LUXEMBOURG: THE EPICENTER OF THE TOKENISATION ERA

A COMPLIANCE FRAMEWORK FOR TOKENISATION

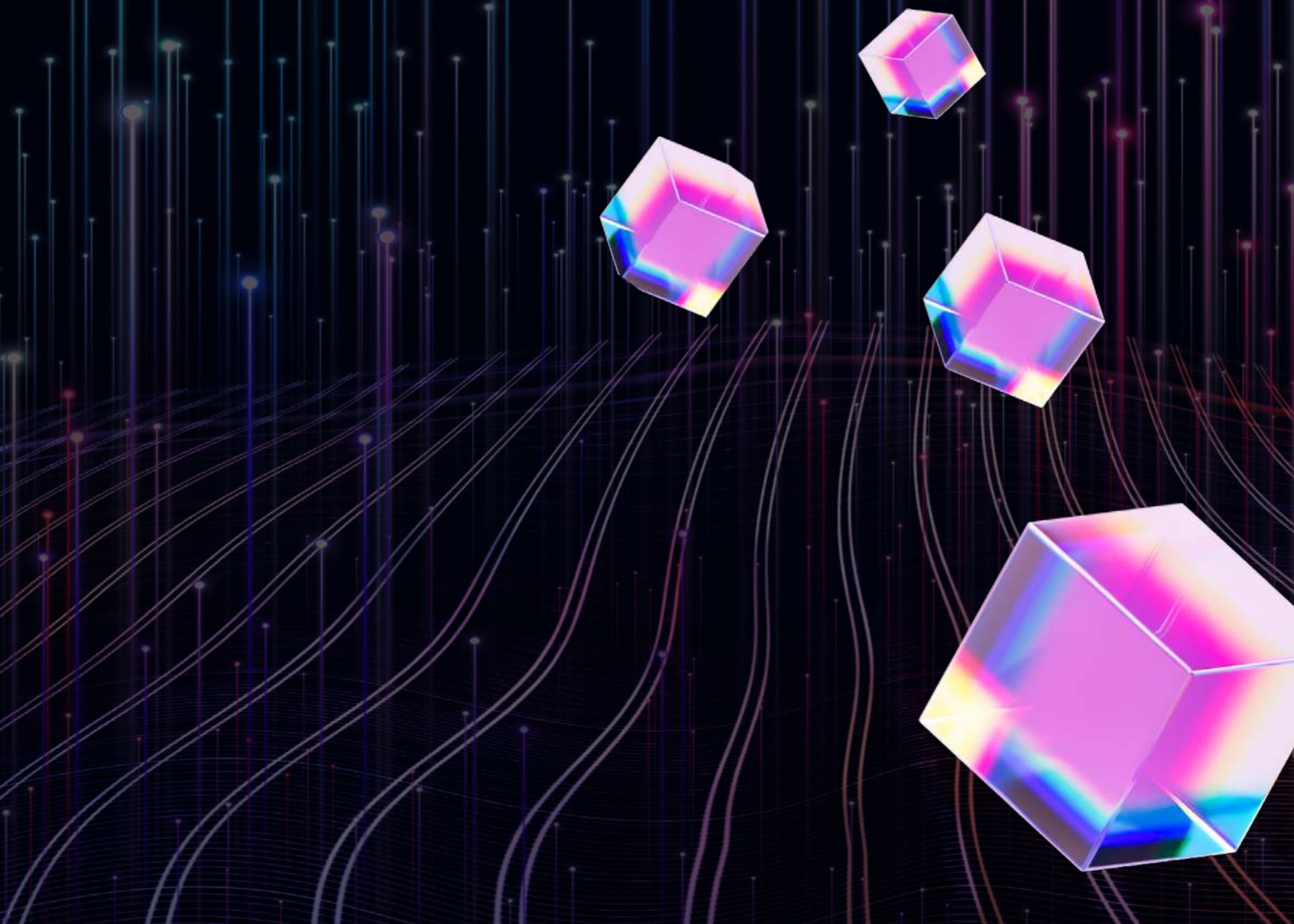

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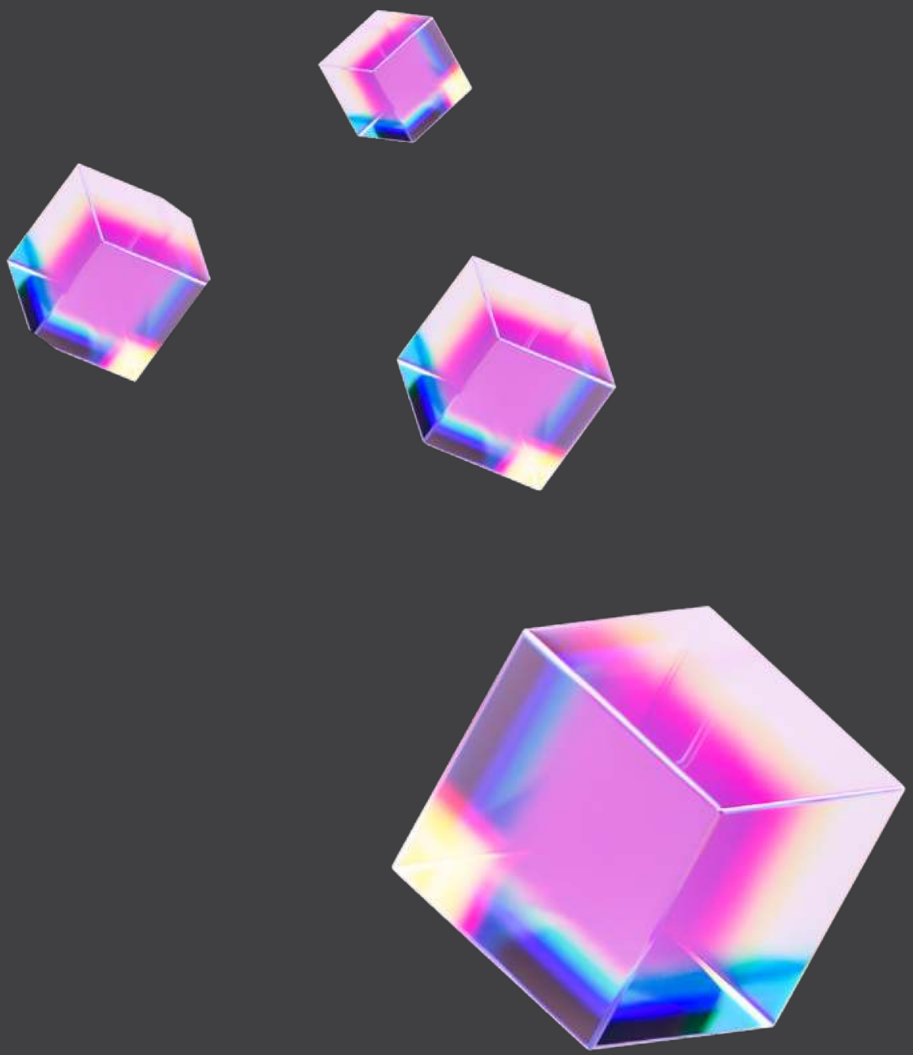
TABLE OF CONTENT

INTRODUCTION



INTRODUCTION

Securities registers play a crucial role in the smooth operation of financial markets, meticulously tracking the ownership of an array of securities. Traditional methods, be it paper-based systems or centralised digital platforms, however, have shown their limits in adapting to the evolving financial landscape. These drawbacks encompass reliance on outdated systems, lack of transparency and accuracy, intermediary risks, vulnerability to cyber threats, inefficient updating processes, and interoperability impediments.

Digital Ledger Technology (DLT), and particularly blockchain technology, offers a promising solution to these issues. DLT is underpinned by a distributed ledger, a tamper-proof database spread across multiple computers or nodes. This ground-breaking technology has the potential to revolutionise securities registers by offering heightened transparency, risk mitigation, efficiency, self-executing smart contracts, and improved interoperability.

DLT enables real-time monitoring of securities ownership, decreasing instances of human errors and fraudulent activities, thus fostering trust in the marketplace. It simplifies the transaction process, doing away with the need for intermediaries and facilitating easier participation for smaller investors. Smart contracts encode agreement terms between buyers and sellers, leading to accelerated transaction execution. Furthermore, the decentralised nature of DLT promotes interoperability, granting multiple parties across varied markets and jurisdictions access to a shared ledger, thereby boosting liquidity and enabling global market access.

However, challenges persist regarding the universal adoption of DLT in securities registers. These include standardisation and interoperability issues, the requirement for education and awareness, and the need for collaboration and partnerships. Clear guidelines are crucial to ensure successful adoption. Standardising will ensure smooth integration with existing systems and facilitate interoperability among different platforms, promoting efficient data exchange and simplifying cross-border transactions.

Enhancing education and awareness among market participants, including investors, regulators, and financial institutions, is vital for building trust and facilitating the adoption of DLT-based solutions. Collaboration among various stakeholders, including technology providers, regulators, financial institutions, and market participants, is a necessity for successful integration of DLT securities registers.

The objective of this report is to shed light on the technical and legal aspects of incorporating DLT in the financial industry, emphasising benefits and fostering sector innovation. By equipping financial institutions with the requisite knowledge to successfully implement DLT in securities registers, the report aims to pave the way for widespread adoption of DLT, ultimately transforming the landscape of securities management and creating fresh opportunities in the financial market.

SECTION 01

THE TECHNICAL POSSIBILITIES BEHIND TOKENISATION AND HOW THEY WORK

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1.1 Redefining the technical infrastructure

Though blockchain technology has been extensively elaborated upon, the benefits it brings to share registry and its capacity to ensure an efficient process in line with applicable regulations might still be unclear. DLT acts as a catalyst for redefining the technical infrastructure, laying the groundwork for secure and streamlined digital securities systems, converting traditional registers into unalterable and shared digital logs, and eliminating silos and fragmented systems. Tokenisation, which involves the representation of assets on a blockchain, enables investment vehicles and firms to maintain real-time investor registries using DLT.

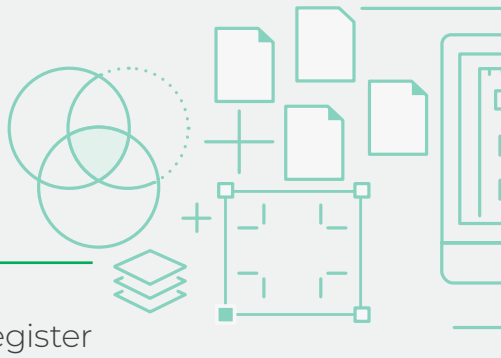
This removes the requirement for data reconciliation by intermediaries, as ownership shifts are instantaneously documented on the shared DLT-based registry, thereby transforming traditional registers into unalterable and unified digital records. This approach, in turn, eliminates silos and fragmented systems, creating a more efficient and transparent environment for market participants.

1.2 Revolutionising registers through blockchain

By leveraging the fundamental and inherent features of blockchain technology, the asset management industry can realise notable improvements in register efficiency. Utilising this technology allows all parties involved to access precise and up-to-date information, fostering transparency and trust within the investment ecosystem. Additionally, investor registers are updated instantly, refining existing cumbersome processes.

Contrarily, current methodologies, even using Word or Excel documents, are largely manually conducted and susceptible to tampering, with an inability to trace modifications. Further, the immutable nature of blockchain records offers an additional layer of security, safeguarding against data manipulation and fraud, while providing a comprehensive audit trail of transactions at all time.

These features can be augmented by incorporating decentralised identity via anonymous credentials issued by trusted identifiers into blockchain systems, thereby reinforcing security and privacy while ensuring compliance. These mechanisms allow securities issuers to enact compliance measures while allowing stakeholders to maintain control over their identities and retain anonymity when participating in the digital securities ecosystem. This approach strikes a delicate balance between transparency and privacy. For instance, one potential option might involve directly linking the ownership of digital securities to digital identities, as opposed to wallet addresses



on blockchain. This arrangement ensures that the DLT-based register remains auditable and allow holders to recover their digital securities in case of lost wallets.

In essence, properly configuring digital securities properly using blockchain technology, tokenisation, and smart contracts can markedly enhance efficiency, security, and compliance. By integrating permissioned tokens, standardised protocols, real-time updates to investor registers, and privacy-enhancing identification methods, these systems have the potential to transform the management and trading of securities.

The combination of blockchain and smart contracts creates a new tamper-proof solution, establishing a transparent and secure platform for managing data relating to securities.

1.3 Whitelisting mechanisms

As previously discussed, in principle, tokenisation enables investment funds, securitisation vehicles, or any other investment vehicle or company to manage its investor register directly using DLT. This technology ensures the investor register for issued fund units or notes (digital securities) remains constantly up to date. By establishing a direct link between the general partner or management company and their investors, intermediaries become redundant. Changes in ownership of digital securities are recorded instantaneously, with settlement occurring within seconds.

To hold digital securities, investors should ideally be whitelisted, a process that only permits identified investors to possess these assets.

The whitelisting process comprises several steps to ensure compliance with regulatory requirements and protect the interests of all stakeholders. Potential investors are required to provide KYC/AML information and eligible criteria data so that the management company or service provider can verify their eligibility to invest in the financial instrument.

This information is cross-checked against trusted sources to confirm the investor's identity, eligibility and understanding of the associated risks. Additionally, investors are also required to connect their blockchain wallets which serve as their securities account for signing transactions, including transfers. Blockchain wallets can either be self-custodied or subject to custodian solutions. As previously explained, the whitelisting process verifies compliance with applicable investment regulations, including investor criteria proofs.

Only when all the required criteria are satisfied can the investor be whitelisted on the blockchain register. Once whitelisted, digital securities can be allocated or transferred to wallets associated with the respective digital identity.

The option of digital identity-based registers on the blockchain ensures the accuracy of ownership records for digital securities. In the event of a lost of a wallet storing the digital securities, these tokens can be recovered to another wallet linked with the same digital identity. This recovery process does not affect the accuracy of ownership records maintained on the blockchain register. Consequently, the fund manager or management company can always identify the holders of the financial instruments for a given investment product, as the register of investors is automatically updated with the blockchain 24/7.

Throughout the lifecycle of digital securities, smart contracts, self-executing codes deployed on the blockchain, manage the functioning of these assets. These smart contracts ensure that only a whitelisted investor can interact with, hold, and transfer digital securities. This automation streamlines the compliance value chain.

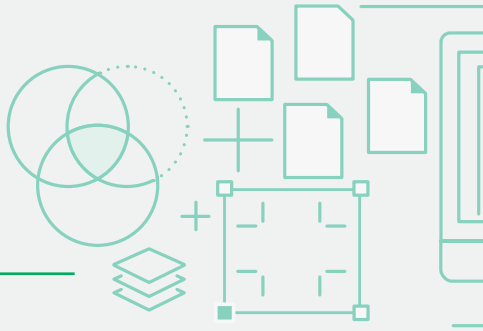
By implementing the whitelisting process, even on public blockchains, only whitelisted investors can hold digital securities, ensuring on-chain and automated compliance.

1.4 Identifying stakeholders

The identification of stakeholders is a critical aspect of any blockchain-based system, particularly when it comes to digital securities. One challenge in this regard is the reliance on wallets and private key as proof of ownership, as anyone with knowledge of the private keys could claim to be the owner. Various options are available under the form of non-transferable token solutions (also known as NTTs) (i.e SoulBound tokens), whitelisting as previously mentioned, or on-chain identity.

The on-chain identity or whitelisting, which leverages decentralised identifiers (DID) and anonymous verifiable credentials can be employed, along with previous approaches, either individually or in combination to identify stakeholders in a blockchain system.

Decentralised identifiers, also known as on-chain identities, are a concept that aims to give individuals control over their digital identity without relying on a third-party authority. In traditional systems, such as social media or online platforms, user identities are



managed and controlled by a central entity. In traditional finance, identity information is spread, duplicated, and maintained by banks, intermediaries and numerous operators. Decentralised identities, on the other hand, leverage blockchain technology to enable individuals to have ownership and control over their identity information.

In a decentralised identity system, individuals create and manage their identities using cryptographic keys and smart contracts. The blockchain serves as a decentralised and tamper-resistant ledger that verifies and validates the authenticity of the identity information.

When it comes to identifying token owners on the blockchain, decentralised identities play a crucial role. Tokens on a blockchain are typically associated with addresses or public keys, which do not inherently prove the real-world identity of the token owner. However, by linking decentralised identities to these addresses, it becomes possible to establish a cryptographically proven connection between the tokenised assets and their real-world owners.

This type of system provides benefits such as enhanced privacy, security, and user control. Moreover, decentralised identity systems enable seamless and trustless interactions between individuals, businesses, and services on the blockchain, as identity verification becomes a more efficient and transparent process.

On-chain identity grants self-sovereignty, allowing only the owner to control the identity, including access permissions to credentials and linked wallets. Identity owners can obtain multiple verifications from various identifiers, and verifiable credentials serve as the link between off-chain information and on-chain identity.

On-chain identities support dynamic data updates to enhance compliance. For example, a change in residence addresses can trigger notification to any applications with access to the residence credential. Moreover, credentials are anonymous, enabling identity owners to prove specific attributes without revealing their identity, thus safeguarding their privacy.

To illustrate, a security token issuer can designate a KYC provider as an identifier to conduct KYC/AML checks. Potential investors submit their documents (e.g., passports) to the identifier, which securely stores them off-chain for verification. An anonymous credential is then issued to the identity, which is used to interact with tokens or applications via smart contracts, verifying whether the investor has passed KYC checks.
On-chain identities also bridges the gap between compliance and

decentralisation. In the event of suspicious activity on the blockchain, trusted authorities can rely on identifiers to obtain access to off-chain information necessary for conducting legal due diligence and identifying the real identities of relevant users.

In summary, the use of on-chain identities can significantly enhance the identification of stakeholders in a blockchain-based system, improving security, efficiency, and privacy. On-chain identities enable ownership tracking in the digital age.

1.5 Permissioned token solutions

Token smart contracts play a crucial role in establishing a robust security token framework, particularly within an open network environment where compliance is paramount. To ensure effective control and secure transfers, it is essential to incorporate key features into the design of smart contracts.

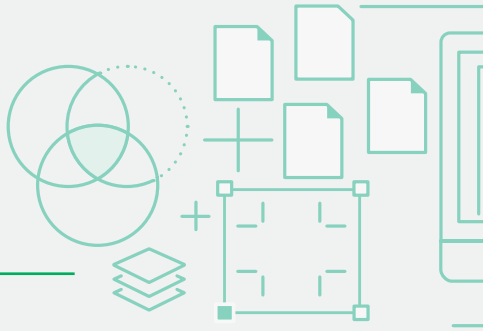
In the context of security tokens, they can be issued as permissioned tokens, meaning that a transaction can only be initiated when both investor rules and offering rules are met. This permissioned layer within the smart contract ensures the security and compliance of transactions. Issuers and agents must prioritise maintaining control over the security tokens to prevent unauthorised transfers and ensure the overall safety of tokens.

A straightforward direct transfer of tokens may entail counterparty risks. To mitigate this risk and establish necessary trust, it is advantageous to adopt a delivery-vs-delivery smart contract design, commonly referred to as atomic swaps. Atomic swaps facilitate the simultaneous exchange of pre-defined security tokens and payment tokens between eligible counterparties, reducing counterparty risks and enhancing trust in the transaction process.

Standardised protocols also play an essential role in enabling seamless interaction between different digital securities systems. They provide a foundational framework for the industry, allowing issuers to customise their token issuance settings while ensuring compliance with legal and regulatory requirements.

While widely adopted standards such as ERC20 tokens exist in the industry, they are permissionless tokens, granting holders complete control over their tokens, resulting in issuers having no oversight. In contrast, other standards like ERC3643 (primarily for EVM ecosystem like Ethereum, Polygon), AMP assets on Liquid Network (Bitcoin Layer 2) or ASA on Algorand[1], are specifically designed for security tokens.

[1] This term refers to specific DLT taxonomy, not to be confused with governmental or supervisory authorities.



These standards enable issuers to generate permissioned tokens that can be traded on any centralised or decentralised trading platforms holding necessary licences, ensuring only authorised parties can hold and transfer them.

Integrating smart contract with digital securities facilitates the automation of various aspects of the securities lifecycle, including issuance, trading, and settlement. Smart contracts can be tailored to meet the specific requirements of each security token, ensuring compliance with applicable laws and regulations.

In the secondary market trading of tokenised securities, specific rules govern ownership transfers. Permissioned tokens ascertain that only authorised entities can possess and trade the tokens, effectively preventing unauthorised transfers and upholding the integrity of the digital securities ecosystem.

1.6 Interoperability

Blockchain interoperability is a crucial aspect of the blockchain ecosystem that enables different blockchains to communicate and exchange information. It plays a pivotal role in reducing fragmentation and enhancing collaboration among blockchain networks. By facilitating the seamless exchange of assets and data between different blockchains, interoperability provides users with access to assets that may not be available on their preferred blockchain network.

There are several approaches to achieving blockchain interoperability, each contributing to a more connected and efficient ecosystem:

Cross-chain bridges: these bridges facilitate verifiable transfers of assets between different blockchains. They act as intermediaries, establishing connections between separate blockchains to enable a secure exchange of information. They are typically managed by decentralised networks of nodes or validators, responsible for validating transactions and ensuring secure asset transfers.

Atomic swaps: enable trustless, peer-to-peer exchanges of tokens between blockchains using smart contracts. They ensure both parties involved in the exchange receive the assets they agreed upon without the need for centralised exchanges or intermediaries.

Interoperability protocols: These protocols provide a standardised framework for cross-chain communication. They simplify the developing process of building applications that can function across multiple blockchain networks. They utilise consensus mechanisms to agree on transaction states and employ smart contracts to facilitate the exchange of assets and data between blockchains.

Sidechains: Sidechains are separate blockchains connected to a main blockchain, enabling the transfer of assets and data between them. They alleviate congestion on the main chain, enhance scalability, and operate on their consensus mechanisms. They feature a two-way peg mechanism to securely transfer assets between blockchains.

Layer 2 solutions: These solutions process transactions off-chain and enable the exchange of assets and data between different blockchains. Designed to be interoperable with other blockchains, layer 2 solutions offer greater connectivity and functionality for users and developers. Operating off-chain allows for faster and more efficient transaction processing.

Interoperability plays a critical role in the liquidity of security tokens and the creation of an efficient and openv ecosystem. By leveraging interoperability, security tokens can enhance data richness, provide reliable valuations as a reference for investors, and embed compliance rules for interaction with other applications. This enables investors to find eligible counterparts, trade digital securities, and have audited valuations that inspire confidence for both buyers and sellers to trade securities at fair prices, thereby driving liquidity.

1.6.1 Interoperability between legacy systems and blockchain networks

In order to fully unlock the transformative potential of blockchain technology and promote its widespread adoption, achieving interoperability between legacy systems and blockchain networks is essential. Legacy systems refer to the existing traditional system and infrastructure that are currently in place. Establishing interoperability between these legacy systems and blockchain networks is essential for seamless integration and effective data exchange.

Middleware and API gateways play a significant role in enabling interoperability between legacy systems and blockchain networks. Middleware acts as an intermediary layer that facilitates communication and data exchange between the two systems. It provides the necessary translation and compatibility functions to ensure smooth interaction between different protocols and data formats. It enables the seamless flow of information and transactions.

API gateways, on the other hand, serve as a standardised interface that allows systems to communicate with each other through well-defined application programming interfaces (APIs). These APIs provide a set of rules and protocols for how different systems can interact, ensuring consistent and efficient communication between legacy systems and blockchain networks. By adopting standardised APIs, interoperability can be achieved more easily, as systems can understand and interpret data in a uniform manner.

The importance of interoperability is particularly evident in the context of securities registers. Securities registers are responsible for recording and maintaining ownership records of securities such as stocks, bonds, and other financial instruments. The transition from legacy systems to blockchain networks, and vice versa, requires a seamless interoperability solution to ensure the accurate transfer and recording of ownership information. By establishing interoperability, securities registers can benefit from the advantages offered by blockchain technology, such as improved transparency, security, and efficiency.

In the legal section of this report, we will extensively review the current framework and can only stress the fact that Luxembourg has an agnostic view on the technology and has been pro-active, allowing financial institutions to test and have the way to implement the technology. The legacy system can get along as long as the necessary infrastructure and technical elements are in place according to the guidance available.

In summary, achieving interoperability between legacy systems and blockchain networks is a crucial step in unlocking the full potential of blockchain technology and promoting its adoption. Middleware and API gateways serve as key components in establishing a standardised interface for communication and data exchange. This interoperability is particularly vital for securities registers, as it enables a smooth transition from legacy systems to blockchain networks and ensures the secure and efficient recording of ownership information.

1.6.2 Interoperability between smart contracts

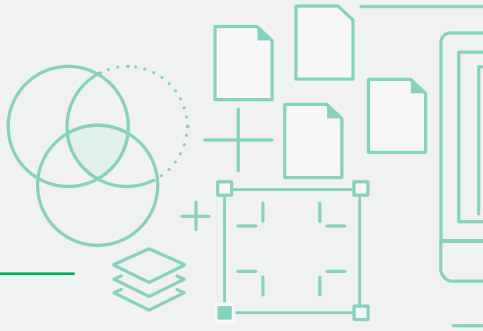
Interoperability holds a crucial position within the blockchain community and presents both a challenge and an opportunity. One area where interoperability is particularly important is in the realm of smart contracts and their interactions. Composability, which refers to the ability of different smart contracts to seamlessly interact with each other, plays a vital role in enabling the creation of complex decentralised applications (DApps).

Composability allows developers to combine various smart contracts to build sophisticated and interconnected DApps that offer enhanced functionality and utility. By leveraging the interoperability of smart contracts, developers can tap into the capabilities of different contracts and create synergistic applications that are greater than the sum of their individual parts. This not only promotes innovation but also fosters the growth of a vibrant and interconnected blockchain ecosystem.

To facilitate composability, it is essential to have audited standards for smart contracts. These standards ensure that smart contracts adhere to best practices, security measures, and regulatory requirements. By following audited standards, developers can have confidence in the reliability, security, and compatibility of the smart contracts they utilise, enabling seamless integration and interaction.

While pursuing interoperability and composability, it is crucial to address data security, privacy, and regulatory compliance. Protecting sensitive data and ensuring user privacy are paramount considerations when implementing interoperable solutions. Additionally, complying with relevant regulations and legal requirements is necessary to maintain trust and facilitate the adoption of blockchain technology.

In summary, interoperability and composability are key factors in advancing the capabilities and adoption of blockchain technology. Composability enables the creation of complex DApps by facilitating



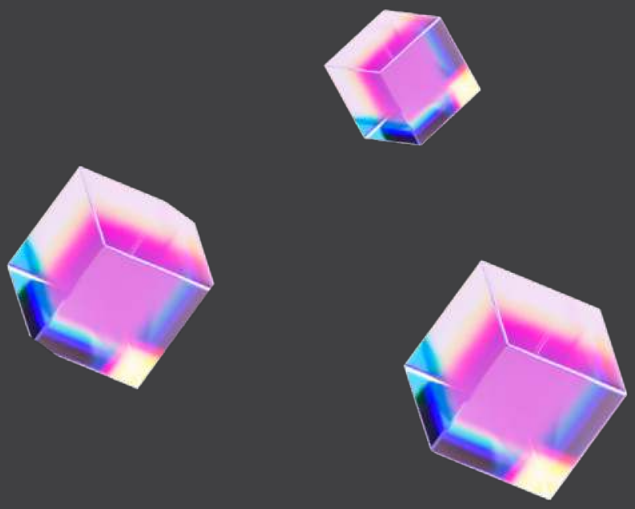
seamless interaction between smart contracts. Meanwhile, audited standards for smart contracts provide a foundation for compatibility and security. When implementing interoperability, careful attention must be given to data security, privacy, and regulatory compliance, with middleware and API gateways serving as crucial tools in ensuring secure and compliant data exchange.

1.6.2 Upgradability of smart contracts to mitigate vulnerabilities

The immutability of smart contracts once deployed on a blockchain raises concerns for securities issuers who require control and flexibility over their digital securities. As regulations and business requirements evolve, the ability to add additional logic and address vulnerabilities becomes crucial. Therefore, issuers of tokenised securities need the capability to upgrade their smart contracts.

However, the primary challenge lies in developing business and operational models that can accommodate the increasing demand for digital securities from both institutional and retail investors. This requires a significant internal education effort to ensure a smooth transition to tokenisation.

Organisations must familiarise themselves with the benefits, risks, and regulatory considerations associated with digital securities, as well as establish robust processes and systems to support their issuance, management and trading. By embracing tokenisation and leveraging appropriate technical solutions, issuers



SECTION 02

THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

2 THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

2.1 Introduction

The use of DLT as an enabler to maintain a securities' register has been highlighted as a prominent use case to unlock the potential of DLT in capital markets.

The legal section of the Whitepaper explores the Luxembourg legal framework applicable to the issuance and transfer of different forms and types of securities on DLT, including examination of the relevant rules enabling commercial companies, investment funds and securitisation vehicles to issue, transfer and record transfers of securities on DLT.

2.2 Forms of securities

2.2.1 Bearer, registered and dematerialised securities

Before delving deeper into how DLT can be used to record the issuance and transfer of securities, it is useful to outline the differences between the various forms of securities under Luxembourg law.

Debt and equity securities can be issued in Luxembourg in three different forms: (i) bearer, (ii) dematerialised, or (iii) registered. This distinction is significant, as each form of security entails a different way of exercising the rights and obligations attached to the securities.

a) Bearer securities are represented by physical certificates that can be transferred by delivery and endorsement. The nature of bearer securities entails that the issuer is only aware of the identity of the owner of the security upon presentation of the security's certificate to the issuer while registered securities rely on the register kept by the issuer or an appointed third party to identify the relevant owner of the security.

This section will not focus on whether DLT can be used to record the issuance and transfer of bearer securities as the physical and paper-based nature of such securities and their certificate excludes them for the use of DLT, which is based on a digital paradigm.

Some practitioners take the view that a security token (such as an ERC-20 token being deployed on the Ethereum blockchain) is akin to a digital bearer security because (i) the holder of such security token exercises its rights directly against the issuer without the involvement of any intermediary and (ii) the issuer of the security token would only become aware of the identity of the holder once the holder reaches out to the issuer to exercise its rights.

2 THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

This line of argument rests on the basis that Luxembourg law should be analysed and applied from a technologically neutral way. However, as physical proof of possession is an explicit pre-requisite for the constitution of a bearer security from a Luxembourg law perspective, we believe that a security token cannot be construed as a bearer security, as a token does not have a material form. A security token would thus be recognised as a registered security to the extent that the issuer is able to rely on the DLT as the basis of the register identifying the relevant holders of such security.

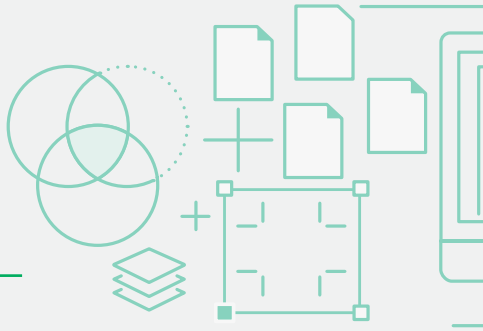
b) Dematerialised securities are securities that are not represented by a physical certificate (like a bearer security) or a register entry (like a registered security), but by book entries in securities accounts kept by authorised account keepers, and such account keepers shall keep accounts pertaining to the dematerialised securities with (i) a central account keeper for dematerialised debt securities that are not admitted to trading on a trading venue or (ii) a settlement organisation for dematerialised securities, regardless of whether such securities are admitted to trading on a trading venue or not.

Dematerialised securities are differentiated from registered and bearer securities by the medium on which the securities are kept. Dematerialised securities are held and kept in securities accounts, which require the use of an intermediary to record the issuance and manage transfers and corporate actions for these securities.

The Luxembourg legislator has clarified the legal position for the use of DLT technology for dematerialised securities through the enactment of the Blockchain Laws:

- In 2019, the Luxembourg legislator promulgated the Blockchain Law I. It was one of the first European laws explicitly recognising the use of DLT for the keeping and transferring of intermediated book-entry securities. However, the scope of the Blockchain Law I only pertained to fungible book-entry securities, as the CSL applies exclusively to securities booked on a securities account and which are transferred by book transfer[1].

- In 2021, the Luxembourg legislator adopted the Blockchain Law II, which (a) enables the issuance of dematerialised securities directly in DLT networks, thereby rendering possible the issuance of a digitally native DLT dematerialised security and (b) opens the central account keeper role to record and operate DLT issuances of unlisted debt securities to any EU credit institution or investment firm.



The Blockchain Law II provides the explicit confirmation that issuances and registrations of dematerialised securities using DLT have the same effects as transfers made between securities accounts.

- The recent Blockchain Law III (a) allows book-entry securities issued and held through DLT to be subject to financial collateral arrangements, and (b) implements important concepts in Luxembourg law to accompany the Pilot Regime.

c) Registered securities are securities that are recorded in the name of their holders in a register traditionally maintained by the issuer (especially concerning equity securities) or by a registrar appointed by the issuer in accordance with article 25 of the FSL to keep its register pertaining to issued financial instruments.

Registered securities are also referred to as disintermediated securities. This entails that a holder will interact directly with the issuer (to the extent that no custodian is interposed between the investor and the issuer).

The difference between bearer and registered securities hinges (from a practical perspective) on the issuer's ability to ascertain the identity of the securities' primary holders at all times (notwithstanding the fact that custodians may hold securities on-account of investors unknown to the issuer).

The use of DLT for registered securities was not dealt with by the Blockchain Laws, which cover only the use of DLT for dematerialised securities. However, there are arguments to support the view that the existing Luxembourg legal and regulatory framework is sufficient and allows the use of DLT-based registers.

To ensure that DLT can be used as a technology for the issuance and transfer of registered securities, it is of the utmost importance to establish a clear legal reasoning shared among legal practitioners in Luxembourg, which will serve as the bedrock for using this technology in the capital markets for registered securities with legal certainty.

2.2.2 Focus on registered securities

The use of DLT for the issuance of registered securities has been a topic of interest and debate in the capital markets industry in Luxembourg in recent years, not least because securities in registered form are the most common form of securities issued by Luxembourg companies.

2 THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

Compared to bearer and dematerialised securities (also known as intermediated securities), these securities have a number of advantages for issuers and their investors.

For example, securities in registered form are easier to issue, as there is no need to take care of the custody of securities, such securities provide greater certainty and protection of the holder's legal title and rights, there is no risk of the intermediary's insolvency, fraud, or negligence, and holders of such securities can directly communicate with the issuer and exercise their rights without relying on the intermediary's services.

DLT applied to registered securities is deemed to increase efficiency and enhance transparency for issuers and investors. However, the absence of a legislative basis dissuades many from using DLT in this way. This section aims to show that the current legal regime in Luxembourg already allows registering securities on DLT registers.

2.2.2.1 Content and form of "traditional" registers

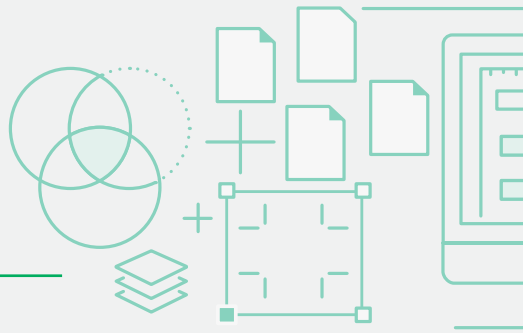
The content and form of registers for registered securities are governed by the Companies Act.

For registered shares, the Companies Act sets out only the minimum information requirements on the content of the register. Specifically, it is required that the register of shares contains at least: (i) the precise designation of each shareholder and an indication of the number of its issued shares and subscribed amount; (ii) an indication of the payments made; (iii) the information on transfers, with their date, or the conversion of shares into bearer shares or dematerialised shares, if the articles of association of the issuer authorise it[2].

This information is necessary to identify the shareholders, and therefore allow the company to communicate and to comply with the obligations under the Companies Act towards such shareholders.

The Companies Act does not provide for similar minimum requirements for the registered debt securities. However, since the primary function of the register is to allow identification of holders of registered securities, the content of the register of debt securities should, in practice, be similar to the register of shareholders.

These information requirements have been extended by subsequent legislation and market practitioners[3], and the registers of registered shares (and by extension, registered debt instruments) must now also include information regarding pledges, privileges or liens on



the shares. In addition, it is generally required that the registers are kept up to date and provide information in particular on the chain of transfers, conversion or cancellation of registered shares to ensure their "traceability".
In terms of the form of the registers, the market practice established the following standards[4]:

(a) Registers may not be split. However, subject to compliance with this principle, the law does not regulate the manner in which records must be kept in practice.

(b) The registers must be kept by the management body of the issuer.

(c) Registers do not need to be endorsed by any public authority.

Lastly, the Companies Act requires that registers of shares, as well as registers of debt securities, are kept at the registered office of the company. In case of debt securities, the Companies Act allows that this requirement is contractually dis-applied by the issuers and the issuers can appoint registrar agents to keep a register of holders of debt securities. In practice, this opt-out is often exercised.

2.2.2.2 Electronic and DLT registers

As technology advances and offers new possibilities for efficiency, security, and innovation, many companies are embracing digitalisation in various aspects of their operations. An example of this trend is the replacement of paper form registers, which are prone to errors, damage, and loss, with electronic form registers, which are easier to manage, update, and integrate.

Some legal practitioners[5] have explored whether keeping a register electronically, meaning that the register's data may be stored on various servers and not at the registered office, would violate Article 430-3 of the Companies Act, which stipulates that the register should be kept at the registered office[6].

It has been concluded that Article 430-3 does not imply that the register must be physically present and accessible at all times at the registered office, but rather that the company must ensure that the share register's data can be easily accessed at any time at the registered office, even if the data is stored elsewhere.

THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

They partly based their argument on the existence of financial sector professionals who maintain the register of one or more financial instruments, such as registrar agents. Since article 25 of the FSL allows such activity, they reasoned that keeping a register electronically is not inconsistent with the Companies Act.

This reasoning could be further supported by the fact that the Companies Act does not prescribe the medium or the technology which needs to be used to keep a shareholder or bondholder register. Therefore using software, such as Microsoft Excel or similar technology replacing the paper form, should be possible.

In case of the debt securities registers, where the requirement to keep the register at the place of the issuer may be contractually disapplied, the use of electronic or other similar forms of registers and their storage using cloud technology should not be disputed.

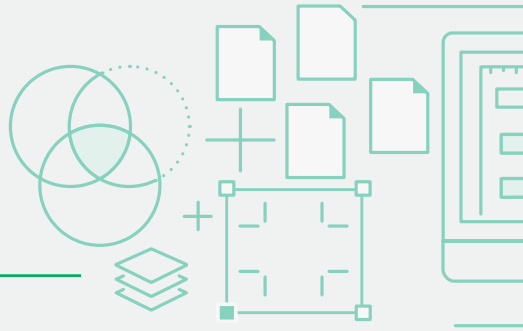
We believe that the DLT registers should not be viewed differently from electronic registers, as they share the same purpose of ensuring data immutability and security (i.e. DLT registers are, at least theoretically, more reliable than electronic registers) and the same arguments can be applied to justify their use.

In this context, issuers of securities and, where applicable, appointed registrars, should assess which DLT application will be most suitable to facilitate the recording and extraction of information related to registered securities and their holders. Different blockchain solutions provide in this sense for the possibility to track the investor id either through whitelisting solutions or dedicated third-party solutions, as the AMP server for the Liquid Network.

Consequently, it can be concluded that DLT can be used to enable a register for registered securities. The following sections will dive into the specific legal framework applicable to equity and debt securities that are issued or transferred using DLT.

2.3 Equity and debt securities using DLT

This section considers the possibility for Luxembourg companies to issue and transfer equity and debt securities via or using DLT. After briefly outlining the applicable legal framework, we will address the issuance of equity and debt securities by the most common forms of Luxembourg commercial companies and address issues of ownership and transferability.



Under Luxembourg law, securities can be in bearer, dematerialised or registered form. As previously explained in this whitepaper, bearer shares will be disregarded for the purpose of this analysis.

2.3.1 Qualification as financial instruments

Luxembourg does not have a dedicated legal framework for the issuance of securities via or using DLT. Instead, the issuance of such securities is governed by the existing Luxembourg legal framework applicable to securities.

2.3.1.1 Qualification of securities as financial instruments

Article 4(1)(15) of MiFID II defines "financial instruments" as those instruments specified in Section C of its Annex I. The same list of financial instruments is included in Section B of Annex I to the FSL. [8] Section C of Annex I of MiFID II and Section B of Annex I of the FSL list, among others, "transferable securities" as financial instruments. Pursuant to Article 1(33) of the FSL and Article 1(55) of the MFIL, which inter alia transpose MiFID II in Luxembourg, transferable securities (valeurs mobilières) include those classes of securities (titres) which are negotiable on the capital market. In addition, the definition sets out a non-exhaustive list of instruments qualifying as transferable securities such as shares, bonds, or depositary receipts.

Consequently, shares, bonds and similar securities issued by companies, which are able to be negotiated on a market, would qualify as financial instruments.

2.3.1.2 Financial instruments vs. virtual assets

The Luxembourg AML Law was amended by two laws of 25 March 2020[9] in order to regulate virtual asset service providers. The AML Law defines "virtual assets" as "a digital representation of value, including a virtual currency, that can be digitally traded, or transferred, and can be used for payment or investment purposes, except for virtual assets that fulfil the conditions of electronic money [...], and the virtual assets that fulfil the conditions of financial instruments within the meaning of point (19) of Article 1 of the Law of 5 April 1993 on the financial sector, as amended."

According to this definition, virtual assets that qualify as financial instruments under the FSL are excluded from the definition of "virtual asset", but instead qualify as financial instruments and are therefore subject to the legal framework applicable thereto.

THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

Furthermore, the proposal for a regulation of the European Parliament and of the Council on markets in crypto-assets[10] (MiCA), excludes from its scope crypto-assets which qualify as financial instruments as defined under Article 4(1), point (15) of MiFID II[11]. This suggests that even if a financial instrument could constitute a form a "crypto-asset", it will nevertheless not be subject to MiCA but be subject to the existing rules applicable to financial instruments.

Finally, the Pilot Regime introduced the concept of a "DLT financial instrument", meaning a financial instrument as defined in MiFID II that is issued, recorded, transferred, and stored using DLT. The definition of "financial instrument" under MiFID II, as amended by the Pilot Regime, now foresees that financial instruments may be issued by means of DLT. Similarly, Article 1(19) of the FSL defines financial instruments as "instruments referred to in Annex II, Section B, including such instruments issued by means of distributed ledger technology, as defined in point (1) of [the Pilot Regime]."

As a result, securities qualifying as "financial instruments" may in principle be issued, recorded, transferred, and stored via DLT. This section will focus exclusively on the issuance of securities qualifying as financial instruments under MiFID II and the FSL.

2.3.2 Dematerialised equity and debt securities using DLT

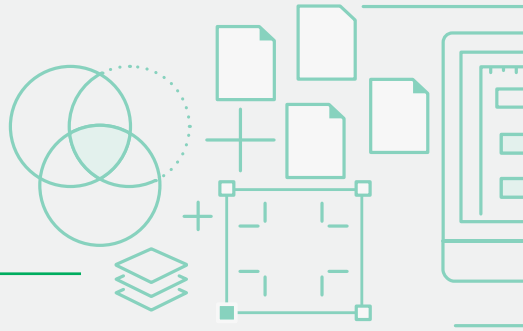
2.3.2.1 Issuance of dematerialised securities

The issuance of dematerialised securities is primarily governed by the DSL. "Dematerialised securities" within the meaning of the DSL are "securities which are issued or converted through registration on a securities issuance account maintained by a settlement organisation or a central account keeper"[12]; such securities are only represented by a record in a securities account.

The "securities" that can be issued under the DSL include, amongst others, equity and debt securities subject to Luxembourg law.[13]

The issuance of dematerialised securities requires the issuer to take appropriate measures to record the issue of all dematerialised securities of the same type with a single settlement organisation or central account keeper.[14]

Certain details on the characteristics of the dematerialised securities issuance must be recorded at all times in a single "securities issuance account" maintained by a single settlement organisation or central account keeper and the latter must in parallel keep securities accounts for investors or intermediaries acting on behalf of investors



in which the actual dematerialised securities are booked.[15]
Further to the amendments introduced by the Blockchain Law II, such "securities issuance account" may be maintained on DLT and registration of securities in such account can be carried out within or through DLT.[16] The possibility of keeping securities accounts within or through DLT is moreover confirmed by the CSL.

The issuance of dematerialised securities via DLT is therefore recognised by the DSL. However, as the securities issuance account must be maintained by a settlement organisation or a central account keeper, the main constraint for issuers is to find a settlement organisation or central account keeper which maintains or is willing to maintain the securities issuance account on DLT. In this respect, it should be noted that when the dematerialised equity securities are to be listed, the issuer can only rely on a settlement organisation[17].

The DSL is not restrictive in respect of who can issue dematerialised securities (the concept of "issuer" used in the DSL refers to any person who issues securities). As a result, any company that is legally allowed to issue equity or debt securities can in principle issue dematerialised equity or debt securities under the DSL, including via DLT.

2.3.2.2 Transfer of dematerialised securities

Under to the DSL, dematerialised securities recorded in a securities account are transferred by book entry transfer, and such transfers are subject to the provisions of the CSL.[18] The Blockchain Law I introduced the possibility for account keepers (including, for instance, banks)[19] to maintain securities accounts and credit securities on securities accounts on DLT.

Article 18a(1) of the DSL states that "[t]he account keeper may maintain securities accounts and credit securities on securities accounts within or through secured electronic registration mechanisms, including distributed electronic ledgers or databases. Successive transfers registered within such a secured electronic registration mechanism shall be considered as book transfers between securities accounts."

The provisions of the CSL relating to the rights of account holders apply regardless of the nature of the securities account. In other words, even where a securities account is maintained on DLT, the rights of account holders as defined in the CSL would apply. Moreover, transfers registered within a DLT are assimilated to book transfers between securities accounts with the result that ownership in the relevant securities is transferred as well.

THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

2.3.3 Registered equity securities using DLT

2.3.3.1 Issuance of registered equity securities

The Companies Act is the main piece of legislation in Luxembourg applicable to registered securities. We will focus on the issuance of registered shares by two of the most common forms of commercial companies, namely public limited liability companies (sociétés anonymes) and private limited liability companies (sociétés à responsabilité limitée).

2.3.3.2 Issuance of shares by sociétés anonymes

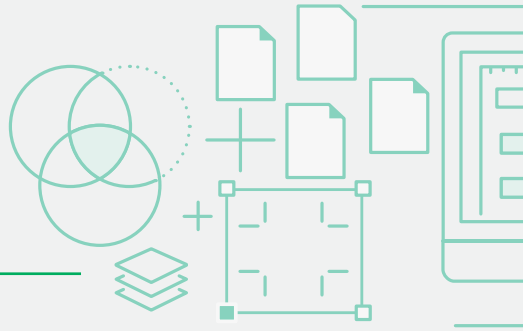
Pursuant to Article 430-3 of the Companies Act, the key obligations in relation to registered securities are that a register of nominative shares be kept at the registered office of the issuer and that such register can be consulted by any shareholder.

Such register indicates the names of the holders of shares and the amount of shares held, an indication of contributions made, as well as transfers and their date, or the conversion of the shares into bearer shares or dematerialised shares if the articles of association of the issuer provide this, as well as the number of securities held.

Contrary to the case of debt securities, where it is possible to derogate in the issuance documentation from the requirement to keep a register of debt securities at the registered office, such a derogation possibility is not available for shares.

Accordingly, as previously explained in this whitepaper, it needs to be analysed if the keeping of a register of nominative shares using DLT is compatible with the requirements of Article 430-3 of the Companies Act for registered shares.

The first requirement relates to the existence of a register as such. The Companies Act does not expressly require that such register be in paper form. Whilst the paper form was the usual form in practice at the time the relevant provisions were introduced, and references to the paper form exist in a number of publications by legal scholars, a certain evolutive interpretation thereof seems possible considering that (i) the law does not expressly mandate the paper form, and (ii) standard legal definitions of a register do not systematically refer to paper form[20].



Moreover, it has become a widespread market practice in Luxembourg to keep share or unit holder registers in electronic form, and to produce/print paper versions (certified or signed by representatives of the issuer) only in case of specific need.

Accordingly, it is arguably possible to keep a register within the meaning of Article 430-3 of the Companies Act in electronic form and in particular using DLT, as long as the register reflects all the information required under the Companies Act.

The second requirement relates to the keeping of the relevant register at the issuer's registered office of the issuer. In this respect, a certain evolution of the interpretation by scholars can be noted, as some consider that it is sufficient that appropriate arrangements / facilities exist at the registered office of the issuer that allow for an access to, and consultation of, the register. This could be achieved in a DLT based register by ensuring that the issuer can access and consult (and let others consult) the register.

The third requirement is that the register can be consulted by any shareholder at the registered office of the issuer. This requirement can arguably be met as described in the previous paragraph, i.e. that the issuer ensures that it is able to access all relevant information in the DLT-based register so that it can provide this access also to shareholders requesting access at the issuer's registered office.

In conclusion, it seems that a register of nominative shares can be held using DLT, provided that the issuer makes appropriate arrangements to access and facilitate access to the DLT based register.

It is important, however, to bear in mind that Article 1500-2 of the Companies Act provides for a criminal sanction in case the register of nominative shares is not kept at the registered office. Nevertheless, it seems reasonable to consider that there is no violation of this requirement if the pertinent information is (rapidly) accessible from the registered office of the issuer.

2.3.3.3 Issuance of shares by sociétés à responsabilité limitée

Although Article 710-8 of the Companies Act provides that additional information has to be reflected in the shareholder register of a private limited liability company (société à responsabilité limitée), the analysis is similar to the analysis for public limited liability companies. Whilst the register must contain additional information (which can presumably be derived from a DLT), there are no similar criminal sanctions as for public limited liability companies.

2.3.3.4 Transfer of registered equity securities

Pursuant to Article 430-4 of the Companies Act, the ownership of registered shares results from the registration in a register of shares maintained by the issuer. However, legal scholars and case law suggest that the registration in the register of nominative shares does not establish ownership of the shares, but rather serves as evidence thereof.

According to the same Article 430-4, transfers of registered shares shall be carried out by means of a declaration of transfer in the register, dated and signed by the transferor and the transferee or by their duly authorised representatives, and in accordance with the rules on the assignment of claims set out in Article 1690 of the Luxembourg Civil Code. In principle, such assignment could be done by way of an electronic cryptographic transaction.

The issuer may accept and record in the register a transfer based on correspondence or other documents establishing the agreement between the transferor and the transferee.

The holder of registered securities is entitled to exercise its voting rights and to benefit from the economic rights as of the moment the ownership of the shares is (and the shares are) recorded in the share register.

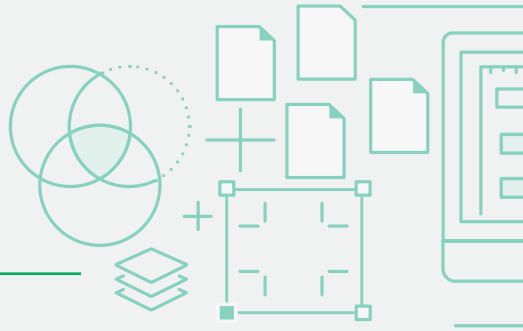
2.3.4 Registered debt securities using DLT

2.3.4.1 Issuance of registered debt securities

The Companies Act is the main piece of legislation in Luxembourg relating to registered securities. According to Article 100-14 of the Companies Act, any company may issue debt securities.[21]

According to Articles 470-1 to 470-19 of the Companies Act which apply in principle to the issuance of debt securities,[22] an issuer of transferable debt securities must comply with certain legal requirements depending on the form of the securities, i.e. bearer, registered or dematerialised.

However, the issuance documentation may derogate from Articles 470-1 to 470-19,[23] which means that the terms and conditions of the debt securities can be contractually determined and that, for instance, the conditions set out in these provisions do not necessarily need to be complied with. This allows an issuer to freely determine the characteristics of the debt instruments to be issued.



The main obligation for issuers of registered securities is the maintenance of a register of such securities to be kept at the issuer's registered office.[24] Such register indicates the names of the holders of securities, as well as the number of securities held. However, the possibility to derogate from Articles 470-1 to 470-19, as mentioned above, also means that the issuer may decide not to keep a register of registered debt securities at its registered office and may opt, for instance, for a register maintained on DLT. The terms and conditions of debt securities may be freely determined in the issuance documentation, which can set out the characteristics of the securities.

We refer also the section on the issuance of equity instruments via DLT of this paper, which analyses the possibility to keep a register of nominative securities using DLT and how the requirements relating to such registers can arguably be met if the issuer would opt to follow the same approach.

2.3.4.2 Transfer of registered debt securities

According to Article 470-1 of the Companies Act, Article 430-4 of the Companies Act applies to debt securities. According to Article 430-4, the ownership of registered debt securities results from the registration in a register of debt securities to be maintained by the issuer.

However, as described above, the requirement to have a register of debt securities at the registered office of the issuer may be derogated from in the issuance documentation, and other forms of registration may be envisaged. It is therefore possible, in principle, to have a register on DLT and it is conceivable for the ownership be determined, for instance, by reference to the wallet address of the relevant holder of the securities appearing on the register; the transfer of the debt securities would take place and be recorded on the register.

In accordance with Article 430-4, which is applicable to debt securities by virtue of Article 470-1 = unless these provisions are derogated from in the issuance documentation, transfers of debt securities would have to be carried out by means of a declaration of transfer in the register, dated and signed by the transferor and the transferee or by their duly authorised representatives, and in accordance with the rules on the assignment of claims set out in Article 1690 of the Luxembourg Civil Code. In principle, such assignment could be done by way of an electronic cryptographic transaction.

2 THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

2.4 Securitisation vehicles

2.4.1 The use of DLT within the securitisation framework

The Luxembourg regulatory framework for securitisation permits the use of DLT for securitisation undertakings (SVs).

Luxembourg SVs are governed by the Securitisation Law, which defines securitisation as follows:

""Securitisation" (...) means the transaction by which a securitisation undertaking acquires or assumes, directly or through another undertaking, risks relating to claims, other assets, or obligations assumed by third parties or inherent to all or part of the activities of third parties and issues financial instruments or contracts, for all or part of it, any type of loan, whose value or yield depends on such risks."[25].

Within the meaning of the Securitisation Law, "financial instruments" are defined as

"financial instruments referred to in point (8) of Article 1 of the Law of 5 August 2005 on financial collateral arrangements, as amended, except for claims and rights referred to in letter (f) of point (8) of Article 1 of that law.".

Article 1 point (8) of the Collateral Law has been amended recently[26] and now reads as follows:

""financial instruments" has the broadest possible meaning, including:
(a) all securities and other instruments, including, but not limited to shares in companies and other securities equivalent to shares in companies, participations in companies and units in collective investment undertakings, bonds and other forms of debt instruments, certificates of deposit, loan notes and payment instruments;

(b) securities which give the right to acquire shares, bonds or other securities by subscription, purchase or exchange;

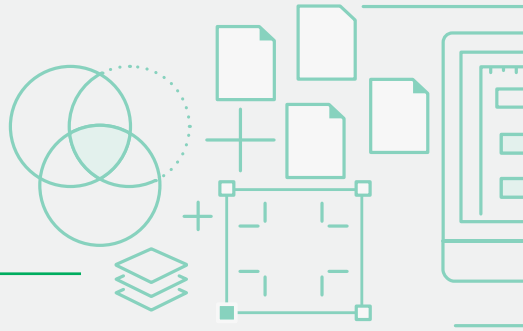
(c) term financial instruments and instruments giving rise to a cash settlement (excluding instruments of payment), including money market instruments;

(d) all other instruments evidencing ownership rights, claim rights or securities;

(e) all other instruments related to financial underlyings, indices, commodities, precious metals, produce, metals or merchandise, other goods or risks;

(f) claims relating to the items described in sub-paragraphs (a) to (e) above or rights in or in respect of these items,

*whether these financial instruments are in physical form, dematerialised, transferable by book entry, including the securities accounts maintained within or through secured electronic registration mechanisms, **including distributed ledgers or electronic databases**, or delivery, bearer or registered, endorseable or not and regardless of their governing law;".*



Securities issued based on DLT would thus be "financial instruments" for the purposes of the Securitisation Law, and would be subject to the rules applicable under the Securitisation Law to the issuance of financial instruments.

2.4.2. The limitations of the use of DLT by securitisation vehicles

If an SV issues "financial instruments offered to the public" on a continuous basis, the SV needs approval from the CSSF[27]. Where an SV securitises a pool of risks, consisting of debt securities, debt financial instruments or claims, which is actively managed by the SV itself or by a third party, the financial instruments issued to finance the acquisition of this pool must not be offered to the public[28].

Irrespective thereof, a service provider to whom an SV delegates the issuance of financial instruments (the Delegate) will usually require prior CSSF authorisation as professional of the financial sector under the FSL. As we have seen in previous sections of this whitepaper, the definition of "financial instruments" in the FSL has recently been amended to include a reference to instruments issued by means of DLT.

Finally, according to Article 25 (1) of the FSL, registrar agents are professionals whose business is to maintain the register of one or more financial instruments. Unless the FSL would not be applicable by virtue of Article 1-1 (2) of the FSL, the activity of maintaining registers of financial instruments based on DLT on behalf of an SV would require an authorisation as registrar agent[29].

2.5 Investment funds

2.5.1 Current regulatory framework applicable to SICAR, SIF, RAIF

(i) Issuance of securities using DLT

In the absence of specific requirements regarding the issuance of securities using DLT, SICAR, SIF, and RAIF are subject to the regulatory provisions applicable to the issuance of securities through traditional means.

As a reminder, these regulatory requirements include obtaining the necessary approvals from the CSSF, providing clear and transparent information to investors, and complying with anti-money laundering regulations.

THE USE OF DLT-BASED SECURITIES' REGISTERS UNDER LUXEMBOURG LAW

Concerning the terms of issuance of securities, relevant provisions for SICAR, SIF and RAIF all refer to the provisions of the articles of incorporation or the partnership agreement, thus leaving contractual freedom in that respect:

"The SICAR can issue new securities "or partnership interests" in accordance with the conditions and procedures set forth in the articles of incorporation "or partnership agreement".[30][31][32]

In addition, the legal provisions applicable to SIF and RAIF provide the possibility to issue bearer shares/units and even dematerialised securities if possible under the provisions of the articles of association. In this context, in the absence of any legal requirement preventing the SICAR, SIF and RAIF to issue securities through DLT, the articles of association or limited partnership agreement, where applicable, may include the possibility for the vehicle to issue securities by means of DLT.

(ii) Investment in securities issued via DLT

In the absence of specific provisions in the respective product laws for SICAR, SIF and RAIF that restrict investment in securities issued by way of using DLT, these investment vehicles may invest in securities, subject to the same regulatory requirements as when investing in traditional securities.

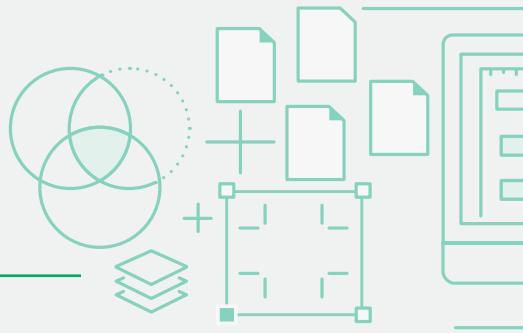
These requirements include performing due diligence on the issuer, ensuring the investment complies with the investment fund's objectives and risk profile, and complying with any relevant legal and regulatory requirements.

2.5.2. Current regulatory framework applicable to UCITS and Part II

(i) The eligible assets of UCITS/ Part II funds and the use of DLT

For Part II Funds, there is no limitation on the type of eligible assets. In the case of UCITS, the eligibility rules will apply in the absence of the update of the UCITS Directive.

The CSSF clarified in its 2023 FAQ on Virtual Assets – Undertakings for collective investment "investing in virtual assets as defined in Article 1 (20b) of the Law of 12 November 2004 on the fight against money laundering and terrorist financing, as amended (hereinafter "the AML/CTF Law") is not suitable for all kind of investors and/or all investment objectives. UCITS, UCIs addressing non-professional



customers and pension funds are thus not allowed to invest directly or indirectly in virtual assets.

(ii) The unit/shareholder registers of UCITS/UCIs Part II and the use of DLT

Unit-/shareholders registers of Luxembourg UCITS are exclusively governed by the Companies Act., the provisions to the corporate forms under the Companies Act will be applicable to such registers of UCITS in a FCP or a SICAV form. According to Article 8 paragraph 2 of the UCIL, "the ownership of units in the form of registered or bearer securities shall be determined, and transfer thereof shall be effected in accordance with the rules laid down in Articles 40 (430-3) and 42 (430-6) of the Companies Act concerning commercial companies, as amended."

Furthermore, only one service provider may be designated to perform the registrar function for a UCI.[34] In one of its FAQ on the Circular CSSF 22/811, the CSSF has published that "any UCIA performing the registrar function may use DLT to maintain the unit- /shareholder register".[35] The technology approach quoted by the CSSF must be considered by the fund promoters to determine whether units/shares may be held in registered form.

Hence, in terms of the share register, there appear to be no constraints in the UCIL and the Companies Act that could prevent the issuance, transfer, and recording of units/shares of Luxembourg UCITS in registered form through DLT.

2.6. Data Protection

2.6.1. DLT and the material scope of the GDPR

Data processing via blockchain and DLT may fall under the material scope of the General Data Protection Regulation (GDPR), as GDPR applies to the processing of personal data wholly or partly automated means and to processing other than by automated means which form or are intended to form part of a filing system.

Public keys and transactional data registered on DLT are considered personal data from a GDPR perspective to the extent and as long as it consists in information about identified or identifiable individuals. Such data could be stored on blockchain in plain text, in the form of a commitment[1], in encrypted form or hashed. It is important to note that pseudonymised or encrypted personal data still falls under GDPR. Only truly anonymised data fall outside of the scope of the GDPR.

[1] cryptographic mechanism that allows one to "freeze" data in such a way that it is both possible - with additional information - to prove what has been frozen and impossible to find or recognise such data by using this sole "commit".
[2] This is especially true when personal information is exploited for purposes other than the primary transaction.

2.6.2. Data subjects rights applied to DLTs

- Data transparency (Articles 12, 13 and 14 of the GDPR)

The use of DLTs can make it difficult to give users with clear information about how their personal data is handled and potential third-party access.[2]

- The right to erasure / to be forgotten (Article 17 of the GDPR)

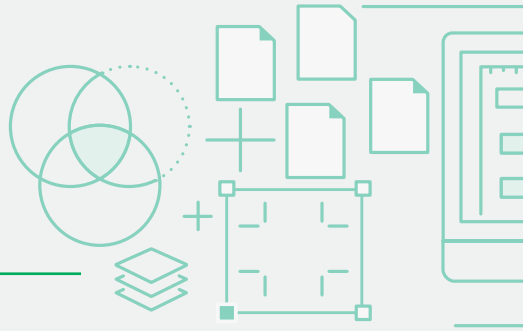
With DLTs, attempts to delete or modify data would entail modifying the existing ledger, which is in principle and most of the time not possible without jeopardising the system's integrity. Hence, once a transaction (including personal data) is recorded on the digital ledger, it may become challenging to comply with the right to erasure or the right to rectification afforded to data subjects under the GDPR.

There is no universal solution to address the right to be forgotten in DLT-based securities registries. When a data subject requests erasure or a predetermined retention period expires, the necessary encryption key can be destroyed, rendering the data inaccessible and essentially "forgotten." However, this solution may not be totally compliant with GDPR standards, as encrypted data remains on the ledger and is deemed personal data. The use of anonymisation or pseudonymisation techniques and/or the storage of personal data off-chain could be a few other options.

- The right to rectification (Article 16 of the GDPR)

Any attempt to modify data that has already been recorded on the ledger would require creating a new transaction, which would not replace the original transaction but would instead create a new, separate entry on the ledger.

Although not in line with the original purpose of blockchain, in principle DLT-based systems could implement revision and amendment protocols that allow for corrections to be made to the original data. The new transaction would update the personal data information to reflect the corrected data. Accuracy checks and automated data corrections could also be implemented to ensure the use of the right of rectification.



- **The right to object (Article 21 of the GDPR)**

Any objection to processing would require modifying the existing ledger, which is not possible without compromising the integrity of the system. To remedy this restriction, DLT-based systems could include opt-out methods, allowing individuals to object to the processing of their personal data, or create a separate ledger transaction that reflects the individual's objection to personal data processing. Access to personal data should be restricted to those who require it to ensure compliance with the right to object in DLT-based securities registrations. However, this approach may compromise the decentralised nature of DLTs and still may not entirely comply with GDPR requirements.

- **Purpose limitation and data minimisation (Article 5(1)(b) and (c) of the GDPR)**

Personal information obtained for a specific DLT-based securities registry transaction should not be used for any other purpose without the person's express consent. Individuals must be informed and given the opportunity to object if personal data relating to them is used for purposes other than those for which it was initially obtained.

DLT-based systems can ensure that only the personal data required for their specific purpose is collected and stored. This can be accomplished by creating explicit data collection policies and procedures, conducting regular data audits, and implementing safeguards to prevent unwanted personal data gathering. DLT-based systems can be subject to data processing impact assessment to identify and assess the risks associated with collecting and processing personal data on the ledger.

2.6.3. Data controller and data processor considerations in the DLT registries

Given their decentralised nature, DLT-based systems involve multiple nodes that collectively validate, store, and update transaction data. In such a scenario, it becomes difficult to clearly identify the roles and responsibilities of each node in terms of GDPR compliance.
Organisations must carefully evaluate and manage these roles to ensure compliance with GDPR requirements. Some requirements oblige controllers and processors, as they also have their own obligations to follow in application of the GDPR.

- Data controller and data processor in a private blockchain securities registry

The data controller's identity depends on the specific governance structure and operational model of the blockchain. In a private blockchain, as the number of participants is limited, there could be one or multiple data controllers depending on the purposes and means of processing personal data within the network. In such scenario, it is crucial to establish clear agreements defining the roles and responsibilities of each participant concerning GDPR compliance. The same general criteria applied to controllers could also be used to distinguish data processors from data controllers in the context of a private blockchain.

- Data controller and data processor in a **public** blockchain securities registry

The process of identifying and assigning roles and responsibilities for data controllers and processors is significantly more complex in a public blockchain. Given that the network is operated by all nodes in a decentralised manner, and there's no central control point, a case-by-case evaluation is necessary. In such situation, each node that initiates a transaction or saves a transaction in its own copy of the database is likely to qualify as data controller.

Nodes have the autonomy to decide if they want to join the ledger and in what capacity. However, nodes do not qualify as joint controllers as they do not determine other nodes' data processing modalities.

LUXEMBOURG

GIVEN THEIR DECENTRALISED NATURE, DLT-BASED SYSTEMS INVOLVE MULTIPLE NODES THAT COLLECTIVELY VALIDATE, STORE, AND UPDATE TRANSACTION DATA.

TOKENISATION

DATA

SOURCES

[1] Article 1 (2) of the CSL.

[2] Articles 430-3 and 430-4 of the Companies Act 1915.

[3] J. Corbiau, Avant-projet de loi sur les sociétés commerciales, ID 11308

[4] JurisNews, Vol 4, No 10/2011, ISSN:1996-3092 « Les Registres de Titres Nominatifs », Daniel Boone, Yann Payen & Isabelle Charlier.

[5] P. Dupont, P. Hoss, « La loi du 28 juillet 2014 relative à l'immobilisation des actions et parts au porteur », Bulletin Droit & Banque.

55, ALJB, 2015, considered also in ALJB – Bulletin Droit & Banque N 67 – Décembre 2020, "Tokenised securities in Luxembourg: concept and legal considerations to be taken into account upon an issuance", Karl Pardaens and Benoit Nerriec

[6] The same analysis would apply to registers of debt securities, unless the requirement to keep the register at the registered office is disapplied.

[7] https://blockstream.com/liquid/

[8] The DLT Pilot Regulation amends the existing definition of "financial instruments" under MiFID II to also include financial instruments issued by means of distributed ledger technology. The Blockchain Law III has also amended the FSL in this respect.

[9] (i) Law of 25 March 2020 establishing a central electronic data retrieval system concerning payment accounts and bank accounts identified by IBAN and safe-deposit boxes held by credit institutions in Luxembourg and amending, amongst others, the AML Law; (ii) Law of 25 March 2020 amending, amongst others, the AML Law with a view to transposing certain provisions of Directive (EU) 2018/843.

[10] Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937

[11] Ibid., proposed Article 2(4)(a).

[12] Art. 1(13) DSL.

[13] Art. 1(11)(a) DSL.

[14] Art. 5 DSL.

[15] Art. 3 DSL.

[16] Art. 1(1a) DSL.

[17] According to Art. 1(6) DSL, a "settlement organisation" is "a securities settlement system within the meaning of the law on payment services, designated as such by the Banque centrale du Luxembourg and notified to the European Commission by the Minister It is also responsible for the financial sector and whose system operator is established in Luxembourg."

[18] Art. 13 DSL.

[19] Under Art. 2(7) DSL and account keeper is defined as "any person authorised pursuant to the Luxembourg law to maintain securities accounts including public national or international bodies established in Luxembourg and active in the financial sector."

[20] See e.g. Cornu defining a register as a book constituting an instrument of evidence or publicity and defining a book as a document of official or private origin meant to gather various information linked to the same topic for purposes of evidence, control and consultation

[21] "Toute société peut émettre des obligations" ("Any company may issue bonds").

[22] Art. 100-14 Companies Act.

[23] Art. 100-14 Companies Act.

[24] Art. 470-1 Companies Act.

[25] Article 1(1) of the Securitisation Law.

[26] Law of 15 March 2023 about :

1° modification of :

a) the amended law of 5 April 1993 on the financial sector;

b) the amended law of 5 August 2005 on financial collateral arrangements;

c) the amended law of 30 May 2018 on markets in financial instruments;

2° application of Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022 on a pilot regime for market infrastructures based on distributed ledger technology, and amending Regulations (EU) No 600/2014 and (EU) No 909/2014 and Directive 2014/65/EU.

[27] Articles 19ss. of the Securitisation Law.

[28] Article 61-1 of the Securitisation Law.

[29] Articles 14ss. of the 1993 Law.

[30] Law of 15 June 2004 relating to the Investment company in risk capital ("SICAR"), art.5

[31] Law of 13 February 2007 relating to specialised investment funds, art. 28(2)

[32] Law of 23 July 2016 on reserved alternative investment funds, art. 26

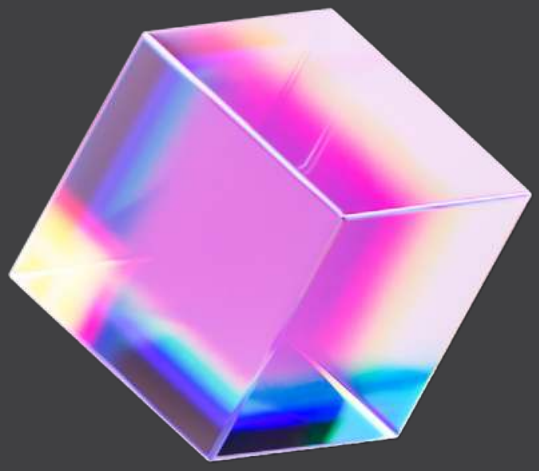
[33] CSSF FAQ, « Virtual Assets – Undertakings for collective investment », published on 06 April 2023, https://www.cssf.lu/wp-content/uploads/FAQ_Virtual_Assets_UCI.pdf, retrieved 11 April 2023.

[34] CSSF Circular 22/811 on UCI administrators, point 11.

[35] CSSF FAQ – Authorisation and organisation of entities acting as UCI administrator, Version 2 – December 2022, p.4.

SECTION 03

THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET



THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET

Since the implementation of Blockchain Law II in 2021, there has been significant debate surrounding its implications for businesses in Luxembourg. Specifically, questions have arisen regarding whether the law adequately clarifies the positioning of blockchain technology and whether it sufficiently addresses the needs of the financial industry, particularly in asset management.

While a previous assessment found that the technical and regulatory elements necessary for blockchain deployment are in place, attention must now turn to the practical reality of technology implementation.

Some have expressed concern that despite significant investments in technology and process security by financial institutions in recent decades, the current change management process, which prioritises full compliance and risk management frameworks, may only allow for incremental advancements rather than major technological overhauls. This focus on intra-group projects and hesitancy to explore extra-group solutions may limit the widespread adoption and expansion of blockchain technology.

3.1. Challenges

Undoubtedly, the financial industry has encountered more obstacles than anticipated, which may help to explain the limited adoption of distributed ledger technology (DLT), regardless of the existing regulatory framework. Challenges impeding market participants from embracing blockchain technology can generally be categorised as follows:

3.1.1 Strategic allocation of capital

The adoption of blockchain technology in the financial industry can bring significant changes to the roles and functions of intermediaries. As blockchain enables peer-to-peer transactions and eliminates the need for intermediaries in certain processes, traditional intermediaries may need to adapt their business models or face the risk of being displaced.

However, it's worth noting that while blockchain technology has the potential to disrupt traditional intermediaries, it can also create new opportunities for collaboration and value creation. Intermediaries can explore how they can leverage the benefits of blockchain to enhance their existing services or develop new offerings that align with the capabilities of the technology.

THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET

Ultimately, the adaptation or potential disappearance of intermediaries will depend on the extent to which they embrace and leverage blockchain technology to provide value-added services in the evolving landscape.

The ability to identify and seize new opportunities, adapt to changing market dynamics, and provide unique value propositions will be crucial for intermediaries to thrive in a blockchain-driven ecosystem. It is also important to keep in mind that the actors required to invest in the technology are also the one, that potentially will have to either adapt to a new role or disappear from the intermediary landscape.

3.1.2. Missing the mass adoption factor

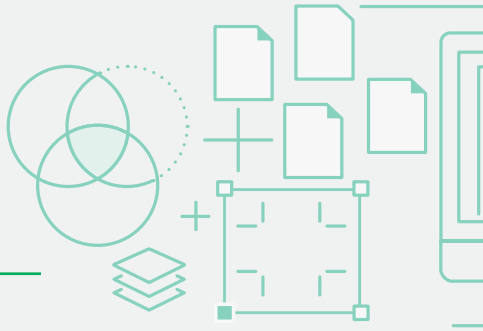
The limited adoption of blockchain technology in the financial industry has resulted in securities and assets issued onto the blockchain being largely isolated, lacking important capabilities for reuse such as repo and lending. Currently, only a limited number of market participants are ready to incorporate blockchain into their general business activities. Rapid developments are necessary to encourage greater adoption of the technology, especially in terms of linking native blockchain-issued securities to legacy infrastructure such as T2S, CSDs, and custodians.

The implementation of blockchain technology requires organisations to undertake transformation projects without certainty that the technology will deliver its promised benefits. Such decisions are challenging for management, given that banks have invested heavily in their legacy systems, and such projects may call into question decisions made in the recent past. Furthermore, organisations often have international activities with different rules and procedures, making the standardisation of processes complex for blockchain-based registries and projects.

Another potential barrier to the mass adoption of DLT is the lack of understanding and awareness of the technology among market participants. To encourage wider acceptance and use, it is essential to explain the benefits, workings, and potential applications of blockchain technology in simple terms. Therefore, increasing educational initiatives and awareness campaigns about DLT in the financial industry is critical.

3.1.3. No appropriate wholesale cash on the ledger (DvP on-chain) solutions available

Delivery versus payment (DvP) is a mechanism that guarantees the transfer of securities only after payment is received, ensuring



greater security in financial transactions. Currently, there is no digital euro solution provided by the European Central Bank (ECB) or commercial banks. Furthermore, existing stablecoins lack the necessary security and transparency for widespread use. Although conditional DvP via trigger solutions has been tested by institutions such as the Bundesbank and Banca d'Italia, the political decision-making process required for their implementation is time-consuming.

The absence of a digital euro solution and the limited availability of secure stablecoins highlight the need for alternative approaches to facilitate secure and transparent financial transactions. While conditional DvP via trigger solutions shows promise, its adoption remains dependent on the political will of relevant institutions and regulatory bodies.

3.1.4. No pressure to migrate to blockchain technology

There are several reasons why financial institutions may not feel pressure to migrate to blockchain technology for the issuance and management of securities. Firstly, they may consider their current processes to be reliable and efficient, and view the introduction of a new technology as potentially adding unnecessary risk to their operations.

Institutions have invested massively in their existing infrastructures, or connecting to these but also linked to some markets stakeholders defending vested interest (sometimes - but not always - based on inefficiencies).

As a result, the case of DLT for public markets will have to be extremely compelling in order to have those markets moving. Additionally, traditional players may not yet be convinced of the potential benefits of blockchain infrastructure, and previous attempts to implement it have seen limited adoption or scale. Furthermore, market participants may be concerned about potential disintermediation and a shift in roles and responsibilities.

While there is interest in the use of public blockchain infrastructure to bypass current intermediaries, concerns around the environmental impact of proof-of-work (POW) consensus mechanisms have been addressed by developing more energy-efficient consensus mechanisms, such as proof-of-stake (POS), which are now the go-to solution.

THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET

3.1.5. The case of private blockchains

Financial institutions tend to favour private blockchains due to the level of control they provide and their potential to remain "in-house". However, while the ability to maintain control over business data is attractive, private blockchains do not differ significantly from existing central solutions and are limited in terms of scalability and interoperability.

As a result, the key benefits of a decentralised infrastructure are not fully utilised, including access to new asset classes, the ability to leverage a publicly available and scalable infrastructure, and the ease of accessibility due to the "plug-and-play" nature of the system.

Additionally, the ability to interact smoothly with other applications on the public infrastructure is also a valuable advantage of a decentralised infrastructure.

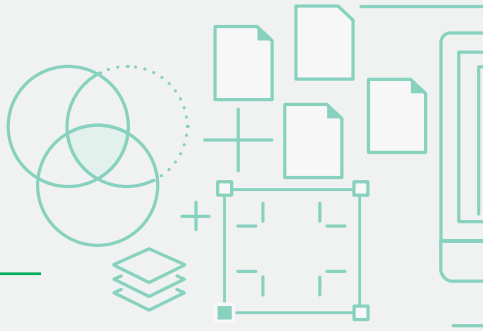
3.1.6. Navigating the ecosystem

The rapidly evolving nature of the blockchain ecosystem presents challenges in navigating and selecting the appropriate solutions for businesses. Although there are initiatives to standardise the technology, there is also a proliferation of platforms and protocols, leading to potential fragmentation in the future. In order to make informed investment decisions, certain criteria should be considered.

Interoperability is a crucial factor, as it enables seamless communication and interaction between different blockchain networks and protocols. Longevity is another important consideration, as investing in a technology that has proven staying power provides confidence in its continued development and support.

The level of mass adoption is also significant, as widespread use indicates that the technology is gaining traction and acceptance among various stakeholders.

Customisation capabilities are essential for businesses to tailor the technology to their specific needs and requirements. Security and data protection are paramount concerns, particularly in the financial industry, where the integrity and confidentiality of sensitive information are crucial.



Despite the existence of some risk-taking actors, investment in blockchain technology by key stakeholders in the Asset Management value chain is still limited. Eliminating the first-mover risk requires more institutions to embrace the technology and demonstrate its effectiveness in improving processes and enhancing the client experience, all while reducing costs.

As more success stories emerge and the technology continues to mature, it is expected that risk-averse institutions will be reassured of the viability and benefits of blockchain technology, leading to wider adoption in the industry.

3.1.7. Usage of different public blockchain protocols and their uncertainties

Thorough due diligence and dedicated assessment are required to evaluate all the various characteristics of public protocols. However, this can be challenging due to the difficulty of assessing elements such as the finality of transactions, and the potential presence of unknown or unwanted parties (particularly in the context of miners/validators). In addition, missing control of the infrastructure and data privacy concerns (such as those related to GDPR) are also potential issues that need to be considered carefully when evaluating public protocols.

Therefore, it is critical to conduct a comprehensive analysis of all relevant factors before implementing public protocols in order to mitigate any associated risks and ensure compliance with applicable regulations.

3.1.8. Knowledge

When considering the lack of adoption of distributed ledger technology (DLT), it is tempting to attribute resistance to the absence of certain actors in the value chain, particularly in Luxembourg. However, the root cause of this may actually lie in a lack of understanding among market participants, e.g. issuers and issuer agents, regarding the potential benefits of DLT.

By providing clear explanations of the main differentiating elements of DLT, it may be possible to increase adoption and overcome this barrier. Therefore, it is important to prioritise education and awareness efforts in order to help market participants fully understand the advantages that DLT can offer and to encourage their active participation in this emerging technology.

3 THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET

3.1.9. Cash-on-chain solutions

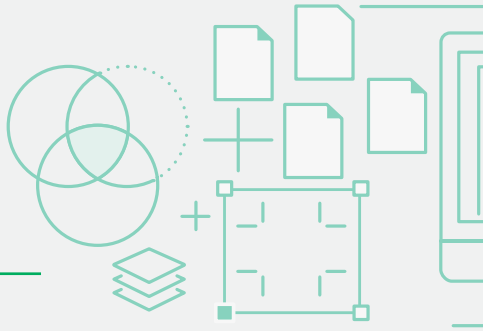
Currently, the missing link in the chain is the integration of cash-on-chain solutions, specifically Central Bank Digital Currency (CeBDCs) or CoBDCs (when Central Banks are not involved in the transaction). These solutions are crucial as certain transactions or investors still rely on traditional Central Bank Money settlement. While DLT is often associated with cryptocurrencies, there is a need for concrete and reliable solutions that enable settlement with money-on-chain.

Recent developments in the realm of CBDCs show promise and are expected to play a significant role in the adoption of DLT in financial transactions. Multiple initiatives are underway, and the industry is eagerly awaiting further guidance from regulatory bodies on a global scale. The successful implementation of CBDCs will be a decisive factor in leveraging the full potential of DLT for financial operations. It will not only bridge the gap between digital assets and traditional fiat currencies, but also bridge the missing link in the new value chain of digital asset management lifecycle. It is important to continue monitoring these developments and ensure regulatory clarity to facilitate the seamless integration of cash-on-chain solutions with DLT-based systems.

3.2. Opportunities and use cases

The development of effective use cases is crucial for driving the adoption of distributed ledger technology (DLT). However, when examining business-focused use cases, we often find that they lack sufficient investor participation and are at risk of low return on investment. On the other hand, internal efficiency-driven use cases tend to face constraints in terms of investment capacity, making them less effective in driving adoption.

The most promising approach for promoting DLT adoption is through the use of external efficiency-driven use cases that involve a collaborative approach among different companies in the value chain. By aligning projects and budgets and working together, these companies can demonstrate the potential benefits of using DLT for securities registers, including increased efficiency, transparency, and cost savings. These use cases provide the necessary input to help stakeholders fully understand the advantages of DLT and to encourage broader adoption across the industry.



3.3. Opportunities

DLT can be used for the issuance and transfer of securities, and as a basis of securities registers - but what would be the operational advantages that DLT would bring to securities registers? Here are some examples:

- **Efficiency and transparency:** The issuance of securities (e.g. in the form of global notes) or the registration in registers are slow and costly processes, and the securities may sometimes be at risk (e.g. register mismatches, theft of securities, etc.). DLT can improve the efficiency and transparency of these processes, including transfers and reconciliation, by enabling near-real-time updates, automation, and verification of transactions across a shared network of participants, without the need for intermediaries or manual interventions. This philosophy fits particularly well with the nature and function of registered securities, which is based on non-custodial models.

- **Direct link:** Using DLT to issue and transfer registered securities can enable a direct link between the issuing company and the investor. This would eliminate the counterparty risks and reduce costs and complexities on the issuer and investor side.

- **Shared and trusted network:** DLT can empower the end-users and stakeholders of the capital markets, such as issuers, investors, regulators, or service providers, by giving them more control, visibility, and participation over their data, assets being transferred, and transactions, as well as enabling them to verify, validate, and audit the information and activities on the ledger. This can enhance the trust, accountability, and governance of the capital markets, which is in line with the policy objectives of the European Union.

3.3.1. The general use of securities registers in the financial sector

The financial sector presents a wide range of potential use cases for technology. Banks have traditionally acted as trusted third parties and kept registers for various functions such as investor transfers and debt issuers. These registries offer benefits such as transparency, efficiency, and lower costs; they are essential in the way we are performing the transactions and can benefit from the latest development in DLT for which, massive and shared adoption will be the decisive factor.

3 THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET

The CSSF also recognises the potential of DLT in the market. For example, in its Frequently Asked Questions on the UCI Administrators Circular, the CSSF clarified that any UCI administrator performing the registrar function may use DLT to maintain the unit/shareholder register.

DLT offers significant advantages in the automation of securities' lifecycle events. Recent experimentation with the EIB's debt issuance and bond emissions in collaboration with various actors has led to the accumulation of knowledge for all parties involved and provided insight into the process and challenges.

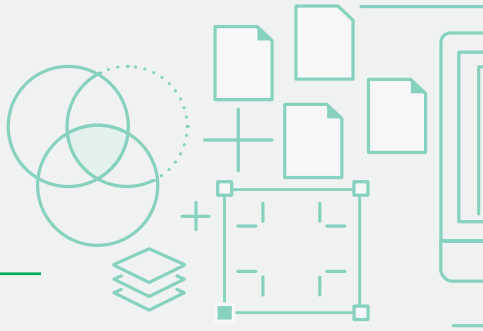
Despite this progress, the sector faces the same adoption challenges as the broader economy. The lack of acceptance can be attributed to additional factors specific to financial services.

3.3.1.1. On-chain / off-chain

The register is just one aspect of a bank's operations, and even if it can be seamlessly integrated with blockchain technology, the other parts of the business will still have to operate off-chain. As such, it is crucial to design the system in an optimal way that takes into account both on-chain and off-chain processes, rather than attempting to retrofit blockchain into an existing system. It is generally more efficient and effective to plan for this integration from the outset, rather than attempting to make adjustments later on in the process.

3.3.1.2. Standardisation

The process of implementing blockchain technology in the banking sector is complicated by the absence of standardisation, particularly due to the preference of some banks for private blockchains. This can result in reduced interoperability, making the process more challenging.



3.3.1.3 Liquidity of the alternative assets class

Asset tokenisation presents an opportunity for Luxembourg fund managers, third-party management companies and service providers in the alternative asset management industry to widen the range of products and services in a changing world.

The next generation of investors is digital native, seeks greater autonomy in the digital space and is looking for true 'ownership'. Asset tokenisation unlocks the potential to reach out to new investor types and enables fractionalisation with reduced risks. Liquidity: Rising interest rates and falling asset prices will be a challenge in the coming year for investors who seek to have access to cash.

Closed-end funds do in general not allow for redemptions and even if opened after the lifetime they may have difficulties to allow for redemptions as the underlying assets are difficult to sell. The result is that the cash is trapped and liquidity is locked.

So far the alternative investment fund industry and its service providers did not have a solution to this problem so investors who seek liquidity will think twice whether they put their money in new alternative investment fund structures.

Fractionalisation enabled by tokenisation provides far more flexibility than traditional fractionalisation in the private markets which are slow, manual, opaque, and have high overheads.

Tokenisation enables part or all of the fund units to be sold in smaller fractions to investors who did not so far have the possibility to invest with smaller tickets in alternative investment products. This does not prevent compliance with restrictions rules pertaining to UCITS and AIFs, based on the nature of the fund.

This will allow existing investors of a closed ended fund (for example pension funds) to get access to liquidity and a new generation of investors (like high net worth individuals and family offices) to access alternative investment products

THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET

3.3.2. The future of securities registers

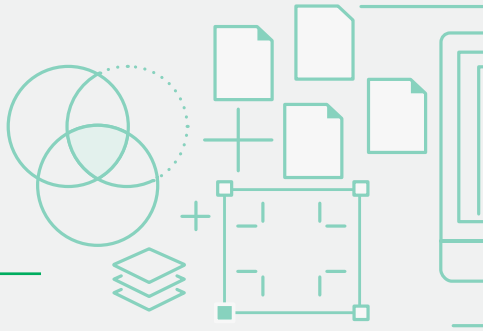
The implementation of distributed ledger technology (DLT) has the potential to create new issuance models and alter the roles and responsibilities of market participants. Consequently, it is crucial to rethink the current models instead of simply replicating them. Inefficiencies already exist within the current systems, and DLT should be viewed as an opportunity to improve the lifecycle of securities, with a focus on the benefits for market participants.

Conditioned to an existing securitisation structure, DLT provides access to new asset classes, including art, collectibles, real estate, and license rights to traditional market participants, by taking advantage of publicly available infrastructure benefits such as scalability, no need for deploying their own infrastructure, low maintenance costs, and economies of scale.

While creating "digital twins" of existing shares may be tempting, the full benefit of DLT lies in the creation of digital native assets, born on the DLT and not replicated from traditional shares.

3.3.3. The importance of public DLT

Public blockchain protocols offer various possibilities for utilising assets and integrating them with other applications. One of the main benefits of utilising blockchain technology for registrar management is the ability to achieve near real-time and continuous reconciliation between entities. This feature brings significant value by increasing efficiency and reducing costs, particularly for entities that need to access and search for information. However, to fully realise these advantages, it is crucial to develop projects that expand beyond one-to-one relationships and adopt multilateral approaches, using technology that adheres to universally accepted operational standards.



3.3.4. A market address

Luxembourg's prominent position in the global Asset Management industry indeed provides a solid foundation for exploring the potential of asset tokenisation.

According to research conducted by SIFMA, a substantial portion of the global equity and fixed income market, estimated at around $225 trillion, could be potentially tokenised. This suggests that there is significant potential for asset tokenisation to reshape the financial landscape and unlock new investment opportunities.

Alternative funds, including real estate funds and private equity, are particularly well-suited for tokenisation. SIFMA's research indicates that up to 7.5% of real estate funds and 10% of private equity funds could be tokenised, presenting substantial opportunities for innovation and growth in these sectors.

In the local context, Luxembourg manages approximately $962 billion in Assets under Management (AuM) in regulated alternative funds. This significant amount underscores Luxembourg's strong position as a hub for alternative investments. By embracing tokenisation, Luxembourg can set an example for the rest of the world, showcasing its pioneering spirit and commitment to remaining at the forefront of innovation in the financial industry.

While DLT provides greater accessibility to a broader customer base through fractional ownership and increased liquidity, tokenisation can lower barriers to entry, allowing a wider range of investors to participate in traditionally exclusive markets. This evolution comes with new challenges related to associated rights, like voting rights. As such, this should be detailed thoroughly to potential investors.

By leveraging its expertise in Asset Management and embracing the opportunities presented by asset tokenisation, Luxembourg can position itself as a leader in the digital transformation of the financial industry. This proactive approach demonstrates a commitment to innovation and reinforces Luxembourg's status as a forward-thinking and dynamic financial centre.

THE CHALLENGES AND OPPORTUNITIES FOR THE LUXEMBOURG MARKET

3.3.5. Integrate sustainable data

Luxembourg's focus on sustainability in finance aligns well with the potential of DLT and asset tokenisation. By leveraging distributed ledger technology, Luxembourg can enhance the integration of sustainability factors into financial transactions and facilitate the development of Environmental, Social, and Governance (ESG) driven investment solutions.

DLT offers the capability to include a broader range of data within transactions, allowing for direct inclusion of accreditations, sustainability scores, and ratings at the instrument level. This means that ESG-related information can be embedded within the digital assets. Investors can have more transparent and reliable access to information regarding the sustainability performance of the assets they invest in.

Furthermore, DLT enables greater customisation and tailoring of investments based on the investor's profile and sensitivity to specific ESG factors. With tokenisation, it becomes easier to create investment vehicles that align with individual investor preferences and values. This tailoring of investments based on ESG considerations can attract a broader range of investors who are seeking investment opportunities that align with their values.

By utilising DLT for sustainability-driven finance, Luxembourg can foster a more conscious and ESG-focused finance industry. It can provide investors with enhanced transparency, facilitate more targeted investment strategies, and ultimately contribute to the broader global sustainability goals.

Additionally, the potential reduction in barriers to entry through tokenisation can democratise access to these specific investment vehicles. By fractionalising assets and making them more easily tradable, tokenisation can enable a wider range of investors to participate in sustainable finance opportunities.

Overall, the combination of DLT, asset tokenisation, and sustainability goals presents a compelling opportunity for Luxembourg to position itself as a leader in sustainable finance, embracing digitalisation and promoting a more inclusive and ESG-driven financial industry.

3.3.6. National initiative

The uncertainties and costs associated with implementing DLT and asset tokenisation can be perceived as barriers to adoption. However, given Luxembourg's national interest in becoming a digital pioneer and its focus on sustainability in the finance industry, it could be beneficial for the country to provide incentives and support for a national initiative.

By offering incentives, such as funding programs, regulatory support, or research collaborations, Luxembourg can encourage the Asset Management industry to actively explore and gain knowledge and experience in DLT and asset tokenisation. This support can help overcome the initial challenges and uncertainties associated with the technology, allowing market participants to better understand its potential benefits and applications.

A national initiative can provide a platform for collaboration and knowledge sharing among industry players, regulators, academia, and technology providers. It can facilitate the exchange of best practices, lessons learned, and technical expertise, creating a strong ecosystem for the development and adoption of DLT-based solutions.

The example of sustainable investments provides a compelling case for driving innovation and adoption of DLT. Luxembourg can harness the synergies between the national initiative and the promotion of sustainable finance to leverage this opportunity.

By aligning these two agendas, Luxembourg can attract a broader range of stakeholders, including investors and asset managers actively seeking sustainable investment opportunities. The convergence of sustainability and DLT will generate significant interest, visibility, and support from both local and global players. This alignment will play a pivotal role in fostering the adoption of DLT in the fund industry, bringing about positive changes in the financial landscape. It is worth noting that this is just one of many examples that can benefit Luxembourg’s Funds industry.

In summary, providing incentives and supporting a national initiative can help the Asset Management industry in Luxembourg overcome challenges, gain knowledge and experience, and create the necessary visibility and traction for broader adoption of DLT and asset tokenisation. The shared focus on sustainability can serve as a catalyst for innovation and drive the digital transformation of the finance industry in Luxembourg.

CONCLUSION

As the exploration of **DLT** within Luxembourg financial industry matures, the potential of this remarkable technology to optimise securities register management is becoming increasingly evident. However, the path to full integration and adoption is riddled with both substantial challenges and true opportunities.

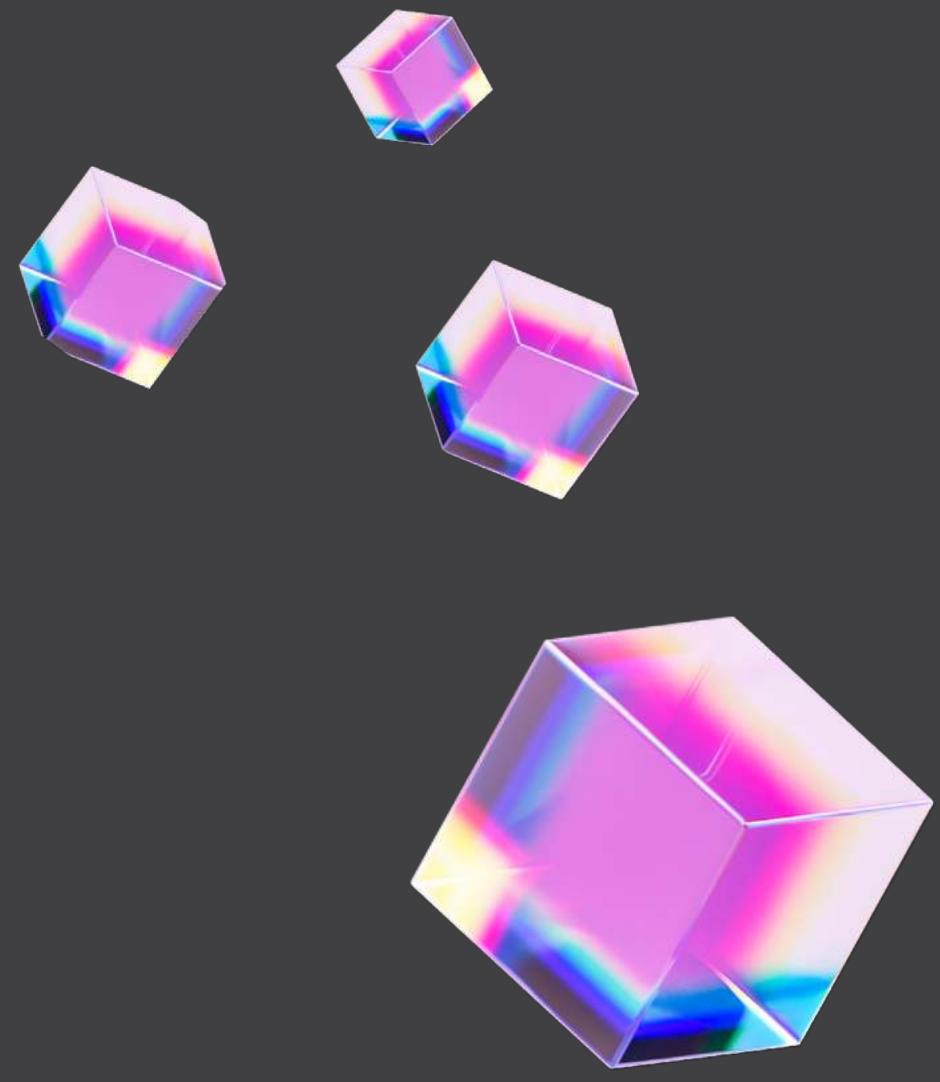
Existing securities register management systems are marred by inherent limitations such as obsolescence, vulnerability to threats, lack of transparency, and inefficiencies in updating records. Luxembourg law clarifies the use of DLT for maintaining securities registers and allows securities to be issued using DLT; this provides a promising avenue to resolve the shortcomings of classic registers, offering improvements in all the aforementioned aspects along with useful features such as interoperability between systems and smart contracts. The latter is poised to catalyse the rapid execution of transactions.

As seen previously, tokenisation and smart contracts allow investment forms to maintain their investor registries on DLT, facilitating real-time updates and instantaneous recording of ownership changes. Non-transferable and permissioned tokens, decentralised identifiers, and anonymous and verifiable credentials are all options allowing stakeholders in blockchain systems to be accurately identified, paving the way for robust controls over identity and permissions.

Nonetheless, despite the numerous benefits of DLT, mass adoption in the financial industry is far from achieved, largely due to substantial investments in legacy systems, lack of understanding about the technology, and hesitance to undertake such transformation projects. Yet, opportunities for widespread adoption are on the horizon, with the potential for DLT to bring about new issuance models and to access new asset classes such as art, collectibles, and so on. Incentives for adoption, such as digital and automated processes, can provide a compelling economic rationale for embracing the technology.

In conclusion, the future that lies ahead is promising. DLT does not alter the legal nature of enforceability of securities and offers a myriad of benefits such as reducing intermediary costs and facilitating the transfer and exercise of holders' rights. We should not shy away from continuing to explore and invest in this technology, while actively seeking to mitigate the challenges at hand. The potential rewards for Luxembourg's financial industry are very real, and the way forward is through continued innovation, adaptation, and collaboration

GLOSSARY



GLOSSARY

AML Law means the Luxembourg law of 12 November 2004 on the fight against money laundering and terrorist financing, as amended.

Blockchain Law I means the Luxembourg law of 1 March 2019 amending the CSL.

Blockchain Law II means the Luxembourg law of 22 January 2021 amending the DSL and the FSL.

Blockchain Law III means the Luxembourg law of 15 March 2023 amending the FSL, the MIFL, and the Collateral Law.

Blockchain Laws means the Blockchain Law I, the Blockchain Law II and the Blockchain Law III.

Collateral Law means the Luxembourg law of 5 August 2005 on financial collateral arrangements, as amended.

Companies Act means the Luxembourg law of 10 August 1915 on commercial companies, as amended.

DLT means Distributed Ledger Technology.

DSL means the Luxembourg law of 6 April 2013 on dematerialised securities, as amended.

CSL means the Luxembourg law of 1 August 2001 on the circulation of securities, as amended.

CSSF means the Commission de Surveillance du Secteur Financier (the Luxembourg Supervisory Authority of the Financial Sector).

FSL means the Luxembourg law of 5 April 1993 on the financial sector, as amended.

MiFID II means Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments (recast).

MFIL means the Luxembourg law of 30 May 2018 on markets in financial instruments, as amended.

Pilot Regime means Regulation (EU) 2022/858 of the European Parliament and of the Council of 30 May 2022, establishing a pilot regime for market infrastructures based on distributed ledger technology.

Securitisation Law means the Luxembourg law of 22 March 2004 on securitisation, as amended.

UCIL means the Luxembourg law of 17 December 2010 relating to undertakings for collective investments, as amended.

UCITS Directive means Directive 2009/65/EC of the European Pvvvarliament and of the Council of 13 July 2009 on the coordination of laws, regulations, and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS).

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