchor Ventures Holding and ConsenSys • ConsenSys products/solutions in banking and financial services • ConsenSys enterprise credentials and projects	**15 min**
Banking Blockchain Network	• Our perspective on a BdL-driven banking blockchain network • Deep-dive #1: Digital ID • Deep-dive #2: Central Bank Digital Currency	**45 min**
Open Discussion and Next Steps	• Open discussion and Q&A • Confirmation of Banque du Liban priorities and requirements • Alignment on next steps	**30 min**

ConsenSys Overview

We are the world's largest pure play blockchain company

With 500+ blockchain experts, entrepreneurs, computer scientists, designers, engineers, consultants, and business leaders across 6 continents.



Our vision is about reconciling technology and trust

We are building the **infrastructure**, **applications**, and **practices** that enable a **decentralized world**.

We are trusted by governments and companies across industries

komgo

Shareholders

covantis

Shareholders

We have a proven track record of launching ventures and deploying blockchain solutions

30	$1B+	50+	10B+	80%
Countries with ConsenSys presence	In tokenization projects, launches, digital assets and currencies	Blockchain and digital transformation engagements	Transactions executed on blockchains	Less custom code needed, deploying on public or private chains

Since 2014, we have tokenized over a billion dollars in digital assets, including a wide range of consumer products, stablecoins, real estate, and financial instruments, powering tens of billions of dollars in blockchain-based transactions. Through our applications, we have served hundreds of thousands of users, ranging from central banks and major financial institutions to developers and retail users of the Ethereum mainnet.

As the official blockchain partner of the EU Blockchain Observatory and Forum, and as a founding member of Global Digital Finance and The Brooklyn Project, we are equipped to navigate and deploy blockchain-based software in the most complex of regulatory environments. Across our strategic engagements, we have optimized assets and business processes within large multinational corporations in traditional and emerging financial markets and commercial networks, to realize cost savings of 20 to 80%.

We are experienced in blockchain-based identity solutions

Ecosystem creation

- Consortium of 400+ member entities targeting 50-60% of Spanish GDP
- uPort solution offers GDPR-compliant portable identity solutions to consumers

- ConsenSys is leading the EU Blockchain Observatory and Forum
- Thought leadership and legal research on digital identity

- IDB leading initiative to build a regional consortium across Latin America, uPort as core identity solution

Financial services

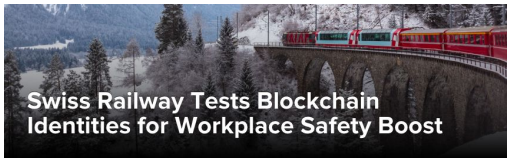
- Pilot with Onfido and PwC to test portable identities during the consumer KYC process - as part of Open Banking & in the UK's FCA regulatory sandbox

- uPort partnered with the GLEIF network to launch decentralized corporate identity management
- Implementation was around verification of a person acting in an official role

- Pilot for decentralized KYC platform

Industry use cases

- Australian Red Cross is building a trusted ecosystem with other humanitarian organizations
- Enabling volunteers to only be verified once and then reshare their profiles for faster deployment



- Swiss Federal Railway pilot to manage railway workers and contractors authorization levels and access to sites
- Allows workers to build reputation through certification credentials

We are experienced in blockchain-based payment solutions

ConsenSys has delivered payment systems for central banks, commercial banks and private enterprises	**SARB**	ConsenSys partnered with the South African Reserve Bank (SARB) on Project Khokha to prove scalability and privacy capabilities of Ethereum for an RTGS interbank payment solution.
	MAS	ConsenSys partnered with the Monetary Authority of Singapore (MAS) on Project Ubin to use blockchain in wholesale clearing and settlement of securities.
	UnionBank	Consensys partnered with Union Bank on Project i2i to build a closed-loop crypto-cash solution for the Rural Banks in the Philippines (similar to a wholesale CBDC).
	UnionBank & OCBC	Following Project i2i, ConsenSys supported UnionBank and OCBC for a cross-border remittance pilot between Singapore and the Philippines (supervised by BSP and the MAS).
	Oxfam & Sempo	ConsenSys partnered with Oxfam and Sempo on project Unblocked Cash to implement the world's first stable coin pilot on the Ethereum Mainnet to distribute "digital cash vouchers" for disaster relief initiatives.
	Leading retailer	ConsenSys is partnering with a leading retailer to build an ecosystem of "digitized euros", branded yet interoperable within the entire network.
ConsenSys supports the development of payment related startups and products	**Adhara**	Adhara is a ConsenSys backed company that builds real time solutions for multi-currency global liquidity management, FX and international payments.
	Monerium	Monerium is a ConsenSys backed company, licensed Electronic Money Institution, that enables businesses to build digital financial services on a decentralized infrastructure.
	Daisy	Daisy is a ConsenSys software enabling companies to accept cryptocurrency payments. Daisy is in production on Ethereum Mainnet with several clients (incl. MythX).

Wholesale Payments **Retail Payments**

We have ongoing CBDC conversations

Focus on retail CBDC

US Federal Reserve

BANK OF CANADA
BANQUE DU CANADA

BANK OF ENGLAND

Hong Kong Monetary Authority

EASTERN CARIBBEAN CENTRAL BANK

South African Reserve Bank

Focus on wholesale CBDC

BANQUE DE FRANCE

RESERVE BANK OF AUSTRALIA

EUROPEAN CENTRAL BANK
EUROSYSTEM

BIS

Banking Blockchain Network

Enterprise blockchain consortia are becoming increasingly common across sectors and industries

Enterprises are creating consortia to jointly build a blockchain network enabling industry-wide use cases that all parties benefit from

ConsenSys is a strategic partner to a number of consortia, supporting to build, maintain and operate the system

komgo

Industry: commodity trade finance
Members: 16 (eg. Shell, BNP Paribas, Citi, Mercuria)
Model: Joint Venture

covantis

Industry: global trade (post-trade operations)
Members: 6 (eg. ADM, Bunge, Cargill, COFCO, Louis Dreyfus)
Model: Joint Venture

LiquidShare

Industry: capital markets infrastructure
Members: 9 (eg. BNP Paribas, SocGen, euroclear, EuroNext)
Model: Joint Venture

ALASTRIA

Industry: industry-agnostic (focus on paperless transactions)
Members: 100+
Model: Non-profit association

We envision a banking consortium driven by BDL for industry-wide improvements for the banking sector in Lebanon

Objectives

Digitization
Transition towards a fully paperless sector across major banking transactions

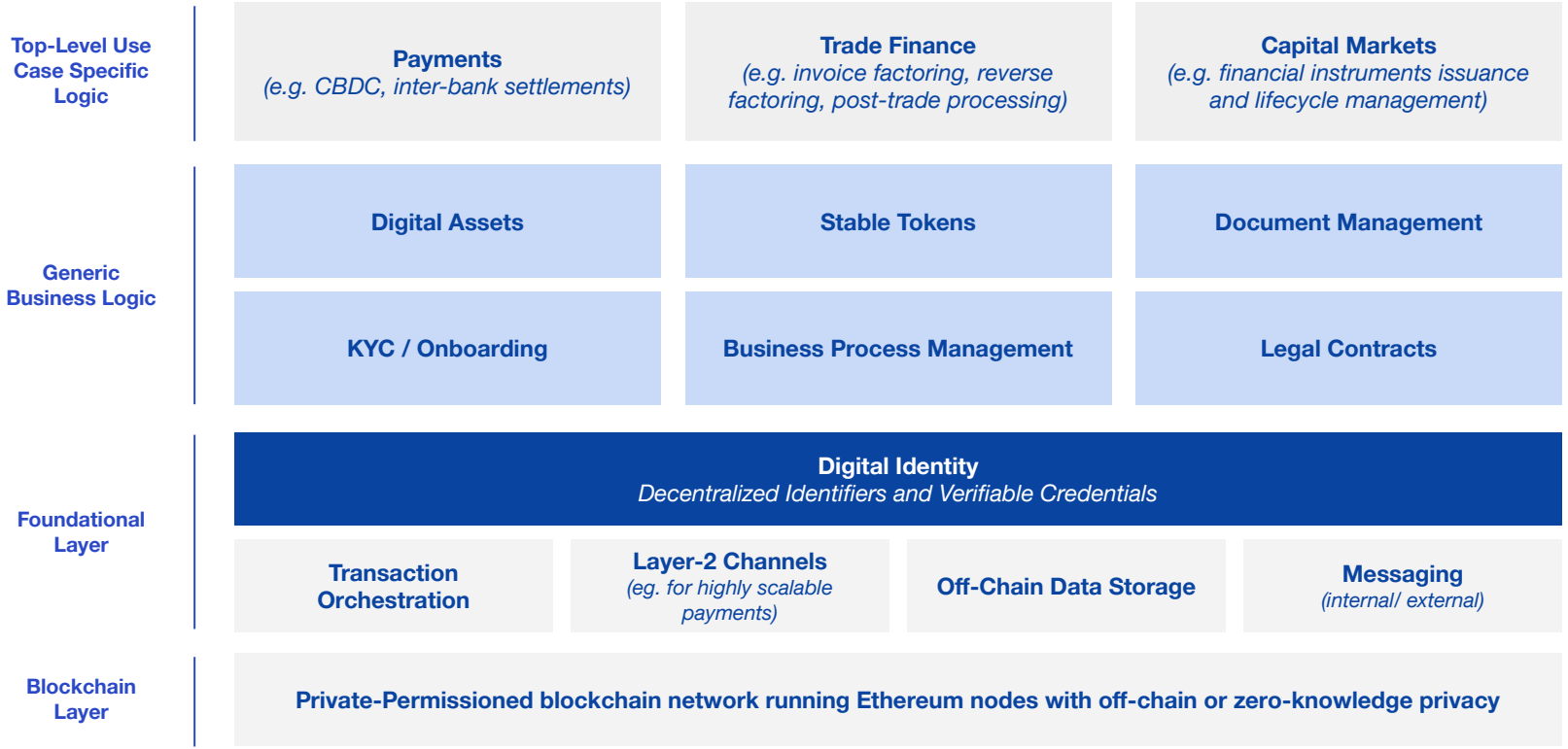
Lower cost of transactions
Improve efficiency in banking operations and minimize transaction costs

New products/ innovation
Enable private sector to innovate and offer new products to customers

Consortium Participation and Governance

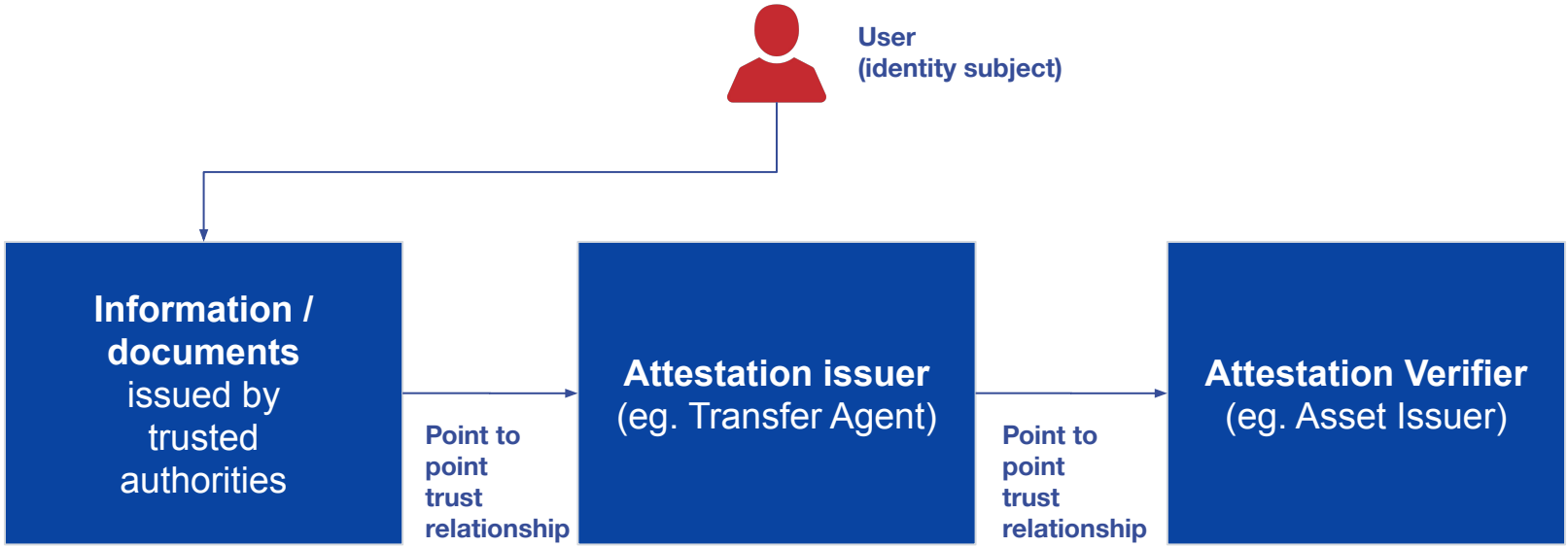
BDL	• Regulatory oversight - has visibility on transactions for compliance monitoring • Approves the addition of new validator nodes • Deploys and runs security audits on new smart contracts on the network
Banks	• Validator nodes - push and validate transactions on the network • Privacy features and zero-knowledge proofs enable private transactions between parties
Other Enterprises	• Consortium can monetize the network by allowing other businesses (retail, trade, etc.) to pay for "observer" nodes in order to use features such as identity and document verification

The system will be built on the foundations of a digital ID layer that enables a large number of use cases on top



Deep Dive #1:
Decentralized Identity

Identity revolves around issuing and verifying attestations (= “verifiable credentials”) that are built on trusted relationships



What is decentralized identity?

A **decentralized identifier (DID)** is a pseudo anonymous identifier for a person, company, object, etc.

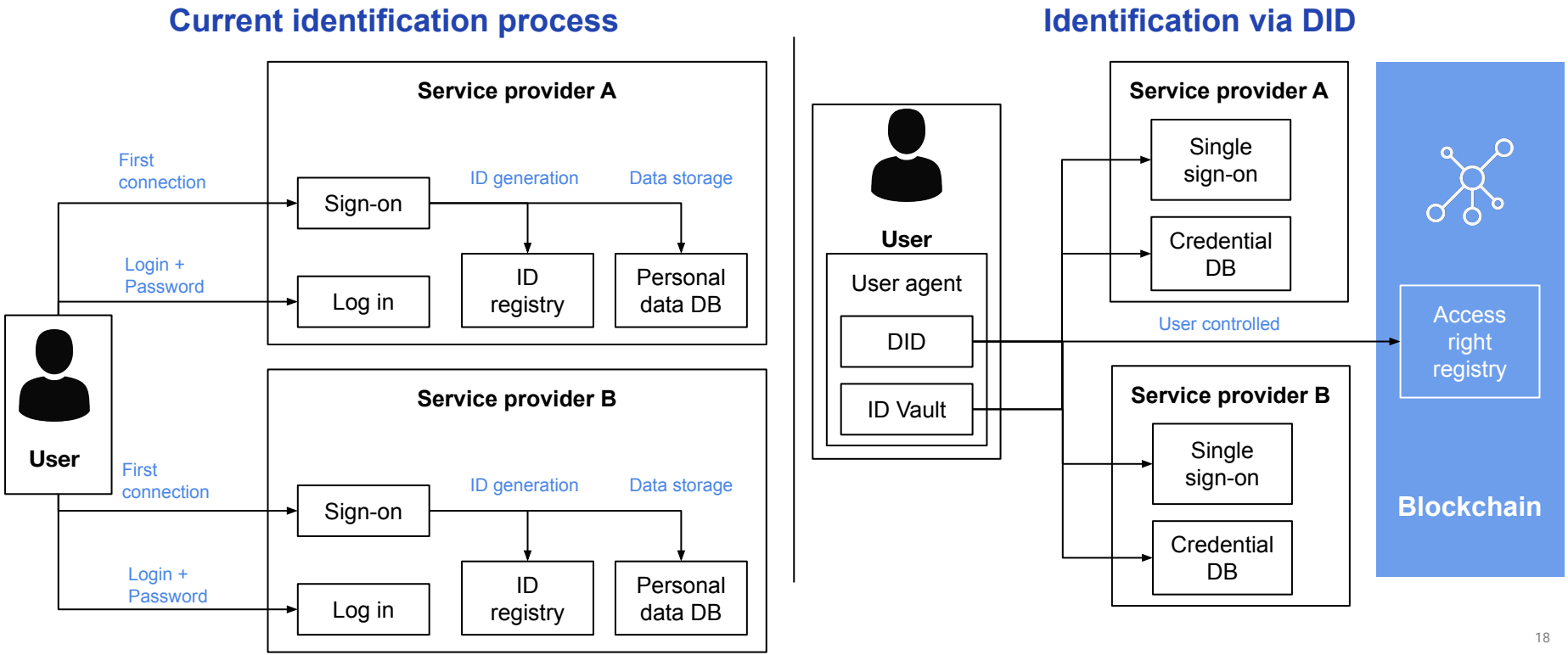
Each DID is secured by a private key. Only the private key owner can prove that they own or control the identity.

One person can have many DIDs, which limits the extent to which they can be tracked across the multiple activities in their life.

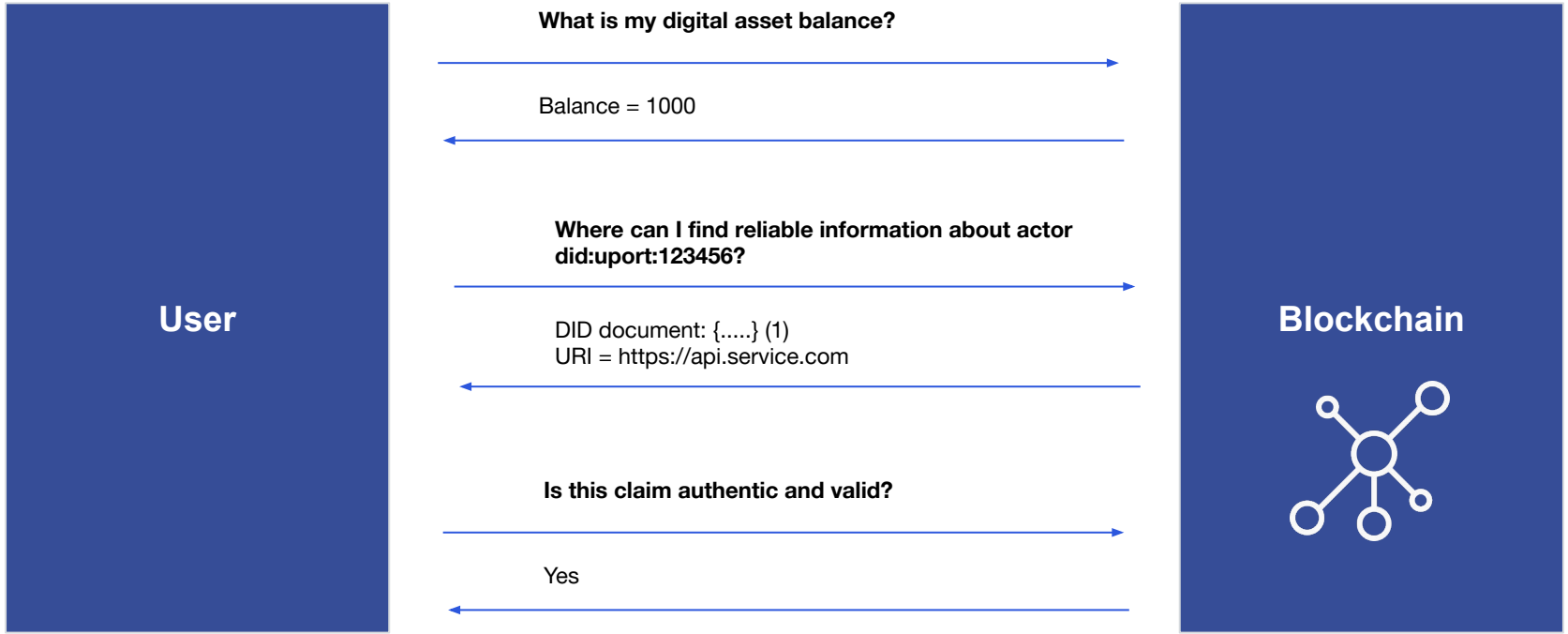
Each DID is associated with a series of **attestations (verifiable credentials)** issued by other DIDs, that attest to certain characteristics of that DID (eg. location, age, diplomas, payslips).

These credentials are cryptographically signed by their issuers, which allows **DID owners to store these credentials themselves** instead of relying on a single profile provider (eg. Google, Facebook).

Identification to services will go from platform-centric to user-centric

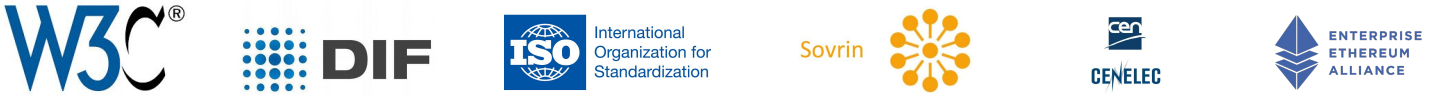


Blockchain is leveraged as a shared, trusted registry of ID information



As such, enabled by blockchain, a decentralized identity framework replicates the real world in a digital way enabling interoperability

An **ecosystem** of identity subjects, issuers and verifiers with **common standards** that are already being established by W3C and DIF.



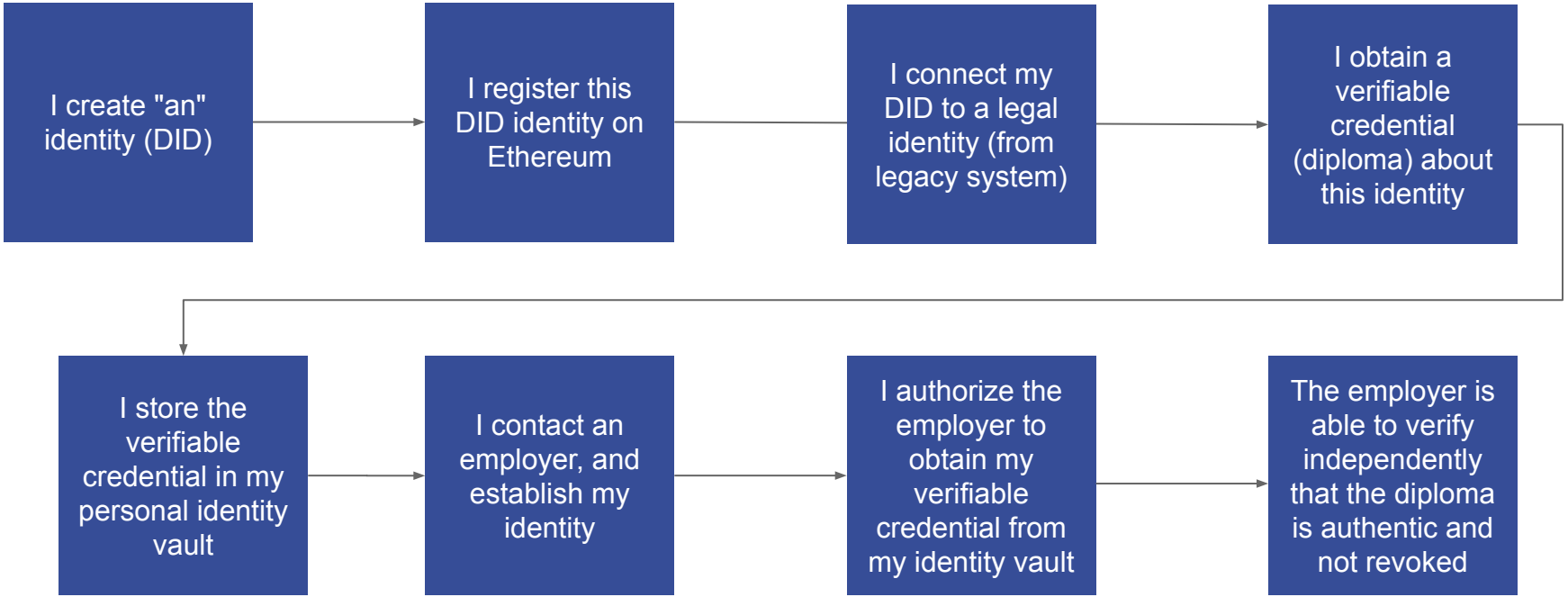
Identity subjects collect verifiable credentials from issuers, that they can deliver to verifiers whenever needed.

Multiple **blockchains are used to register actor identities**, as well as a few revocable credentials.

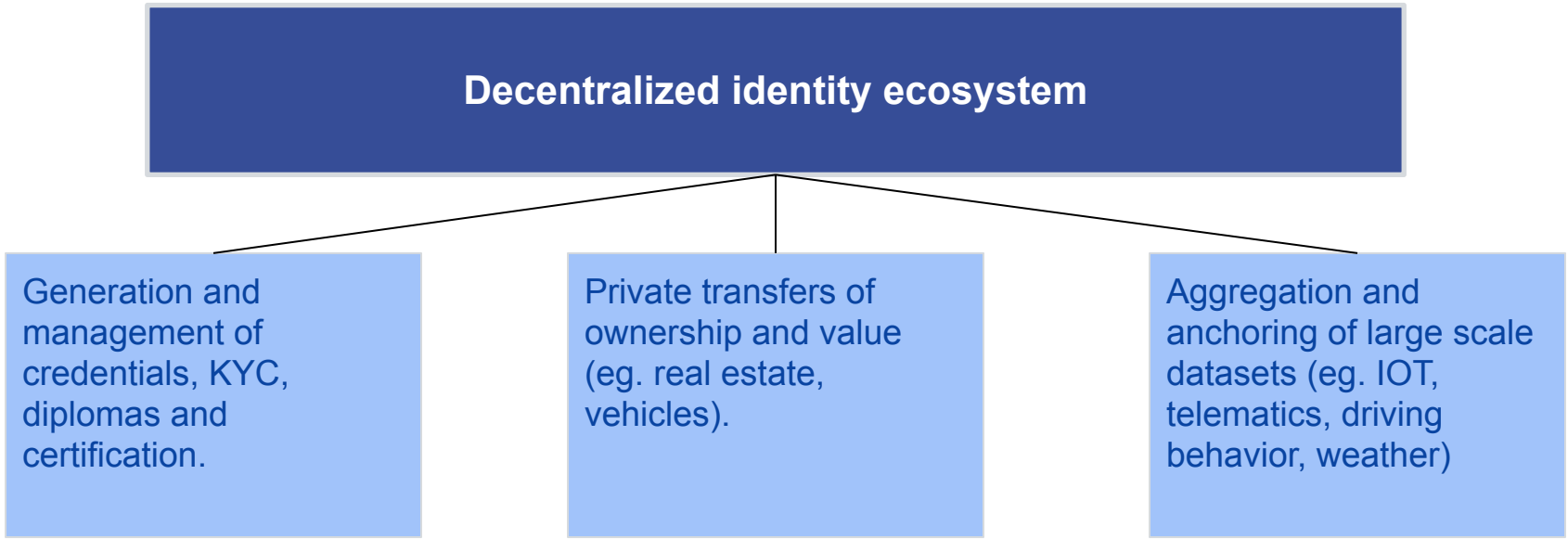
These blockchains can work together via APIs, both because they follow similar standards and because the information stored on-chain is minimized as per standards DID architecture.

For now, **each identity verifier must decide for themselves** what issuers they trust. Over time, government, regulations and private trust score systems will establish common rules and standards to make this process more scalable.

How does decentralized identity work?



Decentralized identity has many applications



ConsenSys Decentralized Identity Stack

User interface (customizable)

- **User agent** (user app, notifications)
- **Admin portal**

Server side (network nodes)

- **Identity hub / personal vault** (private information & document management)
- **Identity SDK** (login management, verified credential request and issuance)
- **Decentralized storage manager** (optional)
- **Legal Agreements**
- **Transaction orchestration**
- **Private key management** (vault)
- **Merkle proof generator**
- **Integration with other platforms**

Storage

- **Ethereum** (public or permissioned)

- **Document storage** (Resilient DB/ IPFS)

- **Merkle proof storage** (Resilient DB/ IPFS/ Sidetree)

The ConsenSys decentralized identity stack can serve as a Bank ID/ KYC hub

User
(identity subject)

Identity node operated by Financial Institution
User agent
Identity hub / personal vault
Other back-end layers
Resilient document and proof storage

Platform A

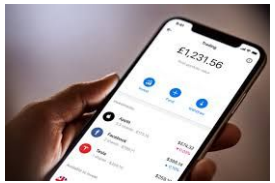
Platform B

Ethereum
(public or permissioned)

- **DID registry**
- **DID documents**
- **Rules to obtain verifiable certificates from Platform A: how many signatures, signed by whom**
- **Rules to obtain verifiable certificates from Platform B: how many signatures, signed by whom**

Deep Dive #2:
Central Bank Digital Currencies

The money and payments system is once again ripe for a change



Money is constantly evolving. Since 1950s, modern money has gone from fiat paper money, to plastic money, to digital money, and more recently to natively digital **stablecoins** with initiatives like Tether and USDC ($9B market), but also **Libra**.

The emergence of internet-enabled financial services and products presented a paradigm shift with users moving into a **digitally connected world economy,** supporting **multi-currency** and **cross-country** experiences.

While the private sector is addressing the need for digital means of payment, we believe **it is critical that Central Banks offer an alternative** with Central Bank Digital Currencies (CBDC) to fulfil their mission of maintaining monetary and financial stability.

Central banks not engaging in CBDC are taking the risk of having the payment infrastructure fully managed by private companies. On the opposite, Central banks that will build CBDC will **promote innovation** without compromising security or risk management.

We believe that CBDC, as a digital cash, brings multiple benefits

Improve availability & usability of CB money	Cash usage is decreasing in several countries while alternative payment systems a being globally adopted (incl. FinTechs, global stablecoins). Unless Central Banks offer an alternative to private payment solutions, there is a growing risk of financial exclusion
Meet payment needs in digital economy	A CBDC is natively digital and consequently do not require the costly and time consuming reconciliation currently needed, in particular for e-commerce and cross border payments.
Foster digital transformation	A CBDC will not only make payments more efficient, resilient and fast, but also lower barriers to entry for new firms in the payments sector which will foster competition and innovation. A CBDC will support the development of digital payments and push towards globalization of services thanks to the Internet and the platform based software model.
Others	Better distribution of government benefits ; Reduce Central Bank cost for managing cash which is high ; Leverage high mobile penetration to reduce risks associated with citizens carrying cash ; Enhance the transmission of monetary policy ; Increase transparency and control over transactions for tax controls ; Prevent wide adoption of private stablecoins

Central banks should get ready to issue CBDC now

A number of private initiatives are building large scale digital payment infrastructure. Those infrastructures will directly compete with Central Bank offering, including wholesale and retail payments (ie. RTGS & cash)

These initiatives are maturing quickly, with go-live plans as early as 2020-2021.

JPM Interbank Information Network (IIN)

FNALITY

libra

It is urgent that Central Banks decide how to position themselves compared with those initiatives.

2020 should be the year of the first retail CBDC issuances

2000' — Central banks assess CBDC potential but conclude that technology is not mature and that innovative digital payment systems should be built by private sector

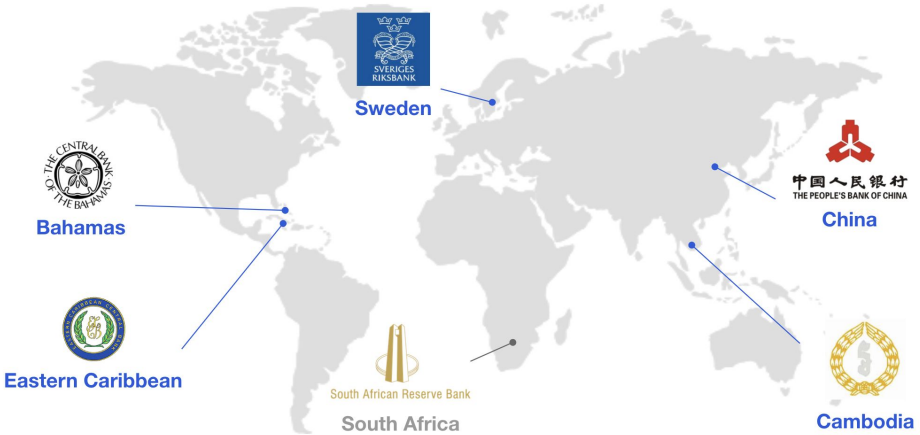
2009 — Bitcoin, a "decentralized peer to peer cash system", is born. However, most of the world refutes its categorization as money

2014 — Ethereum is launched, introducing smart contract and enabling the creation of blockchain business networks beyond the sole exchange of crypto (eg. Komgo for commodity trading)

2017 — Issuance and adoption of privately issued stablecoins (incl. Tether) to overcome crypto assets volatility as means of payment
Some Central banks launch blockchain based CBDC pilots, incl. Monetary Authority of Singapore on Project Ubin with ConsenSys)

2018 — Growing number of privately issued stablecoins (incl. USDC, Terra, JPM coin). Central banks continue to do pilots to test blockchain based CBDC (scalability? Privacy? etc.)

2019 — Facebook announces Libra: most Central Banks launch task forces and pilots in reaction.
Other private projects matures, such as IIN, Fnality for wholesale payments



80%

"of central banks are engaged in some sort of work on CBDC"

Source: BIS

Key Principles of a Central Bank Digital Currency (CBDC)

CBDC will be issued **by the Central Bank as legal tender**.

Supply is limited as determined by monetary policy and **controlled by Central Bank**.

CBDC is a **liability** to the Central Bank balance sheet, ie. a claim against the Central Bank.

CBDC will be issued and distributed at **one to one parity to the relevant fiat**.

Must be accepted as a **means of payment**, **legal tender**, **safe store of value** by all businesses and government.

Consumers and businesses should be able to obtain and return CBDC in **exchange for commercial bank money and cash**.

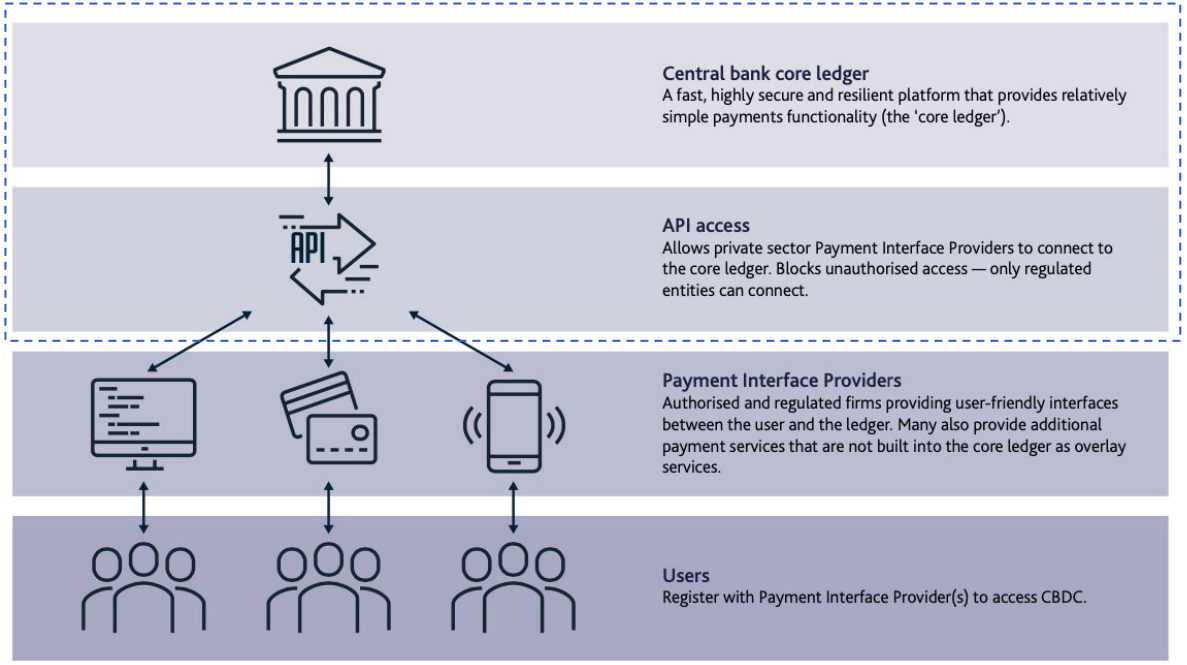
Consumers **don't need a bank accoun**t to hold CBDC.

Should enable **secure**, **real time** (24/7/365), **final** and **irrefutable** transfer of value.

CBDC should be built on **an open infrastructure** to foster competition and innovation

Cost of transacting must be lower than current bank charges.

CBDC infrastructure should built as a Public-Private platform



Source: Bank of England discussion paper

The central bank core ledger should be built on a **private and permissioned blockchain**

Using blockchain will ensure high **security, trust, programmability, availability and innovation**

The public-private platform model will **facilitate competition, innovation and extensibility**.

Blockchain technology brings unique advantage to a CBDC

System trust	A blockchain based CBDC will enable Central bank to be in control of the CBDC while protecting privacy and independence of its use to the end users. We believe it is critical that users are not locked in by intermediaries so that they trust and use the CBDC.
Programmability	Programmability brings multiple benefits, in particular to facilitate compliance with the CBDC rules because they are hard coded in the protocol. It could include wallet thresholds or third party access to the system to build smart contract based innovative applications.
Data availability	System distribution ensures data availability and resilience, in addition to trust and transparency on transactions history. In particular, Ethereum has proved its capacity to support very large networks with 10k+ nodes and hundred thousands of users.
Innovation	A blockchain based CBDC will benefit from the innovative products and services that are being built with blockchain, such as non custodial wallets, ZKP cryptography or even Decentralized Finance. This is a key benefit of open source ecosystems.

Blockchain technology is well suited to support CBDC requirements
Including in terms of scalability and privacy

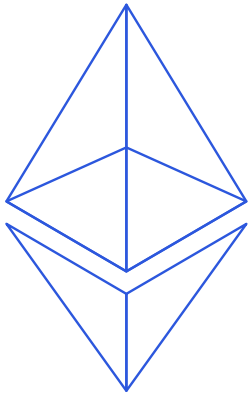
Ethereum is the largest blockchain ecosystem in the world

350,000+

Developers globally

95%+

New token launches



World's largest blockchain technology developer community

- 10x larger than second largest
- Large ecosystems foster digital innovation
- Affordable technology for large adoption

Adopted by the world's largest enterprises

for live production projects

komgo Santander LVMH UNIONBANK J.P.Morgan

Public/private network interoperability

- for long term reliability and global interoperability of trading venues

No long term dependence on any technology provider

Advanced and globally adopted standards

ENTERPRISE ETHEREUM ALLIANCE

ERC Standards

Ethereum should be used as the CBDC base settlement layer

Our novel architecture allows 10k+ TPS with pseudo-anonymous transactions.

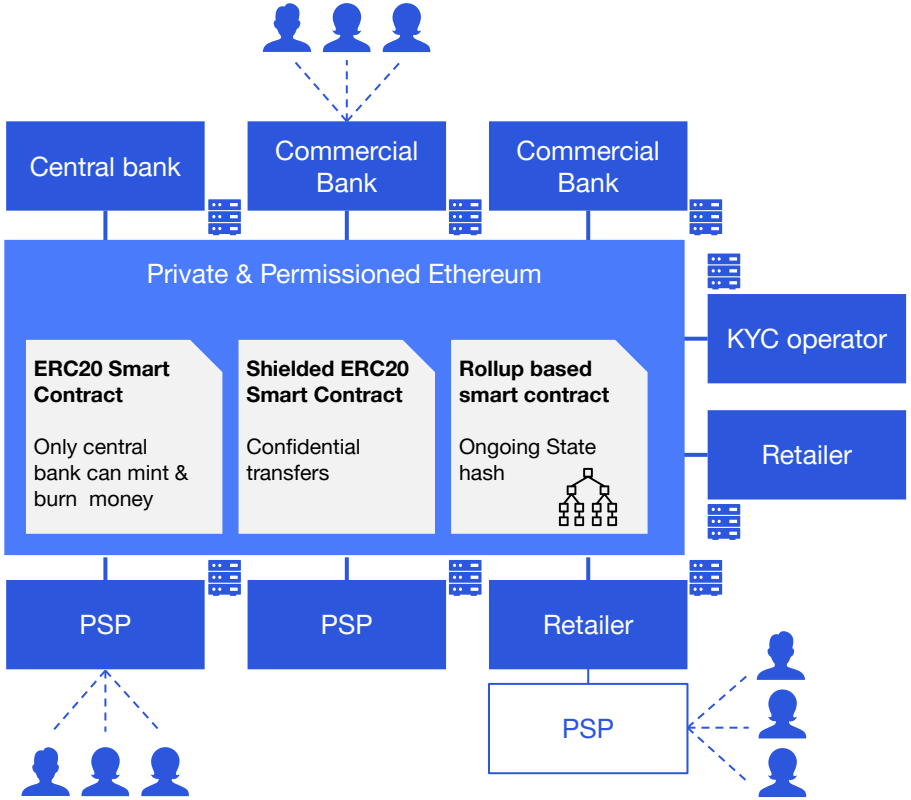
The architecture uses rollups, a one of the most promising innovation in “layer 2” scale up design. With rollups, this solution **uses blockchain as the single source of truth for user balances, but execute transactions off chain.**

Overview of our proposed CBDC architecture

The three pillars of our architecture are:

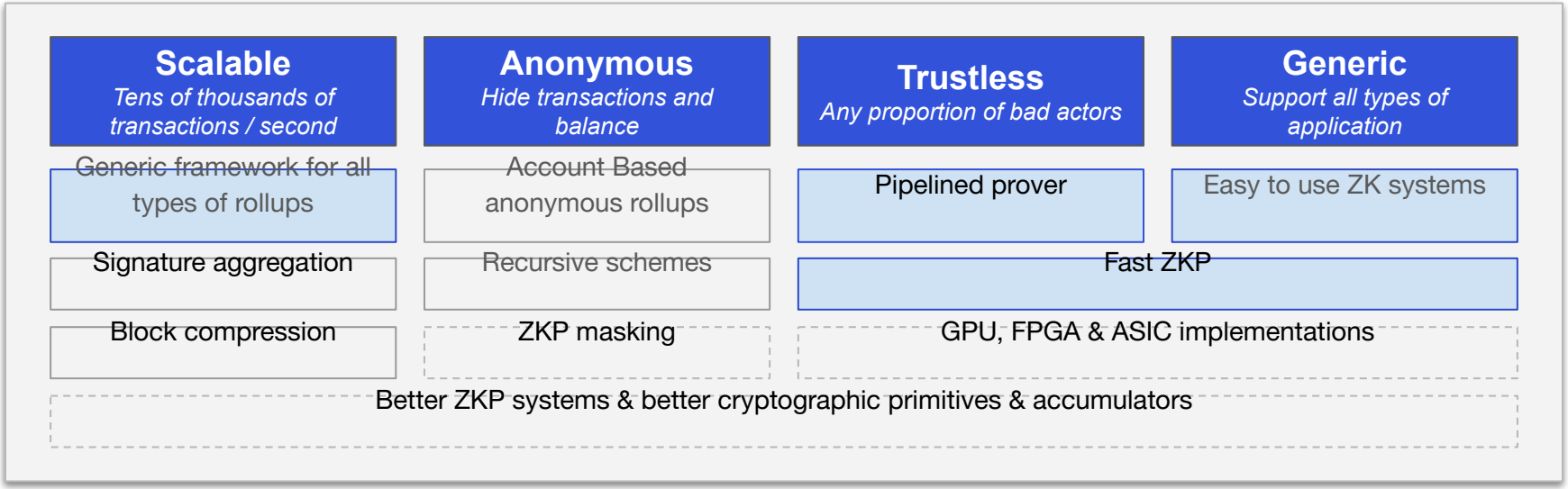
- **A private and permissioned network**, operated by the central bank and selected regulated companies
- **ERC20 smart contracts**, which is the most adopted token standard worldwide, enabling CBDC issuance and transfers between network participants
- **A rollup based smart contract**, which is used to maintain consensus on user balances.

This architecture ensures **real-time, scalable** and **final transactions**. Also, **transactions are pseudo-anonymised:** user identity and data is not solely accessible to network gateways to which user is connected.



Our architecture is ready for production and future proof

Our architecture can be **built for production today**. System improvements will then be phased leveraging the **significant worldwide R&D efforts on rollups**.



Readiness status: CSYS advanced implementation | CSYS applied research | Research (CSYS & others)

Central banks have the opportunity to build a unique infrastructure to be used for both the retail and wholesale transactions

Retail features, widely accessible

Real time and final CBDC transactions

Seamless & free conversion of CBDC against other forms of money

Access to value added services leveraging CBDC (eg. wallet management, loans, etc.)

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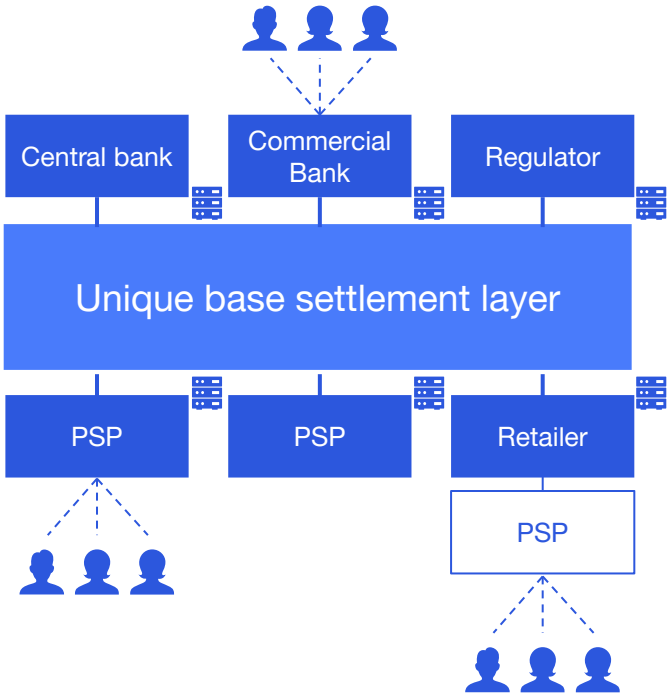

Wholesale features, solely accessible to network operators

Settle trades (PvP, DvP) with atomic swaps

Transaction queue mngt, with prioritization, holding, cancellation, etc.

Liquidity mechanisms for gridlock resolution (eg. multi lateral decentralized netting service)

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Next Steps

Next Steps

- Requirements gathering
  - Relevant documents/ material (current IT landscape, aspirations, etc.)
  - Questionnaire
  - Follow-up meetings
- Project scoping and timelines
- Contracting and kick-off

谢谢!

धन्यवाद!

Je vous remercie!

Gracias!

Thank you!

Go raibh maith agat!

ありがとうございました！

شكرا لكم

Salamat!

CONSENSYS