



EUROPEAN CENTRAL BANK

EUROSYSTEM

# ECB work on technological innovation



ECB Innovation Lab

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ECB-Public



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# ➔ The future has landed

➤ Times of accelerated change

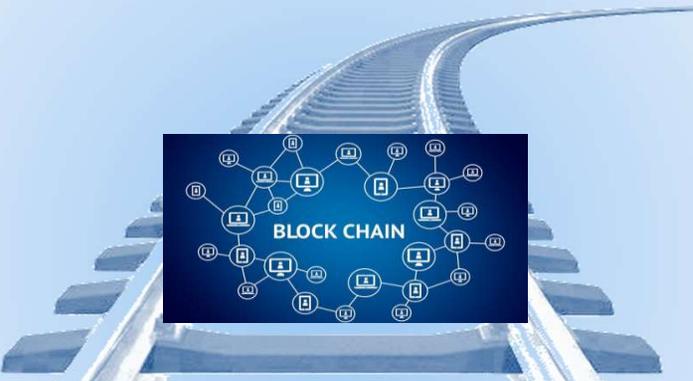
➤ Need to embrace innovation



# ECB approach to technological innovation

## Distinguish infrastructure from asset

**Infrastructure**



**Distributed Ledger Technologies / Cloud / AI**

**Asset**



**Digital currencies / crypto assets / tokens**

# ECB Innovation Lab



## Team

Collaboration between **market infrastructures and IT departments** within the ECB.

Business and IT experts working on **research topics in market infrastructure and payments**.



## EUROchain

Work within EU central bank community

World's first DLT research network between a larger group of central banks



## Main projects



Joint project with Bank of Japan

- Phase1: Wholesale Payments
- Phase2: Delivery vs Payment
- Phase 3: Cross-border payments

## The EUROchain Research Network



EUROchain

The **ECB Innovation Lab** along with experts from **17 European national central banks** explores new technologies (currently DLT) in the field of market infrastructure and payments.

### Few group characteristics

- Different backgrounds
- Heterogeneous skills
- Different countries



## The EUROchain – Events driving innovation

*“Devoting time and energy to finding and testing ideas through a network of diverse individuals gives innovators a radically different perspective.” - The Innovator’s DNA*

- Hackathon
  - Event with focus on innovation
  - Diverse participants
  - Feedback on ideas



## Bank of Japan / European Central Bank cooperation



- Started: December 2016
- Objective: Deepen understanding of DLT

Not geared towards replacing existing central bank services with DLT-based solutions

### 09/2017 **Phase 1: RTGS payments**

Bilateral liquidity-saving mechanisms of RTGS (*Hyperledger Fabric v0.6*)

### 03/2018 **Phase 2: Securities**

Delivery versus Payment in single and cross ledger scenarios, with Hashed Time-Lock Contracts, HTLCs (*Hyperledger Fabric v1.0.5, Corda v1, Elements*)

### 06/2019 **Phase 3: Cross border payments**

How to link transactions of a cross border payment using a cryptographic condition. Analysis of different payment methods (Hyperledger Fabric, Five Bells Ledger)



## Report 1: Wholesale Payments

### Main findings

#### Performance

Some DLT can meet the current performance needs of RTGS without difficulty (100 TPS)

Liquidity-saving mechanisms not a major factor for latency (adding 0.01-0.02 seconds)

DLT performance is affected by distance between nodes

#### Availability

DLT solutions are resilient to the failure of network nodes

Validating nodes recovered in less than 30 seconds on crash faults

Denial of Service attack with incorrect message format added latency but below 1 second

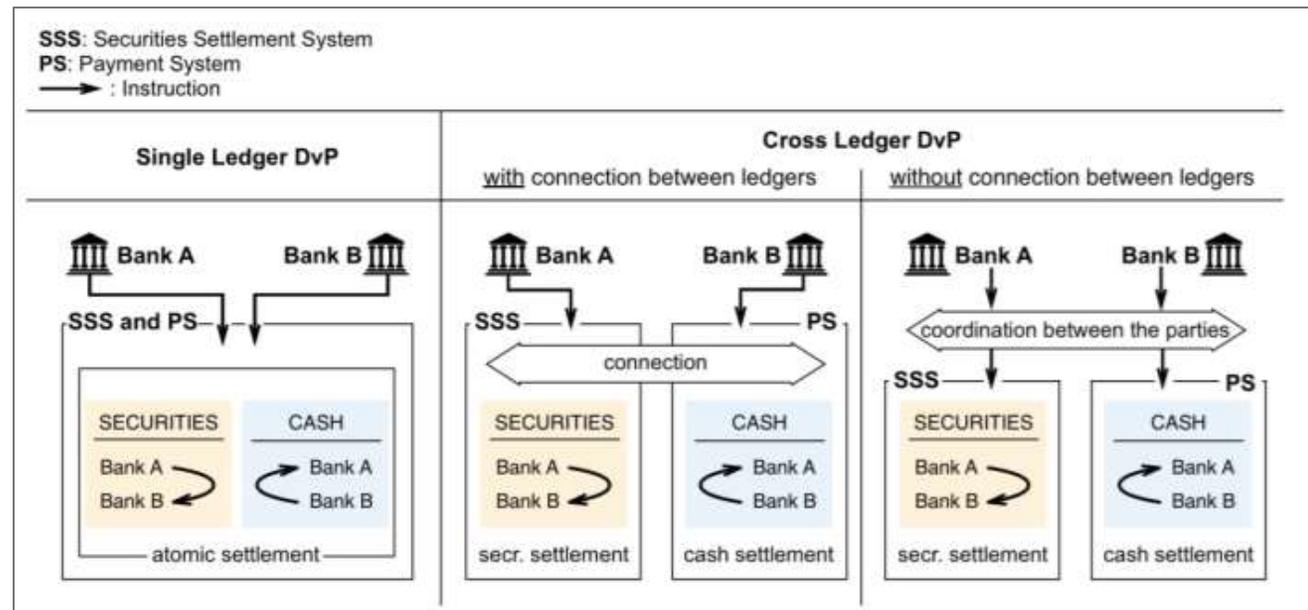


# Report 2: Delivery vs. Payment

## Main findings

DLT offers new approach to DvP without technical connection between ledgers (cross-chain atomic swap)

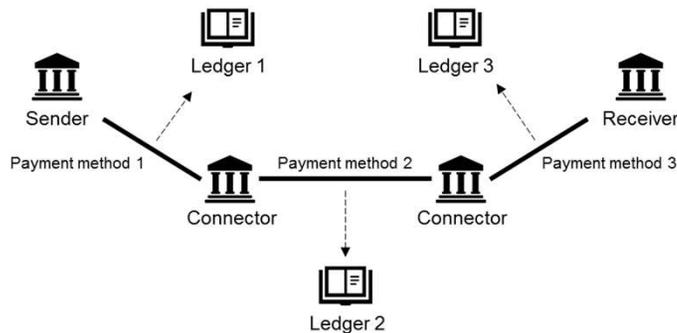
This new interoperability approach entails complexities and additional risks (e.g. higher liquidity needs)





## Report 3: Synchronized cross-border payments

### Main findings



Example of a payment chain, composed of multiple payments across different ledgers:

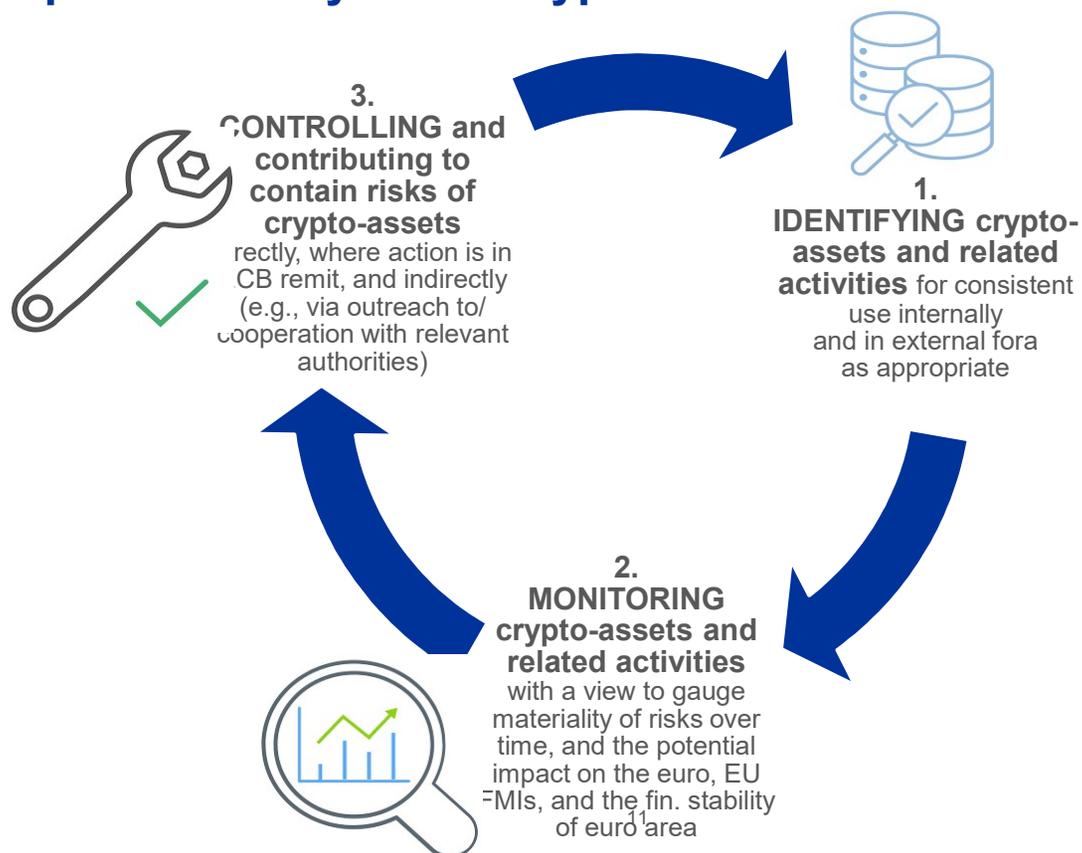
- Payments are linked via a **cryptographic condition** like in the Inter-Ledger Protocol (ILP).
- Each payment is carried out with a specific payment method, depending on the arrangement between the parties. Stella3 analyses **5 payment methods**.

Some of the payment methods, in particular those having enforcement mechanisms:

- can ensure that each transacting party who completely satisfies its responsibilities is not exposed to the risk of incurring a loss on the principal amount being transferred
- could potentially improve the safety of today's cross-border payments business

# Internal Crypto-Assets Task Force, ICA-TF

- An ECB Internal Crypto-Assets Task Force was established in March 2018 with the mandate to deepen the analysis on crypto-assets and is comprised of 15 business areas

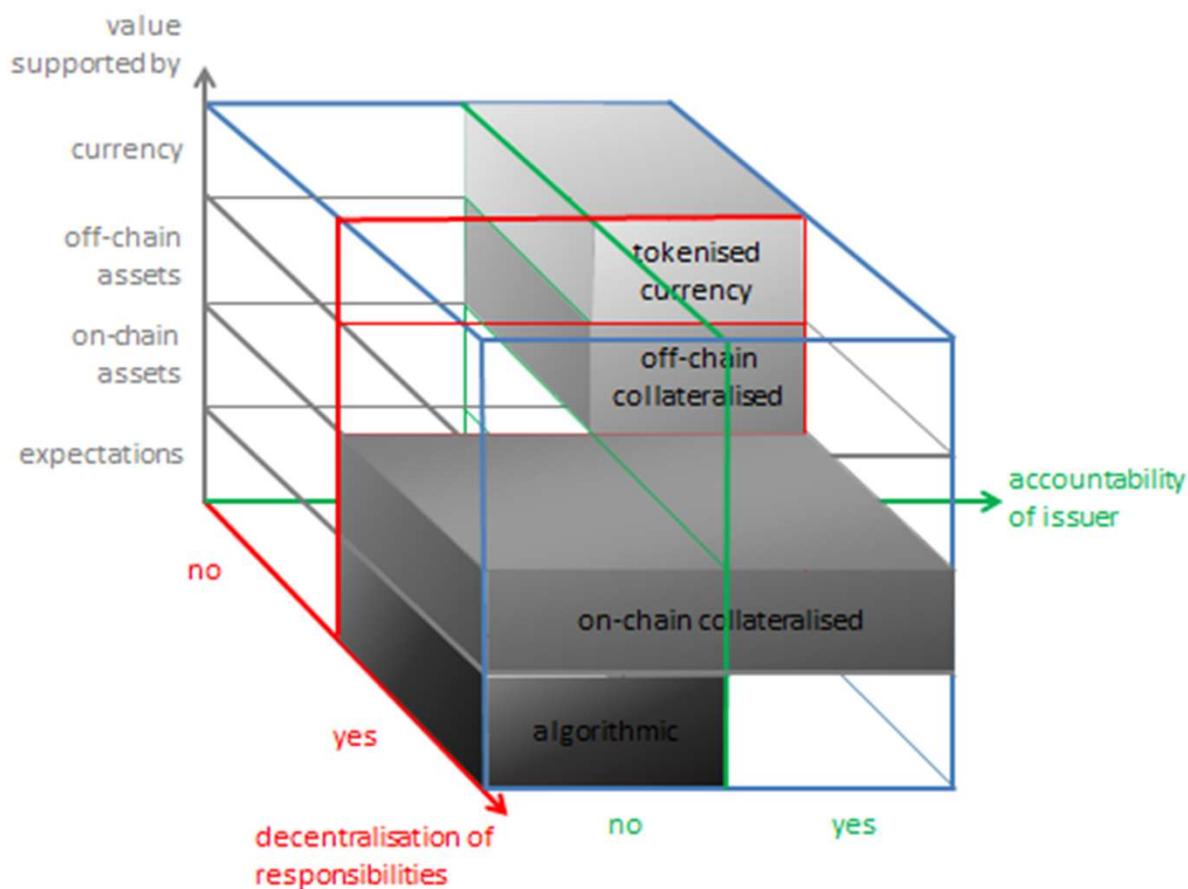


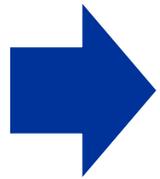
- **Crypto-assets are not to be considered as virtual currencies or digital currencies although these terms are often (inaccurately) used to identify crypto-assets that are used and accepted by some as a substitute for money in particular circumstances**



- The absence of any specific institution (such as a central bank or monetary authority) protecting the value of crypto-assets hinders their use as a form of money

## Taxonomy of stablecoins with the crypto cube





## Hammer looking for a nail?



### ECB stance

Eurosystem operates two of the world's largest market infrastructure services (TARGET2 and TARGET2-Securities) and has launched new projects (e.g. TARGET Instant Payments Settlement).

Technological innovation such as DLT has the potential to profoundly impact the financial market we know today. But any new technology-based market infrastructure service **needs to be mature enough to meet high requirements in terms of safety and efficiency.**

Against this background, the ECB **cannot, at this stage, consider basing its market infrastructure on a DLT solution.**

The ECB will **continue to explore, analyse and test new technologies.** In doing so we will ensure that tomorrow's market infrastructure not only is efficient and innovative but also remains safe and resilient.

# Thank you!

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