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# How CBDCs could increase the efficiency of payment systems

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The way we make everyday payments is dynamically changing, driven by continuous innovation in the payments sector. Cash use has already been on a yearly decline, a trend further exacerbated by the pandemic.

## Central banks are exploring how CBDCs could play a role in the continuously evolving payments landscape

As central banks consider how they should respond to the changing retail payment trends, one area that central banks are actively engaged in researching is central bank digital currencies (CBDCs). CBDCs are a digital payment instrument, denominated in the national fiat currency and convertible to reserves or bank notes at par. They are issued by the central bank and thus a direct liability of the central bank.

## A central bank digital currency is a new digital payment instruction denominated in the national unit of account.

Some central banks, such as The Bank of England, are currently engaging with banks, corporates, FinTechs, payment service providers (PSPs) and end consumers on CBDCs and how they might best be implemented within financial services.

One key concern relates to the risk of fragmentation of the existing payments infrastructure, which could result from different forms of money having different operational characteristics. Incorporating a CBDC model in the financial landscape would require a seamless transition to a hybrid payments system. It necessitates an interoperable platform upon which new and existing forms of money can interact.



## The event

In September 2022, Ernst & Young LLP (“EY UK”) teams were invited to observe the **Barclays CBDC Hackathon 2022**, held at Barclays’ Rise London innovation centre, where participants coded solutions to a series of challenges focused on CBDCs and the roadmap to a workable reality of CBDCs for retail use in the UK. The focus of the hackathon was on exploring interoperability as a solution to the risk of fragmentation between CBDCs and existing payment infrastructures. The hackathon challenges ranged in complexity, from depositing cash into a CBDC account to enabling combined crowdfunding payments to a single project creator, across CBDC and commercial bank accounts. Participants were also encouraged to consider a “stretch challenge” to explore their own unique use cases or infrastructure considerations.

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### Nine global teams competed by coding solutions to six challenges.

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The hackathon saw an energetic participation from nine global teams representing banks, fintechs, and PSPs: Industria, Lloyds Bank, Rethink Ledgers, IBM, SDK.finance, Barclays, Mastercard, UST and REGnosys.

Team participation was not restricted to only those able to attend the Rise London center, as participants dialed in from the around the world, coordinating, collaborating, and working seamlessly despite the time constraints.

In preparation for the event and in line with the Bank of England’s illustrative platform model for retail CBDCs, Barclays developed a simulation of a central bank and commercial bank. The simulation provided a series of APIs, Payment Interface Providers (PIPs) and other financial ecosystem services. Hackathon participants then connected to this simulation and explored how existing infrastructure might be leveraged to solve the hackathon challenges using both existing and new forms of money.

All teams approached the challenges from a variety of conceptual angles, each with a unique technical distinction.

The various CBDC architectures were also assessed through a social lens, deconstructing the use case for financial inclusivity and heightened privacy.

Some teams (Industria, UST, IBM, REGnosys), in addition to the winning team Lloyds Bank, leveraged their choice of code to build a distributed ledger technology based (DLT) solution. Through use of the public DLT (Ethereum), Lloyds Bank created a safe way to transact in CBDCs online and the ability for the open marketplace to create a competitive environment for prepaid invoices. They explored how smart contracts could be leveraged to trigger payment upon receipt of a physical good, and further proposed a public marketplace for pre-funded invoices.

It was their unique proposal for a technology that combined DLT with existing cash-based solutions, such as FSCS protection, that won over the judges.

We also observed other teams opting to not use DLT technology. SDK.finance instead advocated their own open-source-based intellectual property while Rethink Ledgers chose cloud-based digital assets modelling language (DAML) technology. Through this, they created a digital financial ecosystem that could orchestrate a synchronous response between the CBDC issuer, the central ledger and the CBDC account recipient.

The location of the central source of truth, the core CBDC ledger was also a common theme throughout the two-day hackathon. The Bank of England’s proposed architecture suggested that the central bank ledger would be the master source of truth, but some teams chose to reverse that architecture, suggesting that the primary data source might be within the commercial banks and exchanged through the API layer.

Regardless of whether in the future this approach would be feasible, from a practical or legal perspective, it is innovative CBDC designs such as these, driven by the private sector, that are likely to increase a central bank’s chances of producing a technologically sound and thoroughly thought through CBDC model.



## The EY view and observations from the hackathon

Participants explored a variety of technical possibilities in solving the hackathon challenges with a focused view on the use cases for CBDCs throughout the event.

As identified by several teams throughout the event, central banks can explore other architectural options besides distributed ledger technology. They might choose to leverage bespoke legacy technology as a framework for CBDCs instead.

However, a DLT-based solution, designed correctly, could still prove to be the most robust, framework for CBDCs. For example, it potentially provides a means of addressing limitations to facilitate real-time, cross-border payments, as well as reducing barriers to financial inclusion.

Interesting dialogue then emerged around offline payments, and even smart contracts to facilitate delivery-vs-payment leveraging CBDC's.

As the greater community continues to get engaged, it is important to continue to explore creative ways on how the asset class could be beneficial for the Bank of England, PIPs, and end users. We believe these use cases will be the key driving factor for many of the technical considerations around the development of a CBDC, as well as influence the decision around roll-out and adoption.

Whatever the future holds for CBDCs, many of the creative ideas discussed during the hackathon and in the greater community could also be applicable to other forms of digital money, or could even be leveraged to enhance and lift up existing forms of commercial bank money.

However, for this vision to be a reality, it is imperative for central banks to continue to engage with the broader commercial bank, PSP, and fintech ecosystem to ensure a final product is developed that integrates seamlessly into the existing payments ecosystem and meets the requirements of all.

## With careful regulatory and governance consideration, CBDCs could be the next big enabler for the evolution of the payments landscape

### Summary

Central bank digital currencies will be critical in shaping the future of the payments industry. Hackathons can serve as a catalyst for a broader group of industry stakeholders to co-create what this future could look like.

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