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Frequently Asked Questions on DLT and blockchain in bond markets

First published by the International Capital Market Association (ICMA) in September 2022.

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Acknowledgements

Introduction

Distributed ledger technology (DLT) and blockchain represent an exciting new frontier in the evolution of fixed income securities issuance and trading. Several institutions including the World Bank, European Investment Bank, as well as financial and corporate issuers around the world have issued DLT-based debt instruments.[1]

These instruments, involving the use of DLT or blockchain in one form or another, promise to bring about significant efficiencies in the automation of post-trade and asset-servicing processes, with operational efficiencies such as streamlining issuance flows, identifier creation, settlement cycle compression, and payments automation.

However, there appears to be limited knowledge and understanding amongst market stakeholders of the nature of DLT-based bonds, the implications for issuance and settlement processes, market infrastructures and intermediaries, and underlying technologies.

This set of Frequently Asked Questions ("**FAQs**") developed by ICMA, seeks to raise market awareness by clarifying some of the fundamental questions related to DLT and blockchain in bond markets, in a manner that is easy to understand. Where feasible, the FAQs rely on existing definitions and terminology used by central banks, multilateral financial institutions or regulatory bodies to ensure consistency and avoid any ambiguity that may arise from the introduction of new concepts or terms.

Given the variety of DLT bonds and the various issuance structures, this set of FAQs does not attempt to be a comprehensive reference or prescribe specific approaches. Instead, it seeks to serve as an entry point for non-experts to gain a basic understanding of DLT bonds and their impact on capital markets.

The FAQs are intended to be a living document and will be updated and revised regularly to ensure they remain relevant to developments in the fast-evolving DLT bonds space.

1. What is distributed ledger technology? What is blockchain?

Distributed ledger: a collection of data that is spread across multiple nodes [ie computers] and whose consistency is enforced by means of a distributed ledger technology (see next).

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[1] See ICMA's FinTech tracker of DLT-based bond issuance, trading, settlement, distribution as well as repo and securities lending transactions.

(FSB: Decentralised financial technologies: Report on financial stability, regulatory and governance implications, 2019)

Distributed ledger technology (DLT): a means of recording information through a distributed ledger. These technologies enable nodes [ie computers] in a network to propose, validate, and record state changes (or updates) consistently across the network's nodes – without the need to rely on a central trusted party to obtain reliable data. (FSB: Decentralised financial technologies: Report on financial stability, regulatory and governance implications, 2019)

Blockchain: a form of distributed ledger in which details of transactions are held in the ledger in the form of blocks of information. A block of new information is attached into the chain of pre-existing blocks via a computerised process by which transactions are validated. (FSB: Crypto-asset markets: Potential channels for future financial stability implications, 2018)

2. What are virtual assets, crypto assets and (native) digital assets?

The following definitions are based on official sector publications or recommendations, notably by the Financial Action Task Force (FATF), the Financial Stability Board (FSB) and the European Central Bank (ECB). Some of the below terms are sometimes used interchangeably and definitions may vary depending on the jurisdiction and perspective, for a example, whether from a regulated, financial markets angle, a crypto-market perspective or through a broader anti money laundering (AML) lens.

Virtual asset: a digital representation of value that can be digitally traded, or transferred, and can be used for payment or investment purposes. Virtual assets do not include digital representations of fiat currencies, securities and other financial assets that are already covered elsewhere in the FATF Recommendations. (FATF recommendations, Updated March 2022)

Crypto-asset: a type of private asset that depends primarily on cryptography and distributed ledger or similar technology as part of their perceived or inherent value. These are also referred to as cryptocurrencies. (FSB: Crypto-asset markets: Potential channels for future financial stability implications, 2018). The EU's proposed Markets in Crypto-Assets (MiCa) regulation defines a crytpo-asset more broadly as "a digital representation of value or rights which may be transferred and stored electronically, using distributed ledger technology or similar technology" (Art. 3-1 (2)). Examples include Bitcoin, Ether, Tether, Algorand and Stellar, amongst others.

Digital asset: a digital instrument that is issued or represented through the use of distributed ledger or similar technology. This does not include digital representations of fiat currencies. (FSB: Assessment of Risks to Financial Stability from Crypto-assets, 2022)

Native digital asset: a security that is originally issued, recorded and kept in a DLT-based system. (ECB: The use of DTL in post-trade processes, 2021)

3. What is a Central Bank Digital Currency (CBDC)?

A Central Bank Digital Currency (CBDC) is a digital form of central bank money eg a digital banknote which would be a direct liability of a central bank. CBDC designed for use by individuals and businesses is also referred to as "retail CBDC" (rCBDC) or "general purpose CBDC". A CBDC for financial institutions is referred to as "wholesale CBDC" (wCBDC) and could be used to settle financial transactions.

Source:
Federal Reserve, FAQs, Currency and Coin
BIS Innovation Hub work on central bank digital currency

ICMA members note that regulators and central banks globally have adopted different definitions of central bank digital currency. For example, the use of DLT being a criterion for some but not for others.

Further reading:
Wholesale central bank digital currency experiments with the Banque de France, November 2021.
BIS Innovation Hub, the Swiss National Bank (SNB), SIX: Project Helvetia: A multi-phase investigation on the settlement of tokenised assets in central bank money.

4. What are so-called stablecoins?

A stablecoin can be described as "a crypto-asset that aims to maintain a stable value relative to a specified asset, or a pool or basket of assets". The underlying mechanics of so-called stablecoins may vary and include:

- "Asset-linked stablecoins" which "purport to maintain a stable value by referencing physical or financial assets or other crypto-assets". Examples include Tether, USD Coin, or Euro Coin.
- "Algorithm-based stablecoins" which "purport to maintain a stable value via protocols that provide for the increase or decrease of the supply of the stablecoins in response to changes in demand. Examples include DAI, and TerraUSD (which collapsed in May 2022[2]).

However, the FSB notes that "stablecoin issuers are not subject to a consistent set of standards regarding the composition of reserve assets backing the stablecoin, and there is a lack of consistency in disclosure practices among stablecoin issuers"[3], amongst other risks and vulnerabilities. (FSB: Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements, Final report and High-Level Recommendations, 2020)

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[2] Terra crisis fans regulatory concerns over $180bn stablecoin market, Financial Times, 11 May 2022, available at: https://www.ft.com/content/48d82c7a-495f-4d5e-a87a-a56bea58e760
[3] FSB: Assessment of Risks to Financial Stability from Crypto-assets, 16 February 2022, p. 11

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Further reading:
ECB: The expanding functions and uses of stablecoins, published as part of the Financial Stability Review, 2021
G7 Working Group on Stablecoins, IMF, BIS-CPMI: Investigating the impact of global stablecoins, 2019

5. What are DLT bonds?

Whilst there is no single, widely accepted definition, the term "DLT bonds" is understood to be an instrument whose register of ownership is stored using DLT (see Q&A 1).[4]

While the nature of DLT bonds continues to evolve, two different models can be distinguished:

a) Bonds issued natively onto a distributed ledger or blockchain. Such securities are held and traded through the DLT or blockchain environment, ie outside the traditional market infrastructure. The creation and existence of such bonds will be specific to each transaction and will likely differ across transactions. This type of instrument could also be referred to as a "native digital asset", "security token" or "bond token" depending on the deal structure.

    Examples include:
    - SIX Group (CH1142754337, 0.125%, 27/11/2026). See press release.
    - EIB (FR0014003521, 0%, 28/04/2023). See press release.
    - World Bank "BOND-I" (AU0000020612, 2.20%, 28/08/2020). See press release.

    See further examples on ICMA's tracker of new FinTech applications.

b) Traditional bonds which are immobilised from an operational perspective ie held by an (I)CSD or custodian and represented through a token on a blockchain or DLT network (see also Q&A 6). Whether a token holds legal value or not depends on the specific jurisdiction and the underlying operational configuration. This type of instrument could be referred to as a "tokenised bond", or "non-native security token".

    Examples include:
    - Deutsche Börse/HQLAx platform for collateral swaps in the securities lending market, where securities are not physically moved between the collateral agents but change in ownership is recorded on a DLT-based register. See further information here.

In both cases, bonds can be referred to as tokenised assets. Critical bond information including, but not limited to, DLT bond identifiers, issuance amount and maturity, coupon,

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[4] From an IT perspective, a DLT or blockchain system will need to satisfy a number of technical requirements, such as consensus mechanisms to validate transactions, level of distribution, and data structure, amongst others, to be classed as such. ICMA's DLT Bonds Working Group may consider elaborating on such criteria at a later stage.

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features and corporate actions, identification of approved operators, transfer conditions and other reference data can be embedded into its code-based representation.

DLT bonds are sometimes also referred to as blockchain or digital bonds. While DLT and blockchain are used interchangeably, there is no market consensus on the use of the term "digital bond", which can be used loosely to refer to any debt security issued in dematerialised, ie electronic form (see also Q&A 6) irrespective of the use of DLT or blockchain.

Further reading:
ECB: The use of DLT in post-trade processes, 2021
OECD: The Tokenisation of Assets and Potential Implications for Financial Markets, 2020

6. What is the difference between between DLT bonds and traditional bonds, and how they are held?

Traditional bonds are typically held in either physical or dematerialised (account-entry only) form, through a series of intermediaries linking the issuer and the ultimate noteholder. They may also be held by noteholders directly in physical form, although this is now rare[5]. By way of summary:

- *Physical*: The entitlement to bonds issued in paper-based form, also referred to as "definitive", "materialised" or "certificated", is represented by possession of a physical instrument, such as a bearer bond. Historically, Eurobonds issued under English law and held for the two ICSDs (Euroclear Bank and Clearstream) were in "definitive form".

- *Dematerialised:* The entitlement to dematerialised bonds such as registered bonds is represented in account-entry records and transfers made by book entries but there is generally no physical instrument, also referred to as "uncertificated bonds" in some jurisdictions. Dematerialised instruments are prevalent in most European jurisdictions. The examples referred to in Q&A 5 (a) fall in this category. Physical certificates can be issued to evidence title in dematerialised bonds, but it does not represent legal title itself.

- *Immobilised*: Physical bonds are now generally immobilised and issued in the form of a single physical instrument, referred to as a "global" instrument. They are held by a depository or nominee, and the ultimate entitlement to which is represented by the account-entry records and transferred by book entries in those records. This is typically now the case for most Eurobonds which are issued in physical form.

DLT instruments use DLT or blockchain to perform the role of the keeping of records and book entries. As noted above in Q&A 5, DLT or blockchain could be used to perform a similar role to the records in bearer or dematerialised bonds (and regardless of immobilisation), depending on the legal structure adopted. Note the term "immobilised" in Q&A 5 relates to

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[5] It is commonplace however for bond documentation to be drafted in a manner that assumes the bonds are held in definitive form, even if this isn't the case in practice. A mechanism for exchanging interests in a global instrument for definitive instruments is often also included, designed to operate as a fallback in the event the clearing systems fail.

an operational, rather than a legal feature, and refers to a traditional instrument in its different forms described above, which is held or immobilised and represented through a token on a DLT network, where for example, change of ownership can be recorded.

Critically, a DLT bond is still a "bond", being ordinarily understood as a bundle of legal rights as between an issuer and holder, having enforceable existence and with the capacity to be traded. Whether DLT or blockchain can be used to perform some or all of the roles described above (including if the DLT or blockchain can ever be the "source" of the legal rights and obligations between issuers and holders) will be dependent on a mix of law and contract and each jurisdiction is likely to be different. This will have an impact on the future utility and functionality of DLT bonds. See further information on how law and regulation are adapted in key jurisdictions in ICMA's DLT Regulatory Directory

See annex 1 and 2 for a visual representation of how a traditional bond in immobilised form may be held compared to a DLT bond.

Some of the implications and benefits of a new blockchain- or DLT-based systems are outlined in Q&As 10 and 11.

7. How does DLT bond documentation generally differ from traditional legal bond documentation?[6]

In principle, the note itself as well as regulatory documentation such as a prospectus, are expected to be similar to that used in traditional bonds. However, provisions in the documentation for a DLT bond are expected to differ from traditional bonds in a few key respects, stemming from the differences in the legal structure of the bond and any related obligations of the issuer and its potential agent(s). Generally, the documentation of a DLT bond is expected to:

- Accurately reflect how the DLT bond is held from a legal perspective, as described in Q&A 6. This may necesstitate adapting or removing many of the provisions typically seen in traditional bond documentation as regards the legal form of the bonds – for example, the provisions regarding the bearer or registered form of the bonds.

- Accurately reflect the different issuance and lifecycle processes applicable to DLT bonds, as described in Q&A 11. This may necessitate adapting, removing or supplementing the provisions concerning how the DLT bond is safekept, as well as the way record keeping, payments and corporate actions functions are delivered. The roster of transaction parties (eg agents, registrars etc) acting in relation to a DLT bond may differ from a traditional bond, too. The documentation appointing those transaction parties may therefore need revision.

- Ensure that the terms and conditions of the DLT bond are compatible with the relevant DLT or blockchain-based system on which the bonds are recorded, ie ensure the terms and conditions can be converted into computational logic where needed. This is particularly true of DLT bonds that are digital native assets, where the terms

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[6] The term "documentation" refers to all documents needed in relation to a bond issuance, including prospectus or offering circular, contractual agreements between parties involved and others subject to local law and regulatory requirements.

and conditions may be coded onto a DLT or blockchain-based system in the form of a smart contract.

However, it should be expected that core functions of legal documentation, such as disclosure of the terms of the bonds, apply irrespective of the format of a security (whether DLT-based, physical, dematerialised or immobilised) and be performed subject to legal and regulatory requirements of the respective jurisdiction, as also noted above in Q&A 6.

8. What is a (digital) token?

There is no single definition of "token". The FSB defines a digital token as "any digital representation of an interest, which may be of value, a right to receive a benefit or perform specified functions, or may not have a specified purpose or use" (FSB: Crypto-assets: Work underway, regulatory approaches and potential gaps, 2019).

Figuratively speaking, a token can be considered a "digital envelope" that contains a set of information in codified form. In the case of a security, this may include the economic terms (eg issuance amount, coupon rate, redemption date, pre-approval and transfer conditions). In the context of crypto markets and financial markets, tokens or "digital envelopes" always exist in a blockchain or DLT network.

Further reading:
ISO 24165-1:2021(en): Digital token identifier (DTI) — Registration, assignment and structure — Part 1: Method for registration and assignment

9. Are DLT bonds always on a DLT network or blockchain? Are there access restrictions?

Yes, DLT bonds described above (Q&A 5) utilise DLT or blockchain. A DLT or blockchain network can either be permissioned (ie restricted access through a centralised operator) or permissionless (ie no restrictions on accessing the network).

10. Can DLT bonds reduce settlement risk?

DLT bonds in and of themselves do not reduce settlement risk but can be paired with digital or rather, programmed cash solutions. This allows for a DLT bond and digital cash such as a CBDC or tokenised cash to be exchanged simultaneously on the same DLT network, also known as "atomic settlement", or at least intraday. This DLT-based process is designed to minimise settlement risk through programming the transfers of digital cash and digital bonds only to occur together. In practice, there may be multiple DLT networks involved in this process. See also Q&A 11.

11. How might DLT bonds change the issuance and lifecycle process?

The issuance and lifecycle processes for DLT bonds are expected to be different to traditional bonds. This is because:

- For DLT bonds that are native digital assets (also referred to as "bond tokens" or "security tokens") the use of DLT or blockchain is expected to fundamentally change how the execution, clearing, safekeeping, record keeping, payments and corporate actions functions in respect of the bonds are delivered. This could have wide-ranging implications for the market participants that manage those functions in conventional systems, such as trading venues, clearing systems, depositories, custodians, agents, brokers and other intermediaries in the bond issuance and lifecycle processes.

- For tokenised bonds (also referred to as "non-native security tokens"), the use of DLT or blockchain to record the transfer of bonds can make existing processes more efficient by eliminating paperwork depending on the local law requirements, and facilitating more direct communication between issuers and investors.

In general terms, DLT or blockchain-based systems are expected to replace incumbent systems with 'on-chain' solutions, delivering efficiency improvements and cost savings, and potentially enhancing compliance with financial crime and data protection regulations. Atomic settlement or shortened settlement cycles (as outlined in Q&A 10) could eliminate trade fails associated to incorrect settlement instructions, increase transparency to ensure available inventory, enable real-time netting for positions held on the DLT or blockchain network, and reduce or eliminate counterparty risk.

12. How are payments made in relation to DLT bonds?

Payments for settlement, coupon payments or redemption payments of DLT bonds which are tokenised bonds can take place in the same way as traditional bonds. Payments related to DLT bonds that are native digital assets can, from a technical standpoint, take place in the same way as traditional bonds, or use any payment mechanism which is also in code-based or distributed ledger form, commercial bank money in tokenised form, so-called stablecoins representing value denominated in fiat currencies (see also Q&A 4), or central bank digital currency (CBDC, see also Q&A 3). However, in practice, access to central bank money is generally restricted to wholesale commercial banks and to enable DvP with a CBDC, investors would also require direct access to a CBDC, which is a policy choice rather than a technological question.

The below diagram illustrates the forms of payment that have been used in a Delivery-versus-payment (DvP) scenario in bond markets, based on ICMA's tracker of new FinTech applications:
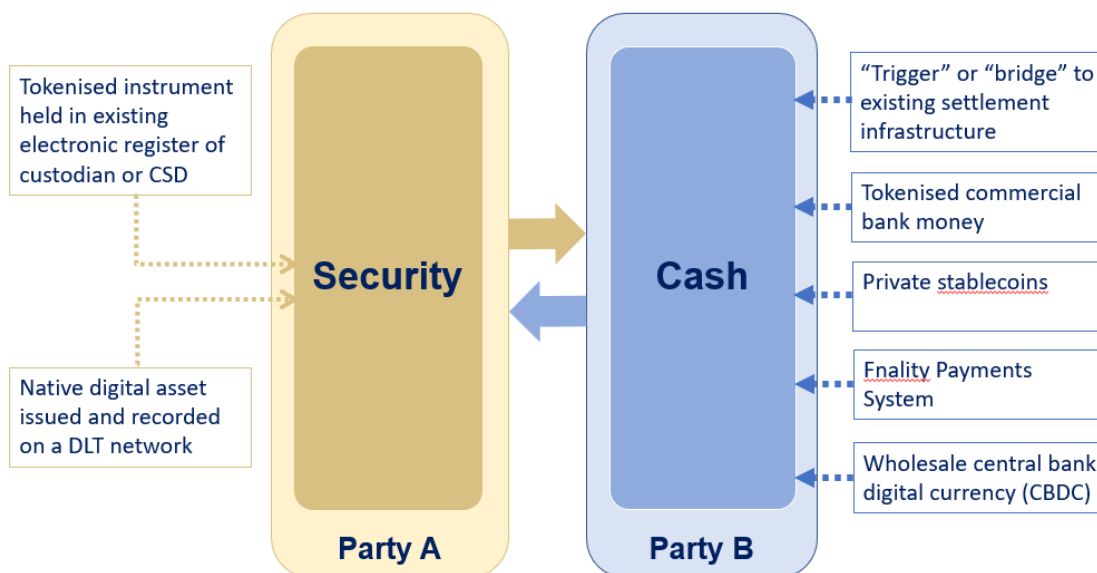
Examples include:

- JPM Coin, "a permissioned system that serves as a payment rail and deposit account ledger, that allows participating J.P.Morgan clients to transfer US Dollars held on deposit with J.P.Morgan within the system, facilitating the movement of liquidity funding and payments in right time"[7].

- Tokenisation of CHF held within an account with SIX Interbank Clearing (SIC) for settlement of DLT instruments on SIX Digital Exchange.[8]

- Fnality Payment Systems, formely known as "Utility Settlement Coin" (USC), which is backed by a consortium of banks and market infrastructures and seeks to provide a "a peer-to-peer digital cash asset to settle tokenised transactions with finality"[9].

13. What is the Common Domain Model (CDM) for repo and bonds, and how does this fit in with DLT bonds?

The CDM essentially enables IT systems to 'speak the same language'. It is a standardised, machine-readable and machine-executable blueprint for how financial products are traded and managed across the transaction lifecycle, initially developed by ISDA for derivatives.

As such, the CDM lends itself to DLT or blockchain applications where market particpants and their computer nodes in a DLT network can use the CDM to exchange and validate transaction

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[7] https://www.jpmorgan.com/onyx/coin-system.htm
[8] General Terms and Conditions, SIX Digital Exchange AG (GTC SDX) - Version 1 July 2022
[9] https://www.fnality.org/about-fnality

data when processing a repo transaction and related lifecycle events such as clearing or settlement processes, or changes of a repo rate.

See also CDM video explainer. Further information is available on ICMA's CDM webpage.

14. What is ICMA's Bond Data Taxonomy initiative for bond markets, and how does it support DLT bonds?

ICMA's Bond Data Taxonomy provides an agreed language to promote automation and reduce the risk of fragmentation across bond issuance, trading, settlement, and distribution. The BDT provides a standardised and machine-readable language of key economic terms of a bond (such as amounts, currency, maturity, interest), key dates (such as pricing, settlement) as well as other relevant information (such as governing law, ratings, selling restrictions) typically included within a term sheet.

The BDT is technology agnostic and is designed to be used both for traditional debt securities as well as DLT-based debt securities. Where relevant, the BDT also incorporates existing ISO data definitions and formats. The BDT's XML files can be integrated into a broad range of applications (including Excel, databases, front and back office systems, APIs, to token standards such as ERC-20 or other token standards), fostering interoperability between traditional bonds and DLT bonds as well as issuance, trading and lifecycle events.

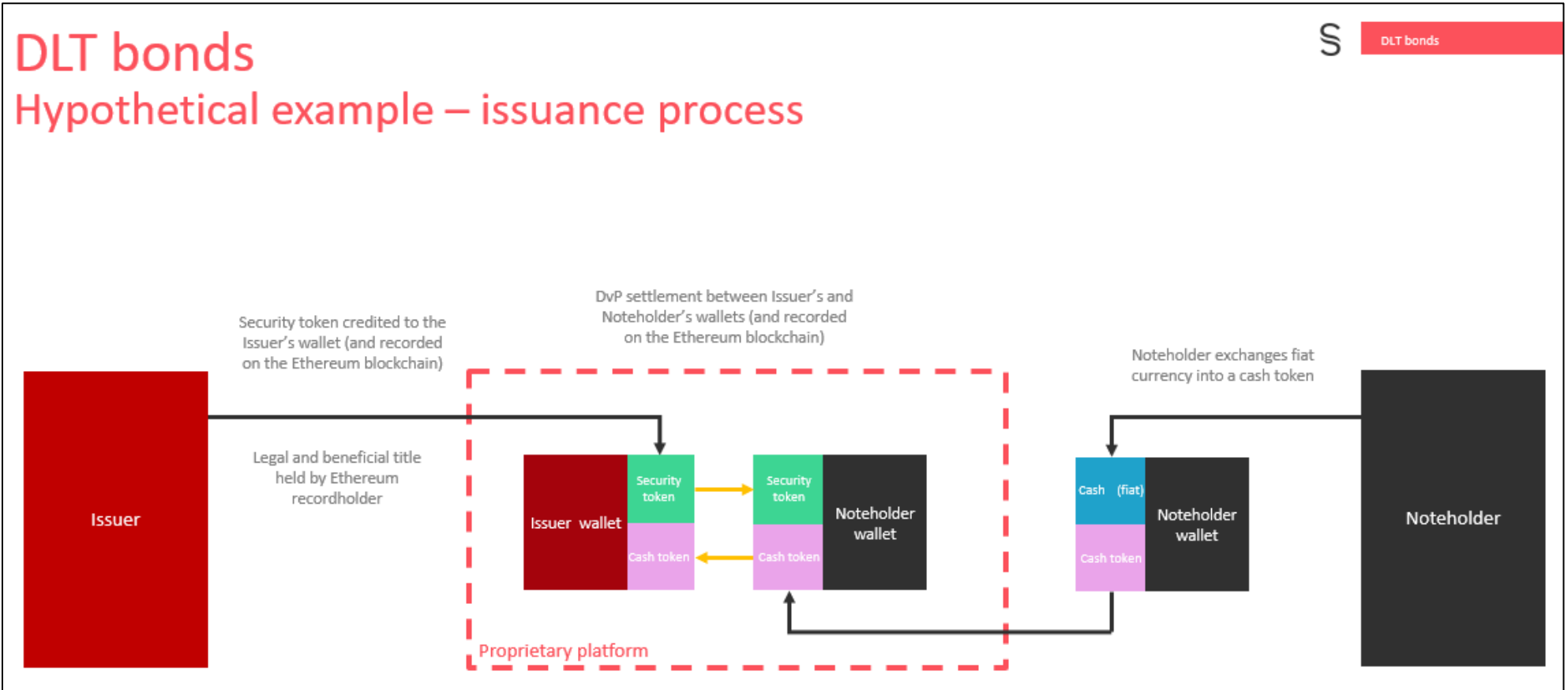**Co-author & Editor:**
Gabriel Callsen, ICMA
gabriel.callsen@icmagroup.org

Appendix 1:
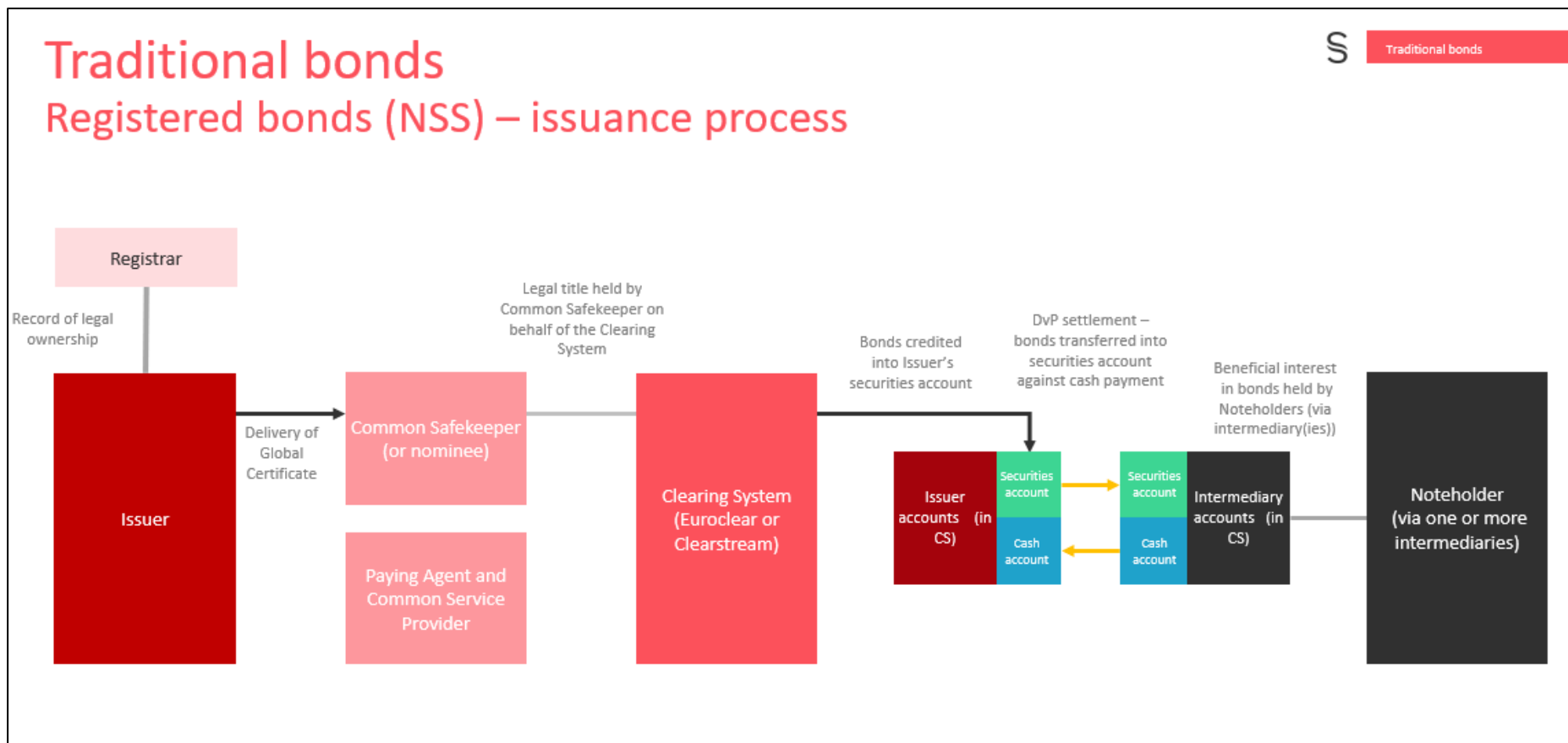
Source: Simmons & Simmons LLP

Appendix 2:

Source: Simmons & Simmons LLP