

# *The Bank of Japan's work on central bank digital currency*

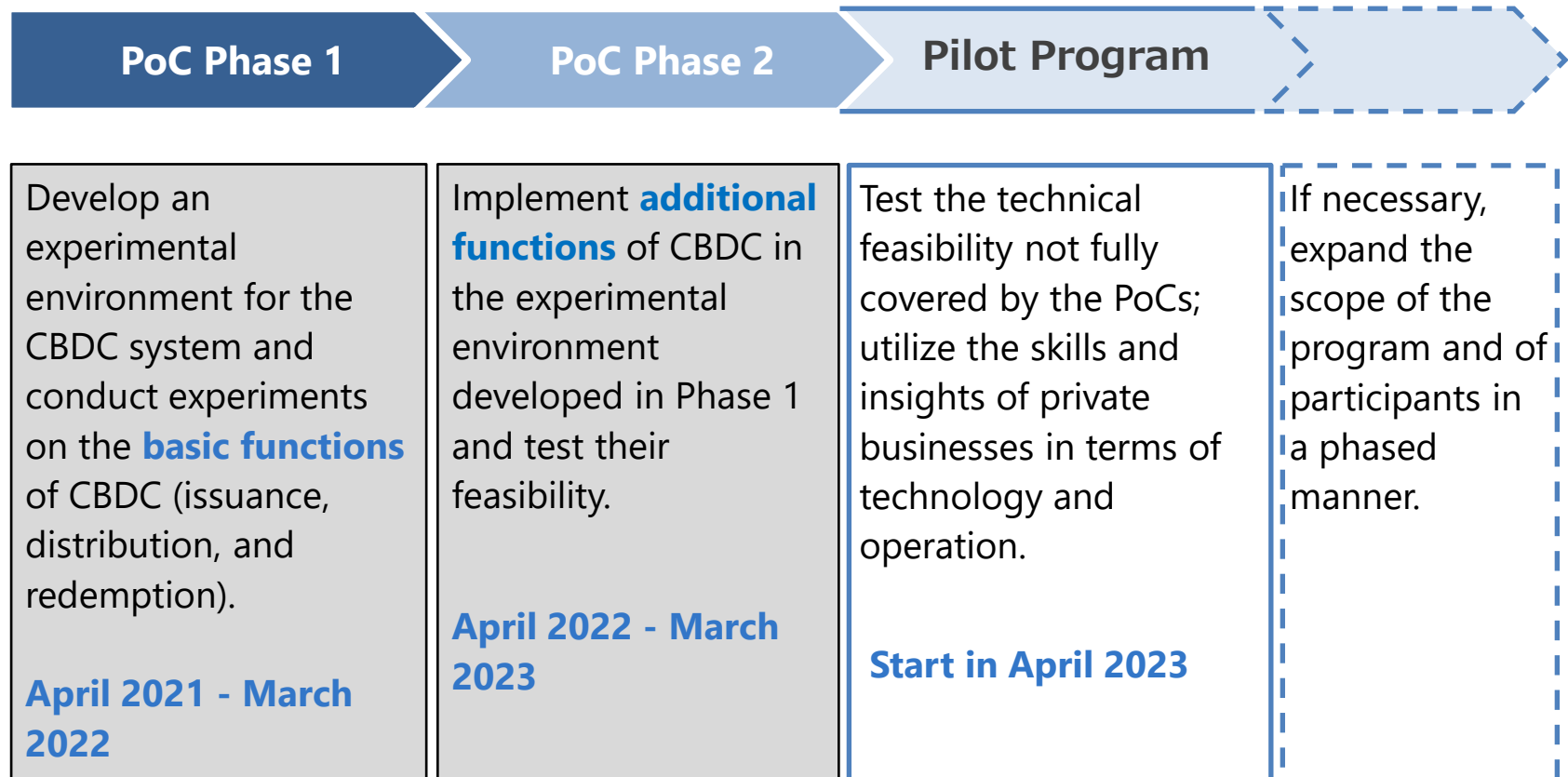
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*25 April 2023*

*Disclaimer: The views expressed are those of the presenter and do not necessarily reflect those of the BoJ.*



# Timeframe of experimentation



# The Bank's approach to CBDC

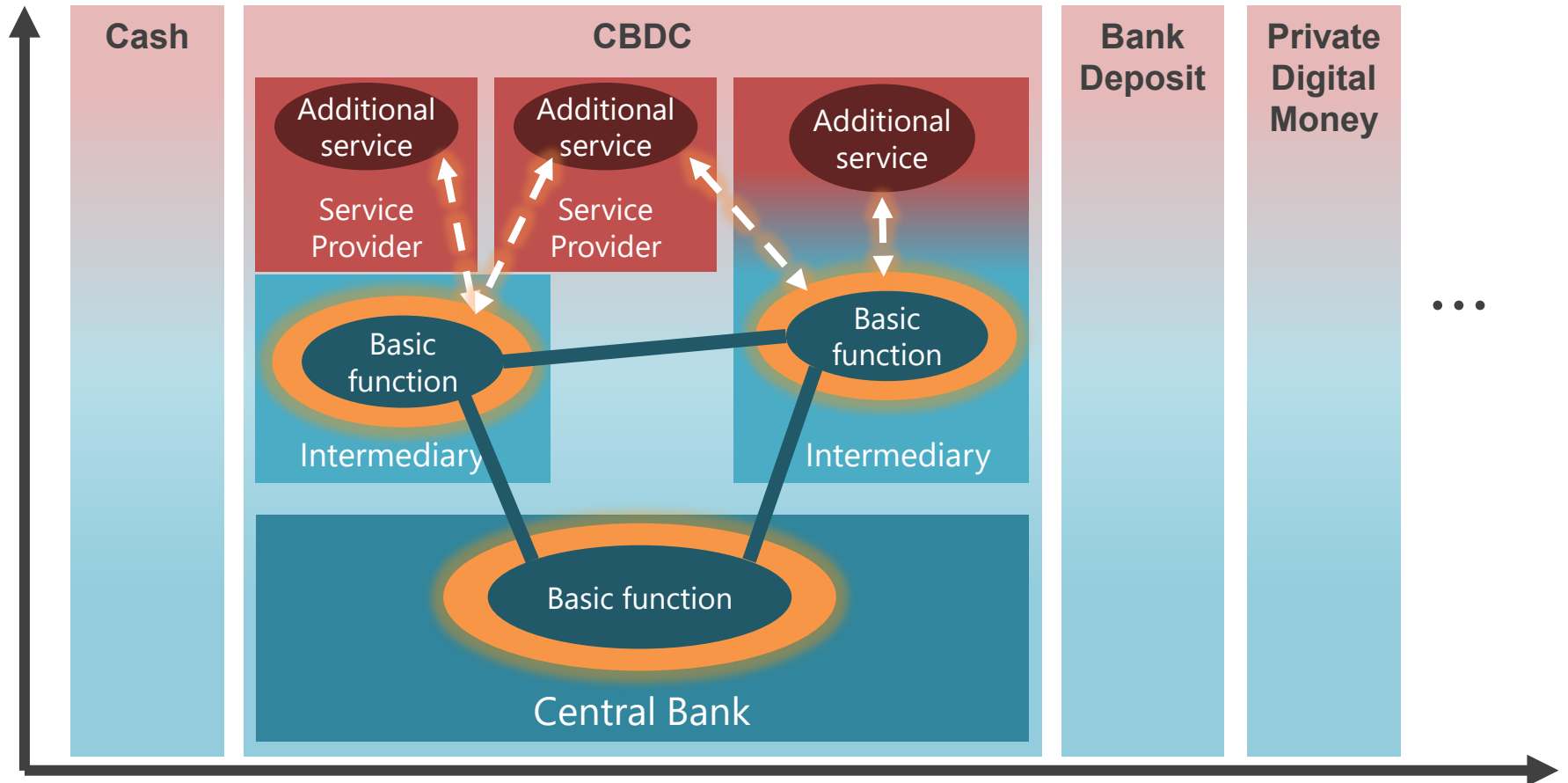
- Digitalization has advanced in various areas on the back of rapid development of information communication technology. There is **a possibility of a surge in public demand for CBDC going forward.**
- While no decision has been made on the issuance of CBDC, **the Bank considers it important to prepare thoroughly** to respond to changes in circumstances in an appropriate manner.
- The Bank will **carry out experiments** and **explore institutional arrangements**, collaborating with stakeholders.
- **The future payment and settlement systems suitable for a digital society** need to be discussed with various stakeholders. CBDC could serve as the basis for innovation to offer various new payment services.
- As long as public demand for **cash** exists, the Bank will stay committed to supplying it.

# Coexistence: Horizontal and vertical

End users

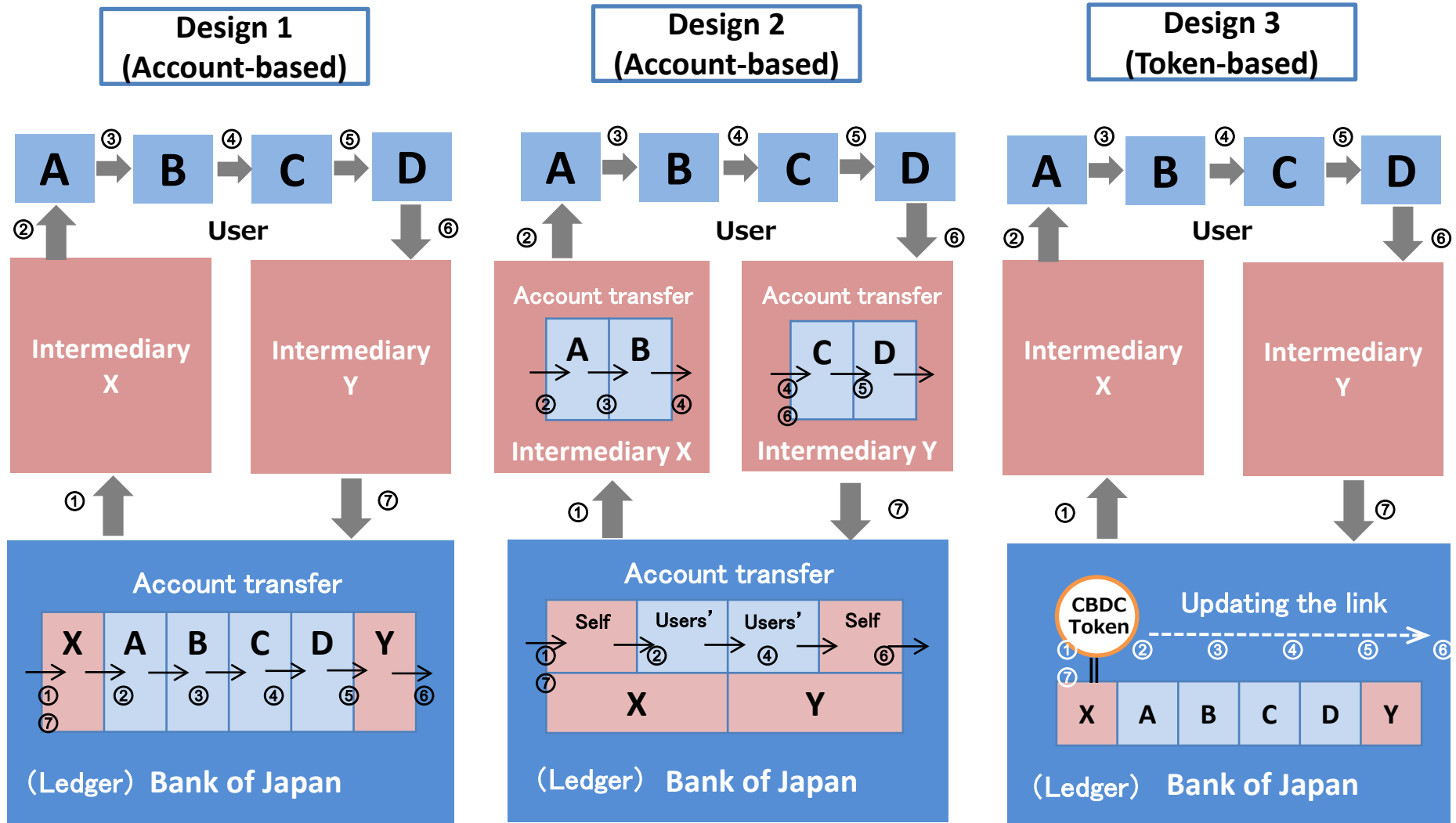


Vertical coexistence



Horizontal coexistence

# PoC phase 1: Ledger design



➡ Movement of CBDC's holder      → Movement on ledger

# PoC phase 1: Main results

## (1) Performance

- The performance of **Design 2** was lower than **Design 1** due to the impact of record locking. However, Design 1 could face the same issue, depending on the size of input. The impact of record locking can be mitigated by **record splitting** or **modified business process flow**.
- The resource consumption of **Design 3** was higher than other designs, although all design choices would hit the resource constraint, as the input increases. **Scaling up/out at scale and optimizing the design and layout of the databases** would be necessary towards a production-ready system.

## (2) Non-performance

- **Resilience to security risks** and **availability** -- No major differences between the design choices at the system level.
- **Fault tolerance** -- The expected impact area of a failure would be relatively small for Design 2, while there are more potential points of failure and the integrity issue of restored data can be anticipated.
- **Extensibility** – While each design has different characteristics, none of them stands out in terms of ease of extension.

# PoC Phase 2

- Feasibility of additional functionalities and their impact on performance.

## Economic design (eg safeguarding FS)

- Limits on CBDC holdings
- Limits on CBDC transaction amounts and volume
- Remuneration for CBDC holdings
- Swing/waterfall (eg holdings exceeding limits)

## Convenience of payments

- Reservation of transfer
- Batch payment, Request to pay

## Connection with intermediaries' and external systems

- Providing multiple accounts for one user
- User-based aggregation of multiple accounts for limit checking
- Connection with other payment systems

- Alternative technology choices.

## Ledger system with flexible-value tokens

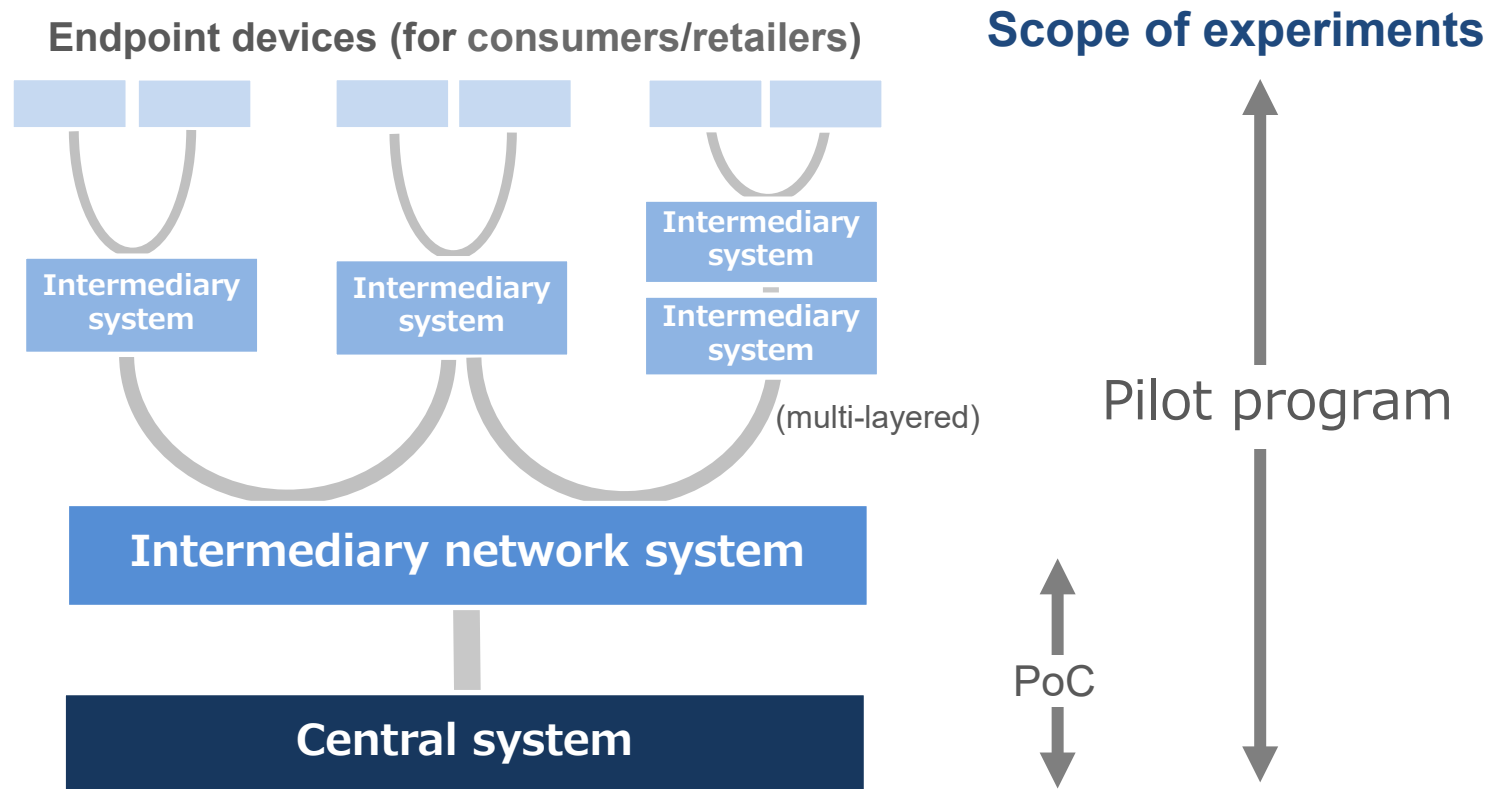
- PoC phase 1 examined the fixed-value approach for a token-based ledger system.
- PoC phase 2 examined the flexible-value approach.

## NoSQL database

- PoC phase 1 used RDB.
- PoC phase 2 tested NoSQL.

# Pilot : Development and examination of experimental system

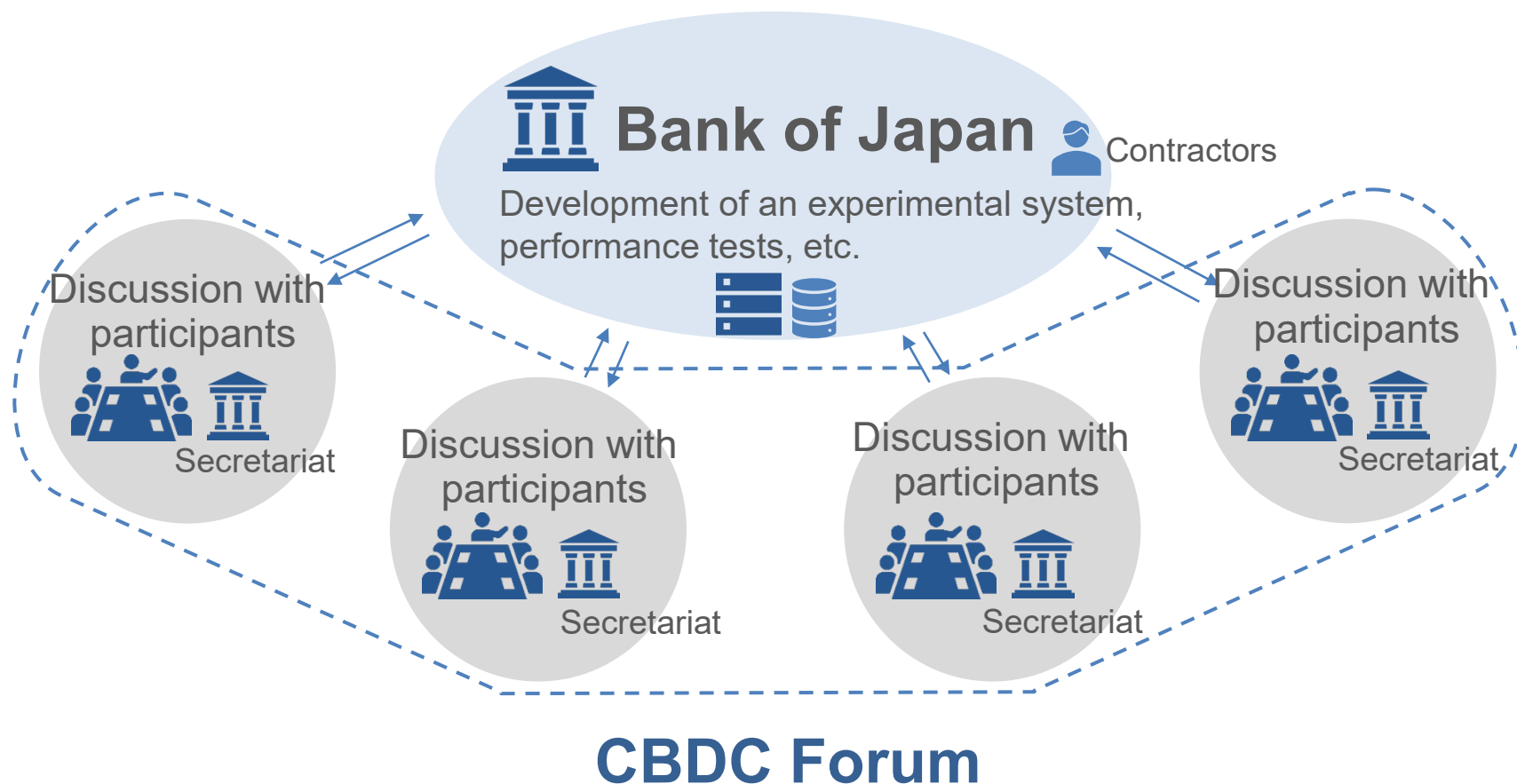
- The Bank will develop a system for experiments, in which a central system, intermediary network systems, intermediary systems, and endpoint devices are configured in an integrated manner.
- The Bank will test the end-to-end process flow, while exploring the measures and potential challenges for connecting the system with external ones.





# Pilot : CBDC Forum

- The Bank will establish a CBDC Forum to discuss and explore a wide range of topics with private businesses related to retail payments.
  - ✓ The findings gained through (1) development and examination of the experimental system and (2) discussions with private businesses are expected to be share as necessary.



# Pilot : Provisional agenda of CBDC Forum

- The topics currently considered include the following, which may evolve as the discussion proceeds.
  - ✓ The Bank plans to establish working groups, taking into account linkages among the topics in consideration.

- The end-to-end process flow in view of the **operational processes of intermediaries**; explore **the measures and potential challenges for connecting the CBDC system with external ones**.
- **Alternative data models** (eg token-based) to account-based ones and **offline payments**.
- Business and technology of CBDC; explore **design requirements for the CBDC system in facilitating overlay services**.
- **Technologies and functions necessary for CBDC as a public good**, such as privacy protection and universal design.