HQLA[X]

A solution for managing high-quality liquid assets: How distributed ledger technology can benefit the securities lending market

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ABSTRACT

For the financial industry, the need to manage high-quality liquid assets (HQLA) efficiently and the related topic of collateral mobility are more relevant than ever. In the aftermath of the global financial crisis, they have posed a significant challenge for the industry. Progress on this issue is strongly linked to the evolution of new technologies. This paper assesses the current situation and how distributed ledger technology (DLT) can help to address this subject and improve the securities lending market. It examines which aspects need to be taken into consideration when designing a DLT solution, how it can be implemented and what are the next steps on our way to solving one of the most pressing issues for the future of financial services.

REGULATION AND RESULTING HIGH-QUALITY LIQUID ASSETS CHALLENGES

Four key financial rations

As the discussion around collateral mobility illustrates, even ten years after Lehman Brothers' collapse, the impact of the global financial crisis is still felt today. As a direct result of the crisis, the Basel Committee on Banking Supervision (BCBS) introduced a host of new regulations to promote global financial stability by strengthening the capital and liquidity positions of the banking industry. These regulations were implemented through the introduction of global minimum standards, including the following four key financial ratios:

1. Capital ratio
2. Leverage ratio
3. Net stable funding ratio (NSFR)
4. Liquidity coverage ratio (LCR)

The capital ratio measures the riskiness of a bank balance sheet by comparing a bank's capital position to the amount of risk-weighted assets (RWAs) on its balance sheet while the leverage ratio is risk-agnostic and simply measures a bank's capital position relative to the total size of assets on its balance sheet. NSFR represents a bank's available stable funding (ASF) relative to its required stable funding (RSF) over a one-year time horizon, and LCR reflects a bank's ability to weather short-term liquidity shocks by comparing the stock of high-quality liquid assets (HQLA) to the expected liquidity outflows during a 30-day stress period.

Managing ratios and generating sufficient return on capital

Managing the big four regulatory ratios is certainly not an easy task for the banking industry, particularly when we add a fifth crucial metric to the mix, and that is return on bank capital for investors. While there is no denying the validity of the stated policy goals of post-crisis bank regulations, there is also no denying the fact that the implementation of these regulations has created a major dragon bank earnings.

Common sense dictates that the greater a bank's capital and liquidity buffers, the safer the bank, but these buffers also come at a great cost. Therefore, it is of utmost importance for banks to manage these capital and liquidity requirements as cost-efficiently as possible. Many banks have created centralised financial resource management teams to help manage the key regulatory ratios in a holistic fashion across their organisations.

This is largely due to the fact that it is very difficult to manage the ratios in isolation. They often interact in opposing fashion, and an action to improve one ratio may have a knock-on effect of adversely impacting another one.

In terms of financial resource optimisation, the key goal for a bank's treasury/chief financial officer (CFO) function is to maximise the bank's liquidity position as measured by NSFR and LCR relative to its risk-based capital position (as measured by the capital ratio) and its non-risk-based capital position (as measured by the leverage ratio). In the following analysis, it is important to understand the concept of binding financial resource constraint as it relates to the capital ratio and the leverage ratio.

Binding constraint: Leverage or risk?

Figure 1, borrowed from the October 2018 BCBS Basel III monitoring report, provides a good visual representation of the status of bank capital ratios and leverage ratios (as of December 2017). The vertical dotted line represents the Basel III leverage ratio minimum of 3 per cent, and the horizontal dotted line represents the Basel III Tier 1 capital ratio target of 8.5 per cent.

The diagonal line represents those points where the Tier 1 risk-based capital requirement is equal to the Tier 1 capital requirement for leverage. The binding constraint for banks plotted above the diagonal line is the Basel III leverage ratio; for those plotted below, it is the Basel III Tier 1 capital ratio.

Banks aiming to maximize the capital efficiency of their regulatory capital will target to right size the amount of risk-weighted assets relative to the size of their overall balance sheet. This holds true even for banks that meet the minimum regulatory capital requirements but are plotted either above or below the diagonal line. Banks above the diagonal line have spare risk capacity, and banks below the diagonal line have spare leverage capacity. To take this analysis a step further, a balance-sheet-constrained bank (above the diagonal line) would be more inclined to rely on liquidity management tools that would not further exacerbate its binding leverage constraint. Here, the importance of effective HQLA management comes into play, particularly for European banks, which tend to be more balance-sheet-constrained than their US counterparts.

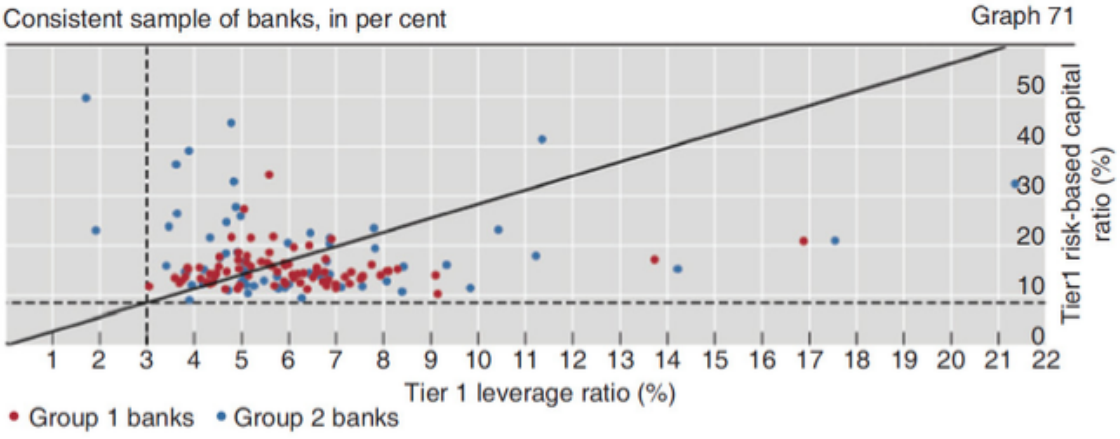


Figure 1 Fully phased-in initial Basel III Tier 1 risk-based capital and leverage ratios
Source: Basel Committee on Banking Supervision, October 2018, Basel III Monitoring Report.

SIZE MATTERS: THE COST OF HOLDING EXCESS HIGH-QUALITY LIQUID ASSETS

The aggregate HQLA portfolio managed by the global banking industry is large, complex and costly. According to the most recent Basel III Monitoring Report[1], the banking industry held €10.8 trillion of HQLA as of December 2017, of which €2.7 trillion represents HQLA held in excess of the LCR minimum prescribed by regulation. The cost of holding HQLA on balance sheet is a function of the negative carry of sourcing the HQLA and the cost of capital for holding the HQLA on balance sheet. For the purposes of this analysis, we apply a conservative estimate for the cost of holding HQLA on balance sheet of 50 basis points. This is nonetheless a significant cost — every basis point has a significant impact on the banking industry's bottom line. For example, applying 50 basis points to the aggregate €10.8 trillion HQLA portfolio held by the global banking industry equates to an overall cost of approximately €54bn per year (€10.8 trillion annualised at 50 basis points).

CAUSES BEHIND EXCESS AND TRAPPED LIQUIDITY

If HQLA portfolios are so expensive to manage, one might ask why the banking industry is holding €2.7 trillion more HQLA than is prescribed by LCR regulations? After all, the estimated cost of holding this excess is significant, at approximately €13.5bn per year (€2.7 trillion annualised at 50 basis points). One possible answer is that this excess is caused by inefficient incumbent settlement systems and practices that cause banks to run larger than required liquidity buffers and/or trap liquidity that could otherwise be mobilised and monetised. The securities lending collateral upgrade market has long played an important role in HQLA portfolio management because of the balance sheet efficiency achieved by exchanging non cash collateral rather than exchanging cash for collateral.

A collateral upgrade transaction is a non cash collateral exchange between two market participants who swap two pre-defined baskets of securities— one HQLA, and the other non-HQLA — for a pre-defined tenor and fee.

A CORE PROBLEM WITH EXISTING MARKET INFRASTRUCTURE

While the collateral upgrade market provides market participants with balance sheet efficiency, the incumbent securities settlement infrastructure suffers from the inability to provide an industrial-strength solution for atomic delivery versus delivery (DvD) of baskets of securities. This refers to instantaneous exchange of one basket versus another basket across a fragmented securities settlement system. In Europe alone, there exist over 40 central securities depositories, which in turn are connected to a myriad of custodians and triparty agents. Current market practice is to settle collateral upgrade transactions in one of two ways: two free-of-payment (FoP) settlement instructions or two delivery versus payment (DvP) settlement instructions. Unfortunately, both settlement practices have drawbacks. The former generates intraday credit exposure, and the latter generates intraday liquidity exposure. Whether a bank is leverage ratio constrained or capital ratio constrained determines the capital impact (1) due to increased RWA exposures caused by timing mismatches of the FoP deliveries or (2) due to the requirement to run higher intraday liquidity buffers to support DVP deliveries.

A NEW ORDER OF THINGS IS NEEDED

The incumbent securities settlement infrastructure is simply not fit to support the liquidity management requirements of the modern-day bank treasurer/CFO function. The current fragmented securities settlement infrastructure is riddled with operational bottlenecks that impede collateral fluidity and increase cost.

[1]Basel Committee on Banking Supervision, October 2018, 'Basel III Monitoring Report', available at: https://www.bis.org/bcbs/publ/ (accessed 10th April, 2019)

A new order of things is needed — a new technology-based solution to improve collateral fluidity and help market participants manage their HQLA portfolios more effectively and cost-efficiently. Distributed ledger technology may enable such a solution in a way that existing financial market infrastructures cannot.

HOW CAN DISTRIBUTED LEDGER TECHNOLOGY ADDRESS THE NEED FOR IMPROVED COLLATERAL MOBILITY?

How can distributed ledger or blockchain technology help the securities lending market to solve the issues caused by today's securities settlement infrastructure? What are its benefits and what specifications are needed? Let's have a closer look at some key aspects, such as interoperability and collateral fluidity, record of ownership, automatable processes, operational risks and regulatory reporting. While there are different enterprise blockchain platforms in production today, we will focus on the Corda platform. Corda is a blockchain platform developed by software firm R3 and built from the ground up following a functional and non-functional requirements-gathering process alongside R3's consortium of more than 100 global banks. Corda differentiates from other enterprise blockchain platforms in its peer-to-peer approach to data privacy, the use of financial industry standard tools to ease integration and its coordinated approach to interoperability between Corda networks.

INTEROPERABILITY AND FLUIDITY OF COLLATERAL MOVEMENT

Generally, a lack of interoperability between different products and institutions' systems is at the heart of many of the complexities across capital markets today, which manifest as operational costs, trapped assets and risk management difficulties. Can distributed ledger technology bridge these gaps between disparate existing market infrastructures?

Phase 3 of Project Jasper, an initiative by Bank of Canada, Payments Canada, TMX, Accenture and R3, demonstrates the potential[2]. The project used Corda to 'loosely couple' existing financial market infrastructures. It allowed for the integration of the Canadian TMX equity settlement system with the Payments Canada interbank cash-payment settlement system. Tokenisation of both cash and equities on a shared ledger resulted in new types of asset interactions during DvP settlement relative to the currently siloed clearing and depository services (CDS) system and large value transfer system (LVTS). DvP settlement was able to occur without a large increase in the number of LVTS transactions. This was achieved without a rebuild or tight integration of the current systems. It was also accomplished while maintaining each system's separate governance (ie without compromising the control of either authority over its system or assets. One can see how extending this approach of bridging existing market participants to the various central securities depositories across Europe could enable more seamless asset exchange on ledger, without requiring the 'big bang' creation of a new financial system from scratch. These interoperability principles can similarly be applied to the HQLA market, both across Europe and perhaps eventually globally. DLT can enable greater collateral fluidity than is in place in today's market infrastructure through flexible and live change of ownership using participant nodes. Cryptocurrencies demonstrate that resilient 24/7 markets and seamless, instant transfer of digital assets can occur across a global market. Distributed bookkeeping, where owners have direct control over those assets via their own nodes, can increase the speed and flexibility of asset movement relative to existing market infrastructures.

IMPROVED RECORD OF OWNERSHIP

Enterprise blockchains allow mutually distrusting entities to form and maintain agreement on relevant facts. These shared facts may represent cash, assets and contracts across a broad range of industries. A blockchain can facilitate record keeping and reconciliation on ledger, providing transparency and trusted records for network participants.

[2] 'Jasper phase III', available at: https://www.payments.ca/sites/default/files/jasper_phase_iii_whitepaper_final_0.pdf (accessed 10th April, 2019)

Having a shared record of ownership between counterparties would allow counterparty nodes to ensure they have the same information and more reliably check transaction status with fewer manual confirmations with counterparties. This change could have a significant impact on liquidity managers' ability to manage their HQLA positions.

AUTOMATABLE PROCESSES AND SMART CONTRACTS

Automatable processes on a shared blockchain network can enable parties to better and more directly coordinate transactions among themselves. A transaction could be executed automatically between all relevant counterparties when certain conditions are met. This application could allow more flexibility in timing and the ability of each party to transact and reduce operational dependencies on a single central operator, allowing individual nodes to perform advanced calculations in concert.

1. **Atomic transactions for delivery versus delivery**
   Transactions can be created that make changes to multiple assets simultaneously enforced by shared code on ledger. They can be designed so that either all changes occur or the transaction fails entirely. In an HQLA setting, a wide range of assets represented on ledger can enable new types of interactions. For example, different baskets of securities can atomically be exchanged for other baskets if particular pre conditions, such as delivery of other securities from another counterparty, are met.

2. **Timing certainty**
   Increased certainty of execution may improve trust in the timings of some transactions. Transfers of assets could occur by the second and could be guaranteed, according to the rules of the network, to self-execute at a predetermined time.

3. **Advanced decentralised netting algorithms**
   Volume increases on any type of capital markets platform naturally cause counterparties to examine how they can more efficiently interact and net with each other. As liquidity on a blockchain platform improves, advanced algorithms for decentralised netting may be implemented. Like the transactions described above, these algorithms will either be executed entirely or not at all. With an enterprise blockchain, assets can be held in temporary escrow on ledger with complex multilateral interactions hard-coded onto the ledger[3].

4. **Default processes**
   As the platform matures, more complicated processes such as complex defaults could be coded onto the ledger, leading to the automatic unwinding of positions in a default scenario. This increased transparency may improve trust among participants, which may lead to market participants being more willing to maintain operations and transaction volumes in times of stress.

INCREASED RESILIENCE AND REDUCED OPERATIONAL RISKS

Moving from a centralised to a more decentralised architecture can reduce operational load and risks. Even the most advanced centralised payment or capital market systems have occasionally failed and are susceptible to outages. As a blockchain network is a web of counterparty nodes, there is no central entity or utility that can 'go down for maintenance' or 'get hacked'.

Cryptocurrencies architectures achieve resilience by having the entire copy of the ledger of transactions replicated on every node. In an enterprise setting, market participants will not allow such data propagation — a resilience predicated on having our counterparties hold our transactional data is impractical.

[3] 'A proposal for a decentralized liquidity savings mechanism with side payments', available at: https://www.r3.com/wp-content/uploads/2018/06/proposal_dlsms_r3.pdf (accessed 10th April, 2019)

In an enterprise setting the resilience instead comes from reduced centralisation of the operational burden and risks. With Corda, there is not a single market infrastructure or participant with an objective view of all trades or even with all the information. The state of the ledger is subjective, not objective — nodes only have a subjective view of their relevant transactions with their relevant counterparties. Additional resilience is achieved through industry standard backups held by each firm.

REGULATORY REPORTING

New financial market infrastructure using distributed ledger technology can also facilitate the regulatory compliance for market participants. This is particularly meaningful at a time when large financial institutions are under increased scrutiny, and reporting demands are increasing. Enterprise blockchains can enable real-time ledger visibility in order to provide observer and regulatory nodes with access to certain transaction details. This does not necessarily mean that all market participants will share all information with regulators. There can be selective reporting of an appropriate amount of information agreed upon by the participants in the blockchain network.

THE HQLA^X TARGET OPERATING MODEL: A VIABLE SOLUTION

Taking advantage of this DLT approach, the HQLA^X target operating model, jointly developed by HQLA^X and Deutsche Börse Group, sets out a new vision for handling collateral: unlike in traditional settlement, there will be no actual movement of securities between custody accounts. Instead, tokens will be transferred while the underlying securities will be kept off DLT and remain static. The ledger will be a closed system where tokenised assets can interact. Market participants will be able to connect to it by using the existing ecosystem (eg. Deutsche Börse Group systems for the trade and post-trade processing layers). This allows them to step into the DLT world but to do so at their own pace. The aim of all partners was to build a custody-agnostic securities lending solution on R3's Corda blockchain platform. The design of the HQLA^X operating model was driven by practitioners from leading global banks. The basic idea from the very beginning was for this platform to be 'designed by banks to maximise the value for banks'. The overarching principle in the design process was to provide a clear path to market adoption by minimising hurdles in the onboarding process. The key message from the banks throughout the design phase was to enhance collateral fluidity by applying new technology to complement legacy collateral management market infrastructures — and to do so without a 'big bang' requirement for banks to change the way they are interacting with their triparty agents and custodians. Figure 2 outlines the joint HQLA^X operating model; it also illustrates the intersection of new technology with legacy infrastructures. The operating model is based on the creation of digital collateral records (DCR) to facilitate more efficient ownership transfers of baskets of securities held for safekeeping at existing triparty agents and custodians. The operating model has four main layers:

1. The trade layer is provided by Deutsche Börse Group; market participants will connect to HQLA^X via the well-established Eurex Repo trading platform to agree to terms of trade for bilateral securities lending transactions for upgrades/downgrades of baskets of securities documented by market-standard Global Master Securities Lending Agreements (GMSLA).

2. The DCR layer is operated by HQLA^X and utilises R3's distributed ledger technology, Corda, to create the registry for the master source, or 'golden record', of truth of ownership for the baskets of securities.

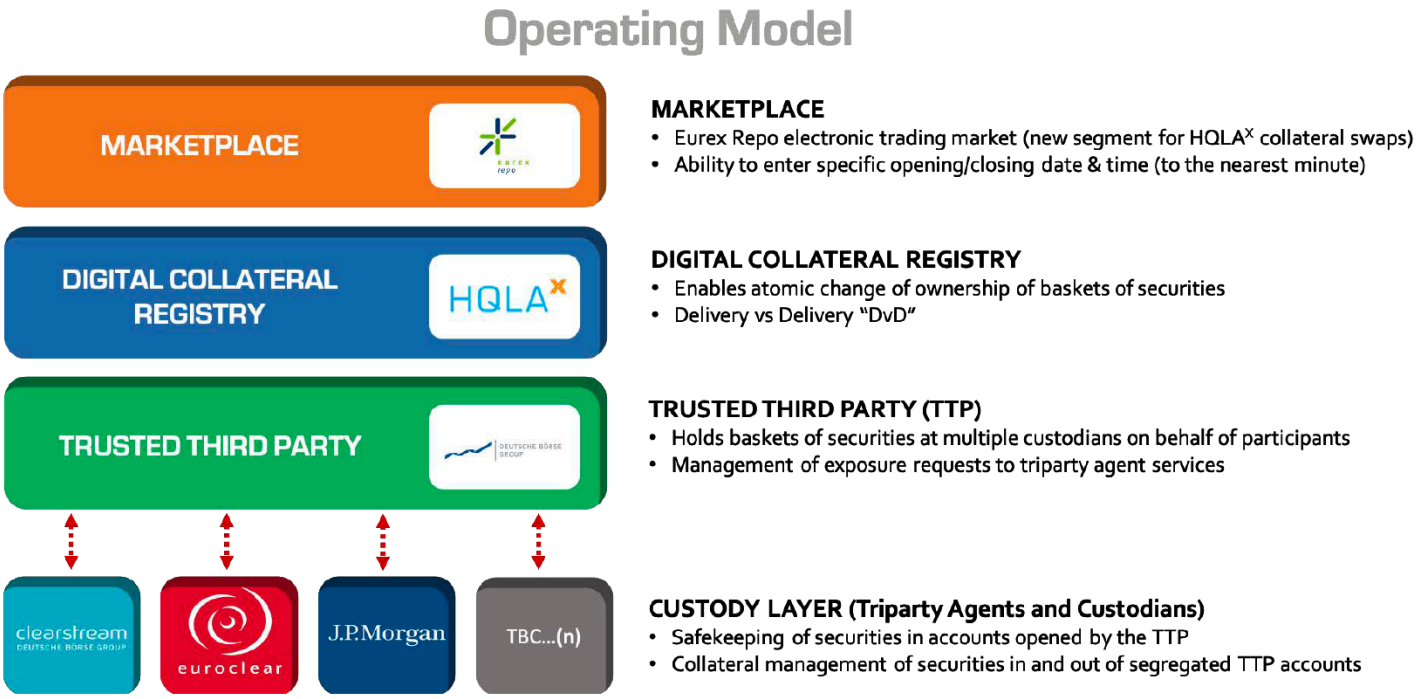
3. The trusted third party (TTP) layer will be operated by an entity of Deutsche Börse Group. It represents the interface between the DLT and legacy securities infrastructure. The TTP facilitates the tokenisation process by opening accounts at triparty agents and custodians and linking the baskets to newly created DCRs. The TTP layer will also police the rights and obligations for the DCR creator and the current DCR holder and provide reporting for the inventory of the baskets.

4. The custody layer will be delivered by existing triparty agents and custodians to provide 'business as usual' collateral management and safekeeping services via the existing market infrastructure.

IMPLEMENTATION CONSIDERATIONS

Implementing a new technology like the HQLA^X operating model is not without its challenges. The benefits of the technology — enabling a highly liquid, transparent and efficient market — had to be weighed against the legal, contractual and technical hurdles — especially as it is hardly operating in a greenfield environment. The financial industry is a good example for the fact that in well established industries innovations typically face significant entry barriers. As mentioned above, there is a high degree of regulation and existing processes. Add to that the fact that underlying technologies are very sticky, particularly when it comes to large-scale liquidity/transaction ecosystems, which involve participants, market infrastructures and service providers alike.

Therefore, it does not come as a surprise that unfolding the benefits of a DLT solution for HQLA almost mandatorily requires seamless integration into today's legal and regulatory regimes, market infrastructures, information technology (IT) systems and operational processes. For each of these areas a pragmatic and appropriate approach needs to be defined to ensure that a solution including DLT can be introduced while keeping the efforts required for the initial adaptation as low as possible. At the same time, these approaches have to keep the door open for further adaptation steps that will — over time — allow the full integration and unfolding of DLT (ie establishing real decentralised solutions across all players and stakeholders of the industry).



http://hqla-x.com/overview

LEGAL AND REGULATORY CONSIDERATIONS

Although new and more flexible DLT related regimes are starting to develop — at least in some countries, it is still early days. It can be expected that it will take a number of years before these DLT-regimes are well established and will therefore be able to attract a substantial part of the business flow. The reality is also that up until now there is no large-scale DLT application up and running in the financial industry. Hence, it is key to initially work with existing legal and regulatory frameworks. This means that DLT will initially be provided as a 'not legally loaded' technical solution. This also entails the creation of a TTP, which will ensure that the token shown on the DLT is a correct representation of a basket of securities held at the custodian level. The TTP will operate under well-established legal and regulatory frameworks and licenses. Therefore, it does not come as a surprise that in the dialogue with the regulators and authorities relevant for the HQLA^X target operating model, a lot of effort has gone into the analysis of the DLT model, the technical setup, the roles and responsibilities of all involved parties and the risk assessment, just to mention a few. In parallel, external legal councils have validated the proposed model. So far, the dialogue with the regulators and authorities — particularly in Luxembourg — has been very constructive and will continue in the coming months and years, aiming to go beyond the so-called minimum viable product (MVP) and further enhance the model.

MARKET INFRASTRUCTURES AND PARTICIPANTS

When it comes to onboarding market participants, the situation is very similar. The best initial starting point is to leverage the existing market infrastructure offering, which is already connected to or used by most market participants. On the trading side, this means leveraging a well-established trading venue; on the custodian side, it means connecting to widely used triparty agent services. The proposed model is, in principle, open to any custodian, allowing for the largest possible reach to relevant HQLA and non-HQLA assets.

Based on the feedback from partner banks it has become clear that the first priority shall be connecting major custodians with comprehensive triparty agent services whereby a minimum of two is required for MVP. Clearstream and Euroclear are connected as the first two custodians and JP Morgan is the third custodian to join the platform. Detailed discussions with further custodians are being held, and it is well understood that the proposed model is of major interest to very important clients of these custodians. It has been identified as significant that the allocation of relevant HQLA and non-HQLA happens in an automated and seamless fashion. Going forward, HQLA^X and Deutsche Börse Group are committed to connect further custodians, mainly following the demand of the customers who will connect to the model over time.

INFORMATION TECHNOLOGY SYSTEMS AND OPERATIONAL PROCESSES

Integrating 'on-premise DLT infrastructures' is a challenging task for many market participants. This is not only due to investments and resources required to initially establish such an infrastructure but also due to the need to adapt existing work flows and operational processes. This is why it is important to first make the creation of an on-premise DLT infrastructure an option rather than a pre-condition for participating in the model. This also means that connectivity to the model and therefore information/reporting flows have to be made available through existing means (eg Society for World-wide Interbank Financial Telecommunication (SWIFT) messages. Such an approach allows market participants to migrate to the DLT infrastructure individually at their own pace while already being fully connected to the overall model and therefore reaping the benefits of seamless mobilisation of securities across custodians.

NEXT STEPS: THE MINIMUM VIABLE PRODUCT AND BEYOND

Since the announcement of HQLA^X' strategic cooperation with Deutsche Börse Group in March 2018, many milestones have been reached, including the execution of live transactions and launch of the platform in Q4 2019.

SCOPE OF THE MINIMUM VIABLE PRODUCT

The initial minimal viable product (MVP) is limited to delivery versus delivery (DvD) ownership transfers of baskets of securities held for safe-keeping at leading custodians/triparty agents in Europe, but longer term plans include expanding the product and jurisdictional footprint through collaboration with other technology platforms and service providers.

WHAT IS NEXT — THE ROAD AHEAD

With a view to further development, the vision is to evolve the HQLA^X operating model across multiple dimensions.

One very interesting opportunity will be to expand the scope of the digital collateral records to include digital cash records, as well as other asset classes such as trade receivables, precious metals, commodities. This could be realised by tokenising the assets directly on the HQLA^X operating model or through interoperation with other DLT tokenisation applications. Another opportunity is to leverage the HQLA^X operating model to facilitate more efficient pledging of collateral to satisfy margin requirements for counterparty credit exposure at central clearing counterparties and/or bilateral counterparties.

These are some of the aspects to be considered for the future. But even in its basic form, the HQLA^X target-operating model is a great example of how the advancing evolution of DLT may yield promising solutions to some of the financial industry's most pressing challenges, such as collateral mobility.

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