



# HYPERLEDGER

BLOCKCHAIN TECHNOLOGIES FOR BUSINESS

## Deutsche Börse Group Hyperledger Case Study



**DEUTSCHE BÖRSE GROUP** is a leading global exchange organization and a track record of innovation in information technology in the financial sector. Here we explain how the Group explores the potential usage of Hyperledger Fabric to enable cash and securities transactions, including the ability to conduct multijurisdictional transfer of securities.



## Hyperledger

The Linux Foundation is the organization of choice for the world's top developers and companies to build ecosystems that accelerate professional open source technology development and commercial adoption. Together with the global technology community, The Linux Foundation is solving the world's hardest problems through open source and creating the largest shared technology investment in history. Founded in 2000, The Linux Foundation today provides tools, training and events to scale any open source project, which together deliver an economic impact not achievable by any one company.

The Linux Foundation hosts Hyperledger, an open source collaborative effort created to advance cross-industry blockchain technologies for business. It is a global collaboration including leaders in finance, banking, Internet of Things, supply chains, manufacturing, and Technology.

Hyperledger Fabric is a blockchain framework implementation and one of the Hyperledger projects hosted by The Linux Foundation. Intended as a foundation for developing applications or solutions with a modular architecture, Hyperledger Fabric allows components, such as consensus and membership services, to be plug-and-play. Hyperledger Fabric was initially contributed by Digital Asset and IBM.

## Working with a Consortium of Collaborators

Deutsche Börse Group (DBG) is one of the largest market infrastructure providers worldwide. It organizes markets characterized by integrity, transparency and safety for investors who invest capital and for companies that raise capital. It operates various markets on which professional traders buy and sell equities – the German cash market Xetra / Börse Frankfurt, derivatives via Eurex, Foreign Exchange via 360T and other financial instruments according to clear rules and under strict supervision.

On the post trade layer, DBG operates Eurex Clearing, one of the largest clearing houses globally, as well as Clearstream, a leading international central securities depository (ICSD)



and supplier of post-trading services. Amongst others Clearstream manages, safekeeps and administers the securities that it holds on behalf of its customers. Over 300,000 domestic and internationally traded bonds, equities and investment funds are deposited with Clearstream. It holds a volume of over 13 trillion euros in assets under custody.

DBG is deeply dedicated to technological innovation. Electronification of trading and clearing has long been a key success factor for DBG, going back to the launch of Deutsche Terminbörse (DTB) in 1990, one of the first global electronic derivatives exchanges. As a global market infrastructure provider with a digitized focus, DBG keeps up with latest technology developments such as blockchain in order to establish “Exchange 4.0”, the exchange of the future, for the benefits of the sector and its customer base.

DBG started to engage in the blockchain subject during 2015 and identified more than 20 use cases across its business units. Given the fact that blockchain was – and still is – in its infancy, to quickly gain internal knowledge, DBG selected a few use cases, relevant for its core business, for deeper analysis and subsequent realization of Proof-of-Concepts (PoCs).

For the time being, DBG does not expect its core securities and derivatives trading business will shift to blockchain based trading systems, due to their large throughput and ultra-low latency requirements. DBG concentrated instead on use cases in the post trade arena and identified potential for blockchain applications in the area of clearing and settlement of securities & cash. Blockchain can improve the operational efficiency in these areas, i.e., shorter settlement times, reduction of reconciliation efforts, more efficient asset servicing, etc. In the long run, certain clearing and settlement functionality will likely materialize via blockchain being supported by clearing houses and CSDs to manage credit and counterparty risks.

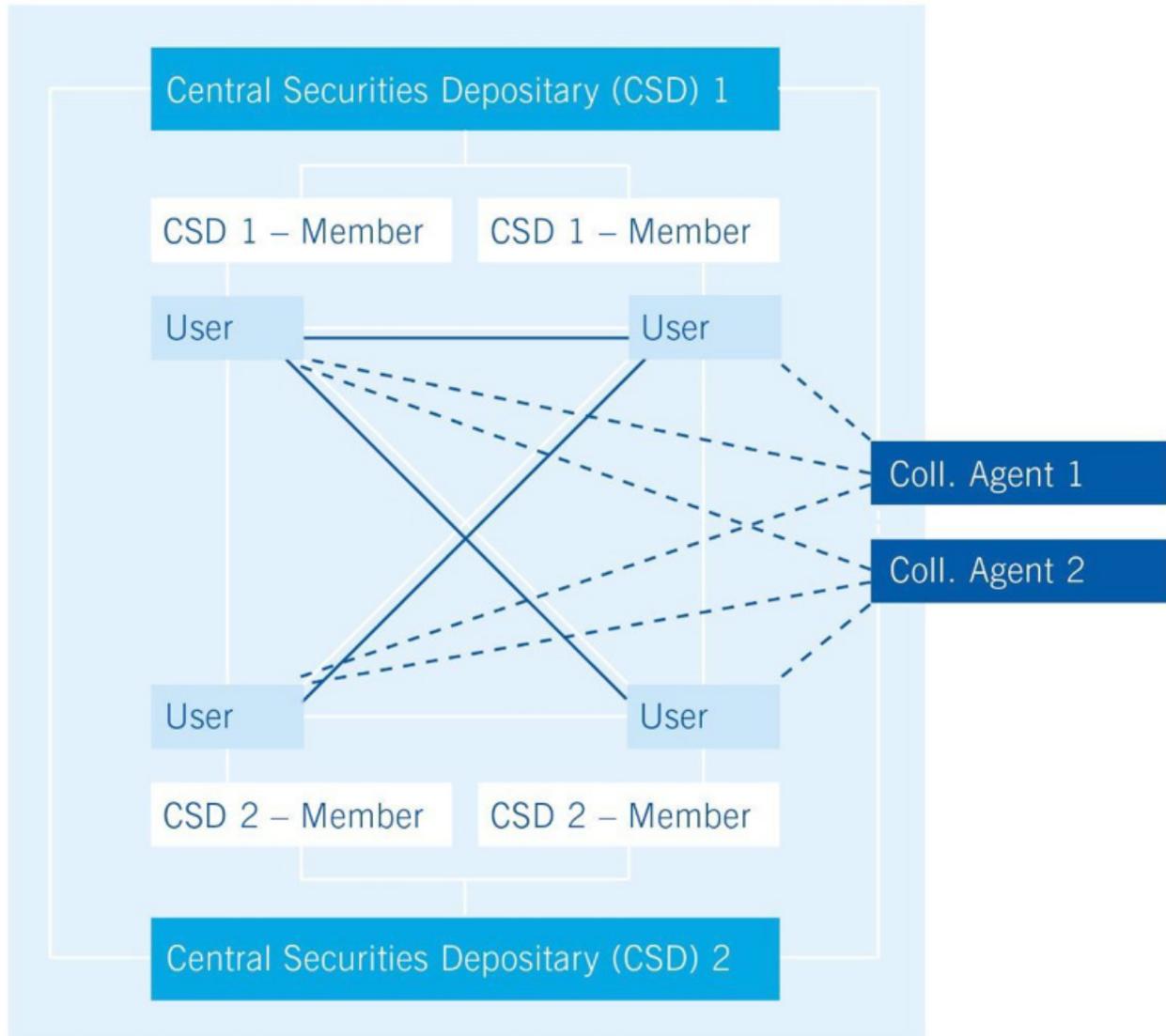
“The financial sector quickly realized the large number of possible applications and the potential blockchain technology can bring to our ecosystem to increase efficiency and reduce complexity. Deutsche Börse has been looking into ways of applying blockchain technology into business processes since 2015,” says Ashwin Kumar, Global Head of Deutsche Börse Group Business & Product Development

Based on this assessment, three use cases were identified, centered around DBG’s business dealing with securities settlement, asset servicing and collateral management for detailed investigation:

- Cross border collateral movement
- Post trade processing, including settlement of securities against cash and asset servicing
- Provision of (commercial bank) money on the blockchain, enabling payments, settlement and asset servicing

## A) Cross border collateral movement

Overview: Cross border collateral movement via blockchain



- Import/export of **Digitized Securities** through CSDs and CSD members
- **Peer-to-peer** movement of Digitized Securities (FoP) between users
- Securities movement by Collateral Agent (integration of collateral management system and blockchain)

Four members of the 'Liquidity Alliance' (LA), an international group of CSDs, are cooperating with DBG on leveraging blockchain technology to ease cross-border mobilization of securities collateral. Through the "Liquidity Alliance Ledger" project, TMX/CDS (Canada), Clearstream (Luxembourg), Strate (South Africa) and VPS (Norway) want to overcome existing hurdles when moving collateral across various jurisdictions, making the transfer faster and more efficient.

Jointly provided by regulated market infrastructures, the blockchain-based 'LA Ledger' prototype facilitates a centralized, faster and more efficient allocation of fragmented security positions to cover financial obligations of market participants in multiple jurisdictions. The decentralized character of blockchain allows for direct interaction between participants giving it the potential to significantly simplify complex processes.

In fact, the cross border use of collateral by traditional means involves multiple intermediaries. In the chosen approach, the assignment of the security is digitalized and added to the blockchain while the security position remains in the original CSD. The entire blockchain network has access to a copy of that assignment information and where the securities are held.

LA Ledger enables users assigning securities to the ledger (blockchain), initiating peer-to-peer movements and removing securities from the ledger. Collateral movements on the ledger are instructed by a collateral management system the prototype interacts with.

"We are proud to be part of this exciting LA Ledger initiative, which is adding another leading edge solution to our suite of services to the benefit of our mutual clients," says Philippe Seyll, Co-CEO Clearstream Banking S.A.

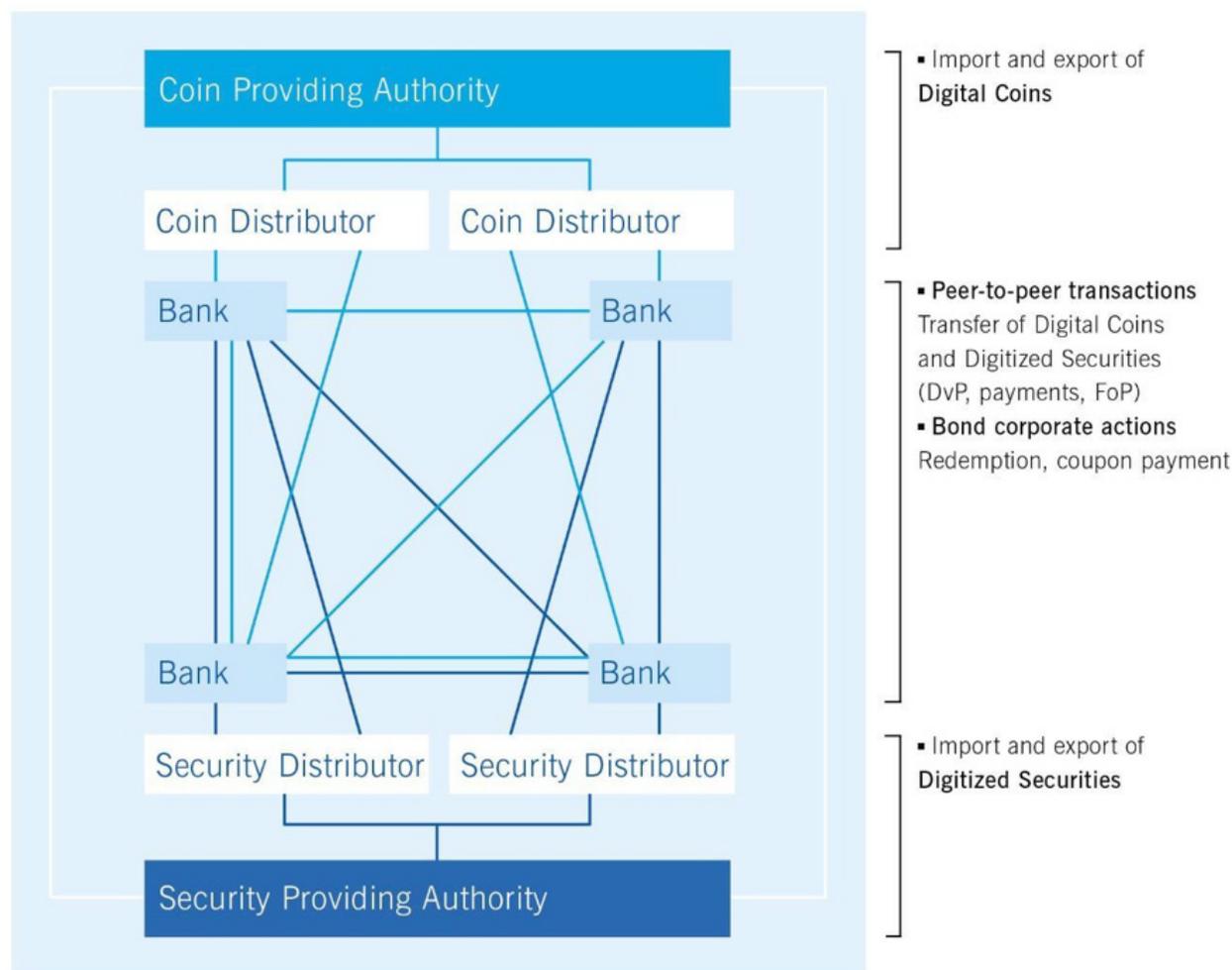
A technical prototype was completed in April 2017 based on Hyperledger Fabric and has since been under detailed evaluation by the national supervisory authorities and legal advisors of all partners. The project was also presented to the DLT working group of CPMI-IOSCO, the global committee of central banks and regulators. Following positive feedback from the authorities and customers, the aim is to implement LA Ledger in production in cooperation with international partners.

## **B) Post trade processing for securities**

In partnership with Deutsche Bundesbank, DBG engaged in a conceptual study in combination with the development of a functional prototype for blockchain based settlement of securities. This prototype was developed during the course of 2016 based on Hyperledger Fabric v 0.6. It provides functionality for the settlement of digitalized securities against digital coins in delivery-versus-payment mode, as well as the pure transfer of either digital coins or digitalized securities. In addition, it is capable of performing basic corporate actions such as coupon payments on securities and the redemption of maturing securities. As of mid-2017, this project is in its second phase looking into performance and scalability topics.

"With the blockchain prototype, the Deutsche Bundesbank and DBG want to work together to find out whether this technology can be used for financial transactions, and if so, how this can be achieved. The Deutsche Bundesbank hopes that this prototype will contribute

## Overview: Post trade processing for securities via blockchain



to a better practical understanding of blockchain technology in order to assess its potential,” explained Carl-Ludwig Thiele, Member of the Deutsche Bundesbank’s Executive Board.

The prototype itself has the following features:

- Blockchain-based payments and securities transfers as well as the settlement of securities transactions against both instant and delayed payment
- Maintenance of confidentiality/access rights in blockchain-based concepts on the basis of a flexible and adaptable rights framework
- General observance of existing regulatory requirements
- Identification of potential to simplify reconciliation processes and regulatory reporting

## C) Collateralized Coins

DBG has developed a concept for transfer of commercial bank money on the blockchain utilizing a clearing house (CCP). By combining blockchain technology with its proven post-trade infrastructure, DBG aims to achieve efficiencies, while at the same time investigating possible new business opportunities enabled by this technology.

“Our innovative concept can be the basis for a variety of use cases, among them credit risk free cash transfers and the value transfer of assets on the blockchain,” explained Eric Müller, CEO of Eurex Clearing, DBG’s clearing house. “Through the involvement of our CCP as trusted third party, a clear set of rules and governance would be ensured.”

Within the Collateralized Coins (CollCo) project DBG investigates a model for the peer-to-peer (P2P) transfer of commercial bank money via a blockchain-based infrastructure. This P2P transfer of commercial bank money is collateralized using functionality of the central counterparty (CCP) Eurex Clearing, ensuring that users carry only the credit risk of their own commercial bank as they would do outside the blockchain. Each participating bank can issue its own “coins” corresponding to the respective commercial bank money and issuing this on-chain to its customers. CollCo addresses existing and potential new use cases. These include the handling of margining requirements, credit risk free payments, and delivery-versus-payment asset/value transfer on the blockchain.

As for the other two projects, DBG has developed a functional prototype based on Hyperledger Fabric 0.6 and deployed it for testing and customer demonstration in the cloud. This prototype contains besides pure commercial bank money payments between the different users also functionality to settle securities in delivery-versus-payment mode, thus being the basis for peer-to-peer securities trading.

## Conclusion

Although DBG is generally platform agnostic, DBG selected Hyperledger Fabric 0.6 as its initial platform for building blockchain prototypes, as it meets core requirements like providing modular architecture delivering high degrees of flexibility and scalability.

Given the fact that Hyperledger is truly open source, it allowed DBG to familiarize with the underlying concepts, architectures and the realization of the various algorithms, thus to build-up in-house capabilities. Furthermore, its completeness allowed DBG to develop prototypes, including access management and user-interfaces in a relatively short time.

A large part of Hyperledger’s value is clearly connected to the fact that The Linux Foundation hosts the project. This is clearly displayed in the setup, the governance and the management of Hyperledger projects. This facilitates the build of technical communities and access to development resources. As a user of Hyperledger blockchains, one can rely on common development and quality standards, as well as communities supporting the projects.