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Report

ESMA Report on the Functioning and Review of the DLT Pilot Regime - Pursuant to Article 14 of Regulation (EU) 2022/858

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1 Executive Summary

Reasons for publication

This report is published pursuant to Article 14 of the DLTR (Regulation (EU) 2022/858 on a Pilot Regime for Market Infrastructures based on Distributed Ledger Technology)[1]. As mandated, ESMA is required to assess the functioning of the Pilot Regime, including technical deployment, market performance, regulatory exemptions, and systemic risks and to advise the European Commission on whether the pilot should be extended, expanded, amended, and/or made permanent.

Contents

The report finds that while uptake of the DLT Pilot Regime remains limited—with only three authorised infrastructures (CSD Prague, 21X AG, and 360X AG) and minimal live trading activity—the regime has stimulated experimentation with DLT-based models for trading, settlement, and compliance (particularly for smaller issuers and innovative asset types).

It highlights operational and legal frictions, such as lack of interoperability and access to central bank money and concludes that current thresholds restrict wider participation. The report recommends recalibrating these thresholds and clarifying the long-term regulatory status of the regime.

Section 2 provides an overview of the authorised DLT market infrastructures under the DLT Pilot Regime and describes their operational focus. Section 3 analyses the types of exemptions requested and granted, the uptake and value of DLT financial instruments, technical and legal issues encountered, and observed risks. Section 4 evaluates the potential for regulatory arbitrage, interoperability challenges, and cost-benefit considerations linked to the use of DLT. Section 5 assess the appropriateness of the regime's thresholds and provides ESMA's recommendations regarding the future direction of the Pilot Regime.

Next Steps

The Commission is expected to present its own report to the European Parliament and Council within three months of receipt of the ESMA Report. Depending on the Commission's recommendations, the DLT Pilot Regime may be extended, amended, or converted into permanent regulation. Should the regime be extended, ESMA stands ready to provide a follow-up report within the revised timeline and continue technical engagement with all stakeholders.

Legislative References

DLTR	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 (OJ L 151, 2.6.2022, p.1).
CSDR	Regulation (EU) No 909/2014 of the European Parliament and of the Council of 23 July 2014 on improving securities settlement in the European Union and on central securities depositories and amending Directives 98/26/EC and 2014/65/EU and Regulation (EU) No 236/2012 (OJ L 257, 28.8.2014, p.1).
MiFID II	Directive 2014/65/EU of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Directive 2002/92/EC and Directive 2011/61/EU (OJ L 173, 12.6.2014, p.349).
MiFIR	Regulation (EU) No 600/2014 of the European Parliament and of the Council of 15 May 2014 on markets in financial instruments and amending Regulation (EU) No 648/2012 (OJ L 173, 12.6.2014, p.84).
SFD	Directive 98/26/EC of the European Parliament and of the Council of 19 May 1998 on settlement finality in payment and securities settlement systems (OJ L 166, 11.6.1998, p.45).
ESMA Regulation	Regulation (EU) No 1095/2010 establishing a European Supervisory Authority (European Securities and Markets Authority) (OJ L 331, 15.12.2010, p.84).
SFTR	Regulation (EU) 2015/2365 of the European Parliament and of the Council of 25 November 2015 on transparency of securities financing transactions and of reuse (OJ L 337, 23.12.2015, p.1).

Abbreviations

BoS	Board of Supervisors (ESMA)	**DLT TSS**	DLT Trading and Settlement System
CBDC	Central Bank Digital Currency	**EC**	European Commission
DLT	Distributed Ledger Technology	**EMT**	E-Money Token
DLT MI	DLT Market Infrastructure	**ESMA**	European Securities and Markets Authority
DLT MTF	DLT Multilateral Trading Facility	**NCA**	National Competent Authority
DLT SS	DLT Settlement System	**RTGS**	Real-Time Gross Settlement

[1] 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

2 Context and scope

2.1 Objectives of the DLT Pilot Regime and ESMA's reporting mandate

1. The DLT Pilot Regime introduced by DLTR aims to foster the development and integration of distributed ledger technology (DLT) into Union financial markets by allowing time-limited and conditional regulatory exemptions for DLT-based market infrastructures. The DLTR provides a controlled environment to test the use of DLT for the trading and settlement of financial instruments while preserving investor protection, market integrity, and financial stability.
2. Pursuant to Article 14(1) of DLTR, ESMA is mandated to assess the functioning of the Pilot Regime and report to the European Commission by 24 March 2026. This report evaluates the deployment of DLT MIs, their legal and operational performance, and the effectiveness of the temporary exemptions granted under the Pilot Regime. The findings are intended to inform the Commission's review under Article 14(2) of DLTR regarding the future of the Pilot Regime. It also supports ESMA's broader objectives under the European Supervisory Framework to promote consistent supervisory outcomes and technological innovation.

2.2 Overview of the DLT Pilot Regime's legal and technical framework

3. The DLT Pilot Regime creates three categories of DLT MIs: DLT multilateral trading facilities (DLT MTFs), DLT settlement systems (DLT SSs), and DLT trading and settlement systems (DLT TSSs). These DLT MIs may benefit from specific exemptions from existing EU financial services legislation, including MiFID II, MiFIR, and CSDR, to facilitate innovation in trading and post-trade activities under close supervisory monitoring.
4. The legal foundation is based on the principle of technological neutrality, allowing the use of DLT while maintaining essential safeguards through conditional exemptions. Operators must comply with core regulatory standards and implement appropriate risk mitigation measures[2]. Each authorisation is assessed case-by-case by national competent authorities (NCAs), with ESMA providing coordination and guidance.
5. Technically, DLT MIs use a variety of ledger configurations, including permissioned, consortium-based, and public permissionless networks. These infrastructures employ smart contracts and automated validation mechanisms to facilitate the issuance, trading, and settlement of financial instruments. DLT MIs must aim to ensure transaction and

[2] Particularly under Article 5(3)(b), which mandates safeguards for investor protection and systemic stability.

settlement finality, data traceability, operational resilience, and legal enforceability, consistent with the key principles embedded in Union financial services law[3].

2.3 ESMA's supervisory convergence role

6. ESMA's role in the Pilot Regime includes: coordinating NCAs in the process of assessing applications; providing guidance on exemptions and supervisory expectations; collecting and analysing data from authorised DLT MIs; monitoring operational and legal risks, market impacts, and regulatory consistency. ESMA also facilitates supervisory convergence by maintaining a regular dialogue with NCAs and issuing clarifications on the implementation of DLTR where needed.
7. ESMA has published Guidelines on standard templates, forms and formats to apply for permission to operate a DLT MI[4], as well as Q&As[5] on the implementation of DLTR. ESMA has also issued non-binding opinions addressed to the NCAs on the exemptions requested and on the adequacy of the type of DLT used for the purposes of DLTR.

2.4 Timeline and scope

8. This report covers the operational period from the formal start of the application of the Pilot Regime (23 March 2023) through to 31 May 2025. It focuses exclusively on DLT MIs formally authorised under the Pilot Regime: CSD Prague (starting date of the specific permission to operate a DLT SS: 11 October 2024), 21X AG (starting date of the specific permission to operate a DLT TSS: 3 December 2024) and 360X AG (starting date of the specific permission to operate a DLT MTF: 29 April 2025).
9. Due to the limited number of operational DLT MIs and the relatively recent first authorisations, this report reflects early high-level considerations and forward-looking policy assessments.

3 DLT MI landscape and activity

3.1 Authorised infrastructures and status

List and profile of authorised DLT infrastructures

10. The list of authorised DLT MIs is published on the ESMA website[6]. As of the reporting cut-off on 31 May 2025, only three DLT MIs have been authorised under the DLT Pilot Regime. This limited uptake reflects both the novelty of the framework, and the complex legal,

[3] While they are expected to aim for transaction finality and legal enforceability in line with Union financial law, certain infrastructures — such as CSD Prague — operate under exemptions from Article 39 CSDR and do not constitute a settlement system with finality under the conventional definition.
[4] esma_70-460-206_final_report_on_dltr_gl_on_application_for_permission.pdf
[5] Search a question | European Securities and Markets Authority
[6] See, Authorised_DLT_Market_Infrastructures.xlsx.

technological, and business transformation required to operate under it. Each project represents a different use case model under the DLT Pilot Regime.

11. Authorised DLT MIs:

Infrastructure Operator	Project Name	Country	Type	NCA	Authorisation Date	Expiry	Status
CSD Prague	DLT Register	Czech Republic	DLT SS	Czech National Bank	11 Oct 2024	TBD	Live
21X AG	21X DLT-TSS	Germany	DLT TSS	BaFin	3 Dec 2024	TBD	Live
360X AG	360X DLT-MTF	Germany	DLT-MTF	BaFin	29 Apr 2025	TBD	Pending

CSD Prague

12. CSD Prague based in the Czech Republic operates as a DLT Settlement System (DLT SS), focusing on securities registration, settlement, and asset servicing via DLT. It was authorised as a DLT Settlement System (DLT SS) under Article 9 of Regulation (EU) 2022/858 (DLTR) by the Czech National Bank (CNB), with ESMA issuing a positive opinion on the requested exemptions.

13. The infrastructure runs in parallel to the operator's traditional settlement system (CZ_UNIVYC), with the DLT register maintained as a distinct, permissioned environment for securities issued natively on a distributed ledger. The system is implemented on R3 Corda Enterprise, a private, enterprise-grade DLT platform offering predictable settlement sequencing, validated messaging, and full auditability. As of Q4 2024, the DLT system is live and operating first with a single validating node fully controlled by CSD Prague and now with a two-nodes model. However, its technical design allows for future scaling and the addition of external participants.

14. The market focus of the DLT SS is domestic issuers, with a particular emphasis on SMEs and unlisted companies seeking simplified access to capital markets. The platform supports a broad range of financial instruments, including shares, corporate bonds, UCITS, and money market instruments, in line with the scope permitted under Article 3 of the Pilot Regime. Initial use cases target digital onboarding of issuers, streamlined post-trade services, and direct retail-facing account functionalities, albeit access remains intermediated through regulated participants.

15. In the event of business cessation, CSD Prague has defined contingency procedures to migrate DLT-registered instruments to traditional book-entry form within CSDR-compliant systems, or, where applicable, to physical certificates, thereby ensuring continuity and investor protection.

21X AG

16. 21X AG, based in Frankfurt, was authorised as a DLT TSS under the EU DLT Pilot Regime by the Federal Financial Supervisory Authority (BaFin) on 3 December 2024 with ESMA issuing a positive opinion on the requested exemptions. In operation since 21 May 2025, the system is registered under the name "21X DLT-TSS" and represents a fully integrated

platform for the trading, clearing, and settlement of DLT financial instruments, without reliance on traditional intermediaries.

17. 21X AG operates as a DLT TSS, combining trading and settlement services using tokenised securities (equities, debt and fund instruments) on a public, permissionless blockchain (Polygon PoS) whereby access to the DLT-TSS and the services provided is permissioned (e.g. by using a set of smart contracts). The infrastructure set-up, however, enforces permissioned access through a whitelisting mechanism: only wallets that have passed KYC/AML checks and been approved by 21X AG can interact with the platform's smart contracts. This design ensures compliance with regulatory requirements while leveraging the scalability and interoperability of a public Layer 2 blockchain[7].

18. 21X AG proposes to integrate trading and post-trading services on a unified, DLT-native infrastructure. The 21X infrastructure to execute and settle transactions is deployed on a public, permissionless blockchain, but access to its trading and settlement functionalities is permissioned through smart contract-based whitelisting. It targets small- and mid-cap issuers as well as institutional and retail investors. The platform aims to facilitate tokenised issuance, trading and end-to-end post-trade workflows using smart contract-based automation on a public blockchain[8]. The company positions itself as an alternative to fragmented post-trade environments, proposing a single infrastructure covering the lifecycle of a security.

19. 21X AG operates under German law and European Union financial services legislation. The infrastructure was designed to comply with the requirements of both MiFID II and CSDR, subject to specific exemptions requested and granted under the Pilot Regime. ESMA has issued an opinion on this case.

360X AG

20. 360X AG operates as a DLT MTF under the DLT Pilot Regime. The firm also holds among other a license for a traditional MTF as an investment firm authorised under the German Investment Firm Act and the German Securities Trading Act. 360X AG can perform brokerage, proprietary trading, and placement services. The traditional MTF is legally distinct from the DLT MTF authorised under the Pilot Regime in April 2025.

21. Although not yet live, 360X AG primarily intends to admit tokenised securities and bearer bonds. Specifically, these include transferable securities, money market instruments (such as treasury bills, certificates of deposit and commercial paper), UCITS, shares, depositary receipts, ETFs, and certificates. Bonds that are eligible for admission to trading on the DLT MTF include, but are not limited to, sovereign bonds, other public bonds, covered bonds, and corporate bonds.

22. These instruments are structured in compliance with the DLT Pilot Regime's eligibility criteria. BaFin has authorised 360X AG for two potential settlement models: the first

[7] 21X AG intends to admit tokenised shares and bonds, including equity and debt instruments that meet the eligibility requirements of the DLT Pilot Regime under Article 3 and 5(8) of Regulation (EU) 2022/858 (DLTR).
[8] It intends to support the issuance, secondary market trading, settlement, and safekeeping of DLT financial instruments.

leverages Clearstream Banking AG's D7 infrastructure[9]; the second is a theoretical model whereby 360X could either connect to an authorised DLT SS/TSS operator or through interaction of a crypto securities register in accordance with the German Electronic Securities Act and an authorised CSD. The initial scope of eligible DLT financial instruments is therefore shaped both by the German Electronic Securities Act and no plans for direct retail access at this stage.

23. Although the 360X AG DLT MTF itself does not use DLT in its trading functionalities, issuance and settlement is supported by a private, permissioned DLT-based system operated and provided by Clearstream Banking AG in accordance with the German Electronic Securities Act and CSDR. Thereby, Clearstream Banking AG is ensuring regulatory compliance and data security. 360X only admits to trading on the DLT MTF dematerialised financial instruments in line with Article 3(1) DLTR which are issued on the DLT-based system of Clearstream Banking AG and settlement relies on integration with Clearstream's conventional infrastructure. 360X AG has implemented onboarding requirements for participants, including contractual requirements regarding the set-up of securities and cash accounts with relevant financial institutions and system compatibility.

24. No exemptions under Articles 4(2) or 4(3) of the DLTR have been requested, and BaFin has not imposed additional compensatory measures, concluding that 360X AG complies with DLTR Article 4(1) under its present and theoretical operating models. For this reason, ESMA has not provided BaFin with an Opinion on 360X AG's application for authorisation as is its prerogative under Article 8(7) of DLTR.

Technical and operational breakdown

25. The infrastructures differ significantly in their design and operational scope. CSD Prague employs a fully permissioned, private DLT environment (R3 Corda Enterprise), currently operated as a two-node system. It is conservative in its rollout and targets small-scale issuance and settlement in a controlled, traditional CSD-adjacent format. In contrast, 21X AG leverages a public-permissionless chain (Polygon PoS) with permissioned access, embedding all trading and settlement functionality on-chain via smart contracts. While it operates on a public blockchain, wallet and contract access are tightly controlled through whitelisting and governance permissions.

26. To date, no DLT MI has ceased operations under the Pilot Regime. CSD Prague and 21X AG are already operational, while 360X AG is in pre-operational phases, has just received the permission to operate a DLT MTF. CSD Prague and 21X AG have reported commercial issuance and settlement activity.

[9] A DLT-based central securities register pursuant the German Electronic Securities Act for the issuance of dematerialised securities and units in collective investment undertakings whereby settlement of transactions conducted on the DLT MTF are ultimately settled in the securities settlement system of the CSD.

3.2 DLT Pilot Regime current applicants

27. The number and diversity of applications submitted under the DLT Pilot Regime underscore a growing interest from both traditional and emerging market infrastructure operators. While only three entities have received full authorisation to date several others are actively progressing through national assessment procedures.

28. These applicants span a range of business models, from tokenised real assets and fixed-income trading to SME-focused platforms and decentralised fund structures. The spread of applications across jurisdictions and technology stacks suggests that the regime is stimulating innovation and competition, though challenges related to regulatory familiarity, integration, and legal clarity remain prominent.

29. Continued uptake will depend on whether legal certainty, cash settlement mechanisms, and interoperability can evolve in parallel with these early-stage projects. Around 10 other potential applicants are in the pipeline, at various stages of maturity. More details regarding the official applications currently under assessment by their NCAs are included below.

Applicant	Technology	Type	NCA	Status	Note
Axiology	XRP Ledger *(permissioned- a modified version of the open source XRP Ledger)*	DLT TSS	BoL	Submitted, completeness of application declared by NCA	Focused on fixed income; on-chain order book; quasi-instant settlement; multi-signature wallet setup; EMT issuance via Lithuanian EMI.
Securitize	Avalanche C-Chain (*public, permissionless network with permissioned access*)	DLT TSS	CNMV	Ongoing review by NCA	Provides full-stack functionality for primary and secondary markets; supports shares, bonds, UCITS; wallet whitelisting and transaction screening.
LISE/Kriptown	Private Hyperledger Besu blockchain (based on Ethereum protocol, using Proof-of-Authority consensus)	DLT TSS	AMF	Ongoing review by NCA	Targets SME capital formation; features an off-chain order book and on-chain settlement; direct retail access enabled with strong onboarding checks; designed to support tokenised securities registry.

3.3 Current activity metrics

30. During the period covered by the report, CSD Prague recorded:

- 6 DLT shares issues with a value of 11,917,753 EUR;
- 1 DLT debt securities issue with a value of 401 EUR.

31. 21X AG recorded 1 DLT debt securities issue with a value of up to 500.000.000 USD.

3.4 Exemptions and permissions granted

32. During the period covered by this report, three applicants received specific permissions under the Pilot Regime, and two of them (CSD Prague and 21X AG) asked for specific

exemptions from core provisions of MiFID II and CSDR, to facilitate their innovative service models. No refusals or withdrawals have been reported to date.

CSD Prague – DLT SS	
Exemptions granted from CSDR (Regulation (EU) No 909/2014)	**CSD Prague has been granted exemptions under Article 5 of the DLTR from the following CSDR provisions:** • **Article 6:** Measures to prevent settlement fails • **Article 7:** Measures to address settlement fails • **Article 35:** Communication procedures with market participants • **Article 38:** Segregation of assets (use of owner-only accounts) • **Article 39:** Settlement finality (non-SFD designated system) • **Article 40:** Central bank money requirement for settlement
Rationale	To allow atomic DvP on-chain and integration with novel cash solutions.
Justifications and proportionality	• Use of owner accounts ensures segregation without omnibus structures • Off-chain commercial bank money is used with automated validation for DvP • Communication is via REST APIs on Corda and not ISO standards, justified by experimental scope
Compensatory measures proposed by CSD Prague	• Enhanced risk controls for finality • Segregation transparency via smart contract auditing • Periodic reporting to Czech National Bank on fails management testing • Strong KYC, identity verification and secure node onboarding • Owner-account based segregation ensuring legal and operational protection • Use of REST-based APIs and direct participant messaging as communication infrastructure

21X AG – DLT TSS	
Exemptions granted from MiFID II and CSDR	**MiFID II (Directive 2014/65/EU):** • **Article 53(3):** Direct access by non-professional clients, including natural persons. This enables retail participation in the 21X DLT-TSS without the intermediation of MiFID-authorised firms. Access is contingent upon a strict onboarding process using a risk-based questionnaire. This exemption, granted under Article 4(2) of DLTR, is conditional on enhanced onboarding procedures, including KYC, smart contract-based access control, and appropriateness assessments. The exemption enables disintermediated access while preserving investor protection standards. **CSDR (Regulation (EU) 909/2014)[10]:** • **Article 2(1)**: Exemptions from definitions such as “dematerialised form”, “transfer order”, “participant”, and “securities account”. • **Articles 3, 6, 7**: Waivers on book-entry requirements and fail prevention/correction measures. • **Articles 33–40**: Exemptions from requirements related to participation criteria, transparency, segregation, settlement finality, and cash settlement. • **Articles 50–53**: Exemptions from standard and customised access links and interoperability obligations.

[10] More precisely, 21X AG was granted a set of targeted exemptions from provisions of CSDR and MiFID II, based on Articles 4(2) and 5(2) to 5(9) of the DLTR (Regulation EU 2022/858). These include exemptions from: Article 2(1)(4), 2(1)(9), and 2(1)(28) of CSDR, concerning the legal definitions of "dematerialised form," "transfer orders," and "securities account"; Article 3 of CSDR, which requires the use of book-entry form for the recording of securities; Article 37 of CSDR, related to the integrity of the issue; Article 38 of CSDR, on account segregation requirements; Articles 6 and 7 of CSDR, which mandate measures to prevent and address settlement fails; Article 19 of CSDR, concerning the outsourcing of core services; Article 2(19) of CSDR, relating to participation rules for natural and legal persons; Articles 33 to 35 of CSDR, covering participation criteria, transparency, and communication procedures; Article 39 of CSDR, addressing settlement finality; Article 40 of CSDR, which mandates settlement in central bank money; Articles 50, 51, and 53 of CSDR, which regulate access and interoperability with other market infrastructures.

Rationale	To enable full lifecycle management (issuance → trading→ settlement) on a single DLT platform, integrating retail access and real-time transaction validation.
Compensatory measures proposed by 21X AG	• Use of non-upgradable smart contracts with clear logic and deterministic behaviour • Assessment of investors' knowledge and experience in respect of transactions in financial instruments and investment services • Monthly talks with NCA and reporting of trading activities (including natural persons). • Wallet whitelisting and role-based permissions to control access to the smart contracts responsible for trading and settlement • External audit and code review of all smart contracts prior to deployment • Use of market surveillance tools (e.g., eflow) to monitor trading behaviour

360X AG – DLT MTF	
Exemptions granted from MiFID II and CSDR	**MiFID II (Directive 2014/65/EU):** No exemptions requested or granted. **CSDR (Regulation (EU) 909/2014):** No exemptions requested or granted.
Rationale	Due to regulatory complexities—particularly around settlement requirements under the CSDR—360X AG has adopted an approach in which its DLT trading venue does not use DLT-based trading. Instead, for strategic reasons, the DLT MTF only accepts for trading DLT financial instruments which are recorded in a DLT-based settlement infrastructure (Clearstream's D7 system), allowing the project to remain compliant with Article 3(2) of CSDR.
Compensatory measures	Neither BaFin nor ESMA have recommended additional compensatory measures. ESMA has not issued a non-binding opinion in this case, given that: 360X has not asked for any exemptions from MiFID II or MiFIR; and would only admit DLT financial instruments to trading, without using DLT for the MTF operations.

33. As of 31 May 2025, no exemptions have been revoked or modified, and no applications have been withdrawn. However, it should be noted that the application process takes a relatively long time.

34. For example, 360X AG encountered frictions with its previous operating model and DLT MTF application under the DLT Pilot primarily due to regulatory and technical challenges related to Article 3(2)[11] of CSDR. At the time of its initial application attempt, 360X AG deemed that no viable DLT-native settlement solution that would still meet the CSDR requirements was available on the market. As a result, 360X AG put its application on hold until it found a solution (using Clearstream D7) ensuring the initial recording of the DLT financial instruments in book entry form in a CSD in accordance with Article 3(2) of CSDR.

35. In the interim, 360X AG applied for an extension of services (under its investment firm license) to operate a conventional MTF, which BaFin approved in April 2024. Once a compliant settlement model was identified in Clearstream's D7, 360X AG resumed the original application process in December 2024.

[11] Article 3(2) of CSDR: Where a transaction in transferable securities takes place on a trading venue the relevant securities shall be recorded in book-entry form in a CSD on or before the intended settlement date, unless they have already been so recorded.

4 Technology, risk, and regulatory observations

4.1 Technology and operational characteristics

36. CSD Prague and 21X AG, both authorised under the DLT Pilot Regime, represent fundamentally different approaches to distributed ledger architecture and governance. CSD Prague operates on a fully permissioned DLT framework (R3 Corda Enterprise), where access control, validation, and role allocation are enforced directly at the infrastructure level. This model ensures regulatory-grade security, predictable settlement sequencing, and centralised governance, with clear separation and assignment of system functionalities.

37. In contrast, 21X AG deploys its DLT Trading and Settlement System (DLT TSS) on Polygon PoS, a public, permissionless blockchain. In this case, permission is applied not at the infrastructure layer but at the service level using a comprehensive suite of smart contracts. These smart contracts implement controls such as wallet whitelisting, role-based access, and transaction eligibility rules, thereby creating a permissioned-access environment on top of a permissionless chain. This architecture allows 21X AG to leverage the transparency, resilience, and decentralised validation offered by public-node distribution and a consensus algorithm, while still ensuring compliance with financial regulation.

38. Despite their differences, both infrastructures prioritise regulatory-grade security, auditability, and settlement integrity, but do so through distinct architectural models—CSD Prague via direct infrastructure controls and 21X AG via programmable logic embedded in the application layer.

39. Both DLT MIs infrastructures have adopted strong identity and access controls, KYC/AML-compliant onboarding, and governance models that restrict participant access. CSD Prague uses designated validating nodes, whereby 21X AG has full responsibility and control over the set of smart contracts. 21X AG, while operating on a public blockchain (Polygon PoS), enforces permissioned access via smart contract-level whitelisting. In the case of 21X AG, trading functionality is also integrated through an on-chain Order Book Smart Contract (OBSC), which supports the submission and matching of buy/sell orders and enables atomic DvP settlement. All core functions (issuance, transfer, record-keeping) are built with regulatory auditability in mind, including full timestamping and transaction traceability.

40. 360X AG's DLT MTF does not directly use a DLT network. Instead, it uses the IT infrastructure provided by Clearstream Banking AG's D7 platform for the initial recording of DLT financial instruments. D7 uses a DLT-based system developed and designed for enterprise uses, which is set up as a private permissioned network in full responsibility of Clearstream. The private permissioned networks of Clearstream's D7 system enable secure, gasless transactions and controlled access, and are therefore considered appropriate for regulated financial market infrastructures.

41. Clearstream's D7 platform has already proven capable of delivering enterprise DLT solutions for tokenised instruments through its involvement in the Eurosystem's trials of

new technologies for the settlement of wholesale transactions in central bank money[12]. In July 2024, Clearstream, in collaboration with Deka Bank and DZ Bank, issued two EUR 5 million tokenised bonds using DLT (hosted by the D7 platform). Settlement was conducted via the Bundesbank's 'trigger solution', which connects to the ECB's Target2 payment system.

4.1.1 CSD Prague

CSD Prague's DLT architecture and governance model

42. CSD Prague has implemented a permissioned distributed ledger architecture based on R3 Corda Enterprise, an enterprise-grade DLT platform tailored to financial market infrastructures. The system supports core asset lifecycle operations, including issuance, registration, and safekeeping, and is designed to ensure compliance with regulatory supervision and integration with the 'traditional' CSD operations.

43. The infrastructure operates as a two-node network, one hosted by CSD Prague and another one (introduced following the recommendation in ESMA's non-binding Opinion) hosted by an in-group entity on a separate server. CSD Prague has a validator role and notary role, ensuring full operational control, predictable and sequential ledger updates, and auditability. Validation is conducted centrally, and the architecture follows clear, rule-based governance protocols that reflect CSDR principles. The system is governed internally by CSD Prague under the supervision of the CNB, with strict access control and embedded consensus rules subject to national competent authority oversight.

44. The modular architecture is composed of distinct layers for transaction processing, identity management, reconciliation, and settlement messaging, which facilitates future scalability and participant onboarding without disrupting stability. Though smart contract functionality is enabled via the CorDapps framework — a set of distributed applications designed specifically for R3 Corda to support business logic execution in a permissioned ledger environment — no production-grade contracts are currently deployed. Planned functionalities include on-chain issuance registration and event-triggered transfers, such as corporate actions.

45. All interaction between the DLT ledger and participant-facing systems occurs through RESTful APIs (Representational State Transfer Application Programming Interfaces)[13], ensuring real-time data updates and compatibility with existing internal systems operated by the Central Securities Depository Prague (CDCP). Users will interact with the platform through a dedicated DLT Register portal, accessible via both web and mobile applications, offering functionalities such as viewing account positions, submitting transactions, requesting statements, and managing property rights — features not typically available in legacy CSD environments.

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[12] ECB. "Participants chosen to explore new technologies to settle wholesale transactions in central bank money." 3 April 2024. Available at: https://www.ecb.europa.eu/press/intro/news/html/ecb.mipnews240403.en.html

[13] A standard way for software applications to communicate over the internet, commonly used to retrieve or update data in real-time.

Operational resilience, outsourcing, and sustainability

46. The system is partially hosted on the O2 Cloud infrastructure, limited to specific components such as the web applications, configured with High Availability (HA) architecture. It benefits from redundant failover mechanisms, robust physical and cybersecurity protocols, and compliance with regulatory requirements for operational resilience and data security.

47. CSD Prague has engaged STYRAX a.s. for system development and technical integration through a formal outsourcing contract. However, the operator retains full responsibility for operational performance, compliance, and security, as validated by CNB and ESMA.

48. Internally, system design and governance are well-documented, including schematic diagrams that clearly distinguish DLT-native infrastructure and core components, which are hosted on-premises, from traditional services such as ISIN assignment, AML processing, and corporate action workflows.

49. Lastly, the system is designed to be energy-efficient, relying on non-mining, permissioned architecture that minimises environmental impact. It aligns with the European Union's climate objectives, leveraging a combination of virtualised on-prem infrastructure and limited external cloud services virtualised infrastructure to reduce its carbon footprint.

4.1.2 21X AG

50. 21X AG operates a fully DLT-native trading and settlement system authorised under the DLT Pilot Regime as a DLT Trading and Settlement System (DLT TSS). The platform is deployed on Polygon, a public, permissionless Ethereum-compatible Layer 2 blockchain that uses a Proof-of-Stake (PoS) consensus mechanism. The infrastructure is designed to support real-time, low-cost settlement with high throughput and finality within seconds, while maintaining alignment with EU digital and environmental objectives.

21X AG's DLT trading and settlement system on Polygon

51. The ecosystem includes three main categories of contracts[14]:

- Instrument Token Smart Contracts manage issuance and ownership tracking;
- Order Book Smart Contracts (OBSC) automate trade matching and DvP settlement;
- Whitelist Smart Contracts govern the access to the multilateral trading facility and the DLT financial instruments

52. All order book smart contracts are deployed by 21X AG and governed via 21X AG's hardware security modules and are non-upgradeable once deployed, ensuring immutability and transparency. Asset custody is fully on-chain and non-custodial: user assets remain in smart contract-linked wallets without any rehypothecation.

[14] In order to ensure delivery versus payment 21X AG determine eligible e-money token smart contracts as settlement asset for the cash leg in accordance with Article 5(8) DLTR issued by EMI's authorised pursuant Article 48 of MiCAR.

53. Client access is permissioned through a wallet whitelisting system embedded within the smart contract logic. Users — including retail investors — undergo rigorous KYC, AML, and appropriateness checks during onboarding, which includes specific blockchain knowledge assessments. Wallet permissions are assigned and revoked dynamically based on internal risk parameters and regulatory triggers[15].

54. Settlement is conducted in euro-denominated (EUROe) or USD-denominated e-money tokens provided by Circle Internet Financial Europe SAS and Quantoz Payments B.V., both authorised under Article 48 MiCA (EURC/USDC and EURQ/USDQ). EMTs are used for on-chain DvP functionality. The platform plans to integrate CBDCs or tokenised commercial bank money should they become available. Backup settlement options and integrations with regulated payment providers are under review. From a compliance perspective, the infrastructure incorporates embedded regulatory logic via smart contracts. Use cases include eligibility filters for investor categories, jurisdictional blocking, and automated matching with transaction reporting voluntarily aligned with certain MiFID II transparency norms. Market surveillance is performed using external tooling, and contract activity is continuously monitored.

55. Environmentally, 21X AG's use of PoS infrastructure ensures a minimal energy footprint, with no reliance on mining or resource-intensive validation.

4.1.3 CSD Prague and 21X AG technical limitations and climate/environmental considerations

56. While both CSD Prague and 21X AG demonstrate credible progress in building secure and compliant DLT environments, they face some technical limitations that constrain scalability and interoperability at this stage:

- Interoperability with legacy financial market infrastructures remains limited. Neither CSD Prague nor 21X AG currently offer live connectivity with traditional central securities depositories (e.g. Clearstream, Euroclear), central counterparties (e.g. Eurex Clearing, LCH), or real-time gross settlement (RTGS) systems such as TARGET2[16], operated by the Euro system. This lack of integration limits DLT MIs' ability to support cross-platform asset transfers, margining, and payment flows, which are essential for institutional investors operating in multi-venue, multi-asset-class environments. Without such interoperability, DLT-based transactions remain siloed, impeding straight-through processing and limiting use cases to pilot-scale or closed-loop issuance. Enabling bridges to traditional infrastructures would support liquidity, facilitate risk management (e.g. collateral reuse or netting), and enhance trust in settlement mechanisms — especially where central bank money is used.

[15] It should be noted that, in some cases, these procedures reflect the firm's own compliance framework and are not imposed by law under MiFID II. While they aim to mirror certain investor protection principles, their alignment with existing legal safeguards remains partial. As such, their effectiveness in ensuring equivalent protection continues to be subject to supervisory scrutiny under the DLT Pilot Regime.

[16] Please note that the 21X AG participated successfully in the ECB exploratory work connecting to the TARGET2 system using interoperability solutions tested by the ECB/Eurosystem.

- DLT-based cash settlement remains work-in-progress. Neither infrastructure has access to central bank money settlement. CSD Prague relies on placeholder models and commercial bank cash reserves, while 21X AG uses regulated EMTs issued under French and Dutch laws. While compliant, cash settlement cannot be provided through accounts opened with a central bank of issue of the relevant currency pursuant Article 40(1) CSDR as preferred settlement asset[17]. Without access to such central bank money settlement, DLT platforms rely on credit institutions or e-money institutions, which may introduce additional counterparty and liquidity risks.
- Scalability constraints are context dependent. CSD Prague, operating a two-node system, avoids latency but sacrifices decentralisation. In contrast, 21X AG's use of a public Layer 2 blockchain brings latency and gas cost sensitivity, particularly for complex corporate actions or bulk operations. Neither system is currently optimised for high-frequency or high-volume activity.
- Smart contract deployment remains conservative. While 21X AG has implemented full lifecycle automation via non-upgradeable contracts, operational controls (e.g. pausing, permissions) are manually governed. CSD Prague has smart contract capacity but has deferred live deployment. Neither system yet supports autonomous rights enforcement (e.g. automatic coupon payments, proxy voting), which limits workflow efficiency gains.

57. Both infrastructures claim they have prioritised environmental sustainability in their architectural choices:
    - CSD Prague reports negligible incremental carbon impact, owing to its permissioned, private-node design with limited replication and a hybrid deployment model that combines on-premises infrastructure for core DLT components with containerised services hosted on national cloud infrastructure (O2 Cloud) for web-facing applications.
    - 21X AG, operating on Polygon, benefits from a Proof-of-Stake consensus model. Internal simulations and system design suggest a reduced energy footprint per transaction, particularly due to the elimination of data reconciliation layers and intermediated infrastructure.
58. Preliminary supervisory findings indicate that DLT-based market infrastructures can contribute to the EU's digital and climate objectives — particularly if integrated with sustainable finance tools such as green bond issuance, sustainability-linked instruments, or automated ESG reporting. Continued measurement will be required to assess the actual versus theoretical environmental benefit at scale.

4.1.4 360X AG

Trading and settlement system

[17] In that regard, settlement of cash does not offer settlement finality in the meaning of the SFD unless the payment system is not recognised as system equivalent to central bank money (i.e., the legal and operational certainty that a payment is irrevocable and unconditional once processed in a systemically important payment infrastructure like TARGET2).

59. The trading functions of the 360X AG's DLT MTF are conducted off-chain, using a traditional system. Instruments are admitted to trading via Request for Quote (RFQ) and Central Limit Order Book (CLOB) mechanisms. No trades are matched or executed directly on DLT. The DLT is used exclusively for initial registration and issuance of the security in the central securities register operated by Clearstream Banking AG in accordance with the German Electronic Securities Act.

60. Post-trade processes are handled via Clearstream's Banking AG's legacy SSS (CASCADE). Once a trade is executed on 360X AG, trade confirmations are sent to the securities settlement system—subject to the participant having pre-established arrangements with an approved custodian and cash account provider. 360X AG has no direct settlement linkage with Clearstream, and all settlement operations are conducted by authorised participants (available also by 360X AG on behalf of its participants).

61. This approach creates a clear separation between trading and settlement environments, with currently limited availability of potential benefits resulting from DLT financial instruments deployed as smart contracts.

Environmental considerations

62. Given that 360X does not run or maintain its own DLT infrastructure, its direct environmental impact from blockchain operations is minimal. All DLT functions relevant to the issuance of financial instruments are managed through Clearstream's private D7 system, which uses Proof of Authority consensus—a low-energy model compared to Proof of Work systems.

63. The D7 system is described as designed to operate without gas fees or intensive computational workloads, and all validator nodes are controlled by a single institution, which reduces energy consumption. However, 360X may consider public or semi-public DLTs for its operations in the future. In such cases, these assumptions behind the project's energy use would change.

4.2 Risk management and compliance frameworks

64. Under Article 7(2) of the DLTR, operators of DLT SS and DLT TSS must implement robust frameworks for risk management including any mitigation measures to ensure investor protection, market integrity and financial stability. These frameworks are expected to address the novel legal, technical, and operational risks introduced by DLT infrastructures, while ensuring market integrity and systemic stability.

65. As a condition of authorisation, CSD Prague, 21X AG, and 360X AG have adopted comprehensive risk control measures adapted to their respective infrastructures. These are actively supervised by their NCAs — the CNB and BaFin — and supported by periodic monitoring at ESMA level. As of writing, CSD Prague and 21X AG are operational, and have not reported any investor losses or major system failures during the very limited period covered by this report.

Design of risk frameworks

66. All three authorised DLT MIs have implemented formal risk management procedures as a condition of their authorisation. These frameworks are tailored to their respective models and are supervised by their NCAs. In their authorisation applications, the operators plan to conduct periodic stress testing, enforce client-loss rules, and maintain cyber incident response protocols. Risk frameworks are currently overseen by NCAs under a principles-based supervisory approach.

67. Risk and compliance frameworks are designed in proportion to each operator's architecture. CSD Prague maintains a low-risk, two-node model; 360X AG operates through a private, permissioned DLT infrastructure; and 21X AG uses a public, permissionless blockchain (Polygon PoS) with a permissioned access layer implemented through smart contract-based wallet whitelisting at the service level of the DLT TSS. For 360X AG, operational resilience relies on a centralised governance model and the use of CSD services including the DLT-based network operated, with dedicated nodes managed solely by Clearstream Banking AG. Operational and technological safeguards to protect investments are embedded throughout via access control, transaction auditability, and liability guarantees. ESMA and the relevant NCAs continue to monitor both infrastructures' stress testing outcomes, cybersecurity maturity, and system usage data in anticipation of scaled operations in 2025.

Governance, surveillance, and risk controls

68. Risk governance structures are formally embedded within internal policies across the three infrastructures, covering key domains such as smart contract audit methodologies, cybersecurity, and operational incident handling. All three entities operate dedicated compliance and risk functions that conduct periodic stress tests, manage client-loss scenarios, and monitor technical and legal risk vectors.

69. Tailored approaches to risk control can be noted. CSD Prague focuses on a deterministic settlement logic, meaning that once a transaction is validated and recorded on the ledger, its finality is assured with certainty and without probabilistic delays. The infrastructure is operated as a two-node network, with one node hosted by CSD Prague and the second by an in-group entity. While this setup ensures continuity and ledger integrity through mutual verification, the redundancy may be limited from a systemic resilience standpoint due to group-level ownership.

70. In contrast, 21X AG deploys real-time monitoring of trade flows and asset control via a public Layer 2 network (Polygon PoS), combined with a proprietary regulatory layer. Their surveillance mechanisms track participant behaviour and transaction compliance through smart contract events and backend analytics, allowing for prompt detection of anomalies and intervention. Operational and technological safeguards to protect investments are embedded throughout via access control, transaction auditability, and liability guarantees. Each infrastructure provides real-time transparency tools and dashboards. For example, CSD Prague's DLT portal and 21X's web-based onboarding tools offer participants continuous monitoring of their asset holdings and transaction histories.

Observed outcomes and limitations

71. It should be noted that trading activity on authorised DLT MIs has been extremely limited to date. So, no investor loss, market abuse (noting that there has not been any trading activity during the period covered by the report), or cybersecurity incidents have been reported during the period covered by this report.

72. ESMA notes that both CSD Prague and 21X AG have put in place procedures in accordance with Article 5(3), point (b) of the DLTR to either prevent settlement fails or address settlement fails if it is not possible to prevent them.

Settlement resilience and fail prevention

73. The design of the DLT SS operated by CSD Prague limits risks of settlement fails by requiring a set of preconditions to be met before settlement begins: for Delivery Free of Payment transfers the corresponding orders must be matched and, in addition, for Delivery versus Payment transfers the corresponding funds must be credited to the settlement account. This should ensure that once settlement commences, it is always successful with no cases of fails due to lack of DLT instruments or lack of cash[18].

74. It should be mentioned that no settlement fails have been reported during the first seven months of operations of CSD Prague DLT SS, while noting that only primary market/issuance operations have been processed, and that there have not been any secondary market transactions.

75. The atomic settlement feature of the DLT TSS operated by 21X ensures that both legs of a transaction—delivery of the financial instrument and payment—occur quasi-simultaneously, which should prevent settlement fails (based on a technical all or nothing approach). In cases where issues arise, the pre-funding requirement ensures that only fully funded orders are processed, thereby limiting the risk of settlement fails. In its non-binding Opinion, ESMA has recommended BaFin to consider requiring 21X AG to monitor and provide reports to BaFin on the number and value of orders that are deleted as per the 21X AG procedure according to which the orders remaining on the Order Book Smart Contract will be deleted at the end of the business day.

4.2.1 CSD Prague

CSD Prague – Risk and safeguard procedures	
Legal certainty and finality controls	Due to exemptions from CSDR Articles 39 and 40 (settlement finality and central bank settlement), CSD Prague implemented functional equivalents: • Predictable validation logic ensures atomic settlement sequencing; • Immutable timestamping and full transaction audit logs support dispute resolution and legal enforceability; • A fallback plan allows for migration to traditional book-entry form or paper certificates if needed.

[18] In its non-binding Opinion, ESMA has recommended CNB to consider requiring CSD Prague to monitor and provide reports to CNB on the number and value of unsettled transactions, which CSD Prague has implemented.

Safeguards on investor asset segregation	Although exempted from Article 38 (segregation), Central Securities Depository Prague uses owner-only token records, logically and technically isolated per client. This is reinforced by: • Regular segregation proof checks; • Internal audits; • Contractual liability rules offering market-value compensation in the event of loss (except in force majeure), aligned with Article 5(3)(b)(ii).
Business continuity & cybersecurity	CSD Prague integrates its DLT nodes operation with its primary operational resilience architecture, including disaster recovery, rollback options, and integrity verification for ledger states. This also include: • ISMS policy, incident handling and log audit procedure; • Secure containerisation of all external interfaces (including REST APIs); • Physical security, backup and business continuity measures; • Segregated accounts and role-based access control through the Corda identity framework.
Client loss management:	Article 5(3)(b) requirements have been implemented through contractual safeguards — ensuring that participants are legally protected against technology-induced operational losses.
Market surveillance	Although trading does not occur on the DLT SS, transaction sequencing is monitored using ledger analytics. Investors benefit from dashboard access to asset data, while intermediaries receive near-real-time settlement reports via REST APIs.
Operational and Cyber Resilience	CSD Prague integrates its DLT nodes within its existing business continuity infrastructure. Key features include: • A hybrid deployment architecture, with core DLT components hosted on-premises and web applications deployed in High Availability (HA) mode on O2 Cloud; • Rollback capabilities and ledger integrity checks; • A formal ISMS policy, secure API gateway, and containerised interfaces.

4.2.2 21X AG

21X AG – Integrated risk controls	
Smart contract risk review	All deployed contracts (e.g. for DvP settlement) undergo formal testing and auditing by third-party firms before production. These (e.g. for order books, DvP settlement) are immutable post-deployment. This supports Article 5(3)(b)'s emphasis on security of investor rights and transaction enforceability. 21X AG has developed and deployed a suite of non-upgradeable smart contracts (e.g. for Order matching, DvP settlement, and asset control), subject to: • Pre-deployment audits by third-party security firms; • Governance restriction via access control of administrative functionalities;
Safeguards for direct access clients	Given its exemption from MiFID II Article 53(3), 21X AG allows direct access to retail users. In mitigation, it has introduced: • Mandatory onboarding modules (including educational content, simulation tools, and assessment of investors' knowledge and experience); • Role-based wallet permissions restricting trade types, limits, and participation scope asset access.
Operational resilience	By operating the trading venue and the settlement system on a DLT network, 21X uses the inherent core attributes of resiliency and redundancy of such systems. All off-chain parts are set up in a redundant manner as well.
Compliance with AML/KYC	All wallet-holders are subject to full KYC/AML onboarding, and behavioural analytics are used post-trade to flag suspicious activity. Role assignments (e.g., trader, issuer) are linked directly to smart contract access permissions.

System resilience and failover design and business continuity	The DLT infrastructure is deployed on Polygon, a permissionless PoS chain with operational overlays for: • Validator node redundancy across jurisdictions; • Emergency "kill switch" logic embedded in OBSC contracts to disable malfunctioning systems while preserving ledger state. Business continuity and incident response are also put in place by 21X AG.
Asset and legal protections	Investor assets are safeguarded through: • Legal opinions supporting the compliance of the product with applicable law; • Ledger-based immutability guarantees.

4.2.3 360X AG

360X AG – Integrated risk controls	
Smart contract risk review	Not applicable – the DLT MTF does not use smart contracts for its trading functions.
Safeguards for direct access clients	Participation is restricted to entities with binding agreements with Approved Custodians and Payment Providers, and with verified custody and cash accounts.
Operational resilience	Operational resilience is supported using services provided by an authorised CSD which operates a permissioned DLT setup (D7 by Clearstream Banking Frankfurt, CBF) and redundancy in node operation (all nodes run solely by CBF).
Compliance with AML/KYC	Participants must have contracts with Approved Custodians and Payment Providers, who are subject to AML/KYC compliance under German financial regulations.
System resilience and failover design and business continuity	For 360X AG, operational resilience is ensured by a centralised governance model. With regard to the DLT-based network as basis for the issuance of DLT financial instruments at the level of the CSD, the chosen set-up as private and permissioned DLT network with PoA consensus operated solely by CBF, ensures controlled updates and centralized governance with redundancy safeguard built into the business recovery processes.
Asset and legal protections	Investor assets are safeguarded through: • Custody agreements with Approved Custodians; • Verified Participant Custody and Cash Accounts; • Legal safeguards under the German Electronic Securities Act (eWpG) and supervision by BaFin.

4.3 Legal, systemic and market risks

76. The initial phase of implementation under the DLT Pilot Regime has identified a range of legal, systemic, and market risks associated with DLT-based infrastructures. While these risks are currently mitigated by low system scale and intended intensive supervisory oversight (as expected for new activities and business models), they will continue requiring close monitoring as infrastructures scale up and diversify their operations[19].

[19] The descriptions and comparisons presented in this section are intended for analytical and supervisory clarity only. They aim to illustrate how different business models and technical architectures give rise to distinct legal and operational considerations under the DLT Pilot Regime. These comparisons are not evaluative in nature and do not imply regulatory endorsement or preference for any particular infrastructure or approach.

Legal and insolvency resilience

77. Both CSD Prague and 21X AG have structured their legal frameworks to ensure that DLT-issued instruments are enforceable under national securities and property law. For CSD Prague, instruments are issued in book-entry form and governed by the Czech Civil Code, with the DLT Register rules mirroring the enforceability standards applicable to traditional CSD-led records.

78. CSD Prague employs a single-tier account model with individual ownership tracking on-chain, *where each participant holds their own DLT address (wallet) rather than relying on omnibus accounts held by intermediaries*. This structure *enhances transparency and legal clarity by enabling real-time ownership verification and immutable audit logs for each transaction*[20].

79. 21X AG mitigates legal risks associated with the use of a public blockchain (Polygon) by linking the rights and obligations embedded in its smart contracts to securities issued in compliance with national law (such as the German Electronic Securities Act). Legal opinions confirm the measures which 21X AG intends to take to allow its users to comply with the law of the Member State under which the financial instruments are issued and governed (ensuring enforceability of these instruments under applicable property, contract, and insolvency frameworks).

80. 360X AG will also only provide access to DLT financial instruments already issued in accordance with the German Electronic Securities Act (eWpG). It uses Clearstream's D7 platform for issuance and traditional book-entry settlement in compliance with CSDR Article 3(2). The financial instruments are recorded natively in the DLT-based central securities register and subsequently settled off-chain through Clearstream's SSS (CASCADE), ensuring enforceability of national law.

81. Nonetheless, some legal uncertainty persists across Member States, particularly regarding:

    - The recognition of DLT-based transfers under existing settlement finality laws;
    - The legal status of smart contracts used for automated corporate actions;
    - The cross-border enforceability of ownership records maintained on public or semi-public blockchains.

Operational and systemic risks

82. Both infrastructures utilise permissioned ledgers/permissionless DLT with permissioned access through smart contract, and closed validator sets, which—while improving control and regulatory oversight—introduce a degree of centralisation risk. CSD Prague operates on a private, permissioned ledger with a closed validator set, while 21X AG relies on a

[20] In the event of insolvency—either of the participant or the infrastructure operator—this model helps ensure that clients retain legal entitlement to their assets, as holdings are attributed to individual investors and not pooled. This structure therefore strengthens asset protection and aligns with the objectives of CSDR Articles 38–40, even though CSD Prague has been granted exemptions from them under the DLTR. In practice, the technical mechanisms used (e.g. smart contracts, private keys, and ledger transparency) provide functional equivalents to traditional segregation, participant access rights, and finality assurances.

public blockchain (Polygon PoS) with a permissioned access overlay via smart contracts. In both cases, failure of key nodes or governance misconfigurations could compromise system operability.

83. CSD Prague's two-node Corda-based infrastructure benefits from predictable settlement logic and a high-availability deployment model, reducing operational complexity but offering limited decentralisation. 21X AG's use of Polygon introduces broader validator distribution but increases dependence on Layer 1/Layer 2 integration stability and node synchronisation.

84. Operational risk is further impacted by dependencies on off-chain services, including:

    - Identity verification (AML/KYC);
    - E-money token issuance;
    - Integration with traditional payment systems.

85. Although the three pilot projects benefit from transparency and immutability features native to DLT, it does not mean that settlement fails cannot occur.

86. The absence of central bank money settlement and limited fallback mechanisms increase exposure to edge-case failures.

87. From a systemic perspective, current risk remains low due to the limited scale, absence of leverage, and the non-interconnected nature of these infrastructures. However, these dynamics could change with greater issuance volumes, retail participation, or potential expansion into wholesale functions.

88. Unlike the "DLT-native" approach taken by 21X AG, 360X AG does not operate its MTF directly on a DLT, nor does it serve as the primary operator of any aspects of the project that are conducted on a DLT. Instead, 360X AG uses Clearstream's private, permissioned platform, D7 for the issuance and recording of DLT financial instruments that 360X AG admits to trading on its DLT MTF. With dedicated nodes, D7 provides high availability but introduces a single point of control out of the hands of 360X AG as for any other access to an authorised CSD as required under Article 3(2) CSDR. Dependence on Clearstream D7 absent a direct contractual relationship means 360X AG's participants assume responsibility for ensuring post-trade obligations via custodians and settlement agents.

Market liquidity and volatility considerations

89. Secondary market liquidity across both infrastructures is potentially limited. CSD Prague does not host trading functionalities, and 21X AG remains separate from established MTFs and exchanges. This limits real-time price discovery and hinders institutional engagement in cases financial instruments are admitted to trading on various trading venues.

90. 21X AG provides an order book smart contract (OBSC) for matching and DvP. However, should the current access design and participant composition remain unchanged, certain limitations may arise—such as reduced order book depth and responsiveness due to the absence of algorithmic trading functionalities and the limited onboarding of professional liquidity providers. Additionally, if financial instruments admitted to trading on 21X are not

also listed on traditional venues, this could restrict investor familiarity and reduce opportunities for cross-venue price discovery or arbitrage.

91. No significant volatility or market abuse has been observed to date.

92. Improvements in interoperability, increased issuance volumes, and engagement with regulated trading venues will be necessary to fully assess the market dynamics of DLT-based financial instruments under real-world conditions.

4.4 Regulatory arbitrage and level playing field

93. The DLT Pilot Regime provides for targeted and conditional exemptions from existing EU financial legislation. While this is intended to promote innovation, the exemptions granted to DLT infrastructures may raise potential concerns about market distortion, regulatory arbitrage, and competitive neutrality—particularly if applied unevenly across actors performing similar functions.

Impact of exemptions on competitive neutrality

94. 21X AG benefits from exemptions from MiFID II provisions on multilateral trading facility (MTF) access (notably Article 53(3)) and certain transparency requirements. These allow it to admit non-professional clients and operate without adhering to some of the disclosure obligations imposed on traditional MTFs. In contrast, legacy market infrastructures must comply fully with CSDR and MiFID II/MiFIR requirements, including settlement discipline, fails penalties, and participation rules.

95. CSD Prague, while exempted from several CSDR articles[21], is still subject to equivalent investor protection obligations implemented through internal procedures. Nonetheless, the difference in compliance obligations may result in an uneven regulatory playing field, especially in areas such as account segregation, communication with participants, or settlement finality.

96. DLT infrastructures remain restricted in their ability to compete with legacy infrastructures in key areas. Most notably, they do not yet have access to central bank settlement or TARGET2 integration, and their use of simulated cash tokens reduces operational trustworthiness in the eyes of institutional actors. This offsets, to some degree, the lighter regulatory treatment received under the Pilot Regime.

97. ESMA acknowledges that the combination of exemptions and technological innovation may result in differentiated compliance burdens. To avoid long-term fragmentation, future revisions to the regime may require the development of functional equivalence tests or harmonised criteria that can balance innovation with regulatory parity.

Frictions with legacy financial market infrastructures

98. Neither CSD Prague nor 21X AG has achieved live interoperability with legacy infrastructures such as traditional CSDs, RTGS systems, or central counterparties. This

[21] See table above p.12

structural disconnect inhibits seamless integration of DLT-based instruments into mainstream financial workflows and creates barriers for institutional participation.

99. Additional frictions include:

- Lack of access to central bank money or for the settlement of DLT-based transactions;
- Differences in timestamping, state synchronisation, and message formats;
- Limited integration with existing regulatory reporting frameworks (e.g. MiFIR), with potential future implications for EMIR or SFTR if derivatives or securities financing transactions are included for instance.

100. These factors hinder post-trade interoperability, affect data quality, and prevent effective consolidation of DLT and non-DLT books and records. As a result, DLT infrastructures currently operate in siloes, and settlement finality may be difficult to validate across system boundaries.

Preliminary assessment

101. While the structure of the Pilot Regime permits certain flexibility in compliance and interoperability, ESMA's assessment to date suggests that the risk of material regulatory arbitrage at the level of the overall system remains low. This is also due to the DLTPR requiring a set of additional and compensatory measures that are specific to the Pilot, precisely to ensure equivalent regulatory standards with the regular rulebook.

102. Nonetheless, ESMA will continue to monitor the impact of exemptions on competition, systemic integration, and user outcomes. Should DLT infrastructures expand significantly in scope, scale, or user base, the question of regulatory treatment and standard practice will need to be re-evaluated in view of maintaining a level playing field while encouraging innovation.

5 Impact assessment and recommendations

5.1 Costs and benefits of the Regime

Efficiency, liquidity, compliance, SME/startup access

103. Early evidence from authorised infrastructures and prospective applicants suggests that DLT can deliver significant operational efficiencies by reducing settlement times, enabling atomic delivery-versus-payment, and simplifying reconciliation. The automation of post-trade workflows via smart contracts may lower transaction costs over time and reduce dependency on fragmented legacy systems.

104. DLT infrastructures under the Pilot Regime aim to open new channels of access to capital markets. One authorised DLT MI (21X AG) and two applicants (Axiology and LISE/Kriptown) focus on facilitating direct listings and tokenised issuance for SMEs. These platforms propose simplified onboarding, direct investor participation, and reduced

administrative barriers — features that could support the Savings and Investment Union (SIU) objectives by easing SME financing constraints.

105. The use of DLT also supports compliance innovation. Immutable transaction records and programmable access controls can enable real-time auditability and enhance AML safeguards. In systems with direct investor access (such as 21X AG), identity verification can be embedded within onboarding flows, with wallet whitelisting linked to verified users. However, in intermediated models (such as Axiology), access is provided through brokers or custodians who perform KYC, and the DLT MI relies on those intermediaries to validate client identity. Applicants like Securitize and Axiology aim to encode compliance rules directly into smart contracts—enabling automatic enforcement of eligibility and transaction limits based on wallet permissions. These features could eventually reduce supervisory burdens and improve regulatory reporting if appropriately standardised.

Costs of implementation, barriers to scaling

106. While the benefits of DLT-based infrastructures are promising, deployment under the Pilot Regime has revealed substantial operational and financial challenges. The set-up costs for DLT systems are significant, particularly for new entrants unfamiliar with EU financial regulation. In particular, these costs include technology development, cybersecurity compliance, risk management infrastructure, and the legal structuring of tokenised instruments under national law.

107. A recurring challenge cited by multiple applicants is the absence of integrated, trusted mechanisms for cash settlement. Without access to central bank money settlement for DLT-based transactions, DLT platforms rely on less efficient substitutes, such as e-money tokens issued by EMIs or simulated cash ledgers. This introduces additional legal complexity and potential credit risk, particularly for institutional investors.

108. Scalability remains another critical barrier. Current infrastructures operate in isolated environments with limited user bases and low transaction volumes. The lack of live interoperability with CSDs, payment systems and existing trading venues hampers broader adoption. Furthermore, uncertainty around the regime's duration may be dissuading larger market actors from committing significant resources to Pilot-aligned projects, despite the reassurance provided by the European Commission in the response[22] to the ESMA letter[23] in 2024.

109. As a result, while the Pilot Regime facilitates valuable experimentation, most participating infrastructures remain in early development phases. Realising the full benefits of DLT in capital markets will likely require further harmonisation, increased legal certainty, and strategic public-private collaboration to address the persistent frictions limiting scale and integration.

[22] Letter from the European Commission on the DLT Pilot Regime Implementation
[23] ESMA75-117376770-460 Letter to EU Institutions on DLT Pilot Regime

5.2 Threshold and eligible assets review

Assessment of Article 3 and 5(8) thresholds

110. Under the DLT Pilot Regime, thresholds are imposed on the financial instruments that may be admitted to trading or recorded on DLT MIs as well as the settlement of payments using commercial bank money in DLT market infrastructures. Article 3 of DLTR caps equity instruments at a EUR 500 million in market capitalisation and debt instruments at a EUR 1 billion issue size. It also sets a global ceiling on the aggregate market value of any DLT financial instrument admitted to trading at EUR 6 billion. Separately, Article 5(8) allows credit institutions to settle in commercial bank money without applying requirements under Title IV of CSDR when they service DLT MIs whose DLT financial instruments do not exceed an aggregate market value at the time of the recording of EUR 6 billion. These thresholds were introduced to limit potential systemic risk during the experimentation phase of the regime.

111. However, feedback from NCAs, industry stakeholders, and market participants suggests that these thresholds are perceived as too restrictive. In practice, they exclude many large-cap issuers and well-established instruments, limiting the commercial viability and attractiveness of DLT infrastructures.

112. Stakeholders argue that raising the thresholds would allow for more meaningful participation by institutional actors, foster deeper secondary market liquidity, and increase the volume of eligible instruments, without compromising investor protection — provided that adequate safeguards and supervisory oversight are maintained.

113. These thresholds may inadvertently constrain the development of more diverse DLT models. Going forward, any revision of the thresholds should be carefully calibrated. A risk-adjusted or tiered threshold model, accompanied by robust compensatory measures (e.g. enhanced disclosure, real-time monitoring, operational stress testing), may provide a balanced path forward that promotes innovation without undermining financial stability.

114. Given the stakeholders' feedback, ESMA recommends to the European Commission to consider increasing the existing thresholds to encourage more market participation, particularly from large institutional investors and issuers.

Implications for systemic risk and DLT model variance

115. The current thresholds serve as a structural safeguard, aiming to contain systemic risk during the regime's initial deployment. Given the relatively small scale and early-stage operations of authorised infrastructures, the thresholds have effectively mitigated potential contagion risks in the event of technical failure or legal uncertainty.

116. However, as the technological maturity and operational robustness of DLT MIs increase, a more flexible approach may be warranted. For example, risk-based thresholds — which differentiate between instrument types or participant profiles — could enable higher-value issuances under stricter supervisory conditions.

Assessment of the scope of eligible assets – complex instruments

117. Recital 23 of DLTR explains that the limits on the scope of eligible instruments are in the regulation to protect retail investors by cross-referring to the analogous category of financial instruments subject to the "execution-only" regime under Article 25(3) and (4) of MiFID II. As such, ESMA and the NCAs have interpreted the scope to exclude complex instruments in line with ESMA's 2016 guidance.[24]

118. A Commission Q&A[25] clarified that NCAs are responsible for determining whether an instrument is eligible on a 'case-by-case' basis and taking into account supervisory practice related to the scope of execution-only instruments. Open questions remain on certain edge cases created by divergences in national implementations of MiFID II. For example, in some jurisdictions, shares that offer pre-emptive subscription rights may be considered eligible even if MiFID is silent on this type of instrument.

119. Regardless of the case-by-case ambiguities, DLT-MIs seeking to deploy trading and settlement services for more complex financial products that are ineligible under Article 3 of DLTPR— such as structured bonds, alternative investment funds (AIFs), or certain exchange-traded instruments — are currently unable to do so within the Pilot Regime in particular also for institutional investors which are eligible clients for such structured products under MiFID II. The current scope of eligible instruments was identified having in mind the protection of investors who can directly access DLT MIs. While this may narrow the experimentation landscape and limits insight into how DLT can support a broader range of financial use cases, any change to the scope of eligible instruments in the pilot regime (e.g., the inclusion of complex-instruments) should be implemented along with the application of all MiFID rules concerning the protection of retail investors. In other words, there should be no difference in the treatment of retail investors between the two regimes, but institutional investors should not face the same limitations as this would impose unnecessary constraints on innovation.

5.3 Overall assessment and strategic recommendations

ESMA's proposed way forward: short-term and long-term measures to promote the EU market for tokenised financial instruments

120. A range of short-term and long-term measures are available to policymakers to define the strategic objectives for the future of the Pilot Regime. Considerations include the types of entities the regime is intended to support, whether the current legal framework provides sufficient flexibility to accommodate innovation, and how best to signal to stakeholders that the EU is prepared to provide a pathway to transition from experimentation to full operation. In this context, temporal factors play a critical role: some reforms can be implemented relatively quickly to address immediate frictions in the market, while others require more substantial legislative changes and institutional coordination that can only be achieved over the longer term.

[24] European Securities and Markets Authority (ESMA). (2016). Guidelines on complex debt instruments and structured deposits (ESMA/2015/1787).
[25] European Securities and Markets Authority (ESMA), "Questions and Answers on the DLT Pilot Regime," Q&A No. 2127, published on August 22, 2024, available at: https://www.esma.europa.eu/publications-data/questions-answers/2127

121. It should also be noted that the measures under consideration here have not been subjected to a formal impact assessment by ESMA. At this early stage, the data needed to evaluate the operational, economic, or supervisory implications of different suggestions is limited due to the lack of evidence with which to assess the risks and effectiveness of the DLT Pilot Regime in its current implementation. Therefore, this analysis is intended to support policymakers in aligning near-term adjustments with longer-term goals, while recognising that further evidence and consultation will be required.[26]

Short-term measures

122. Reforming the Pilot Regime in the short-term should focus on enhancing its attractiveness to the market while maintaining the expectation that it remains a regime intended for experimentation—all while upholding investor protection. The objective of short-term reforms should be to encourage more financial market infrastructures to begin safely investing in DLT-based solutions by eliminating the risk involved in being an early adopter.

123. To send this signal to the market, the EU could start by codifying the DLT Pilot Regime permanently into law and removing the maximum six-year license duration for authorised DLT MIs. Removing the sunset clause and committing the Pilot Regime permanently into law would provide regulatory certainty and incentivise longer-term investment in DLT-based activities by market participants.

Introducing flexibility and proportionality through tiered and/or adjustable thresholds

124. Increasing the regulatory thresholds under the Pilot Regime would be another pragmatic step towards enabling more meaningful experimentation at scale. As it stands, the existing thresholds are often viewed by market participants—particularly larger or more established financial institutions—as too restrictive to justify commercial engagement. While the thresholds are a well-intentioned trade-off for the exemptions available in the Pilot Regime, raising them would allow DLT MIs to reach more customers and prove the economic viability of their investments. It would also unlock investment by contributing to greater liquidity and depth in markets for DLT financial instruments, ultimately benefiting end-users.

125. Raising the thresholds within reasonable limits may not be possible to calibrate in Level 1 on an ex-ante basis (as we've already seen with the current thresholds). To enable flexible thresholds, the EU should consider introducing tiered thresholds into the Pilot Regime, particularly for smaller entities such as startups or SMEs. Instead of rigid, one-size-fits-all thresholds, NCAs could be empowered to impose thresholds tailored to each entity's specific risk profile. Derogations from existing law could be granted based on a proportionality assessment and the specific characteristics of the business model.

126. A tiered model for thresholds would provide NCAs with the tools currently lacking in DLTR — namely, the discretion to calibrate requirements dynamically rather than relying

[26] The Commission as part of the SIU consultation has included a section on potential DLTR reforms under the post-trading topic: European Commission, Directorate-General for Financial Stability, Financial Services and Capital Markets Union. *Targeted Consultation on Integration of EU Capital Markets*. April 15, 2025. Link

on ex-ante legislative assumptions about the size of the market for DLT financial instruments. In the present regime, several potential applicants have cited this as the main deterrent to entering the regime. Differences in the level of operational risk between the models used by DLT MIs (i.e. those using private, permissioned DLT vs. those using public, permissionless DLT) illustrate why it would be more efficient to allow NCAs to apply regulatory thresholds on a sliding scale based on a case-by-case assessment of each project's risks. As is evident in the overview of the three authorised DLT MIs in the previous sections, there is a substantial difference in the business models eligible for the Pilot Regime. Allowing NCAs to tailor the thresholds based on their risk appetite—and change those thresholds on periodic intervals if the risks do not materialise—would allow the DLT MIs to scale their businesses in a stepwise approach while still adhering to the principle of same risk, same rules.

127. This concept takes inspiration from frameworks like the UK's Digital Securities Sandbox, which is the UK's comparable regime for DLT-based financial market infrastructures[27] and is jointly operated by the Bank of England and the Financial Conduct Authority. While the UK regulators have the power to disapply secondary legislation on a case-by-case basis with consideration for proportionality. Such a principles-based approach may be challenging to implement in the EU, where divergences among the 30 EEA financial regulators may lead to discrepancy in treatment of similar firms or business models.

128. Adjustable thresholds is one aspect of a principles-based approach, but policymakers may also consider examining the more prescriptive requirements applicable under the Pilot Regime, including those set out in technical standards or guidelines under the CSDR or MiFID frameworks, to understand if they constitute obstacles to the encouragement of new entrants and could be disapplied for entities that remain below, e.g., the current Pilot Regime thresholds.

129. In either case, to ensure legal certainty and compliance with EU institutional law, such derogations should only be granted within a framework that is clearly defined in EU legislation, and subject to appropriate checks and balances. In particular, it should be clarified that any derogations must either be pre-approved by an EU-level authority, such as ESMA, or only applied in strict accordance with guidance adopted at EU level to ensure consistency across Member States. For example, to maintain a degree of convergence between NCAs in how they apply the more flexible thresholds, ESMA or the Commission could be empowered to provide case-by-case assessments and common guidance, such as indicative parameters, to help NCAs define the threshold tiers or when to disapply a requirement (in a principles-based approach).

Enhancing investor protection and broadening scope of eligible assets

130. Regardless of the way in which it is done, increasing the regulatory thresholds should also prompt a reassessment of the rules for retail investor access under the Pilot Regime.

[27] Bank of England. "Digital Securities Sandbox." Bank of England, https://www.bankofengland.co.uk/financial-stability/digital-securities-sandbox.

131. At present, the exemption framework for retail participation lacks precision, leading to situations in which applicants (and NCAs) may develop own-initiative investor protection arrangements. This creates legal uncertainty about the enforceability of such ad-hoc arrangements, which reduces transparency and investor confidence. Harmonising these requirements would not only enhance supervisory convergence across Member States but also strengthen legal certainty for firms and regulators alike. If it becomes apparent that DLT MIs are unable to comply with MiFID investor protection obligations for retail clients, then the existing provisions permitting direct retail access should be reviewed and reconsidered. One way to avoid exposing retail investors to excessive risk, especially if the scope of eligible instruments were to be extended, is by placing conditions on access to products by investor type. Meaning, the introduction of complex products should be accompanied by clear segmentation between retail investors and more sophisticated institutional or professional investors, with the non-retail categories having access to more complex DLT instruments (perhaps under a risk-based regime).

132. Extending the scope of the Pilot Regime by adjusting the eligible assets under Article 3 would also introduce greater flexibility, thereby allowing a broader range of financial instruments—including complex or illiquid assets—to be traded and settled on DLT MIs. This approach could unlock new opportunities, particularly for the tokenisation of complex instruments such as structured products and bonds. These instruments often contain features well suited to automation via smart contracts. Expanding the scope of eligible assets may also support the creation of new marketplaces for asset classes that many investors have historically found access barriers to for regulatory or structural reasons. Tokenisation (and fractionalisation) could support greater liquidity in asset classes, such as AIFs (e.g. shares in funds representing real world assets) or private equity (because minimum ticket sizes in private equity tend to be cost-prohibitive for the average investor).

133. Extending the scope of the Pilot Regime would require a parallel strengthening of investor protection frameworks. While the current Pilot Regime allows direct access by retail investors under specific conditions (see Article 4(2) of the DLTR), this is exemption is currently limited to non-complex instruments. If the Pilot Regime were to accommodate more complex products, then the application of MiFID II conduct of business rules — and, where relevant, AIFMD rules — must be made explicit and unambiguous. Importantly, DLT as a technology does not change the underlying characteristics of an investment product in terms of risk, cost, or complexity. Therefore, existing investor protection requirements—including appropriateness and suitability assessments, disclosures, and other conduct of business obligations—should continue to apply to DLT infrastructures in a manner consistent with their traditional counterparts.

134. Any amendments to the thresholds in the Pilot Regime should first acknowledge that central bank money should continue to be the preferred settlement asset wherever practical and available. Settlement in commercial bank money and settlement in EMTs should be permitted without the requirement to comply with the prudential provisions of CSDR Title IV, as long as this activity is limited. Given the additional risks of EMTs, DLT MIs using EMT in their business models may be subjected to stricter thresholds. Here, the

ability to apply flexible thresholds based on risk appetite would also be a useful feature for NCAs in a revised Pilot Regime.

135. These short-term enhancements would address many of the practical constraints currently limiting uptake of the Pilot Regime, attracting a broader set of market participants to explore DLT-based models with the appropriate safeguards still in place. These measures would, in theory, give DLT MIs more time to experiment with their DLT-based business models and provide NCAs with a larger sample size from which to collect evidence about the strengths, weaknesses and risks associated with DLT in trading and settlement. ESMA and the Commission could use this evidence as the basis for recommendations about what shape a long-term commitment to DLT and tokenisation would take in the EU.

Long-term measures

136. Because the Pilot Regime was conceived as a temporary, experimental framework, it does not provide DLT MIs with any permanent option to continue operating once they've 'outgrown' the regime. This is because Article 7(7) of the DLTR requires DLT MIs that grow beyond the defined thresholds to wind down their activities—a counterproductive outcome for all stakeholders involved: issuers, operators, and investors.

Enabling continuity of operations and scaling within the Pilot Regime framework

137. One proposal for bringing a long-term outlook to the Pilot Regime is the removal of regulatory thresholds once a DLT MI reaches a pre-set level of activity. Removal of the thresholds should be approached with caution and only considered in circumstances in which adequate investor safeguards can be guaranteed by the operator. At the very least, any future revision of the Pilot Regime could empower NCAs (perhaps subject to a non-binding ESMA Opinion), to authorise continued operations beyond the initial thresholds—setting a new, higher limit—when the DLT MI demonstrates that it has mitigated the risks appropriately.

138. While removal of the thresholds would unlock further scale for DLT MIs, safeguards on the cash settlement leg may remain necessary, particularly where central bank money is not available. As such, ESMA would recommend that the use of private money (e.g., commercial bank money or EMTs) should remain subject to thresholds or risk-based limits until central bank solutions are operational[28]. More broadly, other financial stability safeguards should also continue to play an important role, including requirements on business continuity and operational resilience, supervisory reporting, and exit or wind-down plans. DLT MIs that provide custody for client assets, or whose business models involve participants who perform custody services, should have clear operational continuity and exit plans to ensure investor protection and financial stability in stress scenarios.

Establishing a pathway toward a permanent DLT regulatory framework – beyond the Pilot Regime

[28] The ECB has not yet announced a timeline for the availability of DLT-based settlement solutions linking to Target2. European Central Bank. 2025. "Eurosystem Expands Initiative to Settle DLT-Based Transactions in Central Bank Money." February 20, 2025. https://www.ecb.europa.eu/press/pr/date/2025/html/ecb.pr250220_1~ce3286f97b.en.html.

139. A more pragmatic alternative to removing the thresholds for DLT MIs would involve a transformation of the EU's regulatory approach to DLT, with the goal of promoting its use in mainstream financial applications. In this case, DLT MIs would be allowed to graduate through an established pathway into a permanent regime outside the confines of the Pilot Regime testing environment. A full regulatory license would enable those successful DLT MIs to continue providing services in a stable regulatory environment, incentivising them to invest in the long-term. To accommodate this proposal, EU lawmakers could consider embedding DLT-specific provisions into existing sectoral frameworks where deemed necessary and with due consideration to the principles of tech neutrality and same risk, same rules. Doing so would eliminate the current reliance on exemptions and compensatory measures and signals the EU's willingness to commit to integrating DLT into the mainstream financial infrastructure of the bloc.

140. It is not clear yet whether amending the existing sectoral frameworks would be the most efficient way to accommodate DLT MIs or if making the DLT Pilot a permanent regime for DLT MIs would be the ideal solution. Looking at the exemptions available under the current Pilot Regime would be a good place to start identifying those requirements that would be necessary to adjust in the relevant sectoral legal frameworks in order to enable the use of DLT by market infrastructures. With that said, any changes to the existing EU regulatory framework for market infrastructures or a dedicated regime to accommodate DLT MIs should recognise the novel features of the associated technology and business models without altering existing rules for traditional market infrastructures. By keeping the two categories of entities distinct, EU lawmakers can more easily address the challenges associated with 'retrofitting' existing regulations for traditional market infrastructures to accommodate DLT and ensure that the distinctive features of DLT—such as specific operational risk issues and issues around settlement finality—are properly considered.

Clarifying the regulatory treatment of DLT TSS entities

141. The Pilot Regime also recognises that DLT creates demand for a novel type of market infrastructure: the DLT TSS, which combines trading and settlement in one entity. Although this combination of services appears legally possible in the traditional context under CSDR, any revision of CSDR to accommodate DLT-based systems should provide clarity around this concept[29]. Further, the DLT TSS offers the possibility of atomic settlement. EU lawmakers could consider introducing a new regulatory category with functional requirements focused on outcomes such as risk controls, access rights, and settlement finality, rather than on traditional role-based distinctions. The emphasis on functional requirements is important here because the models that enable instantaneous execution and settlement without an intermediary may require different safeguards from those models that separate trading and settlement processes or make use of DLT in one or both of the services without using the atomic settlement capabilities of DLT.

[29] Under CSDR, providing trading and settlement services through a single legal entity appears possible. See: Art 17(5).